

**SECTION 26 00 10**  
**BASIC ELECTRICAL REQUIREMENTS**

**PART 1 - GENERAL**

**1.1 SCOPE OF WORK**

- A. Contract and General and Supplementary Conditions and Division 1 Specifications are hereby made a part of Division 26, 27, and 28 as fully as if repeated herein. Where provisions of Division 1 and 26, 27, and 28 conflict, the greater or more strict shall prevail.
- B. This Section includes general administrative and procedural requirements for electrical installations including Division 26, 27, and 28. The requirements included in this Section expand the requirements specified in Division 1.
- C. Electrical work shall comply with the requirements indicated in all sections of Division 26, 27, and 28. Examine all Divisions of the specifications and drawings to determine the complete Scope of the electrical work.
- D. The work to be done under Divisions 26, 27, and 28 of the Specifications shall include the furnishing of all labor, material, equipment, tools and appurtenances and performing all operations necessary to provide complete, fully functional systems in accordance with the Specifications, the Drawings and requirements of the applicable codes and standards listed herein. Where the specifications, drawings, applicable codes or standards conflict provide the greater or more strict requirement.
- E. Visit areas of construction where Work is to take place, and examine the construction site carefully, noting locations and conditions under which the Work will be performed and accepting the responsibility for performing the Work under the existing conditions.
- F. The work shall include the following specification sections:
  - 1. Division 26
    - 26 00 10 Basic Electrical Requirements
    - 26 05 00 Common Work Results for Electrical
    - 26 05 19 Electrical Power Conductors and Cables (600 Volts or Less)
    - 26 05 26 Grounding
    - 26 05 29 Hangers and Supports for Electrical Systems
    - 26 05 33 Raceway and Boxes for Electrical Systems
    - 26 05 36 Cable Trays for Electrical Systems
    - 26 05 38\_Cable Bus for electrical systems
    - 26 05 39\_Trenwa precast trench solution
    - 26 05 43 Underground Ducts and Raceways for Electrical Systems
    - 26 05 48 Vibration and Seismic Controls for Electrical Systems
    - 26 05 53 Identification for Electrical Systems
    - 26 08 00 Electrical General Commissioning Requirements
    - 26 08 13 Testing of Electrical Systems
    - 26 09 23 Lighting Control Devices
    - 26 22 00 Low – Voltage Transformers
    - 26 24 13i Switchboards – Install
    - 26 24 16 Panelboards
    - 26 26 00i Power Distribution Units – Install
    - 26 27 26 Wiring Devices
    - 26 28 13 Fuses

- 26 28 16 Enclosed Switches and Circuit Breakers
- 26 32 13i Engine Generators – Install
- 26 32 16 Engine Generator Field Startup Requirements
- 26 33 53i Static Uninterruptible Power Supply – Install
- 26 41 13 Lightning Protection For Structures
- 26 43 13 Surge Protective Devices
- 26 51 00 Interior Lighting
  
- 2. Division 27
  - 27 05 26 Grounding and Bonding for Communication Systems
  - 27 05 28 Low Voltage Raceway Systems
  
- 3. Division 28
  - 28 31 11\_Digital, addressable fire-alarm system - PBB
  - 28 31 11 Digital, Addressable Fire-Alarm System – Suite
  - 28 31 46\_Air sampling smoke detection system
  
- G. The work shall include, but not be limited to, providing equipment and items listed below and installing items furnished under other Divisions of these specifications.
  - 1. The following Drawing Series:
    - a. “E” Series
    - b. “ES” Series
    - c. “EA” Series
    - d. “FA” Series
  
  - 2. Commissioning of Building Systems – assistance and coordination.
  - 3. Electrical Service – coordinate and install. Provide metering provisions required and meet all utility requirements.
  - 4. Conduit, wire and electrical connections to items furnished under other Divisions.
  - 5. Supplementary steel, channel and supports.
  - 6. Coordination with Construction Manager and General Contractor for controlled environmental conditions for stored and installed equipment in compliance with NFPA 70B and the manufacturer/vendor’s requirements. This includes equipment furnished by others and stored or installed under this Section.
  - 7. Provide controllers, starters and variable speed drives for plumbing, fire protection, heating, ventilating and air conditioning equipment except for packaged equipment with integral controllers, unless otherwise indicated.
  - 8. Power wiring and connections for all Heating, Ventilating, Air Conditioning, Plumbing Systems, Elevators and Utilization Equipment including power wiring to control panels.
  - 9. Provide conduit and wiring for dock levelers, motor operated doors and windows, projection screens and their control stations. Install control stations.
  - 10. All materials and appurtenances that can reasonably be inferred to be a part of the electrical systems and necessary to its proper operation, but not specifically mentioned or indicated on the drawings, shall be furnished and installed without additional charge.
  - 11. Identification and Signage as required herein, by code or local authorities.
  - 12. Concrete precast pits, manholes, handholes, frames and covers and miscellaneous hardware for work in Division 26, 27, and 28.
  - 13. Touch-up painting of prefinished equipment furnished or damaged.
  - 14. Fire stopping, smoke, acoustical, water and environmental seals.
  - 15. Furnish, erect, maintain, relocate, and remove all hoisting, rigging, staging and scaffolding required to perform the work of this Section of the specifications.
  - 16. Provide cutting and patching under Provisions of Division 1.
  - 17. Provide core drilling through concrete, steel reinforcement and metal decking.

18. Provide required sleeves. Coordinate and set sleeves and watertight fittings in construction as it progresses so as not to impede the work of other trades.
19. Mounting of the final full size as-built electrical one-line diagram on the wall of the electrical room between two sheets of plexiglass. Secure back sheet to wall and secure front sheet separately so it can be removed to allow updating of the one-line diagram. Provide clips and a lip at the bottom of the back sheet to secure the drawing to prior to overlaying the top sheet of plexiglass.
20. Compliance with construction requirements and procedures to qualify for LEED points.
21. Start up and acceptance testing for all systems provided or installed under this section. Include all requirements indicated herein, recommended by manufacturer or system vendor, and as required by the Owner or Commissioning Authority. Submit written documentation of all inspections and testing.
22. Commissioning of Building Systems – assistance and coordination with Owner and Commissioning Authority.
23. Attendance at and support of Integrated Systems Testing (after all start-up and acceptance testing is complete) of all systems. Include in bid time for 2 electricians (including foreman) for 3 days at a minimum. Refer to individual sections for required scope.

