

SECTION 26 00 01

ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. The Conditions of the Contract and applicable requirements of Divisions 0 and 1 and this Section govern the work of this Division.

1.2 DESCRIPTION OF WORK: All Contractors and employees shall be state licensed.

- A. Work Included: This Work of this Division includes the furnishing of all supervision, labor, materials, supplies, equipment, fixtures, apparatus, appurtenances, transportation, storage, utilities, permits and licenses required for complete installation of complete, tested and operating electrical systems as shown on the drawings and specified or as reasonably inferred there from, in place and ready for service. Refer to Section 26 00 02, "Electrical Scope of Work", for additional requirements. All work performed under this Section shall be current NEC code and performed in a workmanlike manner in accordance with the Drawings and Specifications and industry standards and subject to the terms and conditions of the Contract. For purposes of these Specifications, "provide" and "furnish and install" shall be synonymous.
- B. Drawings: Refer to the Electrical Drawings for graphic representations, schedules, and notations of required electrical work.
- C. Specifications: Refer to this Division and related Divisions for the primary technical specifications of electrical work.
- D. Work of Other Sections: Requirements given within this Section apply to the Work of all Sections of this Division. The actual performance of the Work stays within the Section in which it occurs; but subject to the requirements of this Section to the extent applicable.

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1. **[Finish painting of electrical systems in areas exposed to the view of building occupants is specified in other Divisions.]** All prime, **[finished,]** and protective painting for all areas, **[and finished painting of electrical systems in areas not exposed to the view of building occupants]** shall be provided under this Division.
2. Installation of electrical control power which is not specified as an integral part of equipment specified under Divisions 21, 22, 23 and 25 shall be provided under this Division.
3. Access doors in finished surfaces **[shall be provided under this Division and installed by the Contractor installing the finished surface.] [are specified under other Divisions]**. Locations are shown on the Drawings and as required for proper equipment access.

4. Concrete housekeeping pads[, **curbs**][, **ductbank encasement**] and supporting structures are specified under **[other] [this]** Division**[s]**. Dimensions and locations of pads and supports shall be the responsibility of this Division.
5. Owner and General Contractor-furnished equipment is furnished and installed under other Divisions. Proper electrical provisions, including rough-in and final equipment connections, are included in the Work of this Division.
6. Motors for all equipment shall be furnished and installed by the Division(s) providing the equipment.
7. Motor starters and controllers that are furnished as an integral part of the equipment shall be furnished and installed by the Division(s) shall be wired and connected by this Division.
8. Variable speed drives which are furnished with controlled equipment shall be provided by the Division(s) providing the equipment to this Division for installation, wiring and connections by this Division.
9. All other motor starters and associated electrical wiring and connections are included in the Work of this Division.

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10. Standby engine-driven emergency generator exhaust piping shall be furnished, installed and insulated under Division 23. Exhaust silencer(s), flexible exhaust connector(s), ventilated exhaust thimble(s) and condensation trap(s) shall be provided by this Division and installed and insulated (as required) under Division 23.
11. Standby engine-driven emergency generator cooling supply and exhaust air ductwork and dampers shall be furnished and installed under Division 23. Engine generator set-mounted closed-circuit radiator and engine-driven fan shall be furnished under this Division.

1.3 CODES, PERMITS AND FEES: See also UH Design Guidelines Section 12.0

- A. General: Comply with the most recently revised versions of applicable laws, rules, regulations, and ordinances of federal, state, and local utilities and authorities. Where alterations to and deviations from the Contract Documents are required by said authority, report the requirements and secure approval before starting work. Obtain all applicable permits, licenses and inspections and pay all fees charged by above authorities.

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- B. Code Design Basis: The following codes and ordinances were used in the design of the project and shall be complied with during construction of the project.

1. Building Code - _____, current Edition.
2. Fire Code - _____, current Edition.
3. Electrical Code - _____, current Edition.
4. Mechanical Code - _____, _____ Edition.

5. Plumbing Code - _____, _____ Edition.
6. Energy Code - _____, _____ Edition.
7. Accessibility Code- **[Texas Accessibility Standards(TAS), 1994 and]** Americans with Disabilities Act of 1990.

C. **Precedence:** Where Contract Document requirements are in excess of Code requirements and are permitted under the Code, the Contract Documents shall govern. None of the terms or provisions of the Drawings or specification shall be construed as waiving any of the rules, regulations or requirements of these authorities. In the event of conflict between the Contract Documents and the local enforcing authority, the latter shall rule. Any modifications resulting there from shall be made without additional cost to the Owner or Engineer. This Contractor shall report any such modifications to the Engineer and secure his approval before proceeding.

1.4 QUALITY ASSURANCE AND STANDARDS:

- A. **Materials/Methods:** Manufacturers, materials, and methods described in the various sections of the Specifications, and indicated on the Drawings are intended to establish a standard of quality only. It is not the intention of the Engineer to discriminate against any product, material or method that is equal to the standards as indicated and/or specified, nor is it intended to preclude open, competitive bidding. The fact that a specific manufacturer is listed as an acceptable manufacturer should not be interpreted to mean that the manufacturers' standard product will meet the requirements of the project design, Specifications and space constraints. **The Engineer shall be the sole judge of quality and equivalence of equipment, materials and methods.**
- B. **Alternative Products/Materials/Methods:** Products by other reliable manufacturers, other materials, and other methods may be accepted provided they have equivalent capacity, construction, and performance. **Under no circumstances shall any substitution be made without the prior written approval of the Engineer and Owner.** Wherever a definite product, material or method is specified and there is not a statement that another product, material or method will be acceptable, it is the intention of the Engineer that the specified product, material or method is the only one that shall be used without prior approval. Wherever a definite material or manufacturer's product is specified and the Specification states that products of similar design and equal construction from the specified list of manufacturers may be provided, it is the intention of the Engineer that products of manufacturers that are specified are the only products that will be acceptable and that products of other manufacturers will not be considered for substitution without prior written approval.
- C. **Alternative Equipment:** Where substituted or alternative equipment is used on the project, it shall be the responsibility of the Contractor or Subcontractor involved to verify that the equipment will fit in the space available, including all required Code and maintenance clearances, and to coordinate all equipment requirements and provisions with the Electrical Design and all other Contractors and Subcontractors shall obtain approval of Owner.
- D. **Compatibility:** Provide products which are compatible with other products of the electrical work, and with other work requiring interface with the electrical work, including electrical connections and control devices. For exposed electrical work, coordinate colors and finishes

