

SECTION 260500 – BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 DESCRIPTION

A. General Conditions:

1. The accompanying General Conditions (front-end specifications) shall apply to and form a part of this section.

B. General Requirements:

1. Carefully examine General Conditions, other specification sections, and other drawings (in addition to Electrical) in order to be fully acquainted with their effect on electrical work.
2. Do all work in compliance with all applicable codes, laws, and ordinances, the National Electrical Safety Code, the National Electrical Code (hereinafter referred to as "Code"), applicable energy codes, and the regulations of the local utility companies. Obtain and pay for any and all required permits, inspections, certificates of inspections and approval, and the like.
3. Cooperate with other trades and contractors at job. Perform work in such manner and at such times as not to delay work of other trades. Complete all work as soon as the structure and installations of equipment will permit. Patch, in a satisfactory manner and by the proper craft, any work damaged by electrical workmen.

C. Electrical Contractor Experience Requirements:

1. Electrical contracting firm shall be licensed as an electrical contractor in the state where work will be performed.

1.2 GENERAL SCOPE OF ELECTRICAL WORK (REFER TO DRAWINGS FOR OTHER SPECIFIC SCOPE ITEMS)

- A. Furnish all labor and materials to complete electrical work as shown on drawings and/or herein specified.
- B. Remove all existing electrical equipment and wiring made obsolete by this project and remove or relocate all electrical services located on or crossing through the project property, either above or below grade, which would obstruct the construction of the project or conflict in any manner with the completed project or any code pertaining thereto. Dispose of salvageable materials as directed by the Architect. Contractor shall schedule meeting to review scope of electrical demolition and to confirm scope and phasing of proposed demolition with the owner in the presence of the prime consultant prior to start of any electrical demolition.
- C. Furnish and install complete power, telephone and other electrical services as shown on drawings and/or specified herein.
- D. Pay all electrical utility company service charges (if any) in connection therewith, including permanent meter deposit. Meter deposits will be refunded to Contractor at time of Owner's acceptance.
- E. Furnish and install complete power distribution system as shown on drawings and/or specified herein.

- F. Furnish and install disconnect switches for motors as shown on drawings and/or specified herein.
- G. Furnish and install complete electrical grounding systems as shown on drawings and/or specified herein.
- H. Install and connect electrical equipment mentioned in Division 26/27/28 Specifications or noted in drawings, whether furnished by electrical contractor or by others.
 - 1. Where shown or specified, equipment furnished by others shall be installed and connected under this Contract.
 - 2. Where shown or specified, Contractor shall receive, unpack, check and assume custody of equipment furnished by Others. Contractor shall assume responsibility for care and safekeeping of this equipment, when delivered into his custody. He shall protect it from moisture, dust and damage during construction and until Owner acceptance of project.
- I. Furnish and install complete electrical lighting systems as shown on drawings and/or specified herein.
- J. Furnish and install all electrical items shown on drawings and/or herein specified, unless shown or specified otherwise.
- K. Furnish and install complete controls & auxiliary systems as shown on drawings and/or specified herein.
- L. Furnish and install complete telephone/data raceway (including all outlet boxes, face plates, conduit raceways, telephone backboards, terminal cabinets, etc.), wiring and devices system as shown on drawings and/or specified herein.
- M. Furnish and install a complete Fire Alarm System as shown on drawings and/or specified herein.
- N. Furnish and install a complete Surge Protection System as shown on drawings and/or specified herein.
- O. Procure and pay for permits and certificates as required by local and state ordinances and fire underwriter's certificate of inspection.
- P. Balance loads as equally as practicable on services, distribution feeders, circuits and buses. Provide typewritten directory for each panel.
- Q. Unless specifically indicated or required otherwise, terminate all circuitry/cabling provided within this contract at associated equipment/devices/etc. in accordance with all applicable codes, standards and supplier requirements, whether associated equipment/device/etc. is furnished within this contract or by others.
- R. Complete field testing, adjustment & startup of all systems listed above as shown on drawings and/or specified herein.

PART 2 - PRODUCTS

2.1 APPROVED MATERIALS AND DEVICES

- A. Where not otherwise specified, provide only new, standard, first-grade materials/systems throughout, conforming to standards established by Underwriter's Laboratories, Inc., and so marked or labeled, together with manufacturer's brand or trademark. All equipment/systems

subject to approval of Architect before installation. All like items and associated equipment/systems shall be of one manufacturer.

