

SECTION 26 05 05

GENERAL PROVISIONS FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals shown, specified, and required to complete the electrical Work.
2. Temporary Utilities: CONTRACTOR shall provide temporary power and lighting in accordance with Section 01 51 05, Temporary Utilities, Section 01 51 13, Temporary Electricity, and Section 01 51 26, Temporary Lighting.
3. Utility Companies:
 - a. Electric Utility Company: Perform the Work in connection with the electric service and utility metering in accordance their requirements.
 - b. Telephone and Communications Utility Company: Perform the Work in connection with telephone service and communications services in accordance with their requirements.

B. Coordination:

1. Review installation procedures and schedules under other Specification Sections and coordinate with other trades the installation of electrical items that will be installed with or within formwork, walls, partitions, ceilings, and panels.
2. Coordination and Intent of Electrical Drawings:
 - a. Dimensions on Drawings related to equipment are based on equipment of certain manufacturers. Verify the dimensions of equipment furnished to space available at the Site and allocated to the equipment.
 - b. Drawings show the principal elements of the electrical Work, and are not intended as detailed working drawings for the electrical Work. Drawings supplement and complement the Specifications and other Contract Documents relative to principal features of electrical systems.
 - c. Equipment and devices provided under this Contract shall be properly connected and interconnected with other equipment and devices for successful operation of complete systems, whether or not all connections and interconnections are specifically mentioned or shown in the Contract Documents.
 - d. Drawings are provided for CONTRACTOR's guidance in fulfilling the intent of the Contract Documents CONTRACTOR shall comply with Laws and Regulations, including safety and electrical codes, and provide materials, equipment, appurtenances, and specialty items necessary for complete and operable systems.
3. Field Coordination:

- a. Provide materials, equipment, and services to interface with existing circuits. Field-verify system and equipment requirements prior to modifying existing systems.
- b. Coordinate the interface of equipment with OWNER's personnel and field conditions.
- c. Field-compare existing starter and panel control circuit terminations from record documents with existing circuits.
- d. Field-trace existing circuits as required to interface the equipment provided.
- e. Field-identify terminations for starters and panel controls for follow function for re-connection.

C. Related Sections:

1. Section 03 30 00, Cast-in-Place Concrete.
2. Section 05 05 33, Anchor Systems.
3. Section 09 91 00, Painting.
4. Section 31 23 05, Excavation and Fill.
5. Section 40 61 13, Process Control Systems General Provisions.

D. Work Included in This Contract but Specified Elsewhere:

1. Concrete for pads, manholes, ductbanks, and conduit encasement shall comply with Section 03 30 00, Cast-in-Place Concrete .
2. Anchorage systems shall comply with Section 05 05 33, Anchor Systems.
3. Shop painting and surface preparation shall comply with Section 09 91 00, Painting, unless otherwise specified in Division 26 Sections.
4. Excavation and filling associated with buried electrical Work shall comply with Section 31 23 05, Excavation and Fill .

E. Area Classifications:

1. Materials, equipment, and incidentals shall be suitable for the area classification(s) shown, specified, and required.
2. Wet Locations: Comply with NEC and NEMA requirements for wet locations. Enclosures in wet locations shall comply with NEMA 4 unless specified otherwise.
3. Corrosive Locations: Comply with NEC and NEMA requirements for corrosive locations. Enclosures in corrosive locations shall conform to NEMA 4X requirements unless specified otherwise.
4. Hazardous Locations: Comply with NEC requirements for the Class and Division designated.
5. Dusty Locations: Indoor areas not designated as hazardous, corrosive, or wet are dusty locations. Comply with NEC and NEMA 12 requirements unless specified otherwise.
6. The following table shall serve as a minimum basis for the area classification of the various locations within the water treatment plant:

Area Classification Table

Area Designator	Description	Classification	Enclosures (NEMA)	Conduit	Supports
	Exterior	Wet	4X SS	RGS	Aluminum
	Electrical Rooms	Dusty	12	EMT	Steel
	Control Rooms	Dusty	12	EMT	Steel
05	DAF Area	Wet	4X SS	PVC coated RGS	Aluminum
05	Filters Area	Wet	4X SS	PVC coated RGS	Aluminum
06	GAC	Wet	4X SS	PVC coated RGS	Aluminum
07	Clearwell	Wet	4X SS	PVC coated RGS	Aluminum
08	Finished Water Pump Station	Wet	4X SS	PVC coated RGS	Aluminum
09	Sodium Hypochlorite	Corrosive	4X Non-Metallic	PVC 80	FRP
09	Polymer	Wet	4X SS	PVC coated RGS	Aluminum
09	Alum	Corrosive	4X Non-Metallic	PVC 80	FRP
09	Purate	Corrosive	4X Non-Metallic	PVC 80	FRP
09	Sulfuric Acid	Corrosive	4X Non-Metallic	PVC 80	FRP
09	Fluoride	Corrosive	4X Non-Metallic	PVC 80	FRP
09	Chlorine Dioxide	Corrosive	4X Non-Metallic	PVC 80	FRP
09	Corridor	Wet	4X SS	PVC coated RGS	Aluminum
10	Residuals Handling	Wet	4X SS	PVC coated RGS	Aluminum
10	Gravity Thickener	Wet	4X SS	PVC coated RGS	Aluminum
12	Administration Building	Dusty	12	EMT	Steel
13	Maintenance Building	Dusty	12	EMT	Steel

1.2 QUALITY ASSURANCE

A. Qualifications:

1. Electrical Subcontractor:

- a. Electrical Subcontractor shall have not less than five years experience installing electrical systems of the types required for the Project. Experience to include 3 projects in the last 5 years where the scope of work included medium voltage equipment and medium voltage cabling installation in underground duct banks.
- b. Electrical Subcontractor shall possess a valid electricians' and contractors' license in the jurisdiction where the Site is located.
- c. The Electrical Subcontractor shall employ a Master Electrician to supervise the work on this project. The Master Electrician must be licensed in the jurisdiction where the project is located.
- d. The Electrical Subcontractor shall employ Journeyman Electricians and one Journeyman must be on the project site at all times when work is being done. This includes loading and unloading of equipment. Journeyman Electricians must be licensed in the jurisdiction where the project is located.
- e. License information shall be submitted for review. Information must be verifiable via internet or telephone.
- f. Submit the following information for not less than three successful, completed projects: project name and location; year completed; name and contact information for: prime contractor for whom electrical

Subcontractor worked, project owner, and project engineer or architect, including addresses and telephone numbers.

- B. Component Supply and Compatibility:
 - 1. Materials and equipment similar to each other shall be from the same manufacturer for uniformity.
- C. Regulatory Requirements:
 - 1. Permits: Refer to the General Conditions, Supplementary Conditions, and other parts of the Contract Documents for responsibilities relative to obtaining and paying for permits, licenses, and inspection fees.
 - 2. Codes: Refer to Section 01 42 00, References, for indication of applicable codes.

1.3 SUBMITTALS

- A. General:
 - 1. To the extent practical, submit Shop Drawings and other CONTRACTOR submittals for each Specification Section into the smallest number of submittals possible. Do not furnish partial submittals.
 - 2. Review of equipment submittals does not relieve CONTRACTOR of responsibility for providing complete and successfully operating systems.
- B. Action Submittals: Submit the following:
 - 1. Shop Drawings:
 - a. Internal wiring diagram and drawings indicating all connections to components and numbered terminals for external connections.
 - b. Dimensioned plan, section, elevations, and panel layouts showing means for mounting, conduit connection, and grounding.
 - c. List of components including manufacturer's name and catalog number (or part number) for each.
 - d. Point-to point interconnection wiring diagrams.
 - 2. Product Data:
 - a. Manufacturer's name and product designation or catalog number.
 - b. Electrical ratings.
 - c. Manufacturer's technical data and specifications.
 - d. Manufacturer's indication of compliance with applicable reference standards.
 - e. Painting and coating systems proposed.
 - 3. Test Procedures: Proposed testing procedures and testing limitations for source quality control testing and field quality control testing.
- C. Informational Submittals: Submit the following:
 - 1. Manufacturer's Instructions:
 - a. Installation data and instructions.
 - b. Instructions for handling, starting-up, and troubleshooting.
 - 2. Source Quality Control Submittals: Results for required shop testing.