with other work. Determine in advance of purchase that equipment and materials proposed for installation will fit into the confines indicated, leaving adequate clearance as required by applicable codes and for adjustment, repair, and replacement.

E. Standards: Refer to Divisions 0 and 1 for general administrative/procedural requirements related to compliance with applicable standards. This Work and all materials shall meet the standards set forth in the applicable portions of the following recognized standards:

1. AEIC Association of Edison Illuminating Companies.
2. ANSI American National Standards Institute.
3. ASHRAE American Society of Heating, Refrigerating & Air-Conditioning Engineers.
4. ASME American Society of Mechanical Engineers.
5. ASPE American Society of Plumbing Engineers.
6. ASSE American Society of Sanitary Engineering.
7. ASTM American Society for Testing and Materials.
8. AWS American Welding Society.
9. CBM Certified Ballast Manufacturers.
10. CDA Copper Development Association.
11. CE Corps of Engineers (U. S. Department of the Army).
12. EIA Electronic Industry Association.
13. ETL Electrical Testing Laboratory.
14. FAA Federal Aviation Administration (US Department of Transportation).
15. FCC Federal Communications Commission.
16. FM Factory Mutual Engineering Corporation.
17. FS Federal Specification (General Services Administration).
18. ICEA Insulated Cable Engineering Association.
19. IEEE Institute of Electrical and Electronics Engineers.
20. IES Illuminating Engineering Society of North America.
21. IRI Industrial Risk Insurers.
22. LPI Lighting Protection Institute.
23. MIL Military Standardization Documents (US Dept. of Defense).
24. MSS Manufacturers Standardization Society of the Valve and Fittings Industry.
25. NEC National Electrical Code (by NFPA).
26. NECA National Electrical Contractor Association.
27. NEMA National Electrical Manufacturers Association.
28. NFPA National Fire Protection Association.

- 29. OSHA Occupational Safety Health Administration (US Department of Labor).
- 30. UL Underwriters' Laboratories, Inc.

1.5 SITE VISIT AND FAMILIARIZATION:

- A. General: Become familiar with the Drawings and Specifications, examine the premises, and understand the conditions under which the Contract shall be performed, prior to submitting a bid.
- B. Site: Be informed of the site conditions, verify locations of new and existing equipment, and determine exact requirements for connections.
- C. Coordination: Submission of a bid for this project infers that the Contractor has visited the site and has become familiar with the Drawings and site conditions and has included in his proposal, all work necessary to properly install the systems on the project.
- D. Pre-Bid Conference: Refer to Divisions 0 and 1.

1.6 DRAWINGS AND SPECIFICATIONS:

- A. General: The Drawings are schematic in nature and indicate approximate locations of the electrical systems, equipment, fixtures and devices, except where specific locations are noted and dimensioned on the Drawings. All items are shown approximately to scale. The intent is to show how these items shall be integrated into the building. Locate all items by on the job measurements and in accordance with the Contract Documents. Cooperate with other trades to ensure project completion as indicated.
- B. Location: Prior to locating electrical devices, light fixtures, and other items, obtain the Architect/ Engineer's approval as to exact location. Locations shall not be determined by scaling Drawings. Mount lighting fixtures and electrical devices at the heights directed by the Architect/Engineer. Where there is a question concerning the required location for items of electrical work, the Contractor shall submit a request for information to the Architect/Engineer requesting specific directions for locating the item. Contractor shall be responsible for costs of redoing work of trades necessitated by failure to comply with this requirement.
 - 1. All electrical devices, lighting fixtures, and other devices shall be referenced to coordinated, established data points and shall be located to present symmetrical arrangements with these points and to facilitate the proper arrangements of building construction details, acoustical tile panels and other building features with respect to the mechanical and electrical outlets and devices. Electrical devices, fixtures, and outlets shall be referenced to such features as wall and ceiling furrings, balanced border widths, masonry joints, etc. Outlets in acoustical tile shall occur symmetrically in tile joints or in the centers of whole tiles and the exact location of each outlet and the arrangements to be followed shall be acceptable to the Architect/Engineer. Outlets in wall tile or masonry construction shall occur symmetrically in the centers of whole tiles, bricks, or blocks and the exact location of each outlet and the arrangement to be followed shall be acceptable to the Architect/Engineer.
 - 2. The Drawings show diagrammatically the location of the various outlets and apparatus. Exact locations of these outlets and apparatus shall be determined by reference to the Architectural Drawings and to all detail Drawings, equipment Drawings, rough-in

Drawings, etc., by measurements at the building, and in cooperation with the other trades. The Owner and Architect/Engineer reserve the right to make any reasonable change in location of any outlet or apparatus before installation, without additional cost to the Owner.

- C. Specifications: The specifications are intended to supplement the Drawings and it is not in the scope of the specifications to mention any part of the work which the Drawings are competent to fully explain. Conversely, any part of the work which the specification are competent to fully explain, may not be mentioned on the Drawings.
- D. Disagreement: Disagreement between the Drawings or specifications or within the Drawings or specifications shall be estimated using the better quality or greater quantity of material or installation, and a request for information shall be made to the Engineer.