## **1.2 RELATED WORK**

- A. The following items of procedures, requirements, labor and material incidental and/or related to the installation of the Electrical Work are specified under other Divisions of these Specifications unless specifically indicated otherwise. Provide, assist and coordinate work to meet requirements indicated in the Specifications and on the Drawings.
  1. Cutting and patching in accordance with the requirements under Division 1.
  2. Temporary fire alarm system - Division 1.
  3. Temporary electric services including consumption fees are to be provided by the General Contractor in accordance with Division 1.
  4. Controlled environmental conditions for electrical equipment per the manufacturer's recommendations or as specified in this Division by the General Contractor.
  5. Excavation and backfilling - Division 31.
  6. Concrete work including forms for duct banks, transformer pads, lighting standards, housekeeping pads for equipment -Division 3.
  7. Reinforcing steel - Division 5.
  8. Watertight penetrations for electrical conduits through roof - Division 7.
  9. Flashing and caulking - Division 7.
  10. Setting of frames for access panels - Division 8.
  11. Painting of all equipment and material other than touch up of prefinished fixtures, equipment and other Electrical components - Division 9.
  12. Furnishing and setting of motors for Process, Heating, Ventilating, Air Conditioning and Plumbing Systems is included under each applicable Division of work.
  13. Temperature control systems for Heating, Ventilating and Air Conditioning systems including controls, relays, time clocks, wiring and devices are provided under Divisions 23/25 unless specifically indicated otherwise.
  14. Aquastats, alternators, float switches and other direct control devices for the control of the Plumbing System Equipment are provided under Division 22 unless specifically indicated otherwise.
  15. Utility (electric, telephone, cable TV, fire alarm) backcharges will be paid by the General Contractor with no additional markups allowed. Refer to Section 01005 for Utility backcharges.
  16. Communications equipment is by Owner.
  17. Telephone system equipment and instruments are provided by the owner.
  18. Control devices for plumbing, fire protection, heating, ventilating and air conditioning equipment are included under Division 21, 22, 23, 25 unless otherwise indicated.

19. Security system equipment, wiring and connection under Division 28 unless specifically indicated otherwise.
  20. Wiring or Connection of Owner's Equipment, unless indicated on the Drawings or in the Specifications.
- B. The following items incidental and/or related to the installation of the electrical work will be furnished and/or installed by others and wired and/or installed under this Section.
1. Sprinkler system tamper, flow and pressure switches are provided under Division 21 and wired under this Section.
  2. Any Division 21, 22, 23 furnished motor controllers, variable frequency drives, capacitors and associated disconnects for installation under this Section. Generally these are provided under this Section.
  3. Duct smoke detectors in computer room air conditioning units (CRAC, CRAH, etc.) are integral to the unit. Connect to the fire alarm system through an addressable relay.
- C. Furnish the following items for installation by others and provide coordination, cooperation, assistance and wiring as required:
1. Duct smoke detectors for installation in ductwork per NFPA 72 under Division 23. Furnish quantity required to meet the installation requirements of NFPA 72.
  2. Pitch pocket or approved roofing penetration material for conduit or lightning protection system for installation under Division 7.
  3. Furnish access panels as required for electrical work behind finished surfaces or otherwise concealed for installation under Division 8.
  4. Precast pits, concrete manholes and handholes for installation under Division 3.
- D. Install items purchased by others. Coordinate delivery and be responsible for unloading from delivery vehicles, rigging, and for safe handling and field storage up to the time of installation. This Section shall be responsible for:
1. Coordination of delivery and shipping splits for size and weight restrictions of the project site.
  2. Any necessary field assembly and internal connections, as well as mounting in place of the items, including the purchase and installation of all dunnage supporting members and fastenings necessary to adapt them to architectural and structural conditions.
  3. Connection to building systems including the purchase and installation of all terminating fittings, lugs, etc. necessary to adapt and connect them to the building systems.
  4. Provide all work indicated in the specifications and on the drawings related to the pre-purchased items that are not specifically indicated as pre-purchased.
  5. Carefully examine such items upon delivery, and advise the General Contractor and Owner of any damages or defects noted, as well as the shipper.
  6. Installation, testing, coordination of vendor's work and responsibilities and compliance with warranty coverage, requirements and support.
  7. Pre-purchased equipment as specified:
    - a. Engine Generator - Suite – Owner Furnished
    - b. Engine Generator Set Enclosure - Suite - Owner Furnished
    - c. Power Distribution Units - Owner Furnished
    - d. Static Transfer Switches – Owner Furnished
    - e. Static Uninterruptible Power Supply - Owner Furnished
    - f. Modular Power Solutions Skid - Owner Furnished
    - g. Engine Generator Set Enclosure - PBB - Owner Furnished
    - h. Switchboards – Interior and Exterior - Owner Furnished
- E. Work by Owner

1. Refer to Division 1 for additional requirements and information.
2. Accommodate concurrent work provided by Owner.

**F. Existing Materials**

1. All existing equipment and materials to be reused is assumed to be in good operating condition.
2. Any existing electrical equipment to be reused (i.e., panels, light fixtures, etc.) found to be defective, upon commencement of this contract, shall be reported to the Architect.
3. Guarantee all replacement work, equipment or materials for a period of one year from date of acceptance by the Architect.

