

SECTION 260500

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 STIPULATIONS

- A. The specification sections “General Conditions of the Construction Contract”, “Special Conditions”, and “Division 1- General Requirements” form a part of this section by this reference thereto, and shall have the same force and effect as if printed herewith in full.
- B. Contractor: “Contractor”, “this Contractor” or “Electrical Contractor” when used in Divisions 26, 27, and 28 Specification Sections refers to the Contractor responsible for all work under this section.
- C. Sub-Contractor: Any reference to, or letting of work contained in these specifications to any Sub-Contractor or Manufacture does not relieve this Contractor for all work, material and equipment in these specifications.
- D. All references made to any item in the singular number shall apply to as many identical items that the work may require.
- E. Where applicable, all materials and equipment shall bear the label of the Underwriters Laboratory, Inc., or other nationally recognized testing laboratory and shall be used and/or installed in accordance with any instructions included with the listing or labeling.
- F. The sizes of conductors and thickness of metals shown on the drawings or mentioned herein shall be understood to be American Wire Gauge.
- G. All materials shall be made from steel manufactured in America and certification shall be submitted.
- H. All materials shall be “BAA” and “BABA” compliant (Buy American Act and Build America Buy America).
- I. Any reference made to the “Engineer” in these specifications shall refer to the Personnel of the Engineering Design Division of the Department of General Services.
- J. Any reference made to the “Department” in these specifications shall refer to the Personnel of the Department of General Services.
- K. Any reference made to the “Using Agency” in these specifications shall refer to the Personnel of the Department of Military & Veteran’s Affairs.

1.2 SUMMARY

- A. This Section applies to all Divisions 26, 27 and 28 Sections and includes the following:
 - 1. General Provisions:
 - a. Definitions.

- b. Intent.
 - c. Work Included.
 - d. Responsibility of Bidders.
 - e. Quality Assurance.
 - f. Submittals.
 - g. Substitutions.
 - h. Guarantees.
 - i. Regulations.
 - j. Standards and References.
 - k. Permits and Inspections.
 - l. Project/Site Conditions.
 - m. Delivery, Storage and Handling.
 - n. Protection of Services and Equipment.
 - o. Sequencing, Scheduling and Coordination.
 - p. Type of Service.
 - q. Incoming Electric Service Facilities.
 - r. Interruption of Services.
 - s. Temporary Electrical Service.
 - t. Hazardous Materials.
 - u. Operating and Maintenance Manuals.
 - v. Record Drawings.
 - w. Electrical/Mechanical Sound Control.
 - x. Final Acceptance.
 - y. Using Agency Instruction.
2. Products:
- a. Vibration Isolators.
 - b. Access Panels.
 - c. Concrete Work.

- d. Painting.
 - e. Touchup Paint.
3. Execution:
- a. General Installation.
 - b. Electrical Equipment Installation.
 - c. Demolition.
 - d. Existing Panelboards.
 - e. Existing Wiring.
 - f. Equipment Connection.
 - g. Splices.
 - h. Terminals and Connectors.
 - i. Balancing.
 - j. Excavation and Backfilling.
 - k. Field Quality Control.
 - l. Core Drilling.
 - m. Cutting and Patching.
 - n. Cleaning.
 - o. Refinishing and Touchup Painting.
 - p. Mounting Heights.

1.3 DEFINITIONS

- A. Provide: The term “provide”, as used in these specifications and on the drawings, shall be understood to mean “the Contractor shall furnish and install, complete and operational, with all required hardware, accessories and appurtenances.” Unless indicated otherwise, this shall also include all associated power and/or signal wiring required for electrical systems furnished under this Contract.
- B. Concealed: Where the word “concealed” is used in conjunction with raceways, equipment and the like, the word is understood to mean hidden from sight as in chases, furred spaces or suspended ceilings.
- C. Exposed: Where the word “exposed” is used in conjunction with raceways, equipment and the like, the word is understood to mean open to view.
- D. Approved Equal: Where the phrase “or approved equal,” “or equal,” or “approved” appears, it shall refer to the approval of the Engineer on the materials or equipment involved.

1.4 INTENT

- A. Provide complete and fully operational electrical systems with facilities and services to meet all of the requirements described herein and in complete accordance with all applicable codes and ordinances.
 - 1. The manufacturer's recommendations for the particular equipment or system, the National Electrical Code and the Engineer shall determine what is the complete and proper installation and proper operation. The Engineer shall make the final determination.
- B. The drawings are diagrammatic and approximately to scale, unless noted otherwise. They establish scope, material and quality and are not detailed installation instructions.
- C. The Contractor shall be held responsible for proper installation of materials and equipment to true intent and meaning of both Drawings and Specifications.
- D. In cases of discrepancies between the drawings and the specifications, the Engineer will make the final determination. In cases where items appear in the specifications but not on the drawings, or appear on the drawings but not in the specifications they shall be considered as noted on both. Unless written clarification in the form of an addendum is received, the bid shall be interpreted to include the most expensive installation, equipment or work and all associated costs.
- E. The Engineer reserves the right of interpretation of the specifications and drawings. The Engineer's decisions of specification and drawing interpretations shall be final.

1.5 WORK INCLUDED

- A. Refer to Division 1, General Requirements, specification section 01010, Summary of Work for details of work included in project.

1.6 RESPONSIBILITY OF BIDDERS

- A. Examine all contract documents issued. Visit the site and become thoroughly acquainted with the existing conditions prior to submitting a bid. The submission of a bid shall be considered as evidence that a site visit was conducted; no extra compensation will be allowed for any error resulting from failure to visit job site. Prior to submitting a proposal, bidders must familiarize themselves with the codes, rules, and regulations in effect at the site of the work, to determine existing conditions that affect their installation.
- B. Carefully examine the Architectural, Structural, Heating, Ventilating, Air Conditioning, Plumbing, Fire Protection, and/or Miscellaneous Contract Drawings and Specifications. If any discrepancies occur between the drawings or between the drawings and specifications, report such discrepancies to the Engineer in writing and obtain written instructions as to the manner in which to proceed. Do not make departures from the Contract Drawings without prior written approval of the Engineer.
- C. Execute all work, construct and install all equipment in accordance with the current requirements of all Occupational Safety and Health Administration (OSHA), National Fire Protection Association (NFPA), the National Electrical Code (NEC) as amended to date L&I has adopted, Underwriters Laboratories (UL), National Electrical Manufacturers Association (NEMA), insurance underwriters of the Using Agency and/or other authorities having jurisdiction over premises, public utilities which have connection with any systems specified, and all Federal, State, County and Local ordinances and regulations. Nothing contained in these specifications or shown on the drawings shall be construed to conflict with the aforesaid codes, ordinances, or regulations. Contractor shall be held responsible for accident to persons,

material or property caused by failure to adhere to the proper code requirements until the Department has accepted work.