1.7 DISCREPANCIES:

- A. Clarification: Clarification shall be obtained before submitting a proposal for the Work under this Division as to discrepancies or omissions from the Contract Documents or questions as to the intent thereof.
- B. Detailed Instructions: Should it appear that the work hereby intended to be done or any of the materials relative thereto, is not sufficiently detailed or explained in the Drawings or Specifications, then the Contractor shall submit a request for information to the Engineer for such further Drawings or explanations as may be necessary before proceeding, allowing a reasonable time for the Engineer to respond. The Contractor shall conform to this additional information as a part of the Contract without additional cost to the Owner or Engineer.
- C. Interpretations: Should any doubt or question arise respecting the true meaning of Drawings or Specifications, reference shall be made to the Engineer, whose written decision shall be final and conclusive. No alleged statement by the Engineer will be accepted as an excuse for inferior work.
- D. Contractor Agreement: Consideration will not be granted for misunderstanding of the amount of work to be performed. Submission of a bid conveys full Contractor agreement of the items and conditions specified, shown, scheduled, or required by the nature of the project.

1.8 UTILITIES:

- A. General: Utility information shown on the Drawings have been shown based upon data obtained from the site survey and the agencies having jurisdiction and are accurate to the best of the knowledge of the Engineer.
- B. Coordination: The Contractor shall be responsible for field verification of the actual location of site and/or building utilities and shall make modifications necessary for connection to or construction around those utilities at no additional cost to the Owner or Engineer.

1.9 TEMPORARY FACILITIES:

- A. General: Refer to Uniform General Conditions and Divisions 0 and 1 for requirements concerning temporary electrical facilities.

1.10 CHANGE ORDERS:

- A. General: Refer to Uniform General Conditions and Divisions 0 and 1 for requirement concerning Change Orders.

1.11 ALTERNATES:

- A. General: Refer to Divisions 0 and 1 for information concerning Alternates.

1.12 UNIT PRICES:

- A. General: Refer to Divisions 0 and 1 for information on required Unit Prices which are part of the project bid.

1.13 PRECONSTRUCTION CONFERENCE:

- A. Conference: Upon the award of this Contract and prior to commencing any work, the Contractor and his designated major subcontractors, shall confer with the Architect, Engineer and Owner concerning the Work under this Contract. The conference shall be at a mutually agreeable place and time.

1.14 SITE OBSERVATION:

- A. General: Observation at the site to verify general compliance with Contract Documents shall be made periodically by the Engineer or his representative. Written observation comments shall be submitted to the General Contractor for review and a written response.

1.15 REQUESTS FOR INFORMATION (RFI):

- A. General: All Contractor Requests for Information (RFI's) shall be submitted to the Engineer in writing, for response.
- B. Format: All RFI's shall be submitted on a form which includes the date, a sequential RFI number, the requested information and space for the Engineer's response, signature and date. RFI's shall be submitted to the Engineer in a electronic format (unprotected pdf, doc/docx or xls/xlsx format) for response.
- C. Responses: The Engineer will endeavor to provide RFI response time in the Engineer's office of five working days after receipt of the RFI by the Engineer.

1.16 SUBMITTALS:

- A. General: Submittals required for this project shall include, but not be limited to:
 - 1. Shop Drawings and Product Brochure Submittals.
 - 2. Certifications and Test Reports.
 - 3. Operating and Maintenance Manuals.
 - 4. Warranties (Guarantees).
- B. Refer to Division 1 for additional submittal requirements.
- C. Shop Drawings and Product Brochure Submittals: The Contractor shall submit one electronic (unprotected pdf format) copy or a sufficient number of complete bound hardcopy sets of Shop Drawings and complete data covering each item of equipment or material. The terms

"Submittal" and "Shop Drawing" in this Specification are defined as either product literature, samples of equipment, or actual Shop Drawings. The first submittal of each item requiring a submittal must be received by the Engineer within 90 days of contract award. The Engineer shall not be responsible for any delays or costs incurred due to excessive Shop Drawing review time where the first submittal is received more than 90 days after contract award. The Architect [, **Owner,**] and Engineer will each retain one copy of all hardcopy Shop Drawing submittals for their files. The Contractor is required to include a copy of all final electrical Shop Drawing submittals in Electrical O&M manuals.

1. Contractor shall prepare complete submittals that include all pertinent information about the product. A single Shop Drawing shall not contain information from more than one Specification section, but a single Specification section may be subdivided into separate submittals for items or equipment that are specified in that section. Shop Drawings shall be separately bound by complete or partial Specification section. Where a single Shop Drawing contains information from more than one Specification section, it will be marked "REVISE AND RESUBMIT" and returned. Each Shop Drawing shall include the following items enclosed in a suitable binder, Shop Drawings that do not comply with the above requirements will be marked "REVISE AND RESUBMIT" and returned to the Contractor:
 - a. A cover sheet with the names and addresses of the Project, Architect, M/E/P Engineer, General Contractor, and the Subcontractor making the submittal. The cover sheet shall also contain the Specification section number applicable to the item or items submitted, the item nomenclature and description and a submittal number. Electrical submittals shall be numbered sequentially by Specification section with a sequence suffix (e.g. 26 22 00-1, 26 23 12-2, 26 25 01-1, etc.). Resubmittals shall be numbered with the original submittal number plus an "R" in the sequence suffix (e.g. the resubmittals of submittal 26 22 00-1 would be 26 22 00-1R1, 26 22 00-1R2, ...).
 - b. An index page with a listing of all data included in the submittal.
 - c. A list of variations. This page shall list all variations, including unfurnished or additional items or features between the submitted equipment and the specified equipment. If there are no variations, then this page shall state "No Variations". Where variations affect the work of other contractors, then the contractor shall certify on this page that these variations have been fully coordinated with the affected contractors and that all additional costs to the affected contractors associated with the variations shall be paid by the submitting contractor.
 - d. Equipment information including manufacturer's name and designation, size, performance and capacity data. All applicable listings, labels, approvals and standards shall be clearly indicated.
 - e. Dimensional data and actual sketches as applicable to show that the submitted equipment will fit the space available with all required Code and maintenance clearances.
 - f. Identification of each item of material or equipment matching that indicated on the Drawings.