**1.3 COORDINATION OF THE WORK**

- A. Refer to Division 1 for additional requirements for coordination of the Work including Section 01 31 00 Project Management and Coordination.
- B. Before submitting bid examine all Drawings and Specification, including other Divisions, for requirements that affect work of this Division and include it in the scope of work for this section whether or not such work is specifically mentioned in this Division. Be responsible, under this Division of the Specifications, for the proper coordination of the electrical work with the installations under other Divisions, including proper clearances. Any changes required to avoid interferences shall be submitted to the Architect for approval and shall be made as approved, without additional cost to the Owner.
- C. Coordinate work with that of all other trades affecting or affected by work of this Division. Cooperate with such trades to ensure the steady progress of work under the contract.
- D. Coordinate work with the General Contractor and the project schedule. Provide manpower and materials as required to meet the schedule and not to interfere with or impede the progress of or increase the cost of work by others. Submit shop drawings and order equipment in a timely manner. Expedite deliveries and manufacturing as required.
- E. Deliver products to the project in a timely manner to meet all schedule requirements, properly identified with name, model numbers, compliance labels, and other information needed for identification.
- F. Install materials and apparatus as fast as conditions of the building will permit. Materials and apparatus must be installed when directed and in the fashion specified. Examine the Architectural Drawings for the location of suitable openings and aisles for the passage of equipment to be installed under this Section. The installer shall be responsible for having suitable openings and aisles left open until his equipment has been properly installed. If necessary, request the vendor to ship equipment in sections sized to permit passage. Provide sleeves, pockets, supports and incidentals.
- G. Examine the drawings, the building construction, and vertical transportation for weight and size restrictions. Provide equipment and installation methods to comply with restrictions including shipping split sizes, weights, and disassembled components as required. Obtain manufacturer's approval and assurance warranty will be honored.
- H. Prepare and submit coordination drawings in conjunction with the other Trades, on common CAD drawings of at least 3/8"=1'-0", as directed by the General Contractor. Each system shall be color-coded, and for cad drawings, each system shall be on a different layer. Meet to resolve conflicts between the various Installers prior to submission to the Architect for review. Identify conflicts resolved that include changes to the design. Note on coordination drawings submitted to the Architect any conflicts that the trades could not resolve. The Architect will

provide direction that all Installers will comply with, at no additional cost to the project. In general, distribution systems which require pitch or slope such as plumbing drains, steam and condensate piping shall have the right of way over those which do not. Lighting fixtures have minimal flexibility and should not be moved without prior approval. Install work to avoid interferences and to allow proper clearance around all trades' work for access, maintenance and as required by code. Prepare coordination drawings in the following order (subject to above): HVAC (with lighting fixtures indicated), plumbing, fire protection, electrical and telecommunications systems. Work installed prior to complete and reviewed coordination drawings must be corrected as required at no additional expense to the project.

- I. In all spaces, prior to installation of visible material and equipment, including access panels, review Architectural Drawings for exact locations and where not definitely indicated request information from Architect.
- J. Check Contract Drawings as well as Shop Drawings of all Installers and vendors to verify and coordinate space in which work of this section will be installed.
- K. Obtain from manufacturers the proper method of installation and connection of the equipment that is to be furnished, installed or wired. Obtain all information that is necessary to facilitate the work and to complete the project.

#### **1.4 QUALIFICATIONS / QUALITY ASSURANCE**

- A. Refer to Division 1 for additional requirements for quality assurance and control of the installation.
- B. Receive, handle, house, and protect equipment required for installation under this specification. Replace damaged equipment with new equipment. Provide environmental requirements per NFPA 70B and manufacturer's requirements during shipping, storage and installation.
- C. Review submittals of equipment furnished under other Divisions prior to installation and electrical rough-in. Verify location, size, and required connections. Coordinate details of equipment connections with supplier and Installer.
- D. Utilize Installers with at least five years experienced and properly licensed or certified in the type of work to be performed.
- E. Manufacturers shall be companies experienced and are properly licensed or certified in manufacturing products specified for a minimum of five years.
- F. Be responsible for the care and protection of all work included in this Section until it has been tested and accepted.
- G. Protect all equipment and materials from damage from all causes including theft. All materials and equipment damaged or stolen shall be repaired or replaced with equal material or equipment.
- H. Protect all equipment, outlets and openings with temporary plugs, caps and covers. Protect work and materials of other trades from damage that might be caused by work or workmen and make good any damage caused.
- I. Provide workmanship in accordance with the best accepted practices. Rework installations judged by the Architect as unacceptable.

- J. Power Quality Specialist Qualifications: A registered professional electrical engineer or engineering technician, currently certified by the National Institute for Certification in Engineering Technologies, NICET Level 4, minimum, experienced in performance testing UPS installations and in performing power quality surveys similar to that required in "Performance Testing" Article.
- K. Testing Agency Qualifications: Member company of NETA or an NRTL.
  - 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- L. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- M. UL Compliance: Listed and labeled under UL 1778 by an NRTL.

### **1.5 REGULATORY REQUIREMENTS AND STANDARDS**

- A. Refer to Division 1 for additional regulatory or reference requirements.
- B. Arrange and pay for permits, licenses, inspections and certificates. Give the proper Authorities all requisite notices or information required relating to the work under this Section. Request inspections from Authorities having jurisdiction. At the conclusion of the work, deliver certificates of inspection from authorities having jurisdiction to the Owner's Representative.
- C. Provide products listed and classified by an OSHA certified Nationally Recognized Testing Laboratory (NRTL) as suitable for purpose specified and indicated. Provide NRTL-listed material and equipment where standards are available. Notify Architect of any material or equipment that is not NRTL listed when submitting information.
- D. Perform work in strict accordance with the rules, regulations, listing or labeling requirements, standards, codes, ordinances, and laws of local, state, and Federal governments, and other authorities having legal jurisdiction over the site. No additional compensation shall be granted for work that must be changed as a result of the work not originally complying with the codes, standards, local requirements, etc.
- E. Equipment and installation shall be suitable for the wind, snow, ice, flood, and earthquake requirements indicated in the Building Code and ASCE 7 for the location and usage.
  - 1. Building occupancy classification per ASCE 7 – category II
  - 2. Spectral Acceleration Parameters:
  - 3.  $S_s$  (0.25 sec) = 0.125
  - 4.  $S_1$  (1 sec) = 0.052
  - 5. Seismic Design Category A
  - 6. Site Class as defined in the IBC: C
  - 7. Component importance factor is 1.5
  - 8. Wind load = 90 MPH
  - 9. Snow load = 5 PSF
- F. Materials and equipment shall be manufactured, installed and tested as specified in the latest and required editions of applicable parts of the following publications, standards and rulings of:
  - 1. State and local codes and ordinances.
  - 2. Local Utility Company Requirements and Standards.
  - 3. NEC - National Electrical Code (ANSI/NFPA 70).
  - 4. UL - Underwriters' Laboratories, Inc.