3. Field Quality Control Submittals: Results for required field testing.
 4. Qualifications:
 - a. Electrical Subcontractor.
 - b. Wiring coordinator, including information required of wiring coordinator in Paragraph 1.2.A of this Section.
- D. Closeout Submittals: Submit the following:
1. Record Documentation:
 - a. System Record Drawings: Include the following:
 - 1) One-line wiring diagram of the electrical distribution system.
 - 2) Actual, in-place conduit and cable layouts with schedule of conduit sizes and number, and size of conductors.
 - 3) Layouts of the power and lighting arrangements and the grounding system.
 - 4) Control schematic diagrams, with terminal numbers and control devices identified, for all equipment.
 - b. Point-to-Point Interconnection Wiring Diagram Drawings: Include the following:
 - 1) External wiring for each piece of equipment, panel, instrument, and other devices and wiring to control stations, lighting panels, and motor controllers.
 - 2) Numbered terminal block identification for each wire termination.
 - 3) Identification of the assigned wire numbers for all interconnections.
 - 4) Identification of wiring by the conduit tag in which the wire is installed.
 - 5) Terminal, junction, and pull boxes through which wiring is routed.
 - 6) Identification of equipment and the submittal transmittal number for equipment from which wiring requirements and termination information was obtained.
 - c. Record documents shall indicate final equipment and field installation information.

PART 2 – PRODUCTS

- A. Performance Criteria:
1. Electrical equipment shall be capable of operating successfully at full-rated load, without failure, with ambient outside air temperature of 89 degrees F to 32 degrees F and an elevation of 1043 feet above mean sea level.
 2. Unless specified otherwise, electrical equipment shall have ratings based on 75 degrees C terminations.
- B. Testing Laboratory Labels: Electrical material and equipment shall bear the label of Underwriters' Laboratories, Inc. or other nationally recognized, independent testing laboratory, where standards have been established and label service applies.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine conditions under which Work will be performed and notify ENGINEER in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. General:
 - 1. Install materials and equipment in accordance with the Contract Documents, Laws and Regulations, approved (and accepted, as applicable) Shop Drawings and other CONTRACTOR submittals, and manufacturer's recommendations.
 - 2. Provide tools and equipment required to trace circuits necessary for proper execution of the Work.
 - 3. Define and identify all wiring, circuit terminations, and equipment to be modified to ensure proper interface of components. The Contract Price includes all costs associated with field services specified for a complete and functional system.
- B. Staging, Sequencing, and Coordination with Existing Facilities:
 - 1. Schedule, sequence, and install materials and equipment in accordance with Section 01 14 16, Coordination with Owner's Operations

3.3 FIELD QUALITY CONTROL

- A. Field Quality Control – General:
 - 1. Perform field quality control for electrical Work in accordance with the Contract Documents.
- B. Site Tests:
 - 1. Prior to requesting certificate of Substantial Completion, demonstrate to ENGINEER that electrical systems and electrically-operated equipment installed or modified under the Contract operates in accordance with the Contract Documents and operates as required
 - 2. Perform the following operational tests on electrical systems:
 - a. Operate power circuits to verify proper operation and connection to electrical systems materials and equipment, including mechanical key-interlocks for circuit breakers.
 - b. Remove and re-apply power supply to automatic transfer equipment to verify operation. Activate standby power systems to verify their automatic start-up, proper de-energization, and cool down upon resumption of normal power supply.
 - c. Operate control circuits, including pushbuttons, indicating lights, and similar devices, to verify proper connection and function. Operate all

devices, such as pressure switches, flow switches, and similar devices, to verify that shutdowns and control sequences operate as required.

- d. Operate lighting systems and receptacle devices to verify proper operation and connections.
3. Prepare and submit report on the equipment demonstration and operating field quality control tests. Report shall include complete information on the tests performed and results.

C. Manufacturer's Services:

1. Furnish at the Site qualified, factory-trained representative(s) of equipment manufacturers for the services indicated in the Contract Documents.

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