- B. To ensure proper coordination, it is intended that all electrical equipment and materials specified in Division 26/27/28 of these specifications and shown on the electrical drawings be furnished and installed by the electrical sub-contractor. It will not be permissible for any of these items to be furnished directly by the general contractor without the electrical contractor's coordination.
- C. To ensure commonality of spare parts, it is required that the electrical contractor provide the same brand for all circuit breakers, starters, power equipment, etc. provided under the following divisions of these specifications:
 - 1. SECTION 26 05 73: POWER DISTRIBUTION SYSTEM ELECTRICAL STUDIES
 - 2. SECTION 26 22 00: DRY TYPE TRANSFORMERS
 - 3. SECTION 26 24 13: SWITCHBOARDS
 - 4. SECTION 26 24 16: POWER PANELBOARDS - CIRCUIT BREAKER TYPE
 - 5. SECTION 26 24 17: LIGHTING PANELBOARDS
 - 6. SECTION 26 28 16: SAFETY SWITCHES AND FUSES

2.2 SUBMITTALS

- A. All submittals to the design team shall be accompanied by a letter summarizing all proposed deviations from specified products or pre-approved substitutions. The absence of such a letter shall be understood to indicate that the contractor intends to meet all contract requirements, regardless of cut-sheets/data-sheets provided within the submittal.
- B. Submit to Architect ten (10) days prior to bid date three (3) copies of any items and/or manufacturers which are proposed as substitutes for those specified.
- C. Submit to Architect promptly after award of Contract and prior to purchasing, the number of copies required by the contract. All drawings of a specific item or system shall be made in one submittal, and within thirty (30) days after award of Contract. Shop drawings of all power equipment shall contain exact details of device placement, phasing and numbering, in form of elevations, for each major piece of equipment. Shop drawings shall be submitted on the following:
 - 1. SECTION 26 05 73: POWER DISTRIBUTION SYSTEM ELECTRICAL STUDIES
 - 2. SECTION 26 09 43: LIGHTING CONTROL SYSTEM
 - 3. SECTION 26 09 44: DISTRIBUTED DIGITAL LIGHTING MANAGEMENT SYSTEM
 - 4. SECTION 26 22 00: DRY TYPE TRANSFORMERS
 - 5. SECTION 26 24 13: SWITCHBOARDS
 - 6. SECTION 26 24 16: POWER PANELBOARDS - CIRCUIT BREAKER TYPE
 - 7. SECTION 26 24 17: LIGHTING PANELBOARDS
 - 8. SECTION 26 28 16: SAFETY SWITCHES AND FUSES
 - 9. SECTION 26 43 00: SURGE PROTECTIVE DEVICES
 - 10. SECTION 26 50 00: LIGHTING MATERIALS AND METHODS
 - 11. SECTION 27 10 00: STRUCTURED CABLING SYSTEM
 - 12. SECTION 28 31 00: FIRE ALARM AND MASS NOTIFICATION SYSTEM
 - 13. SECTION 28 78 00: EMERGENCY RESPONDER RADIO COVERAGE SYSTEM
 - 14. ALL POWER DISTRIBUTION EQUIPMENT (i.e. SWITCHBOARDS, PANELBOARDS, DRY TYPE TRANSFORMER, ETC.)
 - 15. ALL ELECTRICAL AND TELECOMMUNICATION EQUIPMENT LAYOUTS - Submittals shall include 1/4" = 1'-0" CAD drawings (hand drawn sketches will not be accepted) of each electrical room, IT room, electrical equipment stand, generator area, or

any other similar area with electrical equipment. Drawings shall indicate all panelboards, transformers, switchboards, generators, equipment racks, control panels, HVAC equipment, etc. that are located in each electrical/IT area. Layouts shall show that each piece of electrical equipment has the clearances, working space and dedicated equipment space required by applicable codes. No conduits to equipment within these areas shall be installed until submittals have been provided and returned without exception by the design team.