5. NRTL - Nationally Recognized Testing Laboratory. (OSHA Certified)
  6. NEMA - National Electrical Manufacturers' Association
  7. IEEE - Institute of Electrical and Electronic Engineers
  8. ASTM - American Society for Testing Materials
  9. ANSI - American National Standards Institute
  10. NBFU - National Board of Fire Underwriters
  11. NFPA - National Fire Protection Association
  12. ICEA - Insulated Cable Engineers' Association
  13. OSHA - Occupational Safety and Health Act
  14. IMSA - International Municipal Signal Association.
  15. FM - Factory Mutual
  16. AADAG - Americans with Disabilities Act Guidelines
  17. EIA/TIA - Electronics Industry Association / Telecommunications Industry Association
  18. BICSI – Building Industry Consulting Service International, Inc.
  19. ASCE7 – Minimum Design loads for Buildings and other Structures
- G. Where conflicts occur among the codes, ordinances, standards, Drawings or Specifications, the more restrictive requirements shall govern.
- H. The Drawings and Specifications do not undertake to repeat requirements written or all work required in the above codes, ordinances and standards.
- I. Comply with applicable codes and regulations regarding toxicity of combustion products of materials used.
- J. Legally dispose of all material. Adhere to all regulations regarding disposal of hazardous material. Recycle hazardous material where recycling is possible. Submit certificates of legal recycling or disposal to the Architect. Include copy in the Owner and Maintenance Manual.
- K. Nothing in these Contract Documents shall be construed to permit work not conforming with applicable codes and regulations. When conflicts occur the more restrictive requirements shall govern.
- L. Should the Facility have established building standards, rules or regulations, obtain a copy from the Building Owner and comply with them.

## **1.6 SUBMITTALS**

- A. Provide and submit under provisions of Division 1 and as indicated herein.
- B. Submit at time of bid any equipment or materials that have lead times that will affect the construction schedule. Provide alternate costs to expedite delivery and manufacturing so that the project schedule can be accomplished.
- C. Submit at time of bid, any proposed substitutions. List reasons the owner should accept substitutions including improved performance or equal performance and improved delivery time. Acceptance of substitutions is subject to acceptance by the Architect, whose decision will be final. A substitution is considered to be any manufacturer or product not specifically identified in the specifications or drawings. If only performance requirements are indicated, and no specific manufacturer is indicated, then a manufacturer meeting the Contract Document requirements is not considered a substitute.
- D. Substitutions of specifically indicated items will be reviewed only if identified at time of bid, otherwise submittals will be returned rejected. It is the proposer's responsibility to submit the first time, all information required to prove equality and a written letter on the proposer's letterhead indicating that the item is in full compliance with the Contract Documents and will fit



in the designated location. Include in bid, coordination of all work and all costs for all trades for any work that may be required, including any architectural or engineering fees, to accommodate the substitution. Acceptance of the proposed substitution is up to the Architect and is not assured. Review will include, but is not limited to, quality, life cycle costs, size, appearance, construction, manufacturer, service record, efficiency, dependability, performance, etc.

- E. Submit for review, within 10 days after being given Notice to Proceed and prior to the submission of any shop drawings, an itemized list of manufacturer's of material and equipment and of firms or subcontractors proposed to be used to perform the work. Include a list of submissions and the proposed schedule to submit them, so that based on the approval times and procedures indicated below, the proposed project schedule will be accomplished. FAILURE TO SUBMIT WITHIN THE TIME LIMIT OF 10 DAYS WILL BE CONSIDERED A CONTRACT VIOLATION and will require that all items will be provided in a timely manner to maintain the schedule and all costs required to meet the schedule are included to expedite delivery and manufacturing.
- F. After approval of the list and schedule, submit 1 electronic and 3 bound hard sets of detailed Shop Drawings and product Data per the submission schedule or within 30 days or sooner if required to meet the construction schedule. Substitutions will not be accepted for failure to comply with the schedule above. Electronic Submissions shall match the requirements for hard copy submissions. Provide one hard copy submission that matches the Electronic Submission.
- G. Submit related shop drawings at one time. SUBMIT ALL ITEMS IN A SPECIFICATION SECTION AT THE SAME TIME. Incomplete submittals will be held until a complete submittal is accumulated.
- H. The review of systems, equipment and Shop Drawings is a general review subject to the Contract Drawings, specifications and verification of all measurements at the job. Review does not relieve the Installer from the responsibility of Shop Drawing errors or complying with the Specifications and Drawings. Carefully check and correct all Shop Drawings prior to submission for approval. Regardless of any information included in the shop drawings submitted for review, the requirements of the Contract Documents shall not be superseded in any way by the Shop Drawing Review.
- I. Mark submittals to clearly identify (including when photocopied) proposed equipment including their accessories, options, and modifications and exclude parts not applicable to the Project, otherwise the Architect will identify items and options to be provided at no additional cost to the project.
- J. Each submittal including electronic submittals, shall be reviewed, stamped and certified prior to submission to the Architect. Such certification shall be made by a person duly authorized to sign binding Agreements for the Contractor. The certification shall state that the data and details contained on each Shop Drawing, layout drawing, catalog data and brochure has been reviewed by the Contractor for conformance to the contract documents and that it complies with the Contract Documents in all respects. Submittals will not be reviewed and will be returned to the Contractor unchecked unless they are certified.
- K. It is intended that Submittals be complete and accurate at the first submission. If the Submittal is returned marked "Resubmit," only one additional submittal will be permitted. If the second Submission is not acceptable, the right of selection will be lost and the Architect will specify exactly what is required and the specified products shall be provided at no additional cost to the Project.
- L. A minimum period of two weeks, exclusive of transmittal time of the hard copies, will be required by the Architect's office each time Submittals are submitted or resubmitted for review.