- g. Sufficient pictorial, descriptive and diagrammatic data on each item to show its conformance with the Drawings and Specifications. Any options or special requirements shall be so indicated. All applicable information shall be clearly indicated with arrows or another approved method. Any non-applicable information shall be crossed out.
 - h. Additional information as required in other sections of this Division.
 - i. Certification by the General Contractor and Subcontractor that the material submitted is in accordance with the Contract Documents, signed and dated.
 - j. Reports or information requiring certification shall be certified by an authorized officer of the manufacturer or testing agency.
 - k. Certified Shop Drawings showing dimensions, loading details, anchor bolt locations, and inserts required for each piece of equipment set on concrete in sufficient time to cause no delay in the Work.
 - l. Equipment and material submittals shall show sufficient data including all performance data, recommended installation details, and sufficient data to indicate complete compliance with the Contract Documents, including proper sizes, clearances, capacities, materials, and finishes.
- D. Required Shop Drawing Submittals: Submit Shop Drawings, including, but not limited to the following items. Refer to individual specification sections for specific submittal requirements.

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| 1. Basic Materials and Methods | Refer to Section 26 05 01. |
| 2. Medium Voltage Conductors and Cable | Refer to Section 26 05 01. |
| 3. Low Voltage Conductors and Cable | Refer to Section 26 05 19. |
| 4. Undercarpet Wiring System | Refer to Section 26 05 20. |
| 5. Modular Wiring System | Refer to Section 26 05 21. |
| 6. Electrical Grounding | Refer to Section 26 05 26. |
| 7. Electrical Raceways | Refer to Section 26 05 33. |
| 8. Electrical Boxes | Refer to Section 26 05 34. |
| 9. Electrical Gutters and Wireways | Refer to Section 26 05 35. |
| 10. Electrical Cable Tray | Refer to Section 26 05 26. |
| 11. Short Circuit Analysis/Coordination Study | Refer to Section 26 05 73. |
| 12. Electrical Controls and Relays | Refer to Section 26 09 16. |
| 13. Lighting Control Devices | Refer to Section 26 09 23. |
| 14. Low-Voltage Lighting Control | Refer to Section 26 09 26. |
| 15. Central Dimming Systems | Refer to Section 26 09 33. |
| 16. Computer Center Site Monitoring System | Refer to Section 26 09 71. |

17. Secondary Unit Substations	Refer to Section 26 11 16.
18. Medium Voltage Pad-Mounted Transformers	Refer to Section 26 12 19.
19. Medium Voltage Switchgear	Refer to Section 26 13 13.
20. Medium Voltage Load Interrupter Switchgear	Refer to Section 26 13 16.
21. Low Voltage Transformers	Refer to Section 26 22 00.
22. Low Voltage Switchgear	Refer to Section 26 23 12.
23. Low Voltage Switchboards	Refer to Section 26 24 13.
24. Tenant Metering Cubicles	Refer to Section 26 24 14.
25. Panelboards	Refer to Section 26 24 16.
26. Isolated Power Panels and Accessories	Refer to Section 26 24 18.
27. Low Voltage Motor Control Centers	Refer to Section 26 24 19.
28. Feeder and Plug-in Busway	Refer to Section 26 25 01.
29. Overhead Plug-in Busway	Refer to Section 26 25 02.
30. Power Distribution Units	Refer to Section 26 26 00.
31. Electrical Service Entrance	Refer to Section 26 27 01.
32. Equipment Wiring	Refer to Section 26 27 17.
33. Miscellaneous Electrical Controls and Control Wiring	Refer to Section 26 27 18.
34. Elevator Equipment Provisions	Refer to Section 26 27 19.
35. Escalator Equipment Provisions	Refer to Section 26 27 20.
36. Voice/Data System Provisions	Refer to Section 26 27 21.
37. Master Antenna/Cable Television System Provisions	Refer to Section 26 27 22.
38. Audio/Visual System Provisions	Refer to Section 26 27 23.
39. Security System Provisions	Refer to Section 26 27 24.
40. Wiring Devices	Refer to Section 26 27 26.
41. Medium Voltage Fuses	Refer to Section 26 28 12.
42. Low Voltage Fuses	Refer to Section 26 28 13.
43. Enclosed Circuit Breakers	Refer to Section 26 28 17.
44. Enclosed Switches	Refer to Section 26 28 18.
45. Enclosed Motor Controllers	Refer to Section 26 29 13.
46. Electronic Variable Speed Drives	Refer to Section 26 29 23.
47. Engine Generators	Refer to Section 26 32 13.
48. Generator Paralleling Switchgear	Refer to Section 26 32 15.

