

October 20, 2020

ADDENDUM NO. FIVE (5)

PROJECT NO: 112741

TITLE OF PROJECT: Headquarters HQ Replacement Phase 1

FACILITY LOCATION: Tyler State Park, Smith County, Texas

NOTICE TO ALL BIDDERS:

This addendum shall be considered part of the Contract Documents and is issued to change, amplify, or delete from or otherwise explain the documents where provisions of this addendum differ from those of the original contract documents. This addendum shall have precedence over the original contract documents and shall govern.

Bidders are hereby notified that they shall incorporate this addendum in their bid, and it shall be construed that the Contractor's Bid shall reflect with full knowledge, all items, changes and modifications to the contract documents herein specified.

Bidders are advised to check for updates, addenda issuance, and bid opening date changes at the TPWD Infrastructure Division Website:

http://www.tpwd.state.tx.us/business/bidops/current_bid_opportunities/construction/

REFER to and INCLUDE the attached Addendum No.5 documents signed and sealed by the Architect of Record on October 19, 2020. *(54 pages)*

Bid due date has changed to the following:
2:00 PM (CT), Thursday, October 29, 2020

Bidders shall acknowledge receipt of this addendum in the space provided on the Contractor's Bid form located above the signature block. **WARNING: BIDDER'S FAILURE TO ACKNOWLEDGE RECEIPT OF ADDENDA MAY RESULT IN REJECTION OF BID.**

END OF ADDENDUM NUMBER FIVE (5)

Sincerely,

/s/ Mandy Holcomb

Mandy Holcomb, CTCD, CTCM
Sr. Contract Manager
Infrastructure Division

ADDENDUM NO. 5

Tyler State Park
Headquarters
TPWD Project Number 112741
FPC Project Number 92705
October 19, 2020

The following Addendum modifies and becomes part of the Contract Documents dated 07/03/2020 for this project:

MODIFICATIONS TO THE CONTRACT DOCUMENTS

Item 1.01 MEP Narrative (One, 8 ½ x 11 page)

Refer to Exhibit A for MEP narrative.

Item 1.02 Specification Section 33 3010 Wastewater Duplex Station (Six, 8 ½ x 11 pages)

Replace section in its entirety. Section revised to change lift station pump from non-clog to grinder type pump.



END OF ADDENDUM 3

10/19/2020

Rachel Wright



ADDENDUM #5

Date: October 19, 2020

Client: Ford, Powell & Carson Architects and Planners

Project Name: Tyler State Park Headquarters Replacement Phase 1

AAI Project Number: 17-012

This addendum is generally separated into sections for convenience; however, all contractors, subcontractors, material men and other parties shall be responsible for reading the entire addendum. The failure to list an item or items in all affected sections of this addendum does not relieve any part affected from performing as per instructions, providing that the information is set forth one time any place in this addendum. These documents shall be attached to and become part of the Contract Documents for this project.

SPECIFICATION ITEMS

22 0500 – COMMON WORK RESULTS FOR PLUMBING:

Item 1: Revised paragraph 1.12.

23 0500 – GENERAL MECHANICAL REQUIREMENTS:

Item 1: Revised paragraph 1.10.

26 0500 – GENERAL ELECTRICAL REQUIREMENTS:

Item 1: Revised paragraph 1.12.

END OF ITEMS FOR ADDENDUM #5

MEB

SECTION 22 0500**COMMON WORK RESULTS FOR PLUMBING****PART 1 - GENERAL****1.01 SUMMARY**

- A. Applicable provisions of General Conditions, Special Conditions, and Special Instructions to Bidders govern work under this section and all of Division 22.
- B. This section is in particular reference to and shall be considered a part of all Plumbing specifications sections following. It is intended that comments in this section be applicable to all parts of Division 22. Work described hereinafter shall be included as though written within each specific section of the specification.
- C. The Contractor shall provide all items, articles, materials, operations, or methods listed, mentioned, or scheduled on the Drawings and/or herein, including all labor, materials, equipment, and incidentals necessary and required for their completion.
- D. All work shall conform to requirements of all local construction codes, applicable sections of the National Fire Protection Association, Public Health Agencies and the Texas Accessibility Standards, latest editions of all publications.

1.02 SECTION INCLUDES

- A. Mechanical Sleeve Seal.
- B. Sleeves.
- C. Escutcheons.
- D. Grout.

1.03 SCOPE

- A. Requirements specified in this section shall govern applicable portions of all plumbing sections including paragraphs on related electrical work, whether so stated therein or not.
- B. Where items specified in the specific plumbing sections conflict with requirements in this section, the former specific sections shall govern.
- C. The Contractor shall furnish all labor, plant, equipment, and materials, complete in connection with the installation of the plumbing systems in strict accordance with this specification and accompanying plans. The Contractor shall submit his bid based on performing all work hereinafter specified or indicated on applicable plans. The Contractor shall furnish and install all connections and appurtenances necessary and usually furnished in connection with such work and systems even though not specifically mentioned or shown on the plans.
- D. These requirements cover information, work, equipment and accessories listed under the following headings:
 - 1. References, Definitions, Procedures
 - 2. Permits and Fees
 - 3. Utility Connections and Inspections
 - 4. Workmanship
 - 5. Mechanical Provisions
 - 6. Electrical Provisions
- E. Work of Other Sections:
 - 1. Requirements given within this Section apply to the Work of all Sections of this Division.
- F. Finish painting is specified in other Divisions. Prime and protective painting shall be provided under this Division.



- G. Electrical interlock apparatus and other electrical apparatus, which is not an integral part of equipment specified under this Division, are specified under Division 26. Necessary conduit, wiring, boxes, and fittings are specified under Division 26.

1.04 REFERENCES

- A. References to standards, codes, specifications and recommendations shall mean the latest edition of such publications adopted and published at date of invitation to submit Proposals.
- B. References to technical societies, trade organizations and governmental agencies is made in plumbing work sections in accordance with the following abbreviations:
- | | |
|----------|---|
| 1. AGA | American Gas Association |
| 2. AIEE | American Institute of Electrical Engineers |
| 3. ANSI | American National Standards Institute |
| 4. ASME | American Society of Mechanical Engineers |
| 5. ASTM | American Society for Testing and Materials |
| 6. AWWA | American Water Works Association |
| 7. FM | Factory Mutual |
| 8. NFPA | National Fire Protection Association |
| 9. NBS | National Bureau of Standards |
| 10. NEC | National Electrical Code (NFPA Pamphlet No. 70) |
| 11. NEMA | National Electrical Manufacturers Association |
| 12. UL | Underwriters' Laboratories, Inc. |

1.05 DEFINITIONS

- A. Definitions of terms and expressions used in plumbing work are:
1. "Provide" shall mean "furnish and install" or "furnish labor and material required for installation of."
 2. "Herein" shall mean the contents of a particular section where this term appears.
 3. "Indicated" shall mean "indicated on contract drawings."
 4. "Section" shall mean one of the portions of plumbing, mechanical or electrical work sections indexed in Division 22, 23 and 26.
 5. "Concealed" where used in connection with insulation and painting of piping, and accessories, shall mean that they are hidden from sight as in chases, furred spaces, or hung ceilings.
 6. "Exposed" where used in connection with insulation and painting of piping, and accessories shall mean that they are not "concealed" as defined herein above.
 7. "Piping" includes in addition to pipe, also fittings, valves, hangers and other accessories, which comprise a system.
- B. Drawings and Instructions
1. Contract drawings for plumbing work are in part diagrammatic, intended to convey the scope of work and indicate general arrangement of equipment, fixtures, piping and approximate sizes and locations of equipment and outlets. Plumbing trade shall follow these drawings in laying out their work, consult other trades and general construction drawings to familiarize themselves with all conditions affecting their work, and shall verify and coordinate spaces in which their work will be installed. The contract drawings shall be considered as a part of these specifications. It is intended that any Contractor making proposal to execute any work should study the drawings for his own particular trade, as well as all drawings of all other trades in order to fully understand the work he is expected to perform. As a qualification for bidding, the contractor shall visit the site and be responsible for determining all existing conditions in as far as it affects his work prior to submitting a proposal.

1.06 DRAWINGS

- A. General:
1. The Drawings are schematic in nature and indicate approximate locations of the plumbing equipment, fixtures and piping systems, 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:
 - 1. Prior to locating plumbing fixtures and plumbing items, obtain the Architect/Engineer's approval as to exact location. Locations shall not be determined by scaling drawings. Plumbing fixtures, shall be mounted at the heights directed by the Architect/Engineer or as required by pertinent standards, codes or regulations. Contractor shall be responsible for costs of redoing work of trades necessitated by failure to comply with this requirement.

1.07 DISCREPANCIES

- A. Clarification:
 - 1. 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. Contractor Agreement:
 - 1. Consideration will not be granted for misunderstanding of the amount of work to be performed. Tender of a proposal conveys full Contractor agreement of the items and conditions specified, shown, scheduled, or required by the nature of the project.
- C. The drawings intend that all equipment and piping be arranged as shown with necessary minor rearrangements to suit the equipment approved and to comply with the requirements of the various equipment manufacturers' recommendations. Some minor rearrangements are expected to best fit the structural conditions. It shall be the responsibility of the Contractor to make known his desires in such change, by shop drawings as required, to obtain agreement of the Architect/Engineer before proceeding with any change or variation. Changes required by job conditions, equipment employed, or structural conditions of the building shall be at no cost to the Owner.

1.08 PRODUCT SUBSTITUTION PROCEDURES

- A. Architect/Engineer will consider requests for Substitutions. Architect/Engineer shall receive such requests a minimum of 10 days prior to scheduled bid date.
- B. Substitutions may be considered when a product becomes unavailable through no fault of Contractor.
- C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- D. A request constitutes a representation that Bidder:
 - 1. Has investigated proposed product and has determined that it meets or exceeds quality level of specified product.
 - 2. Will provide same warranty for Substitution as for specified product.
 - 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
 - 4. Waives claims for additional costs or time extension which may subsequently become apparent.
 - 5. Will reimburse Owner and Architect/Engineer for review or redesign services associated with re-approval by authorities having jurisdiction.
- E. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals, without separate written request, or when acceptance will require revision to Contract Documents.
- F. Substitution Submittal Procedure:

1. Submit two copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
2. Submit Shop Drawings, Product Data, and certified test results attesting to proposed product equivalence. Burden of proof is on proposer.
3. Architect/Engineer will notify Contractor in writing of decision to accept or reject request.

1.09 SUBMITTALS

- A. Submittal Procedures: See TPWD UGC/Special Conditions, for submittal requirements in addition to the following:
1. Submittal Preparation:
 - a. Minimum of six copies are required, complete (all items submitted at one time), index to each Section of Specifications and include the following information and action taken.
 - 1) Project Name
 - 2) Date
 - 3) Name and Address of Architect
 - 4) Name and Address of Engineer (See Division 01 of Specifications)
 - 5) Name, Address and Telephone Number of Contractor or Sub-contractors.
 - 6) Manufacturer's Name
 - 7) Published ratings or capacity data
 - 8) Detailed equipment drawing for fabricated items
 - 9) Wiring diagrams
 - 10) Installation instructions
 - 11) Other pertinent data
 - 12) All required submittals and data, bound together, submitted at one time.
 - b. Where literature is submitted covering a group or series of similar items, the applicable items must be clearly indicated on each copy with a highlighter pen, or other means of identification clearly legible.
 - c. Data and shop drawings shall be coordinated and included in a single submission. Multiple submissions are not acceptable except where prior approval has been obtained from the Architect/Engineer. In such cases, a list of data to be submitted later shall be included with the first submission. Failure to submit shop drawings that meet the requirements of the Drawings and Specifications in ample time for review shall not entitle the Contractor to an extension of contract time, and no claim for extension by reason of such Contractor default shall be allowed.
- B. Submittal Organization:
1. Organize all required data in a 3-ring black (in color) binder of sufficient size (3 inch) with index tabs with number and appropriate title of specification section.
- C. Provide a cover sheet and an index sheet listing all items submitted.
- D. The second and third sheet shall be blank for stamping of submittals. All submittals are to be processed at same date; partial submittals will not and are not acceptable.
- E. Show any revisions to equipment layout required by use of selected equipment. The Engineer shall receive submittals no later than thirty (30) working days from contract date with General Contractor and Owner.
- F. The Engineer's review of submittals is only for confirmation of adherence to design of project and does not relieve the Contractor of final responsibility for furnishing all materials required for a complete working system and in complying with the Contract Documents in all respects.