This time period shall be considered when scheduling the work, and any costs associated with expediting equipment delivery to meet the Schedule will be at no additional cost to the Owner. Submittals of numerous items at the same time may extend the time needed for review, so plan accordingly.

- M. Provide submittals in a timely manner sufficiently in advance to give ample time for checking, correcting, resubmitting and rechecking if necessary. No claim for delay or additional costs will be granted for failure to comply with this requirement.
- N. If proposed equipment deviates from the Specifications or Drawings, indicate those differences and provide sufficient data to justify acceptance. FAILURE TO INDICATE DEVIATIONS OR SUBSTITUTIONS IMPLIES FULL COMPLIANCE WITH DRAWINGS AND SPECIFICATIONS.
- O. Indicate clearly all equipment, components or assemblies that are not NRTL listed or labeled. Failure to indicate otherwise implies NRTL listing or labeling.
- P. Provide products of one manufacturer for each classification of equipment.
- Q. Meet Project requirements including space, size and weight restrictions before submitting to Architect. Equipment shall be of proper size for its allocated space. Equipment may be disassembled so that it can be installed through available openings only if it will not invalidate manufacturer's warranties.
- R. At the job site, maintain the latest equipment submittals showing the action taken by the Architect. Make these submittals available to Architect.
- S. Product Data: Submit catalog data sheets or other published materials showing appearances, electrical ratings characteristics and connection requirements, performance characteristics, dimensions, weights, installation methods, and space requirements of electrical equipment and their accessories, as listed below and required by the individual sections.
  - 26 05 00 Common Work Results for Electrical
  - 26 05 19 Conductors and Cables (600V and Below)
  - 26 05 26 Grounding
  - 26 05 29 Hangers and Supports for Electrical Systems
  - 26 05 33 Raceways and Boxes for Electrical Systems
  - 26 05 38 Cable Bus for electrical systems
  - 26 05 39 Trenwa precast trench solution
  - 26 05 43 Underground Ducts and Raceways for Electrical Systems
  - 26 05 48 Vibration and Seismic Controls for Electrical Systems
  - 26 05 53 Identification for Electrical Systems
  - 26 09 23 Lighting Control Devices
  - 26 22 13 Low-Voltage Transformers
  - 26 27 26 Wiring Devices
  - 26 28 13 Fuses
  - 26 28 16 Enclosed Switches and Circuit Breakers
  - 26 43 00 Surge Protective Devices
  - 26 50 00 Lighting
  - 27 05 28 Low Voltage Raceway Distribution
- T. Shop Drawings: Submit shop drawings (drawn to scale) indicating physical size and arrangement, (plans and elevations) construction details, provisions for conduits, access requirements for installation and maintenance, finishes, and materials used in fabrication. Supplement shop drawings with wiring diagrams and information as described under Product Data. Provide shop drawings for the following and as required by the individual sections:

26 05 38	Cable Bus for electrical systems
26 05 39	Trenwa precast trench solution
26 24 16	Panelboards
26 41 00	Lightning Protection System for Structures
28 31 11	Digital Addressable Fire Alarm System

U. Manufacturer's Instructions:

1. Indicate application conditions and limitations of use stipulated by product testing agency specified under regulatory requirements.
2. Include instructions for storage, handling, protection, examination, preparation, operation and installation of product.
3. Include instructions on manufacturer's requirements for cable restraint in equipment.
4. Submit manufacturer's standard and recommended receiving start up and acceptance testing checklists.

V. In addition to copies of submittals as required under Operation and Maintenance Manuals, provide electronic copies on CDs or DVDs of all submittal information in PDF or Microsoft Word format with O&M manuals.

## **1.7 EXTRA MATERIALS**

- A. Provide extra materials as specified in each section.
- B. Extra materials shall be turned over to the Owner prior to receiving final payment. Obtain itemized receipt properly signed and dated. Submit with request for final payment.
- C. Extra materials shall be in original standard manufacturer's packaging.

## **1.8 PROJECT RECORD DOCUMENTS**

- A. Provide and submit under provisions of Division 1 and this Section the following:
1. Record Drawings
  2. Specifications
  3. Product Data
  4. Operation and Maintenance Manual.
  5. Equipment Warranties.
  6. Certification of proper disposal of regulated materials.
- B. Refer to Division 1 for additional Project record document requirements beyond those indicated herein.
- C. Provide and maintain at the site a set of prints on which shall be accurately indicated the actual installation of all work under this Division, indicating any variation from Contract Drawings, including change orders, field conditions, Architect's direction and changes in sizes, locations and dimensions. Changes in circuitry shall be clearly and completely indicated as the work progresses. Modify Schedules to reflect data consistent with that of the installed equipment.
- D. Record Drawings shall be maintained in a clean, dry and legible condition and shall not be used for construction purposes.
- E. These progress prints shall be available for inspection by the Architect and shall be used to determine the progress of electrical work. Indicate daily progress by color-coding materials

and apparatus installed. Progress prints shall be reviewed weekly and shall be corrected immediately if found inaccurate or incomplete. Drawings will be used as a guide for determining the progress of the work installed. Requisitions for payment will not be approved until the Drawings are accurate and up-to-date.