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| 49. Battery Emergency Power Supply | Refer to Section 26 33 05. |
| 50. Static Uninterruptible Power Supply | Refer to Section 26 33 53. |
| 51. Capacitors | Refer to Section 26 35 13. |
| 52. Power Conditioning System | Refer to Section 26 35 23. |
| 53. Manual Transfer Switches | Refer to Section 26 36 13. |
| 54. Automatic Transfer Switches | Refer to Section 26 36 23. |
| 55. Automatic Transfer/Bypass-Isolation Switches | Refer to Section 26 36 24. |
| 56. Lightning Protection for Structures | Refer to Section 26 41 13. |
| 57. Transient Voltage Surge Protection Devices | Refer to Section 26 43 13. |
| 58. Indoor Lighting | Refer to Section 26 51 00. |
| 59. Exterior Lighting | Refer to Section 26 56 00. |
| 60. Voice/Data System Provisions/Cabling | Refer to Section 27 10 05. |
| 61. Low-Rise Fire Alarm System | Refer to Section 28 31 01. |
| 62. High-Rise Fire Alarm System | Refer to Section 28 31 02. |
| 63. Addressable Device Fire Alarm System | Refer to Section 28 31 03. |
| 64. High-Rise Addressable Device Fire Alarm System | Refer to Section 28 31 04. |
| 65. Coordination Drawings | as required by this Section. |
- E. Samples: Submit two samples, upon request, of electrical devices and materials for review by the Architect/Engineer. Samples will be returned upon written request of the Contractor.
- F. Shop Drawing Submittal Review: Shop Drawings will be reviewed for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Any action shown in review comments is subject to the requirements of the Contract Documents. The submitting Contractor is responsible for: dimensions which shall be confirmed at the job site; fabrication processes and techniques of construction; coordination of his work with that of all other trades; and the satisfactory performance of his work.
1. The Engineer will endeavor to provide a Shop Drawing review time in the Engineer's office of two weeks per review, exclusive of transmittal time, and this review time shall be considered by the Contractor when scheduling his work on the project.
 2. The Architect's review or approval and the Engineer's review of Shop Drawings shall not relieve the Contractor of the responsibility for errors, omissions or deviations that may be contained in the submittals. If the Contractor proceeds on the basis of undetected errors, omissions or deviations in reviewed Shop Drawings, it shall be at his sole responsibility and the review does not allow deviations from the requirements of the Contract Documents. Noting some errors, omissions, and deviations but overlooking other errors, omissions, and deviations does not grant the Contractor permission to proceed in error. Regardless of any information contained in the Shop Drawing or the

Engineer's review thereof, the Contract Documents shall govern the Work and are neither waived or superseded by the Shop Drawing review.

3. It shall be the responsibility of the submitting Contractor to check all equipment and materials for conformance with the Contract Documents and "REVIEWED WITH NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED" submittal at the time such equipment and materials are delivered to the job site, and to notify the Engineer of any deviations.
4. Inadequate or incomplete Shop Drawings will not be reviewed by the Architect or the Engineer and will be returned to the Contractor marked "REVISE AND RESUBMIT" for completion and resubmittal.
5. Shop Drawings will be marked "REVIEWED WITH NO EXCEPTIONS TAKEN", "MAKE CORRECTIONS NOTED", "MAKE CORRECTIONS NOTED AND SUBMIT WRITTEN RESPONSE", "REVISE AND RESUBMIT" or "REJECTED" when reviewed by the Engineer. The definitions of these terms for review purposes is as follows:
 - a. **REVIEWED WITH NO EXCEPTIONS TAKEN** - The Shop Drawing was reviewed and no exceptions from the general conformance with the design concept and general compliance with the information given in the Contract Documents were noted.
 - b. **MAKE CORRECTIONS NOTED** - The Shop Drawing was reviewed and found to have minor deviations from the requirements of the Contract Documents, as noted. A Shop Drawing resubmittal is not required, however, the furnished material/systems shall comply with the corrections noted in the submittal review.
 - c. **MAKE CORRECTIONS NOTED AND SUBMIT WRITTEN RESPONSE** - The Shop Drawing was reviewed and found to have either minor deviations from the requirements of the Contract Documents or information missing from the submittal, as noted. A complete Shop Drawing resubmittal is not required, however, a written response to all review comments shall be submitted in the format used for a resubmittal.
 - d. **REVISE AND RESUBMIT** - The Shop Drawing was reviewed and major deviations from general conformance with the design concept and general compliance with the information given in the Contract Documents were observed, as noted. The Shop Drawing shall be revised to eliminate the deviations noted and resubmitted.
 - e. **REJECTED** - The Shop Drawing was reviewed and is not in general conformance with the design concept or in compliance with the information given in the Contract Documents, as noted. A revised Shop Drawing submittal for the specified equipment or materials shall be resubmitted.
6. Division 1 and General Conditions requirements concerning Shop Drawing submittal review are not applicable to this Division.
7. Materials and equipment which are purchased or installed without a "REVIEWED WITH NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED" Shop Drawing review shall be at the risk of the Contractor and the cost for removal and replacement of such materials and equipment and related work which is judged unsatisfactory by the Architect/Engineer for any reason, shall be at the expense of the Contractor.

8. Shop Drawings shall be complete and checked prior to submission to the Engineer for review. **Where more than three reviews are required for a given Shop Drawing to reach "REVIEWED WITH NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED" status, the Subcontractor will be invoiced for extra services at a cost of \$100.00 per hour for review of the fourth and subsequent reviews.** If the Subcontractor fails to pay any legitimate extra services invoice in full within 30 days, then that invoice will be forwarded to the Architect/Owner requesting him to withhold payment of the amount invoiced from the next General Contractors request for payment as allowed for under the General Conditions of the Contract for Construction (AIA Document A-201). Incomplete submittals will be returned to the Contractor unchecked.
- G. Certifications and Test Reports: The Engineer may, at their option, witness any or all on and off-site acceptance and operational testing. Submit a detailed listing of certification and testing for each system indicating estimated dates for completion of system installation. This listing of certification and testing shall be submitted at least 30 days before any testing is conducted.
1. Test procedures and test result reporting forms shall be submitted for review no later than the date of the certification and testing listing submittal.
 2. Notify the Engineer in writing two weeks prior to all scheduled testing to allow time for Engineer to schedule witnessing of testing, where elected by the Engineer.
 3. Submit four copies of all certifications and test reports to the Engineer for review adequately in advance of completion of the Work to allow for remedial action as required to correct deficiencies discovered in equipment and systems.
 4. Certifications and test reports to be submitted shall include, but not be limited to those items outlined in Section 26 01 25 "Electrical Testing".
- H. Operating and Maintenance Manuals: Submit two copies of Operating and Maintenance Manuals to the Engineer for approval prior to the beginning of operator training. Provide four approved Operating and Maintenance Manuals for use in operator training. Manuals shall be bound in rigid cover, 3-ring binders with spine and cover labels and shall provide operating and maintenance information for every piece of equipment furnished under this Specification. All sections shall be typed and indexed into sections and labeled for easy reference. Bulletins containing information about equipment which is not installed on the project shall be properly marked up or stripped and reassembled. All pertinent information required by the Owner for proper operation and maintenance of applicable equipment supplied by Division 26, 27 and 28 shall be clearly and legibly set forth in memoranda which shall, likewise, be bound with bulletins. As a minimum, the following information shall be provided as applicable:
1. Complete description of each system, item of equipment, and apparatus provided under this Division, including ratings, capacities, performances, data and curves, characteristics identifying name and number, locations, and wiring diagrams, including sources for all parts.
 2. Fully detailed parts lists, including all numbered parts and recommended spare parts, of each item of equipment and apparatus provided under this Division.