1.10 SHOP DRAWINGS, DESCRIPTIVE DATA

- A. As soon as practical and within thirty days after the official award of contract and before any materials and equipment are purchased, the Contractor shall submit to the Architect/Engineer, for review, five (5) copies of the complete list of all materials and equipment identified and referenced to specification paragraphs together with applicable

- shop drawings. In addition, the names and addresses of the manufacturers, their catalog data, numbers, and trade names shall be furnished. Published performance data indicating pressure drops, pump curves, balance points, etc., shall be furnished to indicate compliance with scheduled performance. For all fans and pumps, provide the "family" of curves, not just the selected performance point (minimum size 8 1/2" x 11"). This data will be marked "Reviewed" by the Engineer, dated and distributed to the several parties involved, with two (2) copies returned to the Contractor. The data shall include the following:
1. Equipment-room layouts drawn to 1/4" scale, including equipment, piping, accessories, to show clearances for operating and servicing.
 2. Equipment and materials as indicated in each Section.
 3. Wiring diagrams, control panelboards, motor test data, motor starters and controls for electrically operated equipment furnished by plumbing trades.
 4. Composite drawings of crowded locations where there is a possibility of conflict among trades.
 5. Indicate exact locations and elevations of pipes, ducts, and conduits, obtained from field measurements, after consultation and agreement among trades involved.
- B. Verification of Dimensions:
1. The Contractor shall be responsible for the coordination and proper relation of his work to the building structure and to the work of all trades. The Contractor shall verify all dimensions in the field and advise the Architect/Engineer of any discrepancy before performing the work. Adjustments to the work required in order to facilitate a coordinated installation shall be made at no additional cost to the Owner.
- C. Equipment other than that shown should be used in bids only when approved by the Engineer prior to bidding. Those models and manufacturers identified in drawings and specifications were selected to provide minimum acceptable performance. These models are used in sake of brevity to establish a basis of quality, weights, performance, capacities, etc., required. Any such alternate proposals must include all necessary changes and additions to the work occasioned by such substitution including but not limited to foundations, supports, electrical work, connections, piping, etc. which shall be paid for by the Contractor. In the event that the Contractor submits for approval any material, equipment, etc., that are not in conformity with the specifications, the Architect/Engineer reserves the right to reject this equipment, and the Contractor shall submit data on other equipment which meets the requirements of the specifications for approval.
- D. Installation Directions:
1. Obtain manufacturer's printed installation directions to aid in properly executing work on equipment requiring such directions.
- E. Submit such directions to Architect/Engineer prior to time of installation for use in review of the work.
- F. Operating Instructions, Charts:
1. Furnish manufacturer's printed operating and maintenance instruction for equipment and systems, which, in opinion of Architect/Engineer, require such instructions; obtain receipt for it.
- G. When so specified or instructed, mount operating instructions in approved frame with glass over; locate where directed.

1.11 GENERAL INSTALLATION

- A. Lines and Grades:
1. Construct work in conformity with lines and grades as indicated, using axis lines and bench marks provided under General Construction; verify such axis lines and bench marks.
 2. Axis lines within building will be so spaced on each floor level that plumbing work may be laid out with tape measure having length of 50 feet maximum.

3. Bench marks outside building will be at accessible points on building walls, from which lines and grades required for installation of plumbing and electrical work may be set.
- B. Existing Services:
1. Active Services: When encountered in work, protect, brace and support existing active sewers, gas, piping and other services where required for proper execution of the work. If existing active services are encountered that require relocation, make request in writing for determination. Do not proceed with work until written directions are received. Do not prevent or disturb operation of active services that are to remain. Outages shall be kept to a minimum and allowed only as arranged with the Architect/Engineer.
 2. Inactive Services: When encountered in work, remove, cap, or plug inactive services.
 3. Interruption of Services: Where work makes temporary shutdowns of services unavoidable, shut down at night or at such times as approved by Owner, which will cause the least interference with established operating routine. Arrange to work continuously, including overtime, if required, to assure that services will be shut down only during time actually required to make necessary connection to existing work.
- C. Equipment Design and Installation:
1. Uniformity: Unless otherwise specified, equipment or material of same type or classification, used for same purpose shall be the product of same manufacturer.
 2. Design: Equipment and accessories not specifically described or identified by manufacturer's catalog numbers shall be designed in conformity with ASME, AIEE or other applicable technical standards, be suitable for maximum working pressure and shall have neat and finished appearance.
 3. Installation: Erect equipment in neat and workmanlike manner; align, level and adjust for satisfactory operation; install so that connecting and disconnecting of piping and accessories can be made readily, and so that all parts are easily accessible for inspection, operation, maintenance and repair. Minor deviation from indicated arrangements may be made, as approved.
- D. Protection of Equipment and Materials:
1. Responsibility for care and protection of plumbing work rests with the Contractor until it has been tested and accepted.
 2. After delivery, before and after installation, protect equipment and materials against theft, injury or damage from all causes.
 3. Protect plumbing fixtures and other equipment with enamel or glaze surface, from damage, by covering and/or coating, as recommended in Bulletin, "Handling and Care of Enameled Cast Iron Plumbing Fixtures," issued by Plumbing Fixture Manufacturers Association, and as approved.
- E. Adjustments:
1. It shall be the responsibility of the Contractor to adjust properly any and all equipment and devices and to run reasonable operating tests together with more specific tests indicated in the separate sections of the specifications. If for some reason any piece of equipment does not function satisfactorily after the first adjustments are made, the Contractor shall continue on the job until satisfactory corrections and adjustments have been made. The Contractor is responsible for the proper performance, functioning, integration, and balance of all equipment. Where tests are required by the Architect/Engineer to ascertain equipment capacities in the installed condition, it shall be the responsibility of the Contractor to run approved tests, to provide all required instruments and apparatus and to submit certified statements of test results. All such instruments shall be in proper calibration and shall meet approval of the Architect/Engineer.
- F. Completeness:
1. The Contractor shall be responsible for the absolute completeness of his work, including all adjustments and all final balancing to obtain proper operation in all respects.

Balancing is in reference to proper water flow, control calibration or balancing to eliminate objectionable vibrations, noises, or surges.

2. Each system is intended to be complete and functional in performance. All such items as piping trim, electrical work, controls, accessories, insulated condensate drains and appurtenances required shall be installed at no extra cost.

1.12 PERMITS AND FEES

- A. All building permits and their required fees, extension of utilities together with applicable meters, and all inspection fees for all plumbing work **will be permitted/issued/inspected directly by the Owner. TPWD is the governing jurisdiction on this project and Self Performs permitting & Inspections.**

1.13 UTILITY CONNECTIONS AND INSPECTIONS

- A. Extensions:
 1. The Contractor shall provide or obtain and pay for all utility connections, utility extensions, and/or relocations and shall pay all costs and inspection fees for all work included therein.
- B. Compliance:
 1. The Contractor is required to comply in every respect with all requirements of local inspection departments, local ordinances and codes, and utility company requirements.
- C. Utilities:
 1. The Contractor shall check with the various utility companies whose services are required for this project and shall provide, complete in all respects, the required utility relocations, extensions, modifications, and/or changes.
- D. Certifications:
 1. Prior to final acceptance, the Contractor shall furnish without additional charge a certificate of acceptance from the inspection departments having jurisdiction over the work for any and all work installed under this Contract.
- E. Utility Locations and Elevations:
 1. Locations and elevations of the various utilities included within the scope of this work have been obtained from substantially reliable sources and are offered as a general guide only, without guarantee as to accuracy. The Contractor shall examine the site, shall verify to his own satisfaction the locations, elevations, and availability of all utilities and services required, and shall adequately inform himself as to their relation to the work. The submission of bids shall be deemed evidence thereof.
- F. Ordinances, Rules and Regulations:
 1. All installations shall comply with applicable codes; ordinances and regulations except where drawings require a higher degree of work as indicated on the plans or specified hereinafter.
- G. Installations and equipment shall comply with applicable requirements of the National Fire Protection Association, American Gas Association, Texas State Board of Insurance Underwriters, utility company, or other local, State or Federal agencies having jurisdiction. Compliance with these requirements shall be done at no additional cost to the Owner.
- H. Any changes to the contract required by the aforementioned requirements shall be submitted to the Architect/Engineer in writing for approval prior to execution.

1.14 WORKMANSHIP

- A. All materials and equipment shall be installed in accordance with the approved recommendation of the manufacturer, and by workmen skilled in the trade involved shall accomplish the installation.

1.15 FLAME SPREAD PROPERTIES OF MATERIALS

- A. Materials and adhesives incorporated in this project shall conform to ASTM Standard E84, "Test Method of Surface Burning Characteristics of Building Materials" and NFPA 90. The classification shall not exceed a flame spread rating of 25 for all materials, adhesives, finishes, etc., specified for each system, and shall not exceed a smoke developed rating of 50.

1.16 ASBESTOS ABATEMENT

- A. In the event the Contractor encounters at the site material reasonably believed to be asbestos which has not been abated, the Contractor shall immediately stop work in the area affected and report the condition to the Owner. If in fact the material is asbestos and the asbestos has not been abated, the Contractor shall not resume the non-asbestos-related work in the affected area until the asbestos has been abated. The abatement action may be done in two ways, as the Owner may decide. The Owner may perform the abatement by its own forces, or the Owner may contract with a third party to perform the abatement.

PART 2 PRODUCTS – NOT USED**PART 3 EXECUTION****3.01 SPACE REQUIREMENTS**

- A. General:
 - 1. Determine in advance of purchase that the equipment and materials proposed for installation will fit into the confines indicated, leaving adequate clearances for adjustment, repair or replacement.
- B. Clearance:
 - 1. Allow adequate space for clearance in accordance with the Code requirements and the requirements of the local inspection department.
- C. Responsibility:
 - 1. Since space requirements and equipment arrangement vary for each manufacturer, the responsibility for initial access and proper fit rests with the Contractor.
- D. Review:
 - 1. Final arrangements of equipment to be installed shall be subject to the Architect/Engineer's review.
- E. Equipment, Spaces and Clearances:
 - 1. All equipment and accessories shall be new and standard models of a type that has been in satisfactory use for two (2) years. All major components of any given system shall be of the same manufacturer and shall have a manufacturer's nameplate stating address, catalog model number and capacity.
- F. Materials and equipment shall be installed in accordance with manufacturers' recommendations and best standard practice for the type of work involved.
- G. All equipment shall be continuously protected, using temporary shelters, etc., from dirt, dust, moisture, damage, etc., and will not be accepted otherwise. All necessary supports, frames and foundations shall be provided for all equipment.
- H. The responsibility for the furnishing of the proper plumbing equipment rests entirely upon the Contractor who shall request advice and supervisory assistance from the representatives of specific manufacturers during the installation.
- I. It shall be the responsibility of the Contractor that the combination of proposed equipment will fit into the allotted space shown on the plan with adequate clearances for maintenance and servicing.