- D. The Contractor shall be qualified or licensed to perform the types of work involved under this Division of the Specifications, in the state, county and/or municipality of this project as required.
- E. Wherever any installation, product, equipment item, etc. specified herein is not permitted to be handled or installed, or is otherwise restricted by union regulations, etc., notify the Department in writing before submitting a bid, in ample time for modifications in the requirements to be made. If such notification is not given, this Contractor shall be responsible to complete the installation as specified, to the Department's satisfaction, and at no additional cost.

1.7 QUALITY ASSURANCE

A. Products Criteria:

- 1. Standard Products: Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products for at least three years. See applicable specification sections for any additional requirements.
- 2. Equipment Service: Products shall be supported by a service organization that maintains a complete inventory of repair parts and is located reasonably close to the site.
- 3. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.
- 4. Assembled Units: Manufacturers of equipment assemblies, which use components made by others, assume complete responsibility for the final assembled product.
- 5. Nameplates: Nameplates bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped or otherwise permanently marked on each item of equipment.

- B. Manufacturer's Recommendations: Install materials in accordance with manufacturer's recommendations.

1.8 SUBMITTALS

A. General Requirements Applicable to all Divisions 26, 27 and 28 Sections:

- 1. Submit in accordance with Division 1, General Conditions, Section 01300 and the following:
 - a. Prior to ordering equipment, submit to the Engineer a complete list of proposed equipment and materials, giving the name and address of manufacturer and, when required for proper identification, trade names or catalog numbers. Itemize each type of material and each piece of equipment (omitting duplicates).
 - b. Submit shop drawings and product data grouped to include complete submittals of related systems, products and accessories in a single submittal. Produce shop drawings to indicate fabrication details and proposed layouts for shop or field fabrications as named herein.

- c. Mark dimensions and values in units to match those specified. Include contract drawing identification, type, quantities, capacities, accessories, rough-in dimensions, manufacturer's name, model number, connection sizes, wiring diagrams, installation instructions, motor horsepower, voltage, phase and amperage, colors, finishes and other pertinent data.
- d. The submissions are the contractor's documents; the Engineer's approval constitutes an acknowledgment that the documents have been submitted and nothing more. It is the contractor's responsibility to check his own submissions for compliance with the Contract Documents, job conditions, and coordination with the work and equipment of the other trades.
- e. Certify, by submittal, that the materials or equipment proposed are satisfactory for the intended application, and that the materials or equipment are in current production with no known plans to cease manufacture.
- f. Submittals processed by the Engineer do not constitute change orders. The purpose of the submittal process is to demonstrate the Contractor's understanding of the design concept; the Contractor demonstrates this understanding by indicating which equipment and materials he intends to provide, and the fabrication and installation methods that he intends to use.
- g. If deviations, discrepancies or conflicts between shop drawing submittals and the contract documents (in the form of design drawings, specifications and addenda) are discovered, either prior to or after shop drawing submittals are processed by the Engineer, the contract documents shall control and shall be followed.
- h. All submittals shall bear the Contractor's approval stamp as evidence that he has checked the drawings. Any submittals without this stamp of approval will not be evaluated and will be returned to the Contractor for proper resubmission. Material and equipment reviews by the Engineer are only for general conformance to the design intent of the project and compliance with information given in the contract documents. Dimensions shall be confirmed and correlated at the job site by the installing Contractor and installation shall be coordinated with other trades.
- i. Coordination composite drawings among the HVAC, Plumbing, Fire Protection, Electrical and Ceiling Contractors are required, with the lead role assigned by the Department. The Lead Contractor shall conduct coordination meetings with all other trades to discuss and resolve interference problems. Once each trade Contractor has initialed the coordination drawings to indicate approval, the Lead Contractor shall submit the drawings to the Engineer for review. The other trade Contractors should finalize their shop drawings in accordance with the coordination drawings, and submit for Engineer's review.
- j. Submit samples of materials for approval at the site as requested by the Engineer. Such materials may be incorporated into the project after approval and serving their purpose as samples.

1.9 SUBSTITUTIONS

- A. Submit substitution proposals in accordance with provisions of Division 1, General Conditions and the following:
- B. Throughout the specifications, types of materials may be specified by manufacturer's name and catalog number in order to establish standards of quality and performance and not for the purpose of limiting competition. Unless specifically stated otherwise, assume the phrase "or approved equal", except that the burden is upon the Contractor to prove such equality. If the Contractor elects to prove such equality, he

shall request, in writing, review of the substitution by the Department in accordance with all Supplementary Conditions and/or Division 1 requirements. All such requests shall include manufacturer's literature, specifications, drawings, catalog cuts, performance data or other references or information necessary to completely describe the item. The Contractor shall be responsible for all structural, mechanical, and electrical changes required for their installation, at no additional cost to the Department.

- C. A substitution request constitutes a representation that the Contractor:
 - 1. Has investigated the proposed product and determined that it meets or exceeds the quality level of the originally specified product.
 - 2. Will provide the same or greater warranty than the originally specified product.
 - 3. Will coordinate the installation and make changes to all other work including coordination and compensation to other trades that may be required for the substituted product to be installed with no additional cost to the Department.
 - 4. Waive claims for additional costs or time extensions, which may subsequently become apparent.
- D. When this contractor desires to furnish equipment of a manufacturer other than that specified or intended, he shall include a complete specification of the substituted item, along with each submission copy of shop drawings, indicating the necessary modifications to the substituted product to satisfy the requirements of the contract specifications. Manufacturer's specifications shall be written as close as possible over the contract specifications so that an accurate comparison can be made.
- E. The verification specification shall include the exact wording of the contract specification and the revised wording, identified properly, indicating all the deviations proposed. If no deviations are noted, the contractor shall furnish the material or equipment in accordance with the contract specifications.
- F. Substitutions will be considered when a product becomes unavailable through no fault of the Contractor.
- G. Also, when the contractor submits equipment or materials of the manufacturers specified, verification specifications must be submitted at the request of the Engineer.
- H. In cases where specific manufacturers are listed, the Engineer reserves the right to consider alternate manufacturers.
- I. The Engineer reserves the right of final acceptance of substitutions.

1.10 GUARANTEES

- A. Submit equipment warranties in accordance with provisions of Division 1, General Conditions and the following:
- B. Guarantee all equipment, materials, and workmanship for a minimum of one year following date of acceptance of the project. Provide additional/special warranties where called for in the technical specifications.
- C. Warranty shall be in writing and shall include written copies of factory warranties with expiration dates on items of equipment where warranty date might differ from the acceptance date. No warranty shall start before date of acceptance in writing by the Department. Repair or replace any defective work developing during this period, at no additional cost. Where defective electrical work results in damage to

work of other contracts, this contractor shall be responsible to repair and/or restore such work to its original condition, again at no additional cost to the Department.