- D. The contractor shall fully review, comment upon and correct all shop drawings as required to assure compliance with contract documents prior to submittal to Architect. The failure of the contractor to properly review and correct shop drawings prior to submittal will result in rejection of shop drawings by the engineer. Review by the Architect will be for general conformance with contract documents. The contractor shall be fully responsible for correctness of all submitted dimensions, details, quantities and locations.
- E. None of the above items shall be installed until shop drawings or catalog data have been reviewed by Architect without rejection or required resubmittal. Any listed item not submitted, even if specified, shall be considered not acceptable and shall be removed if directed.
- F. Any required resubmittal will be reviewed by the Architect for conformance with previously issued comments only. The contractor shall be responsible for verifying that all items not specifically requiring resubmittal have not been altered from the previously reviewed submittal.
- G. Material proposed for substitution shall be of the same quality, perform the same functions, conform to such physical dimensions and appearance as are required by the Architect. All material proposed for substitution is subject to the approval of the Architect and his authority for approval is final. No material proposed for substitution will be considered unless all submittal data complies with the drawings and specifications of Section 16 as to time of submission, number of copies of submittal, and detail requirements.
- H. Samples of material shall be furnished where required by drawings or Division 26/27/28 Specification, or as requested by the Architect on items proposed as substitutes.
- I. Submit to Architect a certificate of final inspection from local inspection department.

PART 3 - EXECUTION

3.1 SITE VISIT

- A. The Contractor shall visit the site to determine existing dimensions and conditions affecting electrical work. Failure to do so in no way relieves Contractor of his responsibility under Contract.

3.2 CLEARANCE WITH UTILITIES

- A. It shall be the responsibility of this Contractor, prior to bid, to reaffirm with the utility companies involved, that the locations, arrangement (and with power company voltage, phase, and metering required) and connections to utility service are in accordance with their regulations and requirements. If their requirements are at variance with these drawings and specifications, the Contract price shall include any additional cost necessary to meet those requirements without extra cost to Owner after a contract is entered into.
- B. On many projects the utility company may levy charges due to locations, size or type service involved. The Contractor shall be responsible for these charges (including permanent meter deposit), unless such charges are not available prior to bid and Contractor so documents as

described below. The meter deposit will be refunded to the contractor at time of Owner's acceptance.

- C. Should above cost not be available, prior to bid, Contractor must submit a letter signed by a responsible utility company person so stating with his bid and in turn must be submitted by Prime Contractor with his bid to Owner. The cost will then be deleted from the Contract and become responsibility of the Owner.
- D. Arrange with utility companies for such services as shown or herein specified and installation of meter where shown. Furnish with shop drawings a signed document from utility companies describing the location and type of services to be furnished and any requirements they may have. This document shall be signed for each utility company by a person responsible for granting such service.

3.3 WORKMANSHIP

- A. All work shall be in accordance with the latest editions of NFPA 70 (National Electrical Code), NFPA 101 (Life Safety Code), National Electric Safety Code, International Building Code, applicable NECA standards and the rules and regulations of State and Local Authorities Having Jurisdiction.
- B. All work shall be executed in a workmanlike manner and shall present a neat and mechanical appearance upon completion.
- C. All equipment, devices, etc. shall be installed in accordance with manufacturer's recommendations.
- D. All items shall be installed straight and plumb in a workmanlike manner and care shall be exercised so that like items are mounted the same position, heights and general location.
- E. Keep site clean of accumulation of cartons, trash and debris.

3.4 SAFETY

- A. The contractor is solely responsible for all job safety. Architect assumes no responsibility for job safety. Maximum consideration shall be given to job safety and only such methods as will reasonably ensure the safety of all persons shall be employed. The codes and regulations of OSHA shall be given strict compliance as well as such other codes, laws, and regulations as may be applicable.

3.5 CONTRACT DOCUMENTS

- A. Contract documents indicate diagrammatically, extent, general character and approximate location of work. Where work is indicated but minor details omitted, furnish and install it complete so as to perform its intended functions. For details and mechanical equipment, follow drawings provided by other disciplines (Architectural, Mechanical, Structural, Civil, etc.) and fit electrical work thereto.
- B. Contract documents consist only of the hardcopy documents issued by the Prime Architect. Electronic documents issued directly by the electrical engineer to the contractor and/or its sub-contractors/vendors are issued for convenience only (electronic documents are not formal contract documents).
- C. If the contractor and/or one of its suppliers require a one-time transfer of electronic files of the current electrical construction documents to prepare shop drawings (or for another similar purpose), it shall:

1. Sign a waiver prepared by the electrical engineer prior to the transmittal of these files.
2. Agree to pay the electrical engineer a fee of \$50.00 per drawing, up to a maximum of \$400 per transfer, payable upon receipt of the files.
3. To the fullest extent permitted by law, indemnify, hold harmless, and defend JRA from all claims, damages, losses and expenses, including attorneys' fees arising out of or resulting from the use of the CAD files.