- F. At the completion of the work, obtain and pay for a CADD set of record drawings, modify drawings to represent the work as actually noted on the marked-up prints, including the DIMENSIONED location of all underground conduit. Remove all superseded data to show only the completed installation. Mark all Drawings as "Final Record Drawings" and date them.
- G. Electronic files shall be AutoCad 2008 or 3D or Revit.
- H. Provide phase load data and final circuit identification for all panelboards as part of Record Drawing submittal.
- I. Furnish these record documents to the Architect for review and transmission to the Owner.

#### **1.9 OPERATING INSTRUCTIONS AND MAINTENANCE (O&M) DATA**

- A. In addition to the requirements of Section 01 78 23, provide the following: After completion of the work and prior to final completion furnish and deliver three copies of a complete O&M manual. Each manual shall include one copy of each approved shop drawing, catalog pages, instruction sheets, operating instructions, installation, instructions and recommended maintenance procedures and intervals, and spare parts bulletins. Provide separate sections for each separate system, i.e., power system, lighting system, fire alarm system, sound system, security system, etc.
- B. Give detailed instructions, using O&M manuals, prior to final completion of work, to the responsible personnel designated by the Owner in the operation and maintenance of all work installed under this Division. A letter with two copies containing the name of the person or persons to whom the instructions were given and the dates of the instruction period shall be submitted to the Architect at the completion of the project. Provide instructions for the following:
  - 1. Electrical service, switchboards and switchgear.
  - 2. Generator system.
  - 3. Transfer switch operation.
  - 4. Roll up generator and load bank connection procedures.
  - 5. Lighting control system.
  - 6. Fire alarm system.
  - 7. UPS system.
  - 8. PDU system.
  - 9. Static Transfer Switch
  - 10. Electrical metering.
- C. Prepare sets of manufacturer's catalogs, and other similar data, including the necessary photographic equipment cuts, wiring diagrams covering all mechanical equipment and devices under this Section. These manuals shall provide complete instructions for the proper operation and use of the equipment, together with instructions for lubrication and periodic maintenance and trouble-shooting. Operating instructions shall be specific for each system and shall include copies of posted specific instructions. This manual shall contain only that information which specifically applies to this Project and all unrelated material shall be deleted. During the instruction period, this manual shall be used and explained. The material shall be bound in 3-ring binders, indexed and have a Table of Contents. On the edge of the binder, provide a clear, see-through plastic holder with a typed card indicating the Project name, the Architect's name, the Installer's name and the Volume number (e.g., Vol. No. 1 of 2).

- D. Include a copy of all inspection sign offs, test reports and certifications in the O&M Manuals.
- E. Include name, address and telephone number of the manufacturer's representative and service company for each piece of equipment so that the source of replacement parts and service for each item of equipment can be readily obtained.
- F. Provide three copies of the O&M manual information on CD ROM or DVD. Files shall be in a readable format such as PDF or image files (TIF, etc). Record drawings shall be scanned in, and shall also include the AutoCad dwg files if Record Drawings are provided on Cad.
- G. Furnish these manuals to the Architect for review and transmission to Owner.

#### **1.10 WARRANTY**

- A. Refer to individual sections and Division 1 for additional warranty (guarantee) requirements.
- B. Remedy work performed under this Division that is found not to comply with the Contract Documents, requires excessive service, or fails less than one year from the date of final acceptance.
- C. Manufacturers shall provide their standard warranties for material and equipment furnished under this Division, unless otherwise indicated in each Section.
- D. Materials, equipment and work furnished under this Division shall be guaranteed against all defects in materials and workmanship for a period of one year, commencing with the date of final acceptance by the Owner. Any failure due to defective material, equipment or workmanship shall be corrected as quickly as possible and at no expense to the Owner, including all damage to areas, materials and other systems resulting from such failures.
- E. Upon receipt of notice from the Owner of failure of any part of the systems during the guarantee period, the affected parts shall be replaced as quickly as possible. Any equipment requiring excessive service (more than two unscheduled services) shall be considered defective and shall be replaced.

#### **1.11 LEED / SUSTAINABILITY**

- A. Comply with the requirements of Section 01 81 13 – Sustainable Design Requirements.
- B. Minimize packing materials delivered to the site to minimize waste and maximize opportunity for qualifying for LEED points.

#### **1.12 INTERPRETATION OF CONTRACT DOCUMENTS**

- A. Division One, General and Supplementary Conditions are in addition to the requirements indicated in Division 26, 27, and 28, Drawings and Specifications.
- B. Where Drawings or Specifications conflict or are unclear, advise Architect in writing before Award of Contract. Otherwise, interpretations of Contract Documents by the Architect shall be final, and no additional compensation shall be permitted due to discrepancies or unclarities resolved according to the Architect's interpretation.
- C. The intent of the Drawings and Specifications is to assist and guide and to establish minimum requirements.