- J. Any apparatus, which is too large to permit access through stairways, doorways, shaft, etc., shall be delivered to the job and set in place prior to constructing the plumbing room enclosures.
- K. Machinery Drive:
1. For motor, and other power-driven equipment specified in plumbing work sections, the following shall apply:
 - a. Couplings: Where couplings are specified for direct drive, use all-steel flexible type, Falk Corp. "Type F Steelflex," Farrel-Birmingham Co. Inc., "Gearflex," or approved equal.
 - b. Belt Drive: Where V-belt drive is specified, design for overload as per manufacturer's recommendation for type of service intended but in any case not less than 125 percent of motor horsepower rating, of dimensions and number of belts to transmit required power with 95 percent minimum efficiency; use machined cast iron or steel sheaves designed for this type of drive; belts and sheaves shall be of same manufacture; " Gates Rubber Co., "Vulco Ropes & Sheaves," or approved equal.
- L. Machinery Accessories:
1. Lubricating Devices: Provide oil level gages, grease gun fittings for machinery bearings as recommended by machinery manufacturer; where these lubricating means are not easily accessible, extend to locations as directed. Furnish all grease gun fittings of uniform type.
 2. Sleeve Bearings: Where sleeve bearings are specified for equipment, use self-aligning type, Randall Graphite Bearings, Inc., or approved equal.
 3. Belt Guards: Provide guards to enclose belt, pulleys and sheaves on belt-driven equipment. Construct of galvanized expanded or perforated sheet steel, or 1-inch mesh wire screen, in angle frame with steel angle or channel mounting supports; make guard easily removable for access to belt, pulley or sheave. Conform to codes or regulation of agencies having jurisdiction. Paint prime and finish coats as directed.
 4. Guard Railing: Where guard railings are required for machinery hazard protection, provide galvanized pipe railing with special railing fittings, galvanized malleable iron, Grinnell Co., Inc., Fig. 1181, or approved equal; fasten, brace as directed. Where required provide suitable hinged and latched gate. Conform to codes or regulations of agencies having jurisdiction. Paint prime and finish coats as directed.
 5. Equipment Supports, Foundations, Stands: Where supports, foundations, stands, suspended platforms for machinery, tanks or vessels, and other equipment are indicated or specified in plumbing work sections, perform as follows:
 - a. Design, Construction, Location
 - 1) Design and construct supporting structures of strength to safely withstand stresses to which they may be subjected and to distribute properly the load and impact over the building areas.
 - 2) Conform to applicable technical societies' standards, also to codes and regulations of agencies having jurisdiction.
 - 3) Locate supports for vessels to avoid undue strain on shell and interference with pipe connections to vessel outlets.
 - 4) For vessels containing tubes, check support locations for clearance to pull tubes.
 - 5) Where saddles are indicated or specified for vessel supports, use cast iron or welded-steel saddles of curvature to fit vessel.
 - 6) Mount power-driven equipment on common base with driver unless otherwise indicated, specified or approved.
 - 7) Submit detailed shop drawings of all supports; obtain approval before fabricating or constructing.
- M. Access Doors:
1. Furnish and locate for installation under General Construction, access doors for concealed expansion joints, valves, traps, strainers, cleanouts, other parts requiring accessibility for operation and maintenance.

2. In suspended tile ceilings, use tile in place of access door; provide in such tile a button or other means for identification and easy removal when necessary.
3. Access door size shall be as indicated and where not indicated, make 12" x 12" minimum, or larger as directed. For acoustical ceilings, conform to Architect/Engineer panel pattern.
4. Unless otherwise indicated, access doors shall be hinged flush type steel framed panel, 12 gage minimum for door, 14 gage minimum for frame, with anchor straps; only narrow border shall be exposed, preferably only thickness of frame. For tile walls, provide stainless steel access doors.
5. Hinges shall be concealed type; locking devices shall be flush cam type, screwdriver operated. Access doors and frames shall have prime coat of rust inhibiting paint.

3.02 RELATED ELECTRICAL PROVISIONS

- A. Electrical Contractor To Provide:
 1. Line Voltage and hook-up to all Plumbing (Division 22) Equipment
- B. Plumbing Contractor to Provide:
 1. All motor starters (with heaters as required).
 2. All Plumbing Equipment.
 3. All relays, contactors, and switches required to start/stop Plumbing Equipment other than switches shown on and required by Division 26.
- C. The Electrical plans are based on the equipment and devices scheduled shown on the drawings or as called for in the specifications. Should any plumbing equipment or device associated devices be changed or accepted from those which are shown or noted, all electrical and/or plumbing changes shall be made at the expense of the trade or contractor initiating the change with no expense to the Owner, Engineer or their representatives.
- D. All conduit and boxes for thermostats and/or sensors shall be provided by electrical contractor.
- E. General:
 1. All electrical equipment, control components and circuits not specifically covered herein shall conform to the requirements in Division 26, Electrical.
- F. Motor driven equipment and its installation shall be provided complete with motors, wiring, motor starters, interlocks, and operating and/or safety controls. Their electrical characteristics shall conform to that indicated. Motor starters shall be provided complete with properly sized thermal-overload protection in all phases and other appurtenances necessary for motor control. Motors shall be of adequate size to drive equipment at specified capacity without exceeding nameplate rating of the motor.
- G. Such items as electric control, motors, relays, thermostats, terminal or limiting switches on equipment, etc., shall be furnished as part of the equipment involved. All of these electrical controls, interlocks, and devices shall be installed and wired into the system to conform to Division 26. They shall be complete with all required conduit, condulets, boxes, wire, grounds, power disconnect switches, etc. The electrical trades doing Division 26 work shall provide all power wiring of 115 volt or higher including interlocks. All control wiring shall be the responsibility of the plumbing trades, who shall furnish all wiring and diagrams.
- H. Motors:
 1. Except where otherwise specified or indicated for motors in plumbing and electrical work sections, the following shall govern:
 - a. Motors 1/2 - horsepower and smaller shall be single phase, 115 - volt;
3/4 - horsepower and larger shall be three phase; exceptions will be made, as approved, in case of fractional horsepower motor-driven equipment units furnished by manufacturer with integral motor to suit this standard design.
 - b. Single-phase motors shall be capacitor-start, split-phase or shaded- pole type, as approved for individual application.

- I. Polyphase motors shall be squirrel-cage induction, or wound-rotor induction type, of NEMA Design B, according to starting torque and current characteristics, as approved for individual application. Motors with variable frequency drives shall have insulation rated for that service.
- J. Where motor type, horsepower, speed, or other essential data are not specified in detailed specification of individual equipment unit or indicated on schedules, obtain this information from manufacturer of equipment unit and have it approved before ordering motors.
- K. Manufacture:
 - 1. Motors furnished under plumbing and electrical work shall not be the product of more than two manufacturers. Exceptions will be made as approved, in cases of fractional horsepower motor, or when motor is furnished integral with driven equipment unit as manufacturer's standard.
- L. Design, Performance:
 - 1. NEMA standards shall be taken as minimum requirements for motor design and performance, except where otherwise specified.
- M. Motors shall be suitable for load, duty, voltage, frequency and hazard, for service and location intended.
- N. NEMA classification of motor enclosures shall apply when motor types are specified as open, drip proof, splash proof, totally enclosed and the like.
- O. Motors shall have ball or roller type bearings with pressure grease lubrication; exceptions will be made, as approved, in special cases for sleeve type bearings with approved method of oil lubrication.
- P. Motors shall be quiet operating.
- Q. Motors shall be rated for continuous duty and under full load; maximum rise in temperature shall not exceed current standards.
- R. Motors shall be capable of withstanding momentary overloads of 50 percent, without injurious overheating.
- S. Motors for belt drive shall have adjustable bases with set screws to maintain belt tension; motors for direct drive with coupling shall be doweled to base plate at two points.
- T. Motors shall have nameplates giving manufacturer's name, shop number, horsepower, rpm, and current characteristics.
- U. Motor Tests:
 - 1. For motors 75 - horsepower or smaller, check tests against complete tests of similar motor will be accepted; for motors over 75 - horsepower, make complete test for each motor furnished and submit certified test data sheets for approval.
 - 2. Test for following:
 - a. Determine motor load performance in accordance with ANSI Standard C-50, for insulation resistance, dielectric strength, efficiency, and power factor and temperature rise.
 - b. Determine efficiency and power factor for 50 percent, 75 percent and 100 percent of rated horsepower; for motors 100 horsepower and larger, include also 125 percent rating.
 - c. Perform temperature-rise test at rated horsepower for rated time interval or until temperature becomes constant.
- V. Motor Starters:
 - 1. System Description
 - a. Single Phase Starter: Starters for 115VAC single phase motors less than 1 HP shall be capable of both manual and automatic operation. Refer to Section V.2 for single phase starter requirements.

- b. Combination Starters: Provide combination magnetic starters for all motors requiring branch circuit protection or a line-of-sight disconnect. Refer to Section W.3 for combination magnetic starter requirements.
- 2. Enclosed Full Voltage Non-Reversing (FVNR) Single Phase Starter
 - a. Single Phase Motor Starter Control: The single phase motor starter shall consist of a manually operated quick-make toggle mechanism lockable in the "Off" position which shall also function as the motor disconnect. Additionally, the starter shall provide thermal overload protection, run status pilot light and fault pilot light. The starter must include the capability to operate in both manual and automatic control modes. In automatic mode, the starter shall have the capability to integrate with a building automation system by providing terminals for run input, run status output and fault output. All control terminals shall be integrated in the starter. At a minimum, each single phase starter shall include an interposing run relay and current sensing status output relay. Single phase motor starter shall be in a surface mount enclosure.
 - b. Approved manufacturer: Franklin Control Systems.
- 3. Enclosed Full Voltage Non-Reversing (FVNR) Combination Starter.
 - a. Magnetic Motor Starters with disconnects shall be enclosed in a general purpose electrical enclosure with the appropriate environmental rating. NEMA 1 for indoor installation and NEMA 3R for outdoor installation
 - b. Starters shall consist of a horsepower rated magnetic contactor with a minimum of 2NO and 2NC auxiliary contacts and solid state electronic overload relay.
 - c. Overload relay shall protect all three phases with a wide range 1-40 amp current setting and trip class to allow field adjustment for specific motor FLA. Interchangeable heater elements are not acceptable.
 - d. Overload relay shall incorporate SmartStart Technology, or the following protective functions:
 - 1) Out of calibration protection (if the FLA on the overload is set outside acceptable range, overload will trip to indicate fault event)
 - 2) Stall protection
 - 3) Max time to start
 - 4) Locked Rotor
 - 5) Phase Unbalance
 - 6) Phase loss
 - 7) Cycle Fault
 - e. Starter shall be field selectable for manual or auto reset to restore normal operation after a trip or fault condition. Manual pushbutton shall be accessible without removing or opening cover on starter.
 - f. In the event of a power failure, starter shall restart in last mode by default. Starter shall also be capable of restart with 10 second delay, or restart in "off" mode.
 - g. All starters must be provided with a universal power supply capable of a 208 to 600 volt input range. The power supply must accept the available line voltage and the control voltage shall not exceed 24V.
 - h. Installed accessories shall include Hand-Off-Auto operation pushbutton keypad. Include LED pilot light indicators for Hand, Off, Auto, Run and Overload conditions.
 - i. The starter shall include remote run terminals which accept both a voltage input signal and a contact closure. The voltage run input shall accept both AC and DC signals from 12-250V to allow direct connection of the transistorized automation signal to the starter.
 - j. Starter must contain an integral current sensor with NO contact which closes to indicate motor run status as well as a NO contact which closes when an overload trip condition occurs.
 - k. The starter must provide a voltage output to operate the actuator to open the damper or valve without closing the motor circuit. The starter will only close the motor circuit and start the motor after it has received a contact closure from a limit or end switch confirming the damper or valve position.