3. Manufacturer's printed instructions describing operation, service, maintenance, and repair of each item of equipment and apparatus.
 4. Typed record of tests made of materials, equipment, and systems included under this Division. Such records shall state the dates the tests were conducted, name(s) of person(s) making and witnessing the tests, and citing any unusual conditions relevant to the tests.
 5. Identifying names, name tags designations and locations for all equipment.
 6. Fuse and motor heater information including location and use.
 7. Equipment and motor nameplate data.
 8. Copies of all approved Shop Drawing submittals.
 9. Fabrication drawings.
 10. Equipment and device bulletins and cutsheets clearly highlighted to show equipment installed on the project and including performance curves and data as applicable.
 11. Maintenance instructions clearly highlighted to show all required periodic maintenance and lubrication.
 12. Wiring diagrams.
 13. Operating instructions clearly highlighted to show proper operating procedures for all equipment.
 14. Exploded parts views and parts lists for all equipment and devices.
 15. Color coding charts for all painted equipment and conduit.
 16. Location and listing of all spare parts and special keys and tools furnished to the Owner.
- I. Tools: Provide and deliver to the Owner's authorized representative any special tools required for maintenance of systems, equipment, and apparatus installed under this Division prior to requesting final acceptance of the installation.

1.17 PROJECT RECORD DOCUMENTS:

- A. Site Prints: Maintain a set of clearly marked prints of the Contract Drawings at the job site which shall be used for recording the work details, final size, location, interrelation, and similar items of all work under this Division. This set of Drawings shall be corrected daily as the Work progresses and shall clearly indicate all changes to suit field conditions, changes made by "Field Order" or "Change Order", accurate dimensions of all buried or concealed work, precise locations of all concealed work, locations of all concealed boxes, controls and devices and any deviations from the work shown on the Construction Documents which are required for coordination. All dimensions shall be to at least two permanent structure points.
- B. Upon completion of the work, the Contractor shall clearly and legibly transfer all marks from the site prints to a set of reproducible Record "As-Built" Drawings using red pen or pencil. The reproducible Record "As-Built" Drawings shall have the Engineers Name and Seal removed or blacked out and shall be clearly marked and signed on each sheet as follows:

CERTIFIED RECORD DRAWINGS

DATE: _____

(NAME OF GENERAL CONTRACTOR)

BY: _____ (SIGNATURE)

(NAME OF SUBCONTRACTOR)

BY: _____ (SIGNATURE)

As-Built shall be redrawn by the Engineer before final inspection of the job. Two copies of final drawings shall be furnished to UH Plan Operations. Bottomline, the prints must make the job.

- C. Approval: Prior to final acceptance of the Work of this Division, the Contractor shall submit three prints of properly certified Record Drawings to the Engineer for review and shall make changes, corrections or additions as the Engineer may require to the Record Drawings. Two final sets furnished to UH Plan Operations, electronic and paper.

1.18 COORDINATION OF ELECTRICAL WORK:

- A. General: Refer to Division 1 for general coordination requirements applicable to the entire work. It is recognized that the Contract Documents are diagrammatic in showing certain physical relationships which must be established within the electrical work, and in its interface with other work including utilities and mechanical work and that such establishment is the exclusive responsibility of the Contractor. The Drawings show diagrammatically the sizes and locations of the various conduit and raceway systems and equipment items and the sizes of the major interconnecting distribution, without showing exact details as to elevations, offsets, control lines, and installation details. All major feeders 1-1/2" and over shall be also shown on site and floor plans.
 1. Arrange electrical work in a neat, plumb and straight well organized and workmanlike manner with services running parallel with primary lines of the building construction and with a minimum of 7' overhead clearance where possible. Maintain 4" clearance of other systems and 12" above ceiling.
 2. The Contractor shall carefully lay out his work at the site to conform to the architectural and structural conditions, to avoid obstructions and to provide proper grading of lines. Exact locations of outlets, apparatus and connections thereto shall be determined by reference to detail Drawings, equipment Drawings, roughing-in Drawings, etc., by measurements at the building and in cooperation with other Contractors and in all cases shall be subject to the approval of the Engineer. Relocations necessitated by the conditions at the site or directed by the Engineer shall be made without any additional cost to the Owner or Engineer.
 3. All conduit and boxes except those in the various equipment rooms, in unfinished spaces or where specifically designated herein or on the Drawings shall be run concealed in furrings, plenums and chases. Wherever conditions exist which would cause any of these items to be exposed in finished spaces, the Contractor whose work is involved shall immediately call the situation to the attention of the Engineer and shall stop work in those areas until the Owner's Representative or General Contractor directs

the resumption of the work. Submit for approval a Shop Drawing for any change in equipment placement, etc.