- D. Drawings and Specifications form complimentary requirements; provide work specified and not indicated, and work indicated and not specified as though explicitly required by both.
- E. Should there be conflicts in Contract Documents, provide the greater quantity, the higher quality and the more restrictive of equipment and work.
- F. Electrical Drawings do not limit responsibility of determining full extent of work required by Contract Documents. Refer to Architectural, HVAC, Electrical, Telecommunications, Security, Plumbing, Fire Protection, Structural, specialty trades and other Drawings and other Divisions that indicate types of construction in which work shall be installed and work of other trades with which work of this Division must be coordinated.
- G. Except where modified by a specific notation to the contrary, it shall be understood that the indication and/or description of any item, in the Drawings or Specifications or both, carries with it the instruction to furnish and install the item, regardless of whether or not this instruction is explicitly stated as part of the indication or description.
- H. Items referred to in singular number in Contract Documents shall be provided in quantities necessary to complete work.
- I. Where Drawings or Specifications do not coincide with manufacturer's recommendations, or with applicable Codes and Standards, alert Architect in writing before installation. Otherwise, make changes in installed work as Architect requires within Contract Price.
- J. It is the intent of these Contract Documents to have systems and components that are fully complete and operational and fully suitable for the intended use. There may be situations in the documents where insufficient information exists to precisely describe a certain component or subsystem, or the routing of a component. In cases such as this, where the bidder has failed to notify the Architect of the situation prior to contract award, provide the specific component or subsystem with all parts necessary for the intended use, fully complete and operational, and installed in workmanlike manner either concealed or exposed per the design intent.
- K. In situations or where potential conflicts and Installer believes guidance is required, submit a sketch identifying a proposed solution and the Architect shall review, note if necessary, and return this sketch appropriately marked as required.
- L. Portions of these Drawings and Specifications are abbreviated and may include incomplete sentences. Infer the omitted words or phrases such as "the Contractor shall", "shall be", "as indicated on the Drawings", "in accordance with details", "a", "the", and "all".
- M. "As permitted" means by Code, by Architect or by prevailing conditions.
- N. "Acceptable", "approved", and "satisfactory" means by Architect.
- O. Work indicated on the Drawings is intended to be approximately correct to scale, but figures, dimensions, and detailed Drawings are to be followed. Take measurements at the building before fabrication commences.
- P. Size of pipes or conduits and methods of installing them are indicated, but it is not intended to show every offset and fitting, nor every structural difficulty that may be encountered.
- Q. Drawings are generally diagrammatic and indicate the arrangement and approximate location of fixtures, equipment and conduits. When necessary to deviate from the arrangement indicated, to meet structural conditions or to clear work of other Divisions, inform the Architect

of proposed deviation before proceeding. Obtain in the field all information relevant to the placing of electrical work.

- R. Drawings and Specifications do not undertake to indicate every item required to produce a complete and properly operating installation. Materials, equipment or labor not indicated but which can be reasonably inferred to be necessary for a fully complete, secure and properly operating installation suitable for the intended use shall be provided.
- S. The right is reserved to make reasonable changes in locations of equipment indicated in Drawings prior to installation without increase in contract cost.
- T. Schematic diagrams shown on the drawings indicate the required functions only. Standard circuits of the particular manufacturer may be used to accomplish the functions indicated without exact adherence to the schematic drawings shown. Furnish additional wiring or conduit required for such deviations.
- U. Generally, except in the case of certain raceways and empty and underground raceways, the runs of feeder, branch circuits, communications and signal systems raceways are not indicated on the drawings. Final determination as to the routing shall be governed by structural conditions, and interferences with other trades and by terminal locations on apparatus.
- V. Contract Documents indicate scope of work required. Jurisdictional assignment shall be a responsibility under this Section's contractual obligation.
- W. The Term "Conduit" or "C" is used on the Drawings as a generic term for raceways. The exact raceway to be used shall be as specified in the specifications or notes.
- X. The following definitions apply to the Drawings and Specifications:
  - Furnish: The term "furnish" is used to mean "supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations."
  - Install: The term "install" is used to describe operations at project site including the actual "unloading, unpacking, rigging in place, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations".
  - Provide: The term "provide" means to "furnish and install, complete and ready for the intended use".
  - Installer: An "Installer" is the Contractor or an entity engaged by the Contractor, either as an Employee, Subcontractor, or Sub-Subcontractor for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

### **1.13 TEMPORARY LIGHT, POWER AND FIRE ALARM**

- A. Work provided under Division 1.

## **PART 2 - PRODUCTS**

### **2.1 SPECIFIED PRODUCTS AND SUBSTITUTIONS**

- A. Provide new, unused, full weight, standard equipment that meets or exceeds Contract Document requirements to the satisfaction of the Architect. No equipment or material shall be used unless previously approved by the Architect.
- B. The manufacturer's catalog number and description is the basis of the design and establishes quality and performance required for this project. Generally, the first manufacturer listed is the one the project design is based on.
- C. Manufacturers of generally compatible products may also be listed, subject to compliance with requirements. Substitution of equal products or manufacturers of equal products are also acceptable when indicated in each section.
- D. The description following a catalog number is basically to identify the item but may also call for accessories, options, or modifications that are beyond the cataloged item.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Prior to beginning work in a particular area of the project visit the site and examine conditions under which work must be performed, including preparatory work done under other Divisions or Contracts or by the Owner. Report conditions that might affect work adversely in writing through Contractor to Architect. Do not proceed with work until defects have been corrected and conditions are satisfactory. Commencement of work shall be construed as complete acceptance of existing conditions and preparatory work.
- B. Arrangements shall be made to have the openings, inserts, sleeves and other such incidentals set in place ahead of the construction work, where practical to eliminate the need for cutting and patching. If cutting becomes necessary for the installation of the work, it shall be done under this Division in accordance with the requirements of Division 1 and other applicable Divisions. All openings shall be neatly patched and finished to match the adjoining work in a manner approved by the Architect, any penetration in fire-rated walls or floors must be fire-stopped as indicated in Division 7 and Section 26 05 00 – Common Work Results for Electrical. All cutting shall be performed in a manner not to weaken the structural parts. The cutting manner and method shall meet the approval of the Architect.
- C. The equipment shall be kept upright at all times. If equipment has to be tilted for ease of passage through restricted areas, the manufacturer shall brace the equipment to ensure that the tilting does not impair the functional integrity of the equipment. Comply with manufacturer's requirements.

### **3.2 INSTALLATION**

- A. Do not cut structural members without written acknowledgement from the Architect.
- B. Do not attach to metal roof decking.
- C. Arrange equipment so working parts are accessible for inspection, repair, and renewal.
- D. Where not specified or indicated, mount equipment at heights directed by the Architect.