- D. The equipment and materials manufacturers are expected to recognize that they are responsible for the failure of their products to perform in accordance with data furnished by them or their authorized representatives, as well as misrepresentations of such data. If the products have been installed in accordance with the manufacturers published or written instructions and recommendations, and such products fail, then the Contractor and the manufacturers are responsible for replacement of the products and all associated work and materials, at no cost to the Department.

1.11 REGULATIONS

- A. All electrical work, equipment and material furnished or installed under this contract shall conform to requirements of the latest codes and any other Governmental or Local Authorities having jurisdiction and of all rules and regulations of Utilities involved. Nothing mentioned in the specifications or indicated on the drawings shall be construed to conflict with mentioned codes, ordinances and regulations. The following codes shall be followed:

1. Pennsylvania Uniform Construction Code (UCC)
2. National Electrical Code (NFPA 70)
3. National Electrical Safety Code (NESC-ANSI-C2)
4. Life Safety Code (NFPA 101)
5. National Fire Alarm Code (NFPA 72-2008)
6. International Code Council Series (ICC-2009)
7. Pennsylvania Department of Environmental Protection (DEP)
8. Pennsylvania Department of Labor and Industry (L&I)
9. Americans with Disabilities Act (ADA)
10. Occupational Safety & Health Agency (OSHA)
11. Applicable utility company rules and regulations.
12. Applicable Federal, State, and Local (or any other authority having jurisdiction) laws, rules and regulations.

1.12 STANDARDS AND REFERENCES

- A. Products of workmanship that are specified by association, trade, or federal standards shall comply with the requirements of the following reference standards, except when more rigid requirements are specified or are required by applicable code:
1. American National Standard Institute (ANSI)
 2. American Society for Testing and Materials (ASTM)
 3. Factory Mutual System (FM)

4. Institute of Electrical and Electronics Engineers (IEEE)
5. Illuminating Engineering Society of North America (IESNA), Lighting Standards and Recommended Practices
6. National Electrical Manufacturers Association (NEMA)
7. National Fire Protection Association (NFPA)
8. Underwriters Laboratories, Inc. (UL)
9. Updated Standards: At the request of the Engineer, Contractor or governing authority, submit a change order proposal where an applicable industry code or standard has been revised and reissued after the date of contract documents and before performance of the work affected. The Engineer will decide whether to issue a change order to proceed with the updated standard.

1.13 PERMITS AND INSPECTIONS

- A. Refer to Division 1 – General Requirements.

1.14 PROJECT/SITE CONDITIONS

- A. Refer to Division 1 - General Requirements.
- B. Install work in locations shown on the drawings, unless prevented by project conditions
- C. Prepare drawings showing proposed rearrangement of work to meet project conditions, including changes to work specified in other sections. Obtain permission of the Engineer before proceeding.
- D. Perform all minor cutting and patching, and make all changes, relocations and installations with a minimum of noise. All present and new equipment, floors, walls, etc., shall be adequately protected from dust and dirt caused by the work. Protection shall include suitable temporary barriers or coverings. Maintain exterior and interior premises of the building as clean as possible during construction. At no time shall the Contractor interfere with the normal operation of the building by allowing debris, excess earth, etc., to remain on the premises.

1.15 DELIVERY, STORAGE AND HANDLING

- A. Refer to Division 1 - General Requirements.
- B. Deliver materials and equipment to the project site in a clean condition with openings plugged or capped (or otherwise sealed by packaging) both during shipping and during temporary storage. Deliveries shall be scheduled to minimize the amount of time in temporary storage.
- C. Delivered equipment crating and/or packaging shall clearly identify pick points or lifting points. In the absence of crating or packaging, pick points or lifting points must be identified on the equipment.
- D. When unloading material and equipment, provide special lifting harness or apparatus as required by the manufacturer. Handle materials and equipment in accordance with manufacturer's written instructions.

- E. Determine the required equipment needed for unloading operations and have such equipment on site to perform unloading work on the date of equipment delivery.
- F. Store materials on site only where directed by the Department. Materials and equipment, both on site and off site, shall be stored in accordance with manufacturers written instructions. Store all materials in dry locations, off ground and keep moisture free at all times.
- G. The Contractor shall protect at his own expense, his work, materials, and equipment during construction. Units and devices, both before and after being set in place, shall be securely protected from carelessly or maliciously dropped tools, materials, grit, dirt or any foreign matter. Contractor shall be held responsible for damage so done until work is fully and finally accepted.
- H. The Contractor shall be entirely responsible for all apparatus, equipment and appurtenances furnished by him or his subcontractors in connection with the work, and special care shall be taken to protect all parts thereof in such manner as may be necessary or as may be directed. Protection shall include covers, crating, sheds or other means to prevent dirt, grit, plaster, or other foreign substances from entering the working parts of machinery or equipment. Where equipment must be stored outside the building, it shall be totally covered and secured with heavy, waterproof tarps and kept dry at all times. Where equipment has been subjected to moisture, it shall be suitably dried out before placed in service. Materials and equipment shall be stored in areas designated by the Department.
- I. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products and equipment to assure that they are being maintained under specified conditions, and free from damage or deterioration.

1.16 PROTECTION OF SERVICES AND EQUIPMENT

- A. This Contractor shall, at his own expense, repair, replace and maintain in service any utilities, facilities or service (underground, overhead, interior or exterior) damaged, broken, or otherwise rendered inoperative during the course of construction by him or his representatives. The method used by this Contractor in repairing, replacing or maintaining the services shall be approved by the Department.

1.17 SEQUENCING, SCHEDULING AND COORDINATION

- A. Refer to Division 1 - General Requirements.
- B. 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.
- C. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces.
- D. 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.
- E. Interference:
 - 1. The drawings are generally diagrammatic and indicative of the work. The Contractor is responsible for modifying the work with offsets, bends, or other fittings to avoid minor

interference's and structural obstructions. Perform such modifications at no increase in cost to the Department.

2. In the event that interferences develop, the Engineer's decision will be final and no additional compensation will be allowed for relocation of electrical equipment.

F. Contract Interface:

1. Work performed in cooperation with other contracts: The responsibility for performing work of this contract in cooperation with work of other contracts rests solely with this Contractor.
 - a. Make connections of electrical systems specified in the various sections of this contract to those systems or installations of other contracts requiring such connections.
 - b. These connections are generally indicated as contract breaks on the drawings.

1.18 TYPE OF SERVICE

- A. Existing Electric Service shall remain: - 208/120V-3 phase, 4 wire , 225A, 60 HZ, alternating current (up to CT cabinet).

1.19 INCOMING ELECTRIC SERVICE FACILITIES

- A. Provide all electrical facilities as shown on the drawings, hereinafter specified or as required for maintaining the existing electric service entrance during construction.