D. Take finish dimensions at job in preference to scaled dimensions.

E. Except as above noted, make no changes in or deviations from work as shown or specified except on written order of Architect.

3.6 UNDERGROUND UTILITY/EQUIPMENT COORDINATION

- A. Prior to commencement of work, verify exact locations of all existing or proposed underground utilities and/or underground equipment and verify that proposed electrical installation does not conflict with these items. Notify Architect immediately if any conflict is found.

3.7 EQUIPMENT STORAGE

- A. Store all electrical equipment in dry, covered locations as directed by equipment manufacturers. Contractor shall be responsible for replacing or repairing improperly-stored equipment as directed by Architect.

3.8 EXCAVATION, CUTTING AND PATCHING

- A. Perform all cutting and excavating as necessary for installation of electrical systems, unless specifically covered under another section. After Architect's observation, complete all excavation, filling and backfilling as directed under specifications for preparation of site and earthwork. Foundations for equipment shall be as specified under concrete section. Concrete pads shall be minimum of 6" thick; unless greater thickness required by equipment manufacturer. Obtain specific approval of Architect before cutting into any structural members.
- B. For all such work employ competent workmen, and finish up in neat and workmanlike manner, equal to quality and appearance to adjacent work.

3.9 PENETRATIONS

- A. All penetrations in water tight barriers shall be made so that barrier rating is not compromised. Furnish roof flashing for all equipment installed under Division 26/27/28 that penetrates through the roof. Appropriate flashing is specified under roofing and sheet metal section. Supply these flashings for installation under roofing and sheet metal section.
- B. All fire/smoke barrier penetrations shall be made in accordance with a U.L. listed assembly to maintain the fire/smoke rating of the associated membrane.
- C. Where penetrations are required through structural elements, verify penetration locations and sizes with structural engineer. In no case shall the structural integrity be compromised without written approval from structural engineer.

3.10 INSTALLATION OF EQUIPMENT - GENERAL

- A. Care shall be exercised in exact routing and location of all items so as not to obstruct access to equipment, personnel walkways, or expose it to potential mechanical damage.
- B. Items shall be securely anchored and/or fastened. Provide proper support for all equipment, devices, conduits, boxes, panels, etc. as required by code and for a workmanlike installation.

Provide guy wiring for wood poles where required to prevent leaning. All construction shall meet the seismic design requirements of the building code. Items (especially transformers, light fixtures, equipment racks, freestanding gear, etc.) installed in seismic zones C, D, E or F shall be supported and braced per applicable codes and standards.

- C. All wall, pole or frame-mounted electrical equipment shall be mounted to metal unistrut (or similar) frames of same material as electrical equipment. For example, pole-mounted painted or galvanized steel disconnect switches shall be mounted to galvanized steel unistrut frames.
- D. All electrical equipment, furnished by Contractor or by others shall be covered and protected during construction.
- E. All control cabinets, panels, motor control centers and other electrical cabinets and enclosures shall have all trash removed and be vacuumed clean. All foreign paint, etc., shall be removed from exterior and all scratches in finish touched up with same color and material as original. Any rusted areas shall be sanded, primed and repainted.
- F. All relays, starters, push-button and other control devices shall be cleaned and if necessary, lubricated with CRC 2-26 to assure free operation.

3.11 MOTORS, STARTERS AND CONTROLS

- A. Unless otherwise specified or shown, all motors will be furnished and installed under other sections of this specification.
- B. Electrical Contractor shall install all starters and all electrical power wiring and connections to motors and starters.
- C. Unless otherwise specified or shown, all control items for motors shall be furnished, installed and wired in conduit under other divisions of this specification.