- E. Generally, the Drawings do not show wiring. Provide wiring to best suit circuiting indicated on the Drawings.
- F. Single-phase non-lighting circuits require separate neutrals. Circuits to data processing equipment and isolated or dedicated circuits require separate neutrals. Circuits for lighting may use common neutrals as allowed by the Electric Code. Systems furniture shall use common neutrals as indicated on the Drawings.
- G. Do not combine or reduce the number of homeruns indicated on the Drawings without written acknowledgement from the Architect.
- H. Locate pull boxes, panelboards, control pushbuttons, terminal cabinets, safety switches and such other apparatus as may require periodic maintenance, operation, or inspection, so that they are easily accessible. If such items are shown on the plans in locations which are found to be inaccessible, advise the Architect of the situation before work is advanced to the point where extra costs will be involved.
- I. Circuits on panelboards shall be field connected to result in evenly balanced loads on each phase.
- J. The panelboard circuit numbering system is for outlet grouping purposes only indicate the final circuit identification on the Record Drawings and the panelboard schedules.
- K. Any work installed contrary to Contract Drawings shall be subject to change as directed by the Architect, and no extra compensation will be allowed for making these changes.
- L. Where installed in damp, wet and areas requiring washing down, all surface mounted panel boxes, junction boxes, conduit, etc., shall be supported by spacers to provide a clearance between wall and equipment.
- M. All connections to equipment shall be made as required, and in accordance with the approved shop and setting drawings.
- N. Unless otherwise approved by the Architect, conduit indicated exposed shall be installed exposed; conduit indicated concealed shall be installed concealed.
- O. Where exact locations are required for roughing in, stubbing-up and terminating conduit request Shop Drawings, equipment location drawings, foundation drawings, and any other data required to locate the concealed conduit before the floor slab is poured or wall or ceiling is installed.
- P. Verify the ceiling type, ceiling suspension system and clearance above hung ceilings prior to ordering lighting fixtures. Notify the Architect of any discrepancies.
- Q. Fire ratings of enclosures, walls, ceilings, and floors shall be maintained. Penetrations for electrical Work shall be fire-stopped as indicated in Division 7, Section 26 05 00, or indicated in individual Sections on Drawings, or by Architect. Review Architectural drawings for fire ratings.
- R. Smoke ratings, acoustical, water tightness of enclosures, walls, ceilings, and floors shall be maintained. Provide necessary fittings, accessories and coordination as required.
- S. Do not use powder actuated tools or anchors without written permission from the General Contractor or Construction Manager. Only allow personnel who are properly trained and licensed to use the powder actuated tools.

### **3.3 TESTING AND STARTUP**

- A. Provide start up and acceptance testing as indicated in individual sections and in Section 26 08 13. Submit written results.
- B. Assist Owner in performing Integrated Systems Testing.

### **3.4 INSTRUCTIONS**

- A. For additional requirements for starting, demonstration, and instructions of systems refer to Division 1.
- B. Provide starting, demonstration, and instructions of systems as required in individual Sections.
- C. Insure that the Owner's operating personnel are made entirely familiar with the nature, operation, and maintenance of the systems and equipment provided under this Division.

### **3.5 SUBSTANTIAL COMPLETION**

- A. For additional requirements refer to Section 01 77 00 Closeout Procedures.
- B. When Work under this Section (or designated portion of Work) is considered substantially complete, submit written notice through the General Contractor with a list of items remaining to be completed or corrected.
- C. All systems shall be operational and tested. Submit test reports.
- D. Submit local authority final sign off inspection reports. Include copy in O&M manuals.
- E. Should Architect observe and find Work is not substantially complete, written notification will be provided listing observed deficiencies.
- F. Remedy deficiencies and send a second written notice of substantial completion.
- G. When Architect finds Work is substantially complete, a Certificate of Substantial Completion will be prepared in accordance with provisions of General Conditions.
- H. Submit test reports for review prior to Architect's site visit.

### **3.6 FINAL COMPLETION**

- A. For additional requirements refer to Section 01 77 00 Closeout Procedures.
- B. When Work under this Section is considered complete, submit through the General Contractor written certification that:
  - 1. Contract documents have been reviewed.
  - 2. Work has been inspected for compliance with Contract Documents.
  - 3. Work has been completed in accordance with Contract Documents (and deficiencies listed with Certificate of Substantial Completion have been corrected).
  - 4. Equipment and systems have been tested, adjusted and balanced and are fully operational.
  - 5. Work is complete and ready for final Architect review.

- C. Upon completion of all work, and as a condition to receiving final payment, furnish to the Architect the following original, signed certificates and include copies of these certificates as part of the Operation and Maintenance manuals:
  - 1. From the manufacturer's authorized representative, stating that authorized factory engineers have inspected and tested the operation of their respective equipment and found same to be installed in accordance with the manufacturer's requirements and to be in satisfactory operating condition. This certification shall be provided for all major equipment and for all complete systems. It is not required for other components unless specifically requested by the Architect.
  - 2. Certificates of inspections, letters and notices from the appropriate government-authorized inspectional authorities stating that all portions of the work (indicate trade and responsibility) have been inspected and are installed in conformance with the applicable codes, laws, ordinances and referenced standards. If non-conformance notices are received, include the re-inspection certificate, letter of explanation, etc. as required to indicate complete conformance. Provide written evidence of all variations, exceptions, variances, etc. given by the inspectors.
  - 3. Certificate from the Installing firm responsible for the work (indicate trade and responsibility) signed by an authorized officer or owner of the Firm and the Foreman or Project Manager in charge, stating that to the best of the signer's knowledge and belief that the project (indicate project name and address) has been installed in compliance with the Contract Plans, Specifications and Addenda, and all applicable codes and laws, ordinances and referenced standards. Where subcontractors perform a portion of the work of this Section, include certificates from them.
- D. Should Architect observe and find Work incomplete, the review will be promptly suspended and written notification will be provided through the General Contractor.
- E. Complete Work, remedy deficiencies and send a second certification of final completion.
- F. Architect shall, upon receipt of a second certification of completion, make a second review and provide notification in writing through the General Contractor, listing observed deficiencies.
- G. When Architect finds work complete, close-out submittals will be considered.

**END OF SECTION**