- l. The starter shall include a dedicated voltage input for Fireman's Override operation. When activated, the starter run the motor in any mode (Hand, Off or Auto) regardless of other inputs or lack of inputs either manual or auto. The purpose of the Fireman's Override input is to act as a smoke purge function. Fireman's Override has priority over the Emergency Shutdown input.
 - m. The starter shall include an Emergency Shutdown input which will disable the starter from operating in either Hand or Auto mode regardless of other inputs either manual or auto.
 - n. Manufacturer shall provide and install tags with engraved white lettering to designate equipment served
 - o. All disconnects shall include a lock-out mechanism when in the off position.
 - p. Motor circuit protectors (MCP) shall be provided as the acceptable form of disconnecting means. The MCP shall be a UL listed 508 current limiting manual motor starter with magnetic trip elements only. The MCP shall carry a UL 508F rating (up to 100A frame size) which provides for coordinated short circuit rating for use with the motor contactor and provides a minimum interrupting rating of 30,000 AIC for the combination starter.
 - q. Approved manufacturer: Franklin Control Systems or Engineer approved equal.
- W. Motor Control Enclosure for individual Motor:
 - 1. Enclosure shall be furnished by manufacturer of control devices, of size and design to suit each application; with operating and resetting device operable from outside; hinged door with padlock; NEMA Type 1 for general purpose indoor application, other types for special applications, as approved.
- X. Automatic Alternating Devices:
 - 1. Where alternating devices are specified for duplex pumping units, furnish device, which will automatically alternate the cycle of operation.
 - 2. Automatic alternator shall be Square D Co., Class 9039 in separate enclosure, or in common enclosure with specified starter and disconnect means, Class 8541, or approved equal.
 - 3. Mechanical alternator for duplex unit with common tank shall be Square D Co., Class 9038 or approved equal.
- Y. Alarm Audible Signal Device:
 - 1. Where alarm bell or gong is specified, furnish 4 - inch, 6 - inch or 10 -inch heavy duty vibrating bell, for 24-volt or 115 - volt alternating current; Edwards Co., "Adaptable" No. 340, or approved equal.
 - 2. Where size is not specified, furnish 10-inch sized for boiler room, 6-inch or 4-inch in other locations as approved.
- Z. For outdoor installation, mount bell in weatherproof box Edwards Co., No. 348 or 349.
- AA. Motor Control Enclosure for individual Motor:
 - 1. Enclosure shall be furnished by manufacturer of control devices, of size and design to suit each application; with operating and resetting device operable from outside; hinged door with padlock; NEMA Type 1 for general purpose indoor application, other types for special applications, as approved.
- BB. Cleaning Piping, and Equipment:
 - 1. Piping and equipment shall be thoroughly cleaned of dirt, cuttings and other foreign substances. Should any pipe, or other part of the systems be stopped by any foreign matter, disconnect, clean and reconnect wherever necessary for purpose of locating and removing obstructions. Repair work damaged in the course of removing obstructions.

3.03 EXCAVATION, BACKFILLING, AND CUTTING

- A. Boring, excavating, backfilling and cutting shall not be undertaken without receiving approval of the Architect/Engineer before starting same. Cutting through masonry on concrete shall be

made with masonry saws or core drills. This approval is required where the work may interfere with the work of other trades or where it may weaken the structure in any way.

B. Excavation:

1. All excavation of every description and of whatever substances encountered, to the depth indicated on the drawings and/or required for the installation of piping, utility system, etc., shall be performed. All exterior lines shall be installed with a minimum cover of 24 inches unless otherwise indicated. Concrete encase all sewer lines under streets with less than 30 inches of cover. Generally, more cover shall be provided if grade will permit. All excavated materials not required for backfill or fill shall be removed and wasted as acceptable to the Architect/Engineer. All grading in the vicinity of excavations shall be controlled to prevent surface ground water from flowing into the excavation. During excavation, material suitable for backfilling shall be stacked in an orderly manner sufficient distance back from edges of trenches to avoid overloading and prevent slide or cave-ins. Any water accumulated in the excavations shall be removed by pumping or other approved method. All shoring and sheeting required to perform and protect the excavations and to safeguard employees shall be performed. Excavate as required under the building in order that all piping, ductwork, etc. shall clear the ground a minimum of 12 inches for a distance of 24 inches on either side. Edges of such excavation shall slope at an angle of not over 45 degrees with the horizontal unless otherwise approved by the Architect/Engineer. The bottom of such excavation shall be graded to drain in a manner acceptable to the Architect/Engineer.

C. Backfilling:

1. The trenches shall not be backfilled until all required tests are performed and until the piping, conduits, utilities systems, etc., as installed, conform to the specified requirements. The trenches shall be carefully backfilled with the excavated materials approved for backfilling, consisting of earth, loam, sandy clay, sand and gravel, soft shale, or other approved materials free from larger clods of earth or stone, deposited in thoroughly and carefully rammed 6 inch layers, until the pipe has a cover of not less than 1 foot. The remainder of the material shall be backfilled after moistening and then tamped in place using 1-foot layers. Blasted rock, broken concrete or pavement, and large boulders shall not be used as backfill material. Any trenches improperly backfilled, or where settlement occurs, shall be reopened to the depth required for proper compaction, be refilled and mounded over and smoothed off. Unless otherwise indicated open trenches across roadways or other areas to be paved shall be backfilled as specified above, except that entire depth of trench shall be backfilled in 6 inch layers, each layer moistened and compacted to a density at least equal to that of the adjacent level in such manner as to permit the rolling and compaction of the filled trench together with the adjoining earth to provide the required bearing value, so that paving of the area can proceed immediately after backfilling is completed. Where an area has been prepared for pavement prior to excavation, backfill shall be of such materials and installed as to comply with the paving requirements for preparation of subgrade and stabilized base courses as specified in other sections of the specifications. Along all other portions of the trenches, the ground shall be graded to a reasonable uniformity and the mounding over the trenches left in a uniform and neat condition. Backfill under concrete slab on fill shall be as specified above, shall be select fill, or shall be such other materials more suitable for the application. Installation and compaction shall be as required for compatibility with adjacent materials.

D. Opening and Closing Pavement and Lawns:

1. Where excavation requires the opening of existing walks, streets, drives, other existing pavement or lawns, such surfaces shall be cut as required to install new lines and to make new connections to existing lines. The sizes of the cut shall be held to minimum, consistent with the work to be accomplished. After the installation of the new work is completed and the excavation has been backfilled, paved areas shall be reinstalled to match existing paving and lawn areas shall be re-sodded.

3.04 CONCRETE WORK

- A. Where concrete work is indicated or specified under plumbing work, as for foundations, piers, pedestals, tank encasement, cradles or saddles for tanks or pipes, manholes, pits, and catch basins, perform as follows:
 - 1. Concrete Strength:
 - a. Concrete shall have compressive strength after 28 days of 2,200 pounds per square inch minimum.
 - b. Concrete mix shall consist of one part Portland cement to 4-1/2 parts by volume of fine and coarse aggregate in dry state, with 7-1/2 gallons water maximum per sack of cement.
 - c. Portland cement shall be as per ASTM C 150, Type 1.
 - d. Concrete aggregate shall be as per ASTM C 33.
 - e. Water shall be clear, of quality suitable for domestic consumption.

3.05 Tests

- A. Following requirements are supplementary to tests specified for individual equipment or systems in plumbing work sections.
- B. Notice of Tests:
 - 1. Give written notice in ample time to all concerned of date when tests will be conducted.
- C. Prior Tests:
 - 1. Concealed or insulated work shall remain uncovered until required tests have been completed, but if construction schedule requires it, arrange for prior tests on parts of system as approved.
- D. Preliminary Tests:
 - 1. As soon as conditions permit, conduct preliminary or "turn-over" test of certain equipment as directed, to ascertain compliance with specified requirements. Make needed changes, adjustments or replacements as preliminary tests may indicate, prior to acceptance test.
- E. Acceptance Tests:
 - 1. Conduct pressure, performance and operating tests as specified for each system or equipment unit, in presence of Architect/Engineer or other accredited representative of Owner, as well as representatives of agencies having jurisdiction. The Contractor shall correct all deficiencies resulting from test data and from deficiencies identified at times of site observations.
- F. Costs:
 - 1. Furnish labor, material, and instruments and bear other costs in connection with all tests.
- G. Record Report Copies:
 - 1. Provide a copy of all test reports in Operations and Maintenance manual.

3.06 Guarantees

- A. All work, including plumbing, equipment, and materials, shall be guaranteed by the Contractor for a period of one (1) year after final acceptance of the work. All defects in labor and materials occurring during the one year after final acceptance of the work shall be immediately repaired or replaced by the Contractor at no additional cost to the owner.

3.07 Certification

- A. Certification shall be furnished by the authorized manufacturer's representative stating equipment is installed in accordance with the manufacturer's recommendation and is eligible for specified warranties. Include in Operations and Maintenance manual.

3.08 Operating Instructions

- A. The Contractor shall turn over the following to the Owner at completion of contract.
 - 1. Operating instructions together with wiring diagrams.

2. Approved drawings, equipment submittals, as-built control diagrams, etc.
3. All equipment guarantees and warranties together with instructions shipped with equipment.
4. Parts list of all major items of equipment.
5. Test reports.
6. All above items shall be "punched" and bound in a loose-leaf notebook.

END OF SECTION 22 05 00

SECTION 23 0500**GENERAL MECHANICAL REQUIREMENTS****PART 1 - GENERAL****1.01 SUMMARY**

- A. Applicable provisions of General Conditions, Special Conditions, and Special Instructions to Bidders in addition to the requirements of Division One specifications govern work under this section and all of Division 23.
- B. This section is in particular reference to and shall be considered a part of all Mechanical specifications sections following. It is intended that comments in this section be applicable to all parts of Division 23. Work described hereinafter shall be included as though written within each specific section of the specification.
- C. The Contractor shall provide all items, articles, materials, operations, or methods listed, mentioned, or scheduled on the Drawings and/or herein, including all labor, materials, equipment, and incidentals necessary and required for their completion.
- D. All work shall conform to requirements of all local construction codes, applicable sections of the National Fire Protection Association, and the Public Health Agency.

1.02 SCOPE

- A. Requirements specified in this section shall govern applicable portions of all mechanical sections including paragraphs on related electrical work, whether so stated therein or not.
- B. Where items specified in the specific mechanical sections conflict with requirements in this section, the specific sections shall govern.
- C. The Contractor shall furnish all labor, plant, equipment, and materials, complete in connection with the installation of the heating, air conditioning, ventilating, controls, utilities and systems in strict accordance with this specification and accompanying plans. The Contractor shall submit his bid based on performing all work hereinafter specified or indicated on applicable plans. The Contractor shall furnish and install all connections and appurtenances necessary and usually furnished in connection with such work and systems even though not specifically mentioned or shown on the plans.
- D. These requirements cover information, work, equipment and accessories listed under the following headings:
 - 1. References, Definitions, Procedures
 - 2. Permits and Fees
 - 3. Utility Connections and Inspections
 - 4. Workmanship
 - 5. Plumbing Provisions
 - 6. Mechanical Provisions
 - 7. Electrical Provisions
- E. Work of Other Sections:
 - 1. Requirements given within this Section apply to the Work of all Sections of this Division.
- F. Finish painting is specified in other Divisions. Prime and protective painting shall be provided under this Division.
- G. Electrical interlock apparatus and other electrical apparatus, which is not an integral part of equipment specified under this Division, are specified under Division 26. Necessary conduit, wiring, boxes, and fittings are specified under Division 26.