1.20 INTERRUPTION OF SERVICES

- A. Refer to General Conditions of the Contract.
- B. At beginning of the project, review the procedures of the Using Agency relating to utility interruptions and plan the electrical work accordingly. Develop a preliminary utility interruption schedule and submit to the Using Agency for approval before developing final project schedules.
- C. Schedule the work to avoid major interruptions of any utility services. Interruption of services shall be done during overtime if necessary at no additional cost to the Department.
- D. Notify the Using Agency in writing a minimum of five working days prior to any interruption of services.

1.21 TEMPORARY ELECTRICAL SYSTEMS

- A. Refer to Division 1 - General Requirements.

1.22 HAZARDOUS MATERIALS

- A. Should hazardous or toxic materials be encountered in any existing work, the Contractor shall notify the Department.

1.23 OPERATING AND MAINTENANCE MANUALS

- A. Submit under provisions of Division 1 and in accordance with the following:
- B. Provide heavy-duty catalogue binders with appropriate labeling.
- C. Binder shall be indexed by material and/or system type and at a minimum shall include:
 - 1. Title page with clear plastic protection cover.
 - 2. List of Drawings.
 - 3. Description of Systems: Provide complete and detailed description of systems.
 - 4. Operating Division: Provide complete and detailed operation of major components.
 - 5. Maintenance Division: Provide preventative maintenance schedule for major components.
 - 6. List of Equipment Suppliers and Contractors: Provide list of equipment suppliers and contractors, including address and telephone number.
 - 7. Certification: Include copy of tests performed on insulation, grounding, continuity, phase balancing and signal systems; electrical equipment tag identification and wiring color code; inspection approval certificates for electrical systems and operational tests on applicable electrical equipment.
 - 8. Shop Drawings and Maintenance Bulletins: Provide materials received in compliance with clause 'Shop Drawings', arrange alphabetically.
- D. Divider Tabs: Laminated Mylar plastic and colored according to Section.
- E. Submit documents for approval prior to being turned over to the Using Agency.

1.24 RECORD DRAWINGS

- A. Submit under the provisions of Division 1 and in accordance with the following:
- B. Keep on site at all times an extra set of drawings and specifications recording changes and deviations from contract documents including all addendum, bulletin and request for information data. Documents shall be updated on a daily basis. This set of documents shall be used specifically for this purpose.
- C. The record drawings shall accurately reflect the as-built conditions at the time of the project completion.
- D. Record drawings shall be presented with maintenance manuals to the Department at the time of final acceptance of the project.

1.25 ELECTRICAL/MECHANICAL SOUND CONTROL

- A. All equipment shall operate without objectionable noise or vibration within Noise Criteria Curves listed in Sound Control Fundamentals of the latest edition of the ASHRAE Handbook of Fundamentals. Sound and vibration measurements shall conform to the ASHRAE Handbook of Fundamentals. If such objectionable noise or vibration shall be produced and transmitted to occupied portions of the building by electrical/mechanical equipment (i.e. generators, transformers, etc.) or other parts of this work, any

necessary changes, as approved shall be made without additional cost to the Department. Noise levels shall conform to the requirements of OSHA.

- B. Any and all other insulation or isolation required to accomplish results specified above shall be furnished and installed without additional cost to the Department.
- C. Isolation systems shall be installed in strict accordance with the manufacturer's written instructions and submittal data. Locations of all vibration isolation products shall be selected for ease of inspection and adjustment, as well as for proper operation.
- D. No rigid connections between equipment and building structure shall be made that degrades the noise and vibration isolation system herein specified. Electrical conduit connections to isolated equipment shall be looped to allow free motion of isolated equipment.

1.26 FINAL ACCEPTANCE

- A. Refer to Division 1 - General Requirements.
- B. When the installation is reported in writing by the contractor to be complete and ready for acceptance, an inspection shall be made by the Contractor in the presence of the Department to ascertain whether it complies with the contract documents. If in the opinion of the Department it fails to do so, the Contractor shall at once remedy all defects and shortcomings. Any additional tests that may be required shall be entirely at the Contractor's expense. All of the testing work shall be done when and as directed by the Department.

1.27 USING AGENCY INSTRUCTION

- A. The Contractor shall furnish the services of qualified personnel, approved by the Engineer and thoroughly familiar with the completed installation, to instruct the permanent operating personnel of the Using Agency in the proper operation of all systems included under this contract, and the proper care of all equipment and apparatus. These services shall be furnished for a period of one 8-hour day, after the operation of the systems has been taken over by the Using Agency.
- B. When instructions are provided under this contract, the Contractor shall have in his possession three copies of an identifying letter which shall list the names of the Contractor's qualified instruction personnel, including manufacturers' representatives and subcontractors that will be giving the instructions. Likewise, on this same letter, spaces shall be provided for the personnel of the Using Agency who will receive the instructions. After instructions have been given and received for each system, the Contractor's representatives and subcontractors shall sign and date the letter, and the Using Agency personnel attending shall sign and date the letter acknowledging that they have received adequate instructions for operating and maintaining the systems and equipment. One signed copy shall be delivered to the Using Agency, one copy to the Department and one copy shall be retained by the Contractor.
- C. In addition to the verbal instructions outlined above, the Contractor and his manufacturers' representatives and subcontractors shall furnish written basic instructions indicating the proper operation of each system and associated equipment. Each manufacturer shall also submit a brochure on his equipment, including instructions on operation, recommended spare parts, and instructions on preventative, routine and breakdown maintenance.
- D. The Contractor shall combine the written instructions and the manufacturers' equipment brochures in complete volumes with hardback binders which shall be turned over to the Using Agency before final acceptance of the contract work. The Contractor shall obtain two copies of a signed receipt from the

Using Agency for the written instructions and equipment brochures. One copy of the receipt shall be delivered to the Engineer and one copy retained by the Contractor.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS

A. Neoprene Isolation Pads:

1. Neoprene isolation pads shall be single rib or crossed, double rib neoprene in shear pads, in combination with steel shims when required, having minimum static deflections as tabulated. All neoprene pads shall be true neoprene in-shear using alternately higher and lower ribs to provide effective vibration isolation, and shall be molded using 2500 psi tensile strength, oil resistant, compounds with no color additives. Pads shall be 45 or 65 durometer and designed to permit 60 to 120 psi loading, respectively, at maximum rated deflections. Neoprene in-shear isolation pads shall be provided to meet tabulated minimum operating static deflections without exceeding published maximum static deflections. Use single or, crossed, double rib or laminated composites of both as required. When two pads of ribbed material are laminated, they shall be separated by, and bonded to, a galvanized steel shim plate.