3.12 CIRCUITS AND BRANCH CIRCUITS

- A. Outlets shall be connected to branch circuits as indicated on drawings by circuit numbers. No more outlets than are indicated shall be connected to a circuit.
- B. Branch circuit homeruns shall be installed as shown on drawings. Multiple homerun conduits shall not be combined by contractor into larger, single homerun conduits unless specific permission is granted by the Engineer.

3.13 LUG/TERMINAL RATINGS

- A. All lug/terminal ratings, sizes, locations, types, etc. shall be coordinated with the associated conductor sizes, types, routings, etc. by the contractor.
- B. All lugs/terminals/etc. shall be rated for 75 degree C terminations (minimum, unless specified otherwise).

3.14 EQUIPMENT FAULT CURRENT RATINGS

- A. All equipment and breakers shall meet the minimum RMS symmetrical interrupting capacity ratings shown on plans for the associated distribution equipment. All interrupting ratings shall be full ratings. Where new devices or breakers are added to existing distribution equipment, the new devices/breakers shall have interrupting ratings matching or exceeding that of the existing distribution equipment.

3.15 OUTLET LOCATION

- A. Symbols shown on drawings and mounting heights indicated on drawings and in specifications are approximate only. The exact locations and mounting height must be determined on the job and it shall be the Contractor's responsibility to coordinate with other trades to ensure correct installation.

3.16 IDENTIFICATION

- A. Each panel shall have each circuit identified. Panels without branch circuit nameplates shall have typewritten directories.
- B. Each individually mounted switch, circuit breaker, starter and/or any other control or protective device shall identify equipment fed and fuse size, if any, by engraved plastic nameplate, white with black letters, screw attached.
- C. See Specification Section 260553 for additional requirements.

3.17 GROUNDING

- A. All equipment shall be grounded and bonded in accordance with all state/local regulations, The National Electrical Code and as specified herein.

3.18 TELEPHONE WORK

- A. Provide telephone raceways, outlets and backboards, as shown. Provide additional work as described in Specification Section 271000 and/or shown on drawings. Bond all raceways together at backboards and provide No. 6 ground wire extending from raceway bonds to cold water pipe, in 1/2 inch raceway. Carefully ream ends of all raceways.

3.19 PAINTING

- A. Refer to Painting/Finishing specifications for requirements regarding field painting of exposed conduit. Any scratches, dents or rust spots in conduit electrical enclosures, panels, motor control or any other electrical items shall have the dents removed, and they, along with any rust spots or scratches, sanded and touched up with the same exact color paint as original finish.

3.20 ACCEPTANCE TESTING

- A. Upon completion of work, the entire electrical system installed within this project shall be tested and shall be shown to be in perfect working condition, in accordance with the intent of the specifications and drawings. It shall be the responsibility of the Electrical Contractor to have all systems ready for operation and to have an electrician available to operate same in accordance with and under the supervision of the observation representative(s) of the Architect. The Electrician shall be available to assist in removal of panel fronts, etc., to permit inspection as required.
- B. The electrical sub-contractor shall include in bid price start-up assistance and training from a certified representative of the manufacturer for the following systems:
 - 1. SECTION 26 09 43: LIGHTING CONTROL SYSTEM
 - 2. SECTION 26 09 44: DISTRIBUTED DIGITAL LIGHTING MANAGEMENT SYSTEM
 - 3. SECTION 27 10 00: STRUCTURED CABLING SYSTEM
 - 4. SECTION 28 31 00: FIRE ALARM AND MASS NOTIFICATION SYSTEM
 - 5. SECTION 28 78 00: EMERGENCY RESPONDER RADIO COVERAGE SYSTEM

3.21 OPERATION AND MAINTENANCE DATA

- A. One set of marked "AS BUILT" drawings, three (3) sets of all equipment catalog and maintenance data and three (3) sets of all final shop drawings, on all equipment requiring same shall be turned over to owner. These items shall be bound in hard back book. Contractor shall explain and demonstrate all systems to Owner's representative.

3.22 GUARANTY-WARRANTY

- A. Furnish a written Guarantee-Warranty, countersigned and guaranteed by General Contractor, stating:
 - 1. That all work executed under this section will be free from defects of workmanship and materials for a period of one (1) year from date of final acceptance of this work.
 - 2. Above parties further agree that they will, at their own expense, repair and replace all such defective work, and all other work damaged thereby, which becomes defective during the term of the Guaranty-Warranty.

END OF SECTION 260500