1.03 REFERENCES

- A. References to standards, codes, specifications and recommendations shall mean the latest edition of such publications adopted and published at date of invitation to submit Proposals.
- B. References to technical societies, trade organizations and governmental agencies is made in mechanical work sections in accordance with the following abbreviations:
1. AFI Air Filter Institute
 2. AGA American Gas Association
 3. AIEE American Institute of Electrical Engineers
 4. ANSI American National Standards Institute
 5. ASHRAE American Society of Heating, Refrigeration, and Air Conditioning Engineers
 6. ASME American Society of Mechanical Engineers
 7. ASTM American Society for Testing and Materials
 8. AWWA American Water Works Association
 9. CMA Convectur Manufacturers Association
 10. CSD Commodity Standards Division U.S. Department of Commerce
 11. HPACCNA Heating, Piping & Air Conditioning Contractors National Association
 12. IBR Institute of Boiler & Radiator Manufacturers
 13. IUHA Industrial Unit Heater Association
 14. NAFM National Association of Fan Manufacturers
 15. NFPA National Fire Protection Association
 16. NBS National Bureau of Standards
 17. NEC National Electrical Code (NFPA Pamphlet No. 70)
 18. NEMA National Electrical Manufacturers Association
 19. SBI Steel Boiler Institute
 20. UL Underwriters' Laboratories, Inc.

1.04 DEFINITIONS

- A. Definitions of terms and expressions used in mechanical work are:
1. "Provide" shall mean "furnish and install" or "furnish labor and material required for installation of."
 2. "Herein" shall mean the contents of a particular section where this term appears.
 3. "Indicated" shall mean "indicated on contract drawings."
 4. "Section" shall mean one of the portions of mechanical work sections indexed in Division 23.
 5. "Concealed" where used in connection with insulation and painting of piping, ducts and accessories, shall mean that they are hidden from sight as in trenches, chases, furred spaces, pipe shafts or hung ceilings.
 6. "Exposed" where used in connection with insulation and painting of piping, ducts, and accessories shall mean that they are not "concealed" as defined herein above.
 7. "Piping" includes in addition to pipe, also fittings, valves, hangers and other accessories, which comprise a system.
- B. Drawings and Instructions

1. Contract drawings for mechanical work are in part diagrammatic, intended to convey the scope of work and indicate general arrangement of equipment, fixtures, ducts, interlocks, piping and approximate sizes and locations of equipment and outlets. Mechanical trades shall follow these drawings in laying out their work, consult other trades and general construction drawings to familiarize themselves with all conditions affecting their work, and shall verify and coordinate spaces in which their work will be installed. The contract drawings shall be considered as a part of these specifications. It is intended that any Contractor making proposal to execute any work should study the drawings for his own particular trade, as well as all drawings of all other trades in order to fully understand the work he is expected to perform. As a qualification for bidding, the contractor shall visit the site and be responsible for determining all existing conditions in as far as it affects his work prior to submitting a proposal.

1.05 DRAWINGS

A. General:

1. The Drawings are schematic in nature and indicate approximate locations of the heating, ventilating, air conditioning systems, and piping systems, 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:

1. Prior to locating diffusers and grilles, obtain the Architect/Engineer's approval as to exact location. Locations shall not be determined by scaling drawings. Contractor shall be responsible for costs of redoing work of trades necessitated by failure to comply with this requirement.

1.06 DISCREPANCIES

A. Clarification:

1. 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. Contractor Agreement:

1. Consideration will not be granted for misunderstanding of the amount of work to be performed. Tender of a proposal conveys full Contractor agreement of the items and conditions specified, shown, scheduled, or required by the nature of the project.

- C. The drawings intend that all equipment and piping be arranged as shown with necessary minor rearrangements to suit the equipment approved and to comply with the requirements of the various equipment manufacturers' recommendations. Some minor rearrangements are expected to best fit the structural conditions. It shall be the responsibility of the Contractor to make known his desires in such change, by shop drawings as required, to obtain agreement of the Architect/Engineer before proceeding with any change or variation. Changes required by job conditions, equipment employed, or structural conditions of the building shall be at no cost to the Owner or Architect/Engineer.

1.07 SUBMITTALS - GENERAL

- A. Submittal Procedures: See TPWD UGC/Special conditions, for submittal requirements in addition to the following:

1. Submittal Preparation:

- a. Minimum of six (6) copies are required, complete (all items submitted at one time), index to each Section of Specifications and include the following information and action taken.
 - 1) Project Name
 - 2) Date
 - 3) Name and Address of Architect
 - 4) Name and Address of Engineer
 - 5) Name, Address and Telephone Number of Contractor and Sub-contractors.
 - 6) Name, Address and Telephone number of major equipment manufacturer's local representatives.
 - 7) Manufacturer's Name
 - 8) Published ratings or capacity data
 - 9) Detailed equipment drawing for fabricated items
 - 10) Wiring diagrams
 - 11) Installation instructions
 - 12) Other pertinent data
 - 13) All required submittals and data, bound together, submitted at one time.
 - b. Where literature is submitted covering a group or series of similar items, the applicable items must be clearly indicated on each copy with a highlighter pen, or other means of identification clearly legible.
 - c. Data and shop drawings shall be coordinated and included in a single submission. Multiple submissions are not acceptable except where prior approval has been obtained from the Architect/Engineer. In such cases, a list of data to be submitted later shall be included with the first submission. Failure to submit shop drawings that meet the requirements of the Drawings and Specifications in ample time for review shall not entitle the Contractor to an extension of contract time, and no claim for extension by reason of such Contractor default shall be allowed.
- B. Submittal Organization:
1. Organize all required data in a 3-ring black (in color) binder of sufficient size with index tabs with number and appropriate title of specification section.
- C. Provide a cover sheet and an index sheet listing all items submitted.
- D. The second and third sheet shall be blank for stamping of submittals. All submittals are to be processed at same date; partial submittals are not acceptable and will not be reviewed.
- E. Show any revisions to equipment layout required by use of selected equipment. The Engineer shall receive submittals no later than thirty (30) working days from contract date with General Contractor and Owner. Allow two weeks (10 working days) for review process.
- F. The Engineer's review of submittals is only for confirmation of adherence to design of project and does not relieve the Contractor of final responsibility for furnishing all materials required for a complete working system and in complying with the Contract Documents in all respects.

1.08 FABRICATION AND SHOP DRAWINGS, DESCRIPTIVE DATA

- A. As soon as practical and within thirty days after the official award of contract and before any materials and equipment are purchased, the Contractor shall submit to the

Architect/Engineer, for review, six (6) copies of the complete list of all materials and equipment identified and referenced to specification paragraphs together with applicable fabrication and shop drawings. In addition, the names and addresses of the manufacturers, their catalog data, numbers, and trade names shall be furnished. Published performance data indicating pressure drops, pump curves, balance points, etc., shall be furnished to indicate compliance with scheduled performance. For all fans and pumps, provide the "family" of curves, not just the selected performance point (minimum size 8 1/2" x 11"). This data will be marked "Reviewed" by the Engineer, dated and distributed to the several parties involved, with three (3) copies returned to the Contractor. The data shall include the following:

1. Equipment-room layouts drawn to 1/4" scale, including equipment, piping, accessories, to show clearances for operating and servicing.
2. Equipment and materials as indicated in each Section.
3. Automatic control system and sequence of control together with all data on components. In no case will wire-to-wire or terminal type of wiring diagrams for control system be included or checked as submittal; they shall be included as information only.
4. Wiring diagrams, control panelboards, motor test data, motor starters and controls for electrically operated equipment furnished by mechanical trades.
5. Composite coordination drawings of crowded locations where there is a possibility of conflict among trades. Indicate exact locations and elevations of pipes, ducts, and conduits, obtained from field measurements, after consultation and agreement among trades involved.
6. See also Section 23 31 00.

B. Verification of Dimensions:

1. The Contractor shall be responsible for the coordination and proper relation of his work to the building structure and to the work of all trades. The Contractor shall verify all dimensions in the field and advise the Architect/Engineer of any discrepancy before performing the work. Adjustments to the work required in order to facilitate a coordinated installation shall be made at no additional cost to the Owner or Architect/Engineer.

C. Equipment other than that shown should be used in bids only when approved by the Engineer prior to bidding. Those models and manufacturers identified in drawings and specifications were selected to provide minimum acceptable performance. These models are used in sake of brevity to establish a basis of quality, weights, performance, capacities, etc., required. Any such alternate proposals must include all necessary changes and additions to the work occasioned by such substitution including but not limited to foundations, supports, electrical work, connections, piping, etc. which shall be paid for by the Contractor. In the event that the Contractor submits for approval any material, equipment, etc., that are not in conformity with the specifications, the Architect/Engineer reserves the right to reject this equipment, and the Contractor shall submit data on other equipment which meets the requirements of the specifications for approval.

D. Installation Directions:

1. Obtain manufacturer's printed installation directions to aid in properly executing work on equipment requiring such directions. Submit such directions to Architect/Engineer prior to time of installation for use in review of the work.

E. Operating Instructions, Charts:

1. Furnish manufacturer's printed operating and maintenance instruction for equipment and systems, which, in opinion of Architect/Engineer, require such

instructions; see also requirements for owner's manuals at the end of this section.

- F. When so specified or instructed, mount operating instructions laminated or in approved frame with glass over; locate where directed.

1.09 GENERAL INSTALLATION

A. Lines and Grades:

1. Construct work in conformity with lines and grades as indicated, using axis lines and bench marks provided under General Construction; verify such axis lines and bench marks.
2. Axis lines within building will be so spaced on each floor level that mechanical work may be laid out with tape measure having length of 50 feet maximum.
3. Bench marks outside building will be at accessible points on building walls, from which lines and grades required for installation of mechanical and electrical work may be set.

B. Existing Services:

1. Active Services: When encountered in work, protect, brace and support existing active sewers, gas, piping and other services where required for proper execution of the work. If existing active services are encountered that require relocation, make request in writing for determination. Do not proceed with work until written directions are received. Do not prevent or disturb operation of active services that are to remain. Outages shall be kept to a minimum and allowed only as arranged with the Architect/Engineer.
2. Inactive Services: When encountered in work, remove, cap, or plug inactive services.
3. Interruption of Services: Where work makes temporary shutdowns of services unavoidable, shut down at night or at such times as approved by Owner, which will cause the least interference with established operating routine. Arrange to work continuously, including overtime, if required, to assure that services will be shut down only during time actually required to make necessary connection to existing work.

C. Objectionable Noise and Vibration:

1. Mechanical equipment shall operate without objectionable noise or vibration.
2. If such objectionable noise or vibration should be produced and transmitted to occupied portions of building apparatus, piping, ducts or other parts of mechanical work, make necessary changes and additions, as approved, without extra cost to Owner. The completed installation shall result in a noise level below the Noise Criteria Curves from ASHRAE Guide and Data books established for each type of space.