2.2 ACCESS PANELS

- A. Furnish factory-fabricated access panels for access to all concealed pull boxes, junction boxes, capped conduits and other electrical equipment where no other means of access is available. Access panels for electrical work, along with all required auxiliary or supporting steel, hardware, etc., shall be furnished by the electrical contractor to the general contractor, who shall install them. Access panels are not required at lift-out removable tile ceilings.
- B. Access panels shall be of appropriate size but not less than 16" x 12". Panels shall be all steel construction with a #16 gauge wall or ceiling frame and a #14 gauge panel door. Doors shall be provided with concealed hinges and cylinder lock except doors for wall panels which may be secured with suitable clips and countersunk screws. Outside of access panels shall be finished flush with finished walls or ceilings surfaces and shall be prime painted.
- C. At locations where access panels are installed in fire-rated ceilings, access panels shall contain the 1-1/2" hour fire-rated "B" label, and, in addition, shall also be provided with layers of gypsum wallboard in a thickness which will supply an additional one-hour fire rating. Consider all ceiling access panels required in gypsum board or plaster ceilings to be 1 hour rated unless otherwise noted on the Architectural drawings.
- D. Determine the exact locations and sizes of required access panels and coordinate same with the Department. Access panels shall not be installed without prior approval of the Department. All panels shall be installed and located to present a neat and symmetrical appearance.
- E. Junction boxes, capped conduits and other electrical equipment above removable tile ceilings or above panels shall be suitably identified by small, inconspicuous adhesive-backed labels attached to the ceiling surface or the surface of the access panel. Labels shall be additionally secured with screws or rivets. Labels shall be white with 3/8" high black letter and shall be a manufactured item for that purpose.

2.3 CONCRETE WORK

- A. Refer to Division 3 – Cast-In-Place Concrete.
- B. This Contractor shall provide all concrete for equipment foundations, duct-banks and patching as specified or otherwise required for completion of work.
 - 1. Concrete for equipment foundations and pole bases shall be Pennsylvania Department of Transportation, Class A, rated 4000 pounds/square inch at twenty-eight (28) days. Equipment foundations shall be properly dwelled in with floor construction, and shall have slopped bevels on all horizontal and vertical edges. Foundations shall be 4" high, unless otherwise indicated. Foundations shall be reinforced with 6"x 6" #10 gauge wire mesh and anchored through floor construction with ¾" diameter bolts or rods. Anchor bolts for equipment shall be placed in foundations before equipment is set. Foundations shall be of sufficient size for equipment and shall extend a minimum of 4" beyond equipment on all sides.
 - 2. Concrete for conduit encasement shall be Pennsylvania Department of Transportation Class A, rated 3,300 pounds/square inch at twenty-eight (28) days.
 - 3. All concrete shall be obtained from an approved source. Concrete testing is not a requirement, however, batch slips shall be given to the inspector for checking.
 - 4. All concrete shall be 6% air entrained and the slump of concrete shall not exceed three inches. All concrete shall be thoroughly compacted by the use of mechanical vibrators.
 - 5. All work associated with the handling, placing of reinforcing steel and curing shall be done according to the recommendations of the American Concrete Institute and Concrete Reinforcing Steel Institute, and all materials shall conform to the American Society for Testing Materials Specifications, applicable to this work.
 - 6. To insure adequate curing, do not remove forms from vertical surfaces for five (5) days after casting unless other approved means are taken to prevent premature drying of concrete. Keep all horizontal surfaces continuously wet for seven (7) days with mechanical sprinklers or coat with an impervious sealer, applied in atomized form at a rate of not less than one (1) gallon per two hundred square feet after surface water has entirely disappeared, but while surfaces are still moist. This compound shall form an effective seal which will prevent evaporation of moisture from concrete for the full curing period, and shall be used in strict accordance with the manufactures published recommendations.
 - 7. Provide adequate equipment for heating the concrete and protecting the concrete during freezing or near freezing weather. All concrete materials, reinforcement, forms and ground with which the concrete will come in contact shall be free of frost.
 - 8. After the first frost and until the mean daily temperature at the site falls below 40 degrees for more than one (1) day, protect concrete from freezing for not less than the first forty-eight (48) hours after it is placed. When the mean temperature falls below 40 degrees for more than one (1) day, place concrete thereafter at a temperature not lower than 55 degrees and not higher than 70 degrees, and maintained not lower than 55 degrees for at least the first three (3) days. During the next three (3) days protect from freezing. When the mean daily temperatures rise above 40 degrees for more than three (3) successive days, placement and maintenance of concrete for three (3) days at or above required minimum temperatures may be discontinued, but concrete should not be exposed to freezing temperatures for at least forty-eight (48) hours after placing.

2.4 PAINTING

- A. This Contractor shall paint all exposed raceways, hangers, junction boxes, etc., that this Contractor installs in finished areas. Finished areas shall be those areas where the surfaces are plastered, glazed tile, painted block, etc. This Contractor is not responsible for any other painting except as otherwise noted.
- B. Where the Contractor is the only Contractor working in a specified area, he shall be responsible for painting equipment and related raceway, if classified a finished area.

2.5 TOUCH-UP PAINT

- A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.
- B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.
- C. Panelboard trims and doors, safety switch and circuit breaker enclosures, and items of similar nature shall be baked enamel finished at the place of manufacture. Damage to the factory finish due to shipment or installation shall be "touched-up" by this Contractor with factory supplied paint

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

- A. All work shall be installed in a neat and workmanlike manner by craftsmen experienced in the trade involved and shall be acceptable to the Department. All details of installation shall be mechanically and electrically correct. All materials and equipment shall be new, and without imperfections or blemishes, unless otherwise noted. Before ordering any material or doing any work, the Contractor shall verify all measurements at the site and shall be responsible for the correctness of same.
- B. The Contractor shall lay out his work from dimensions of bid documents, actual dimensions taken at the site, and from the approved dimensions of equipment being installed. Layouts in congested areas should not be scaled from the electrical and mechanical drawings. No extra compensation will be allowed on account of difference between actual dimensions and measurements and those indicated on the drawings. Any difference, which may be found, shall be submitted to the Department for consideration before proceeding with the work.
- C. This specification includes under each item all labor, material and equipment necessary to properly install complete, adjust, and place in operating condition, satisfactory to the Department, the several branches of work described herein. This shall include all necessary interconnections between the several branches of work described herein, and connections to work under other sections of specifications and other contractors.
- D. All items of labor, material or equipment not described in detail by specifications or drawings, but which are incidental to or necessary for complete installation and proper operation of several branches of work described herein, or reasonably implied in connection therewith, shall be furnished and/or installed as if called for in detail by drawings or specifications.
- E. The drawings are generally indicative of the work required and shall be followed as closely as circumstances will permit, however they do not indicate all bends, fittings, boxes and accessories which may be required. The Contractor shall carefully investigate structural and finish conditions affecting work and arrange work accordingly, furnishing such fittings, accessories, etc., required to meet such

conditions. Contractor will be held responsible for proper installation of materials and equipment to the true intent and meaning of contract documents.