4. Equipment has been chosen to fit within the available space with all required Code and maintenance clearances and shall be installed as shown. Every effort has been made to also accommodate equipment of other approved manufacturers, however since equipment and access space requirements vary, the final responsibility for installation access and proper fit of substituted equipment rests with the Contractor with approval from Author by having jurisdiction.
5. System interferences shall be handled by giving precedence to pipe lines which require a stated grade for proper operation. Where space requirements conflict, the following order of precedence shall, in general, be observed:
 - a. Building lines.
 - b. Structural members.
 - c. Soil and drain piping.
 - d. Steam and condensate piping.
 - e. Sprinkler piping.
 - f. Vent piping.
 - g. Supply ductwork.
 - h. Exhaust ductwork.
 - i. Chilled water and heating hot water piping.
 - j. Domestic water piping.
 - k. Electrical conduit.
6. Locate electrical equipment properly to provide easy access. Arrange entire electrical work with adequate code access for operation and maintenance.
7. Advise other trades of openings required in their work for the subsequent move in of large units of electrical work (equipment).
8. Coordinate all items which will affect the installation of the work of this Division. This coordination shall include, but not be limited to: voltage, ampacity, capacity, electrical connections, space requirements, sequence of construction, building requirements and special conditions.
9. When submitting Shop Drawings on the project, this Contractor is indicating that all necessary coordination has been completed and that the systems, products and equipment submitted can be installed in the building and will operate as specified and intended, in full coordination with all other Contractors and Subcontractors.

B. Coordination Drawings:

1. Coordinate the work of all Subcontractors for this Division with the Contractors and Subcontractors responsible for this and other Divisions. Provide, in writing (with copies to the Engineer, Architect and Owner) all information necessary for coordination to

- permit the work of the project, including all Divisions, to be installed satisfactorily and with the least possible interference or delay.
2. This Divisions Contractors, in coordination with Contractors responsible for other Divisions, shall prepare a complete set of construction "Coordination Drawings" which shall be completed and submitted to the Engineer, Architect and Owner within **[one (1)] [two (2)] [three (3)]** months after notice to proceed is given to the General Contractor. If the General Contractor or any Subcontractor allows any work to be installed before coordinating with the work of other Subcontractors, the necessary changes for field coordination shall be made without extra cost to the Owner, Architect or Engineer.
 3. "Coordination Drawings" shall be drawn at a scale of not less than 1/4" = 1'0" and shall be originals or CAD plots, Drawings shall show actual equipment being provided and shall maintain all design drawing space allocations, designated dimensions, ceiling heights, chase dimensions, room sizes and required service clearances for the actual equipment being provided. Deviations from ceiling heights, chase dimensions, room sizes and similar requirements to the Construction Documents shall not be made without specific prior written authorization from the Architect.
 4. "Coordination Drawings" for interior construction shall show the coordinated locations for equipment, ductwork, piping, conduit, busway, devices, etc. and shall show all ductwork, all busway and all pipe and conduit larger than 2"C using double lines. Elevations shall be shown for all construction and horizontal dimensions from major construction to accessible column or building lines shall be shown. Where required for coordination, offsets shall be shown and sections shall be cut and drawn.
 5. "Coordination Drawings" shall indicate loads and anchor/support points for all piping 8" and larger, for all racked piping, for all racked conduit 1"C and larger, for all busway and for all suspended equipment. These drawings shall be submitted to the Structural Engineer for review and approval. Any special hangers, embeds, supports, reinforcing, etc. required by the Structural Engineer shall be provided at no additional cost to the Owner.
 6. "Coordination Drawings" for all work routed underground or embedded in concrete shall show specific dimensions to accessible column or building lines and the burial depth and size of all underground utilities. Where existing utilities are located in the area where new utilities are being installed, dimensions and burial depth for existing utilities shall be shown on "Coordination Drawings".
 7. Prior to submittal, each "Coordination Drawing" shall be completed and signed off by the General Contractor and all applicable Subcontractors prior to the submission to the Architect, Engineer and Owner and prior to installation of Division 21, 22, 23, 25, 26, 27 and 28 work in the area covered by the specific coordination drawing.
 8. The requirement for "Coordination Drawings" shall not be construed as releasing the General Contractor or Subcontractors from their responsibility to coordinate the installation of the work or as authorization for the General Contractor or Subcontractors to make unauthorized changes to the Construction Documents or the project design concepts.

1.19 MATERIALS AND WORKMANSHIP:

- A. General: Materials and equipment shall be new, of best grade and quality, and standard products of reputable manufacturers regularly engaged in the production of such materials and equipment and meeting UH requirements.
- B. Workmanship: Work shall be executed and materials installed in accordance with the best practice of the trades in a thorough, substantial, workmanlike manner by competent, state licensed, workmen, presenting a neat appearance when completed, straight and plumb.
- C. Manufacturer's Recommendations: With exceptions as specified or indicated on the Drawings or in the Specifications, apply, install, connect, erect, use, clean, and condition manufactured articles, materials, and equipment per manufacturer's current printed recommendations. Copies of such printed recommendations shall be kept at the job site and made available as required.

1.20 SPACE REQUIREMENTS:

- A. General: Determine in advance of purchase that the equipment and materials proposed for installation will fit into the confines indicated, leaving adequate code clearances for adjustments, repair, or replacement and comply with code.
- B. Clearance: Allow adequate space for clearance in accordance with requirements of the Code and local inspection department.
- C. Scheduled Equipment: The design shown on the Drawings is based on the equipment scheduled.
- D. Responsibility: Since space requirements and equipment arrangement vary for each manufacturer, the responsibility for initial access and proper fit rests with the Contractor.
- E. Review: Final arrangements of equipment to be installed shall be subject to the Architect's review.