D. Equipment Design and Installation:

1. Uniformity: Unless otherwise specified, equipment or material of same type or classification, used for same purpose shall be the product of same manufacturer.
2. Design: Equipment and accessories not specifically described or identified by manufacturer's catalog numbers shall be designed in conformity with ASME, AIEE or other applicable technical standards, be suitable for maximum working pressure and shall have neat and finished appearance.
3. Installation: Erect equipment in neat and workmanlike manner; align, level and adjust for satisfactory operation. Install duct and pipe straight and parallel to building lines, with any required slopes. Install so that connecting and disconnecting of duct, piping and accessories can be made readily, and so that

all parts are easily accessible for inspection, operation, maintenance and repair. Minor deviation from indicated arrangements may be made, as approved.

E. Protection of Equipment and Materials:

1. Responsibility for care and protection of mechanical and electrical work rests with the Contractor until it has been tested and accepted.
2. After delivery, before and after installation, protect equipment and materials against theft, injury or damage from all causes.

F. Adjustments:

1. It shall be the responsibility of the Contractor to adjust properly any and all equipment and devices and to run reasonable operating tests together with more specific tests indicated in the separate sections of the specifications. If for some reason any piece of equipment does not function satisfactorily after the first adjustments are made, the Contractor shall continue on the job until satisfactory corrections and adjustments have been made. The Contractor is responsible for the proper performance, functioning, integration, and balance of all equipment. Where tests are required by the Architect/Engineer to ascertain equipment capacities in the installed condition, it shall be the responsibility of the Contractor to run approved tests, to provide all required instruments and apparatus and to submit certified statements of test results. All such instruments shall be in proper calibration and shall meet approval of the Architect/Engineer.

G. Completeness:

1. The Contractor shall be responsible for the absolute completeness of his work, including all adjustments and all final balancing to obtain proper operation in all respects. Balancing is in reference to proper airflow and water flow, control calibration, refrigerant flow, or balancing to eliminate objectionable vibrations, noises, or surges.
2. Each system is intended to be complete and functional in performance. All such items as piping trim, electrical work, controls, accessories, insulated condensate drains and appurtenances required shall be installed at no extra cost.

1.10 PERMITS AND FEES

- A. All building permits and their required fees, extension of utilities together with applicable meters, and all inspection fees for all mechanical work **will be permitted/issued/inspected directly by the Owner. TPWD is the governing jurisdiction on this project and Self Performs permitting & Inspections..**
- B. The Mechanical Contractor shall assist the Owner and Engineer in the application process for any utility rebate that might apply, including scheduling of pre-inspection visits required by the utility, providing information and invoices, and any other requirements.

1.11 WORKMANSHIP

- A. All materials and equipment shall be installed in accordance with the approved recommendation of the manufacturer, and workmen skilled in the trade involved shall accomplish the installation.

1.12 FLAME SPREAD PROPERTIES OF MATERIALS

- A. Materials and adhesives incorporated in this project shall conform to ASTM Standard E84, "Test Method of Surface Burning Characteristics of Building Materials" and NFPA 90. The classification shall not exceed a flame spread rating of 25 for all materials, adhesives, finishes, etc., specified for each system, and shall not exceed a smoke developed rating of 50.

1.13 ASBESTOS ABATEMENT

- A. In the event the Contractor encounters at the site material reasonably believed to be asbestos which has not been abated, the Contractor shall immediately stop work in the

area affected and report the condition to the Owner. If in fact the material is asbestos and the asbestos has not been abated, the Contractor shall not resume the non-asbestos-related work in the affected area until the asbestos has been abated. The abatement action may be done in two ways, as the Owner may decide. The Owner may perform the abatement by its own forces, or the Owner may contract with a third party to perform the abatement.

PART 2 - PRODUCTS – NOT USED**PART 3 - EXECUTION****3.01 SPACE REQUIREMENTS**

- A. General:
 - 1. Determine in advance of purchase that the equipment and materials proposed for installation will fit into the confines indicated, leaving adequate clearances for adjustment, repair or replacement.
- B. Clearance:
 - 1. Allow adequate space for clearance in accordance with the Code requirements and the requirements of the local inspection department, and manufacturer's requirement.
- C. Responsibility:
 - 1. Since space requirements and equipment arrangement vary for each manufacturer, the responsibility for initial access and proper fit rests with the Contractor.
- D. Review:
 - 1. Final arrangements of equipment to be installed shall be subject to the Architect/Engineer's review.
- E. Equipment, Spaces and Clearances:
 - 1. All equipment and accessories shall be new and standard models of a type that has been in satisfactory use for a minimum of three (3) years. All major components of any given system shall be of the same manufacturer and shall have a manufacturer's nameplate stating address, catalog model number and capacity.
- F. Materials and equipment shall be installed in accordance with manufacturers' recommendations and best standard practice for the type of work involved.
- G. All equipment and materials shall be continuously protected, using temporary shelters, etc., from dirt, dust, moisture, damage, etc., and will not be accepted otherwise. All necessary supports, frames and foundations shall be provided for all equipment.
- H. The responsibility for the furnishing of the proper mechanical and electrical equipment rests entirely upon the Contractor who shall request advice and supervisory assistance from the representatives of specific manufacturers during the installation.
- I. It shall be the responsibility of the Contractor that the combination of proposed equipment will fit into the allotted space shown on the plan with adequate clearances for maintenance and servicing.
- J. Any apparatus, which is too large to permit access through stairways, doorways, shaft, etc., shall be delivered to the job and set in place prior to constructing the mechanical room enclosures.
- K. Machinery Drive:
 - 1. For motor and other power-driven equipment specified in mechanical work sections, the following shall apply:

- a. Couplings: Where couplings are specified for direct drive, use all-steel flexible type, Falk Corp. "Type F Steelflex," Farrel-Birmingham Co. Inc., "Gearflex," or approved equal.
 - b. Belt Drive: Where V-belt drive is specified, design for overload as per manufacturer's recommendation for type of service intended but in any case not less than 125 percent of motor horsepower rating, of dimensions and number of belts to transmit required power with 95 percent minimum efficiency; use machined cast iron or steel sheaves designed for this type of drive. Belts and sheaves shall be of same manufacture; "Gates Rubber Co., "Vulco Ropes & Sheaves," or approved equal.
- L. Machinery Accessories:
- 1. Lubricating Devices: Provide oil level gages, grease gun fittings for machinery bearings as recommended by machinery manufacturer; where these lubricating means are not easily accessible, extend to locations as directed. Furnish all grease gun fittings of uniform type.
 - 2. Sleeve Bearings: Where sleeve bearings are specified for equipment, use self-aligning type, Randall Graphite Bearings, Inc., or approved equal.
 - 3. Belt Guards: Provide guards to enclose belt, pulleys and sheaves on belt-driven equipment. Construct of galvanized expanded or perforated sheet steel, or 1-inch mesh wire screen, in angle frame with steel angle or channel mounting supports; make guard easily removable for access to belt, pulley or sheave and allow for tachometer. Conform to codes or regulation of agencies having jurisdiction. Paint prime and finish coats as directed.
 - 4. Guard Railing: Where guard railings are required for machinery hazard or roof edge protection, provide galvanized pipe railing with special railing fittings, galvanized malleable iron, Grinnell Co., Inc., Fig. 1181, or approved equal; fasten, brace as directed. Where required provide suitable hinged and latched gate. Conform to codes or regulations of agencies having jurisdiction. Paint prime and finish coats as directed. (Note that roof mounted equipment has been located a minimum of 10' from the roof edge to preclude requirement for roof edge safety railings. If this distance cannot be met, provide such railing at no additional cost).
 - 5. Equipment Supports, Foundations, Stands: Where supports, foundations, stands, suspended platforms for machinery, tanks or vessels, and other equipment are indicated or specified in mechanical work sections, perform as follows:
 - a. Design, Construction, Location
 - 1) Design and construct supporting structures of strength to safely withstand stresses to which they may be subjected and to distribute properly the load and impact over the building areas.
 - 2) Conform to applicable technical societies' standards, also to codes and regulations of agencies having jurisdiction.
 - 3) Locate supports for vessels to avoid undue strain on shell and interference with pipe connections to vessel outlets.
 - 4) For vessels containing tubes, check support locations for clearance to pull tubes.
 - 5) Where saddles are indicated or specified for vessel supports, use cast iron or welded-steel saddles of curvature to fit vessel.
 - 6) Mount power-driven equipment on common base with driver unless otherwise indicated, specified or approved.
 - 7) Submit detailed shop drawings of all supports; obtain approval

before fabricating or constructing.

M. Smoke Duct Detectors and Shut Down:

1. Fire Alarm Contractor shall furnish and Mechanical Contractor shall install smoke duct detectors in all units providing 2,000 CFM or greater and/or in units serving corridors of egress and/or units having smoke/fire dampers. Interlock with air handler to turn unit off in the event of detection of smoke. Provide and install smoke duct detectors in units smaller than 2,000 CFM if these units supply a contiguous space served by multiple units with a total airflow equal or greater than 2,000 CFM. In this case, provide a smoke duct detector in all units serving this space, regardless of CFM. Comply with the requirements of the authority having jurisdiction.
2. In buildings with existing fire alarm systems, coordinate with fire alarm contractor to install smoke duct detector compatible with fire alarm system. Upon initiation of detections, air handler shall shut down and fire alarm system alarmed.

3.02 RELATED ELECTRICAL PROVISIONS

A. Electrical Contractor To Provide (coordinate with electrical contractor):

1. Line Voltage and hook-up to all HVAC (Division 23) Equipment
2. All Conduits into accessible attic space for thermostats and sensors.
3. Junction Boxes (Standard Two Gang) required for mechanical and controls contractors, and coordination with mechanical and controls contractors.
4. One TVSS power outlet at each energy management control panel located by project controls contractor.

B. Mechanical Contractor to Provide:

1. All motor starters (with motor overload protection, including heaters or solid state devices sized for actual motor amperage as required).
2. All thermostats.
3. All HVAC Equipment.
4. All relays, contactors, and switches required to start/stop Mechanical Equipment other than switches shown on electrical drawings and required by Division 26.

C. Controls Contractor to Provide, or Mechanical Contractor if no Controls Subcontractor:

1. All required relays.
2. All Sensors.
3. All conduit required above ceiling.
4. All control wiring.

D. The Electrical plans are based on the equipment and devices scheduled shown on the drawings or as called for in the specifications. Should any mechanical equipment or associated devices be changed from those which are shown or noted, all electrical and/or mechanical changes shall be made at the expense of the trade or contractor initiating the change with no expense to the Owner, Engineer or their representatives.

E. All Conduit and boxes for thermostats and/or sensors shall be provided by mechanical contractor. A thermostat or sensor junction box and 3/4" conduit to accessible attic and/or to corridor shall be provided for each room served with HVAC equipment. All control conduits required in attic, clear spaces, or on roof shall be by the Mechanical or Controls Contractor.

F. General Electrical Coordination:

1. All electrical equipment, control components and circuits not specifically covered herein shall conform to the requirements in Division 26, Electrical.