- F. The Contractor shall carefully examine all contract documents including those of all other trades, and carry on his work so as not to delay or interfere with the work of other trades. He shall obtain in writing from the other contractors such data as is necessary to coordinate his work with other trades.
- G. The drawings indicate approximate location of wiring, outlets, equipment, etc., and the actual location shall be confirmed at the site with the Department. The department reserves the right to make minor changes in the locations of conduits, outlets, equipment, etc. prior to roughing-in, without incurring additional expense to the Department.
- H. Coordinate location of luminaires, conduit, wire, wiring devices, equipment, etc., to be clear of windows, doors, openings, diffusers, return grilles, sprinklers and other services and utilities. This Contractor shall be held responsible to coordinate his work with that of the other trades so that all work may proceed in an orderly manner and conflicts and delays may be avoided. Where drawings indicate special space allocation for different contracts, contractors shall rigidly adhere to sequence of installation designated by the Department or as required to allow all the trades to work equipment or materials into place in respective order. Special attention shall be paid to work under the floor slabs, above ceilings and in locations otherwise concealed. All work shall be tested before it is closed in.
- I. Secure dimensions of all recessed lighting fixtures, telephone, data and similar device outlets and other equipment immediately upon the award of the Contract. Work closely with the General, HVAC, Plumbing and other Contractors and provide them with the necessary information and dimensions so that there will be no interference between piping, duct work, structural steel, furring channels, etc., and recessed lighting fixtures or other electrical equipment.
- J. In case interference or fouling results, the Department shall decide which item is to be relocated, regardless of which is installed first. The Contractor shall receive no additional compensation for relocating items that result from interference with other work.
- K. Contractor shall determine in advance, location and size of chases and openings necessary for proper installation of his work, and have same provided during erection of work in which chases and openings occur. He shall furnish and set sleeves, hangers, and anchors, and be responsible for their proper and permanent location.
- L. In cases where cutting of new building construction is necessary due to failure to set proper sleeves or inserts, or due to the failure to provide proper openings and chases such cutting shall be done and repaired to match the original condition of the work by the contractor under this specification.
- M. Points of connection and termination of work under this specification are shown on drawings or stated within the specification, but in case of doubt as to such points, the Department's decision will be final.
- N. Follow manufacturer's published recommendations for installation methods not otherwise specified. The Contractor shall furnish the services of manufacturer's representatives for each piece of major equipment furnished under these contract documents. The amount of factory service provided by the contractor shall be as normally recommended and furnished by the various equipment manufacturers unless specified otherwise. Testing of equipment shall be made under the direct supervision of competent authorized service representatives. Any and all expenses incurred by the equipment manufacturers' representatives shall be borne by the contractor.
- O. Contractor shall seal all openings left in building construction by the installation of work specified under this section. Sealing shall be in accordance with "Cutting and Patching" section specified herein.

- P. Where the vapor barrier of any insulation is broken due to the installation of conduit and equipment, the Contractor shall properly repair all insulation and seal all openings with vapor barrier covering and vapor barrier adhesive of type installed with the insulation.
- Q. Upon completion of the work, all remaining waste materials and rubbish resulting from the contract work shall be removed from the building and premises.
- R. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Department for clarification. Do not proceed with work without clear instructions.
- S. The Contractor and his subcontractors shall satisfactorily complete the systems so that they are functional and operating to the satisfaction of the Department. All systems, their controls and their sequencing must be demonstrated to the satisfaction of the Department.

3.2 ELECTRICAL EQUIPMENT INSTALLATION

- A. Headroom Maintenance: If mounting height or other location criteria is not indicated, arrange and install components and equipment to provide the maximum possible headroom.
- B. Materials and Components: Install level, plum, 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.
- D. Connect for ease of disconnecting, with the minimum interference with other installations.
- E. Right of Way: Give to raceways and piping systems installed at a required slope.

3.3 DEMOLITION

- A. Existing Equipment:
 - 1. To accommodate the renovations, disconnect and remove or relocate existing equipment and services as indicated on the plans or as required (whether or not the existing equipment is shown on the drawings). All other existing equipment shall be removed, unless otherwise noted.
 - 2. If new equipment such as receptacles, light fixtures, etc. is to be installed where an existing device is located, the existing outlet box may be reused if it complies with all applicable codes.
 - 3. All existing building equipment to be removed that would be of some value to the Using Agency, such as light fixtures, time clocks, safety switches, panelboards, etc., shall be removed by this Contractor and turned over to the Using Agency for storage.
 - 4. It is this Contractor's responsibility to pay disposal fees for equipment removed. Equipment shall be disposed of in accordance with governing environmental regulations (i.e. ballasts, lamps, transformers, batteries, etc.).
- B. Removal of Existing Circuits:
 - 1. Where it is noted for switches, receptacles, fixtures or other electrical equipment to be disconnected and removed; it shall be understood that all wiring, junction boxes, supports, appurtenances and accessories associated with the equipment (not required to remain, due to continuity or other necessity) shall be removed in their entirety.

- C. Extension of Existing Circuits:
 - 1. Where existing equipment is indicated as being relocated and a circuit connection is not shown or noted, this Contractor shall extend and connect the existing circuit as required.
 - 2. In areas where the general construction work interrupts the continuity of an existing circuit, this Contractor shall relocate portion of the circuit required to maintain continuity.
- D. Coordination: Coordinate all demolition work with the other trades and the Department.

3.4 EXISTING PANELBOARDS (Where Applicable)

- A. Existing panelboards to remain or to be relocated:
 - 1. Clean interiors and exteriors.
 - 2. Inspect for damage. Notify Engineer if repairs are necessary or damaged components need replacing.
 - 3. Tighten conduit and wire terminations in accordance with applicable codes.
- B. Verify panelboards and panelboard feeders are of adequate capacity for loads to be served.
 - 1. Activate loads connected to panelboards to achieve full load condition.
 - 2. Measure and record amperage readings of phase and neutral conductors of panelboard feeders.
 - 3. Provide typewritten report of recorded measurements to the Engineer for review.
- C. Provide new typewritten circuit directory.
- D. New circuit breakers for existing switchboards, panelboards or loadcenters shall match the existing circuit breaker type, manufacturer, and AIC rating. If the existing breaker type is no longer available, submit proposed substitution to Engineer for approval.

3.5 EXISTING WIRING

- A. Inspect existing wiring which is to be disturbed for damage. Repair or replace damaged wiring.
- B. Insure integrity of existing wiring insulation:
 - 1. Megger wiring phase-to-phase, phase to neutral, phase to ground, and neutral to ground.
 - 2. Record megger results. Provide typewritten report of results to the Engineer for review.
 - 3. Repair defective insulation to a dielectric value equal to that of wire of the same type and age.
- C. Secure and label existing wiring which is to be disturbed.
- D. Tighten existing wiring terminations and connections in accordance with applicable codes.