1.21 SAFETY REGULATIONS:

- A. All electrical work shall be performed in compliance with all applicable and governing safety regulations. All safety lights, guards, signs, and other safety materials and provisions required for the performance of the electrical work shall be provided by and operated by the Electrical contractor. Include temperature power.

1.22 DELIVERY, STORAGE AND HANDLING OF MATERIALS:

- A. General: Protect all materials and equipment to be installed under this Division from physical and weather damage.
- B. Scope: Work under this Division shall include, but not limited to:
 - 1. Shipping from point of manufacture to job site.
 - 2. Unloading, moving, and storage on site with proper protection as required to properly protect equipment from rust, drip, humidity, dust, or physical damage.
 - 3. Hoisting and scaffolding of materials and equipment included in this Division.
 - 4. Ensuring safety of employees, materials, and equipment using such hoisting equipment and scaffolding.

- C. Coordination: All large pieces of apparatus which are to be installed in the building and which are too large to permit access through doorways, stairways or shafts shall be brought to the job by the Contractor and shall be placed in the spaces before enclosing partitions and structure are completed. All apparatus shall be cribbed up from the floor by Contractor and shall be covered with tarpaulins or other protective covering where required for protection.

1.23 NOISE AND VIBRATION:

- A. General: Warrant the electrical systems, and their component parts to operate without objectionable noise or vibration. Noise from systems or equipment which results in noise within occupied spaces above the recommended NC curves (refer to ASHRAE Standard) shall be considered objectionable. Vibration shall not be apparent to the senses in occupied areas of the building. Objectionable noise, vibration, or transmission thereof to the building shall be corrected.

1.24 CLEANING, ADJUSTING AND START-UP:

- A. Start-up Services: Where specified for any individual item of electrical equipment, provide a factory-authorized representative for testing, start-up of equipment, and instruction of Owner's operating personnel. Certify that these services have been performed by including a properly executed invoice for these services or a letter from the manufacturer.
- B. Testing: Refer to Section 26 01 25, "Electrical Testing" for requirements.
- C. Clean-up: Each Contractor shall clean away from the job site all debris, surplus material, and similar items, resulting from work or operations, leaving the job and equipment in a clean condition. Each Contractor shall thoroughly clean all pieces of equipment, conduit, boxes, fixtures, and similar items, leaving the installation in a first class condition. Bottomline: If you are the last one in the area it is yours.
- D. Operation Prior to Completion: When any piece of electrical equipment is operable and it is to the advantage of the Contractor to operate the equipment, he may do so, providing that he properly supervises the operation, and has the Engineer's written permission to do so. The warranty period shall, however, not commence until such time as the equipment is operated for the beneficial use of the Owner, or date of substantial completion, whichever occurs first. Regardless of whether or not the equipment has or has not been operated, the Contractor shall properly clean the equipment, properly adjust, and complete all deficiency list items before final acceptance by the Owner. The date of final acceptance and the start of the warranty may not be the same date. Also you must have approval of authority having jurisdiction.

1.25 FINAL REVIEW:

- A. General: Upon completion of the Work, perform a final test of the entire system.
 1. The system shall be operating properly and conform to campus setpoints.
 2. After the final test, any changes or corrections noted as necessary for the Work to comply with these Specifications or the Drawings, shall be accomplished without delay in order to secure final acceptance of the Work.

3. The date for the final test shall be sufficiently in advance of the Contract completion date to permit execution, before expiration of the Contract, of any adjustments or alterations which the final acceptance tests indicate as necessary for the proper functioning of all equipment. Any such modifications shall be completed within the time allotted for completion of the Contract. Retests shall be conducted as directed and shall be of such time duration as necessary to ensure proper functioning of adjusted and altered items. Retests shall not relieve the Contractor of completion date responsibility.
 4. Certificates, including certificates of occupancy from local authorities and documents required herein, shall be completely in order and presented to the Engineer at least one week prior to the review.
- B. Qualified Person: Individuals knowledgeable of the systems and persons approved by the Engineer shall be present at this final inspection to demonstrate the system and prove the performance of the equipment including facilities personnel.

1.26 OWNER INSTRUCTION:

- A. General: This Contractor and appropriate factory-trained representatives shall instruct the Owner's representative in the proper operation and maintenance of all systems and equipment and shall explain all warranties including facilities personnel.
- B. Outline: Prior to instruction of Owner Personnel, prepare a typed outline, listing the subjects that will be included in this instruction, and submit the outline for review by the Engineer.
- C. Certification: At the conclusion of the instruction period obtain the signature of each person being instructed on each copy of the approved outline to signify that he has a proper understanding of the operation and maintenance of the systems and resubmit the signed outlines.
- D. Other Requirements: Refer to other Division 26, 27 and 28 Sections for additional Operator Training requirements.

1.27 CONTRACTOR WARRANTIES AND GUARANTEES:

[EDIT TO SUIT PROJECT]

- A. General: Contractor shall guarantee all material and equipment installed by him against defects in workmanship and material for a period of 24 months after final acceptance of the work by the Owner and he shall repair or replace any materials or equipment developing such defects within that time, promptly on due notice given him by the Owner and at Contractor's sole cost and expense.
- B. Equipment: All equipment bearing a manufacturer's guarantee, such as electrical equipment, devices, components, and similar items, shall be construed to have an extended guarantee to the Owner by the manufacturer. Any such equipment that proves defective in materials or workmanship within the guarantee period is to be replaced by the Contractor in accordance with the manufacturer's guarantee.
- C. Start-up: The Electrical Contractor shall provide instructions and equipment starting service on new equipment for two complete year after date of final acceptance of the work by the Owner, at Contractor's sole cost and expense.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

Not applicable.

END OF SECTION 26 00 01