2. Mechanical contractor shall coordinate with Electrical trade to confirm that electrical service, including voltage, phase, overcurrent protection, conductors and terminations are compatible with equipment requirements. Any discrepancies shall be called to the attention of the Engineer during submittals.
 3. Mechanical contractor shall also coordinate carefully to ensure all electrical starters, disconnects, and accessories are covered appropriately and are correct voltage. Review electrical drawings and equipment wiring schedules.
- G. Motor driven equipment and its installation shall be provided complete with motors, wiring, motor starters, interlocks, and operating and/or safety controls. Their electrical characteristics shall conform to that indicated. Motor starters shall be provided complete with properly sized thermal-overload protection in all phases and other appurtenances necessary for motor control. Motors shall be of adequate size to drive equipment at specified capacity without exceeding nameplate rating of the motor.
- H. Such items as electric control, motors, relays, thermostats, terminal or limiting switches on equipment, etc., shall be furnished as part of the equipment involved. All of these electrical controls, interlocks, and devices shall be installed and wired into the system to conform to Division 26. They shall be complete with all required conduit, condulets, boxes, wire, grounds, power disconnect switches, etc. The electrical trades doing Division 26 work shall provide all power wiring of 115 volt or higher including interlocks. All temperature control wiring shall be the responsibility of the mechanical trades, who shall furnish all wiring and diagrams.
- I. Motors:
1. Except where otherwise specified or indicated for motors in mechanical and electrical work sections, the following shall govern:
 - a. Motors 1/2 - horsepower and smaller shall be single phase, 115 - volt; 3/4 - horsepower and larger shall be three phase; exceptions will be made, as approved, in case of fractional horsepower motor-driven equipment units furnished by manufacturer with integral motor to suit their standard design.
 - b. Single-phase motors shall be ECM, capacitor-start, split-phase or shaded-pole type, as approved for individual application.
- J. Polyphase motors shall be squirrel-cage induction, or wound-rotor induction type, of NEMA Design B, according to starting torque and current characteristics, as approved for individual application. Motors with variable frequency drives shall have insulation rated for that service.
- K. Where motor type, horsepower, speed, or other essential data are not specified in detailed specification of individual equipment unit or indicated on schedules, obtain this information from manufacturer of equipment unit and have it approved before ordering motors.
- L. Manufacture: Motors furnished under mechanical work shall not be the product of more than two manufacturers. Exceptions will be made as approved, in cases of fractional horsepower motor, or when motor is furnished integral with driven equipment unit as manufacturer's standard.
- M. Design, Performance:
1. NEMA standards shall be taken as minimum requirements for motor design and performance, except where otherwise specified.
- N. Motors shall be suitable for load, duty, voltage, frequency and hazard, for service and location intended.
- O. NEMA classification of motor enclosures shall apply when motor types are specified as open, drip proof, splash proof, totally enclosed and the like.

- P. Motors shall have ball or roller type bearings with pressure grease lubrication; exceptions will be made, as approved, in special cases for sleeve type bearings with approved method of oil lubrication.
- Q. Motors shall be quiet operating.
- R. Motors shall be rated for continuous duty and under full load; maximum rise in temperature shall not exceed current standards.
- S. Motors shall be capable of withstanding momentary overloads of 50 percent, without injurious overheating.
- T. Motors for belt drive shall have adjustable bases with set screws to maintain belt tension; motors for direct drive with coupling shall be doweled to base plate at two points.
- U. Motors shall have nameplates giving manufacturer's name, shop number, horsepower, rpm, and current characteristics.
- V. Motor Tests:
 - 1. For motors 75 - horsepower or smaller, check tests against complete tests of similar motor will be accepted.
 - 2. Test for following:
 - a. Determine motor load performance in accordance with ANSI Standard C-50, for insulation resistance, dielectric strength, efficiency, and power factor and temperature rise.
 - b. Determine efficiency and power factor for 50 percent, 75 percent and 100 percent of rated horsepower; for motors 100 horsepower and larger, include also 125 percent rating.
 - c. Perform temperature-rise test at rated horsepower for rated time interval or until temperature becomes constant.
- W. Motor Starters:
 - 1. System Description
 - a. Single Phase Starter: Starters for 115VAC single phase motors less than 1 HP shall be capable of both manual and automatic operation. Refer to Section W.2 for single phase starter requirements.
 - b. Combination Starters: Provide combination magnetic starters for all motors requiring branch circuit protection or a line-of-sight disconnect. Refer to Section W.3 for combination magnetic starter requirements.
 - 2. Enclosed Full Voltage Non-Reversing (FVNR) Single Phase Starter
 - a. Single Phase Motor Starter Control: The single phase motor starter shall consist of a manually operated quick-make toggle mechanism lockable in the "Off" position which shall also function as the motor disconnect. Additionally, the starter shall provide thermal overload protection, run status pilot light and fault pilot light. The starter must include the capability to operate in both manual and automatic control modes. In automatic mode, the starter shall have the capability to integrate with a building automation system by providing terminals for run input, run status output and fault output. All control terminals shall be integrated in the starter. At a minimum, each single phase starter shall include an interposing run relay and current sensing status output relay. Single phase motor starter shall be in a surface mount enclosure.
 - b. Approved manufacturer: Franklin Control Systems.
 - 3. Enclosed Full Voltage Non-Reversing (FVNR) Combination Starter.

- a. Magnetic Motor Starters with disconnects shall be enclosed in a general purpose electrical enclosure with the appropriate environmental rating. NEMA 1 for indoor installation and NEMA 3R for outdoor installation
- b. Starters shall consist of a horsepower rated magnetic contactor with a minimum of 2NO and 2NC auxiliary contacts and solid state electronic overload relay.
- c. Overload relay shall protect all three phases with a wide range 1-40 amp current setting and trip class to allow field adjustment for specific motor FLA. Interchangeable heater elements are not acceptable.
- d. Overload relay shall incorporate SmartStart Technology, or the following protective functions:
 - 1) Out of calibration protection (if the FLA on the overload is set outside acceptable range, overload will trip to indicate fault event)
 - 2) Stall protection
 - 3) Max time to start
 - 4) Locked Rotor
 - 5) Phase Unbalance
 - 6) Phase loss
 - 7) Cycle Fault
- e. Starter shall be field selectable for manual or auto reset to restore normal operation after a trip or fault condition. Manual pushbutton shall be accessible without removing or opening cover on starter.
- f. In the event of a power failure, starter shall restart in last mode by default. Starter shall also be capable of restart with 10 second delay, or restart in "off" mode.
- g. All starters must be provided with a universal power supply capable of a 208 to 600 volt input range. The power supply must accept the available line voltage and the control voltage shall not exceed 24V.
- h. Installed accessories shall include Hand-Off-Auto operation pushbutton keypad. Include LED pilot light indicators for Hand, Off, Auto, Run and Overload conditions.
- i. The starter shall include remote run terminals which accept both a voltage input signal and a contact closure. The voltage run input shall accept both AC and DC signals from 12-250V to allow direct connection of the transistorized automation signal to the starter.
- j. Starter must contain an integral current sensor with NO contact which closes to indicate motor run status as well as a NO contact which closes when an overload trip condition occurs.
- k. The starter must provide a voltage output to operate the actuator to open the damper or valve without closing the motor circuit. The starter will only close the motor circuit and start the motor after it has received a contact closure from a limit or end switch confirming the damper or valve position.
- l. The starter shall include a dedicated voltage input for Fireman's Override operation. When activated, the starter run the motor in any mode (Hand, Off or Auto) regardless of other inputs or lack of inputs either manual or auto. The purpose of the Fireman's Override input is to act as a smoke purge function. Fireman's Override has priority over the Emergency Shutdown input.

- m. The starter shall include an Emergency Shutdown input which will disable the starter from operating in either Hand or Auto mode regardless of other inputs either manual or auto.
 - n. Manufacturer shall provide and install tags with engraved white lettering to designate equipment served
 - o. All disconnects shall include a lock-out mechanism when in the off position.
 - p. Motor circuit protectors (MCP) shall be provided as the acceptable form of disconnecting means. The MCP shall be a UL listed 508 current limiting manual motor starter with magnetic trip elements only. The MCP shall carry a UL 508F rating (up to 100A frame size) which provides for coordinated short circuit rating for use with the motor contactor and provides a minimum interrupting rating of 30,000 AIC for the combination starter.
 - q. Approved manufacturer: Franklin Control Systems.
- X. Motor Control Enclosure for individual Motor:
- 1. Enclosure shall be furnished by manufacturer of control devices, of size and design to suit each application; with operating and resetting device operable from outside; hinged door with padlock; NEMA Type 1 for general purpose indoor application, other types for special applications, as approved.

3.03 EXCAVATION, BACKFILLING, AND CUTTING

- A. Boring, excavating, backfilling and cutting shall not be undertaken without receiving approval of the Architect/Engineer before starting same. Cutting through masonry on concrete shall be made with masonry saws or core drills. This approval is required where the work may interfere with the work of other trades or where it may weaken the structure in any way.
- B. Excavation:
- 1. All excavation of every description and of whatever substances encountered, to the depth indicated on the drawings and/or required for the installation of piping, utility system, etc., shall be performed. All exterior lines shall be installed with a minimum cover of 24 inches unless otherwise indicated. Concrete encase all sewer lines under streets with less than 30 inches of cover. Generally, more cover shall be provided if grade will permit. All excavated materials not required for backfill or fill shall be removed and wasted as acceptable to the Architect/Engineer. All grading in the vicinity of excavations shall be controlled to prevent surface ground water from flowing into the excavation. During excavation, material suitable for backfilling shall be stacked in an orderly manner sufficient distance back from edges of trenches to avoid overloading and prevent slide or cave-ins. Any water accumulated in the excavations shall be removed by pumping or other approved method. All shoring and sheeting required to perform and protect the excavations and to safeguard employees shall be performed. Excavate as required under the building in order that all piping, ductwork, etc. shall clear the ground a minimum of 12 inches for a distance of 24 inches on either side. Edges of such excavation shall slope at an angle of not over 45 degrees with the horizontal unless otherwise approved by the Architect/Engineer. The bottom of such excavation shall be graded to drain in a manner acceptable to the Architect/Engineer.
- C. Backfilling:
- 1. The trenches shall not be backfilled until all required tests are performed and until the piping, conduits, utilities systems, etc., as installed, conform to the specified requirements. The trenches shall be carefully backfilled with the excavated materials approved for backfilling, consisting of earth, loam, sandy

clay, sand and gravel, soft shale, or other approved materials free from larger clods of earth or stone, deposited in thoroughly and carefully rammed 6 inches layers, until the pipe has a cover of not less than 1 foot. The remainder of the material shall be backfilled after moistening and then tamped in place using 1-foot layers. Blasted rock, broken concrete or pavement, and large boulders shall not be used as backfill material. Any trenches improperly backfilled, or where settlement occurs, shall be reopened to the depth required for proper compaction, be refilled and mounded over and smoothed off. Unless otherwise indicated open trenches across roadways or other areas to be paved shall be backfilled as specified above, except that entire depth of trench shall be backfilled in 6 inch layers, each layer moistened and compacted to a density at least equal to that of the adjacent level in such manner as to permit the rolling and compaction of the filled trench together with the adjoining earth to provide the required bearing value, so that paving of the area can proceed immediately after backfilling is completed. Where an area has been prepared for pavement prior to excavation, backfilled shall be of such materials and installed as to comply with the paving requirements for preparation of subgrade and stabilized courses as specified in other sections of the specifications. Along all other portions of the trenches, the ground shall be graded to a reasonable uniformity and the mounding over the trenches left in a uniform and neat condition. Backfill under concrete slab on fill shall be as specified above, shall be select fill, or shall be such other materials more suitable for the application. Installation and compaction shall be as required for compatibility with adjacent materials.

D. Opening and Closing Pavement and Lawns:

1. Where excavation requires the opening of existing walks, streets, drives, other existing pavement or lawns, such surfaces shall be cut as required to install new lines and to make new connections to existing lines. The sizes of the cut shall be held to minimum, consistent with the work to be accomplished. After the installation of the new work is completed and the excavation has been backfilled, paved areas shall be reinstalled to match existing paving and lawn areas shall be re-sodded.