3.6 EQUIPMENT CONNECTION

- A. Refer to Section 260510, Electrical Equipment Wiring, for mechanical equipment wiring requirements.
- B. Terminate all circuits feeding equipment or furniture in safety switch, receptacles or outlet as shown on the drawings or as directed by the Department.
- C. Each piece of equipment requiring electric service shall be provided with a finished outlet.
- D. Make final connections to each piece of equipment requiring electric service.
- E. The drawings show generally the location of electric service to each piece of equipment. However, this contractor shall secure detailed shop drawings showing dimensioned locations for electric service to each piece of equipment from various contractors supplying such equipment prior to roughing-in.
- F. This contractor will be required to relocate any misplaced outlet at his own expense if he fails to secure detailed shop drawings prior to roughing-in for equipment.

3.7 SPLICES

- A. Splices shall be made with approved type solder-less connectors of the insulated type. However, at locations where the non-insulated type are used, they shall be covered with rubber and friction tape to the same thickness as the original insulation of the wire used. Solder-less connections shall be as manufactured by AMP Incorporated, Thomas & Betts, Burndy or approved equal.

3.8 TERMINAL AND CONNECTORS

- A. All lugs, terminal blocks, etc. for panelboards, enclosed circuit breakers, switches, control centers, etc., shall be standard product as manufactured by AMP Incorporated, Thomas & Betts, Burndy or approved equal.

3.9 BALANCING

- A. Each system of feeder and branch circuits for power and lighting shall be connected to panelboard buses in such a manner that loads connected thereto will be balanced on all phases as closely as practicable. Should there be any unfavorable condition of balance on any part of the electrical system, the Electrical Contractor shall make changes to the electrical system that may be required by the Department to remedy the unbalanced condition. Should there be an unbalance on existing equipment, not included under this contract, the contractor shall report the unbalance to the Department so that the condition may be corrected by the Department under a separate contract. Before final acceptance by the Department, the contractor shall submit readings of all phase legs at each panel with the lighting and power circuits "on". All conductors for the system shall be connected in strict accordance with the requirements of the National Electrical Code.

3.10 PIPE CURBS; EQUIPMENT SUPPORTS AND FLASHING

- A. Coordinate installation of curbs, equipment supports, and flashing with the roofing work.
- B. Minimum curb and support height shall be 12 inches.

- C. Flash and counter flash where electrical conduit and equipment passes through weather or waterproofed walls, floors and roofs.

3.11 EXCAVATION AND BACKFILLING

- A. Refer to Division 31 for requirements.
- B. The contractor shall do all necessary excavating of widths and to depths required for the installation of manholes, box pads, concrete foundation slabs, for the installation of underground duct banks, and for the installation of other equipment and materials as shown on the drawings and herein specified.
- C. Final grading, finishing, paving and seeding at all excavated areas shall be included under this contract, except where new surfaces are being provided as a part of the site work under the General Contract. The Electrical Contractor will be responsible for all backfilling and paving of roadways, sidewalks and other paved areas associated with this contract. All surfaces shall be restored to the satisfaction of the Department.
- D. Prior to submitting his bid price and prior to any work, the Electrical Contractor shall familiarize himself with local ordinances and amendments and shall contact the appropriate authorities to obtain all regulations and requirements that must be followed. The contractor shall secure all necessary permits before the start of any work.
- E. Conform to Act No. 287 of the General Assembly of the Commonwealth of Pennsylvania that was enacted to protect the public health and safety.
- F. The bottoms of all excavations shall be properly leveled off and concrete placed on undisturbed soil. All loose materials shall be removed and the excavations shall be brought into approved condition to receive concrete or other material. No earth filling shall be allowed under any bases or slabs. All excavation shall be carried down to firm formation. However, if additional depths are required to reach firm earth, the extra excavation and materials required to perform the work shall be done at no extra cost to the Department. If, through an error on the part of the contractor, any part of the excavation is carried below the depth indicated or required for the work, the contractor shall maintain the excavation and shall start concrete from the excavated level, and no extra compensation will be considered. Excavate and pour concrete only on the basis of approved shop drawings. Excavation below footings shall be filled with concrete as directed by the Department.
- G. Notify the Department as soon as excavations are completed, in order that the bearing quality of the bottoms may be inspected before concrete is poured, or before formwork is erected. Concrete shall be poured as soon as weather conditions permit after excavation is completed and inspected. In case bottoms of excavations become wet and soft, all soft material shall be removed and the concrete poured to the required extra depth, at no extra cost to the Department.
- H. Minimum cover for the various lines shall be not less than indicated on the drawings, but not less than local regulations and practice. Generally, piping shall be installed with not less than 3'-0" cover.
- I. The width of all trenches shall be not less than widths shown on the drawings or required to install piping and materials.
- J. The excavation shall be kept safe at all times. Shoring and sheathing shall be used when necessary. The excavation shall be kept free of water at all times. Additional shoring and sheathing may be ordered at any time to safeguard the work. Shoring and sheathing shall be provided in strict accordance with all applicable State, county and local ordinances and regulations.

- K. All excess excavated materials shall be disposed of as directed by the Department. The number of points at which the contractor will be permitted to work and length of open trenches that will be permitted will be governed by the Department.
- L. No existing asphalt or concrete paving shall be buried or otherwise disposed of on the site. It shall be disposed of off-site, by the contractor, in a manner consistent with applicable laws and regulations.
- M. To protect persons from injury and to avoid property damage, adequate barricades, construction signs, torches, red lanterns, and guards shall be placed and maintained during the progress of construction, and until it is safe for traffic use. Rules and regulations of the local authorities respecting safety provisions will be observed.
- N. Adequate protection shall be provided for all new or existing structures, services, or utilities encountered in the excavation. The protection shall include bracing, sheathing, supports, etc., as required to maintain grade and alignment and to provide proper mechanical strength. Any structures, services, or utilities damaged by the work of the contractor shall be promptly repaired and replaced in same condition as they originally were prior to such damage.
- O. Any existing services, utilities or other obstructions no longer required, shall be removed where encountered during the excavation.
- P. Excavation shall be conducted in a manner to cause the least interruption of traffic. Where traffic must cross open trenches, the contractor shall provide bridges suitable for the traffic involved.
- Q. The proposal shall include all excavation that may be necessary to complete the project, including any rock that may be encountered. No blasting of any kind will be permitted on the interior or exterior of the building.
- R. After the pipe or equipment has been laid, tested, inspected and concrete has been poured, cured and inspected, the excavation shall be backfilled by the contractor with the best carefully selected materials free from stones, large pebbles, hard lumps or frozen earth. The backfilling shall be placed in horizontal layers not to exceed 6" in thickness and each layer shall be thoroughly consolidated and compressed with pneumatic rammers. No backfilling shall be done until all undermined earth has been broken down and the sides of the excavation made vertical or inclined outward. New backfill shall be obtained on the site where necessary and where directed by the Department, or where necessary, backfill shall be hauled from off-site locations at no additional cost to the Department.
- S. Restore the surfaces of all excavations to their original condition. This shall include existing or new paved or unpaved streets, parking areas, driveways, sidewalks, and turf. Existing trees, shrubs, or turf damaged under this contract shall be replaced to the satisfaction of the Using Agency and the Department.
- T. As the work progresses, record on the drawings all changes and deviations from the contract drawings. Measurements shall include elevations and sufficient offset measurements from building to definitely locate all equipment and underground lines. Two prints of the marked drawings shall be delivered to the Department before final acceptance.
- U. Any settling, deterioration or washing out of earth or repaired surfaces after initial installation shall be corrected by this contractor.

3.12 FIELD QUALITY CONTROL

- A. Inspect installed components for damage and faulty work, including the following:

1. Supporting devices for electrical components.
 2. Concrete bases.
 3. Electrical demolition.
 4. Cutting and patching for electrical construction.
 5. Touchup painting.
- B. This Contractor shall furnish the services of an experienced superintendent who shall be constantly and continuously in charge of the installation of work.
- C. The quality of the workmanship required for this trade in the execution of its work shall be of the finest and highest obtainable in that trade working with materials specified. Workmanship shall be accomplished to the satisfaction of the Department.

3.13 CORE DRILLING

- A. This Contractor shall core drill holes associated with new feeders and branch circuits as indicated on the drawings.
- B. All core drillings shall be fire stopped/sealed after installation of conduits as hereinafter specified.
- C. This Contractor shall cover all equipment on the floor below core drillings. Any water or other damage shall be the responsibility of this Contractor to repair or replace without additional expense to the Department.

3.14 CUTTING AND PATCHING

- A. Refer to Division 1 - General Requirements.
- B. This Contractor shall be responsible for all cutting, patching, and finishing of existing construction for the proper installation of all electrical equipment and materials to be installed in the building. This will also be required for the removal of the existing equipment and materials. All cutting shall be kept to a minimum consistent with the requirements of the project. Cutting, patching, and finishing shall be done by workmen skilled in this type of work. All patching shall be done utilizing materials of the same quality and texture as the adjacent undisturbed areas perfectly and to the satisfaction of the Department. Painting of the final disturbed areas, where general construction work occurs, will be the responsibility of the General Contractor, unless otherwise indicated. Painting of the final finished areas, where no general construction work occurs, shall be by this Contractor. Be it walls or ceilings, paint entire plane in which damage occurs.
- C. No cutting shall be done which may affect the building structurally or architecturally without first securing the approval of the Department. Cutting shall be accomplished in such a manner as not to cause damage to the building or leave unsightly surfaces, which cannot be concealed by plates, escutcheons or other construction. Where such unsightly conditions are caused, this Contractor shall be required, at his own expense, to repair the damaged areas.
- D. Where openings are to be made in existing roof, obtain bonding company approval, if roof bond is still in effect, before such openings are made. Perform finishing and roof flashing, in areas of existing building or roof not being disturbed under general construction, for installation of work under Divisions 26, 27 and 28.

- E. Cutting of the construction excessively or carelessly done shall be repaired by this Contractor to match the original work and to the satisfaction of the Department who will make the final decision with respect to excessive or careless cutting work.
- F. This Contractor shall seal all openings he has made in plenum spaces, fire rated floors, ceilings or partitions after his work has been installed. The materials used for sealing the openings shall have a fire rating equal to or greater than the rating of the floor, ceiling or partition material.
- G. Where present equipment is removed and unused openings remain in walls, floors, partitions, etc., this Contractor shall properly patch all such openings. All patching and repairing shall be done by workmen skilled in this type of work and shall match present or new finishes.

3.15 CLEANING

- A. Refer to the General Conditions of the Contract.
- B. Prior to painting, clean as required to remove plaster, dirt, grease, dust, labels, burrs, etc.
- C. Prior to final inspection, the Contractor shall clean all equipment and surfaces within the scope of the project (for example: lighting fixtures, switch and receptacle plates, engine generators, electrical distribution equipment, etc.). In addition, the Contractor shall clean anything else that requires cleaning as a result of the Contractor's work.
- D. Any damage in the electrical system or other damage to any part of the building, its finish or furnishings, due to failure to properly clean electrical equipment and or associated components, shall be repaired by the Contractor with no additional cost to the Department.

3.16 REFINISHING AND TOUCH UP PAINTING

- A. Refinish and touch up paint.
 - 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.
- B. Conduit and equipment to be painted: Clean all conduit exposed to view in completed structure by removing plaster and dirt. Remove grease, oil and similar material from conduit and equipment by wiping with clean rags and suitable solvents in preparation for paint.

3.17 MOUNTING HEIGHTS

- A. In addition to careful review of the electrical drawings, this Contractor shall refer to all applicable details, plans, etc. and perform a site survey to determine exact positioning of electrical, telephone, data, television, video, etc. outlets prior to installations. Unless otherwise specifically instructed, centerline-mounting heights of outlets and other equipment shall be located as follows:

1. Local Lighting Control Switches: Locate all outlets for single or gang switches 48" (top of box) above finish floor on strike side of door. If this location is such that it places the switch group partly in tiles or other finishes, the outlet shall be lowered sufficiently to bring the plate entirely on a flat surface (verify with Department before lowering outlet).
2. Convenience Outlets: 18" above finished floor except as otherwise noted.
3. Telecommunications Outlets: 18" above finished floor except as otherwise noted. Outlets for wall phones shall be located 60" above finished floor or as directed.
4. CATV Outlets: 18" above finished floor except as otherwise noted. Coordinate locations for wall-mounted televisions with Architectural details and features.
5. Outlets Above Countertops: 8" above top of counter without backsplash or 6" above top edge of backsplash except as otherwise noted.
6. Blank Outlets: Coordinate location with served equipment manufacturers shop drawing and installation details for service connection point of access except as otherwise noted.
7. Where similar types of outlets/devices are indicated on the drawings as being installed adjacent to each other on the same wall or in the same general area, but are indicated above as having different mounting heights, all similar outlets/devices shall be installed at the same mounting height. In such situations, confirm the mounting height with the Department.
8. Fire Alarm Pull Stations: 48" above finished floor to top of box.
9. Fire Alarm Audio/Visual and Visual Only Devices: The lower of 80" above finished floor (bottom of box) or 6" below ceiling (top of box).
10. All fire alarm pull stations and audio/visual devices shall be installed on same vertical centerline.
11. Safety Switches: 4' above finished floor, except as otherwise noted.
12. Suspended Fixtures: As shown on drawings, as scheduled or as directed by the Department.

END OF SECTION 260500