3.04 CONCRETE WORK

A. Where concrete work is indicated or specified under mechanical work, as for foundations, piers, pedestals, tank encasement, cradles or saddles for tanks or pipes, manholes, pits, and catch basins, perform as follows:

1. Concrete Strength:
 - a. Concrete shall have compressive strength after 28 days of 2,200 pounds per square inch minimum.
 - b. Concrete mix shall consist of one part Portland cement to 4-1/2 parts by volume of fine and coarse aggregate in dry state, with 7-1/2 gallons water maximum per sack of cement.
 - c. Portland cement shall be as per ASTM C 150, Type 1.
 - d. Concrete aggregate shall be as per ASTM C 33.
 - e. Water shall be clear, of quality suitable for domestic consumption.

3.05 MISCELLANEOUS

A. Cleaning Piping, Ducts, Equipment:

1. Piping, ducts, and equipment shall be thoroughly cleaned of dirt, cuttings and other foreign substances. Should any pipe, duct or other part of the systems be stopped by any foreign matter, disconnect, clean and reconnect wherever necessary for purpose of locating and removing obstructions. Repair work damaged in the course of removing obstructions.

- B. Provide refrigerant circuit access ports located outdoors with locking-type tamper-resistant caps.

3.06 TESTS

- A. Following requirements are supplementary to tests specified for individual equipment or systems in mechanical and electrical work sections.
- B. Notice of Tests:
 - 1. Give written notice in ample time to all concerned of date when tests will be conducted.
- C. Prior Tests:
 - 1. Concealed or insulated work shall remain uncovered until required tests have been completed, but if construction schedule requires it, arrange for prior tests on parts of system as approved.
- D. Preliminary Tests:
 - 1. As soon as conditions permit, conduct preliminary or "turn-over" test of certain equipment as directed, to ascertain compliance with specified requirements. Make needed changes, adjustments or replacements as preliminary tests may indicate, prior to acceptance test.
- E. Acceptance Tests:
 - 1. Conduct pressure, performance and operating tests as specified for each system or equipment unit, in presence of Architect/Engineer or other accredited representative of Owner, as well as representatives of agencies having jurisdiction. The Contractor shall correct all deficiencies resulting from test data and from deficiencies identified at times of site observations.
- F. Costs:
 - 1. Furnish labor, material, and instruments and bear other costs in connection with all tests.

3.07 GUARANTEES

- A. All work, including mechanical, equipment, and materials, shall be guaranteed by the Contractor for a period of one (1) year after final acceptance of the work. All defects in labor and materials occurring during the one year after final acceptance of the work shall be immediately repaired or replaced by the Contractor at no additional cost to the Owner.
- B. See also individual sections for further requirements.

3.08 CERTIFICATION

- A. Certification shall be furnished by the authorized manufacturer's representative stating equipment is installed in accordance with the manufacturer's recommendation and is eligible for specified warranties.

3.09 OWNERS MANUALS

- A. The Contractor shall turn over the following to the Owner at completion of contract.
 - 1. Operating instructions together with wiring diagrams.
 - 2. Approved drawings, equipment submittals, as-built control diagrams, etc.
 - 3. All equipment guarantees and warranties together with instructions shipped with equipment.
 - 4. Parts list of all major items of equipment.
 - 5. List of all local suppliers with contact information
 - 6. Copy of final Test, Adjust and Balance Report.
 - 7. Certificates of acceptance by local inspection departments having jurisdiction.

8. Comply with the requirements of Division One in providing "As-built" Mechanical Drawings in a format acceptable to the Owner. Unless otherwise instructed, provide a clean, marked-up set of prints showing as-installed conditions to the Engineer for processing.
9. All above items shall be "punched" and bound in a loose-leaf notebook.

END OF SECTION 23 05 00

SECTION 26 0500
GENERAL ELECTRICAL REQUIREMENTS**PART 1 - GENERAL****1.01 SUMMARY**

- A. Applicable provisions of General Conditions, Special Conditions, and Special Instructions to Bidders govern work of Division 26 sections.
- B. Contractor shall provide items, articles, materials, operations, and methods listed, mentioned, or scheduled on the Drawings and specifications, including labor, materials, equipment, and incidentals required for their completion.
- C. Work shall conform to requirements of locally adopted codes and ordinances; applicable building codes; applicable code sections of NFPA standards; and interpretations of the authority having jurisdiction.
- D. Work shall conform to Owner's General Conditions and Special Conditions.

1.02 SCOPE OF WORK

- A. Requirements of Division 26 sections shall govern installation of materials specified, including those related to the work of other disciplines, even where not referenced by other division's specification.
- B. Where items specified in specific Division 26 section conflict with requirements in this section, the specific section shall govern.
- C. Contractor shall supply labor, equipment, and materials in strict accordance with Drawings and specifications. Contractor shall provide conductors, cabling, connections, and accessories required for complete and functional systems, even where not specifically shown on the Drawings.
- D. Finish prime and painting is specified in other Divisions. Prime and painting specified under Division 26 is limited to protective coatings, rust inhibiting, and identification.

1.03 REFERENCES

- A. Where reference is made to standards, codes, specifications, and recommendations, it is understood that the latest edition of the publication adopted and published at the date of the Contract Documents is that which is referenced, unless a specific date is stated.
- B. References to technical societies, organizations, governmental agencies, laws, and publications made in specifications are in accordance with the following abbreviations:
 - 1. ADA Americans with Disabilities Act
 - 2. ANSI American National Standards Institute
 - 3. ASME American Society of Mechanical Engineers
 - 4. ASTM American Society for Testing and Materials
 - 5. CSD Commodity Standards Division U.S. Dept of Commerce
 - 6. IEEE Institute of Electrical and Electronic Engineers
 - 7. NFPA National Fire Protection Association
 - 8. NBS National Bureau of Standards
 - 9. NEC National Electrical Code (NFPA 70)
 - 10. NEMA National Electrical Manufacturers Association
 - 11. TAS Texas Accessibility Standards
 - 12. UL Underwriters' Laboratories, Inc.

1.04 DEFINITIONS

- A. Where the terms such as "Acceptable", "Equal", and "Equivalent" are used in Drawings and specifications, it is understood that judgment of Architect shall govern such decision.

- B. Where terms such as "Approved", "Directed", "Requested", "Authorized", "Selected", "Required", and "Permitted" are used in Drawings and specifications, it is understood that instruction is that of the Architect.
- C. Terms such as shown, noted, scheduled, and specified are intended to help the reader locate referenced information. Term should not be interpreted as limiting location(s) of applicable information.
- D. Definitions of terms and expressions used in electrical work:
 - 1. Furnish: Supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
 - 2. Install: Operations at the Project site including the actual unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
 - 3. Provide: Both the furnishing and installation, complete and ready for operation.
 - 4. Indicated: Graphically represented, noted, or scheduled on the Drawings; cited by Paragraphs or Schedules in specifications; or similarly required in the Contract Documents.
 - 5. Listed: Tested, approved, and certified by a qualified product listing organization, as meeting appropriate safety standards as applicable to the product and intended installation application.
- E. NEMA Classifications: (For complete definitions and listing see NEMA Standards)
 - 1. Type 1 General Purpose, Indoor.
 - 2. Type 2 Drip-proof, Non-corrosive, Indoor.
 - 3. Type 3R Rain proof, Outdoor.
 - 4. Type 4 Watertight and dust-tight, non-corrosive, indoor and outdoor.
 - 5. Type 4X Watertight and dust-tight, corrosion resistant, indoor and outdoor.
 - 6. Type 12 Dust-tight, watertight, non-corrosive, indoor.

1.05 DRAWINGS

- A. Drawings and Instructions:
 - 1. Drawings for Division 26 work are in part diagrammatic, intended to convey the scope of work and general arrangement of equipment, fixtures, interlocks, conduit, and outlets. Division 26 installer shall follow Drawings in laying out the work, consult other trades and general construction drawings, and coordinate spaces in which the work will be installed.
 - 2. Drawings and specifications shall be considered as complementary parts of the Division 26 work and of the Contract Documents. Study Drawings and specifications for Division 26 work, as well as that of other trades to fully understand the work to be performed.
 - 3. As a qualification for bidding, visit the site and identify existing conditions that may affect Division 26 work prior to submitting a proposal.
- B. Locations and Scaling:
 - 1. Prior to locating electrical equipment, outlets, switches, and similar devices, obtain approval from Architect as to exact location. Locations shall not be determined by scaling Drawings.
 - 2. Mounting heights shall be as directed by Architect and in accordance with the TAS and ADA.
 - 3. Material, equipment, and labor required to redo installation, restore structure, and repair finishes due to failure to comply with this requirement shall be the responsibility of Contractor.

1.06 DISCREPANCIES

- A. Clarifications: Obtain necessary clarifications as to discrepancies, omissions, and questions regarding the intent of the Contract Documents, before submitting a proposal.
- B. Contractor Agreement:

1. Consideration will not be granted for misunderstanding of the amount of work to be performed. Tender of a proposal conveys full Contractor agreement of the items and conditions specified, shown, scheduled, or required by the nature of the project.
- C. Changes required by job conditions, equipment employed, or structural conditions of the building shall be at no cost to the Owner.
- D. Codes and Standards:
 1. Perform the work in strict accordance with requirements and recommendations of applicable codes and standards. Nothing in the Contract Documents shall be construed to permit work not conforming to these codes.
 2. When two or more codes or standards are applicable to the same work, the stricter code or standard shall govern.
 3. Correct deficiencies caused by failure to comply with written codes or standards at no additional cost to Owner.

1.07 PRODUCT SUBSTITUTION PROCEDURES

- A. Architect will consider requests for substitution, received a minimum of 10 days prior to scheduled bid date.
- B. Substitutions will be considered when a product becomes unavailable through no fault of Contractor.
- C. Document each Request for Substitution with complete data substantiating compliance of proposed substitution with Contract Documents.
- D. Submission of Request for Substitution represents that Contractor:
 1. Has investigated proposed product and has determined that it meets or exceeds quality level of specified product.
 2. Will provide same warranty for substituted materials and installation as for specified product.
 3. Will coordinate and revise installation, including consideration for the work of other trades, to ensure the work is complete and operable.
 4. Waives claims for additional costs or time extension, except as specifically stated in the Request for Substitution.
 5. Will reimburse Owner and Architect for review and redesign services that may be required.
 6. Will pay additional review, permit, and inspection fees associated with securing re-approval of authorities having jurisdiction.
- E. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Submittals, without separate written request, or when acceptance will require revision to Contract Documents.
- F. Substitution Submittal Procedure: As required by Division 1.

1.08 SUBMITTALS

- A. Submittal Procedures: Division 1 - Requirements in addition to the following:
 1. Submittal Preparation:
 - a. At Contractor's option, digital electronic copy may be used for submittals that do not designate otherwise or require physical demonstrations, such as color samples or scalable templates. Digital electronic copies shall be original electronic copies from the manufacturer and shall include electronically searchable text. Scans made by the Contractor are not acceptable. Reference to indexing of material below may be accomplished in electronic media with bookmarks or by separation into distinct files.
 - b. Where digital electronic copy is not used, a minimum of six copies hard copy notebooks shall be provided. Notebooks shall be delivered to the Architect in a neat

and professional manner. Reference to indexing below shall be accomplished by named or numbered tabs.

- c. Submittals shall be provided complete with all sections at one time, indexed to each Section of Specifications, and shall include the following information:
 - 1) Project Name
 - 2) Date
 - 3) Name and Address of Architect
 - 4) Name and Address of Engineer
 - 5) Name, Address and Telephone Number of Contractor and sub-contractors.
 - 6) Manufacturer's Name
 - 7) Published ratings or capacity data
 - 8) Detailed equipment drawing for fabricated items
 - 9) Wiring diagrams
 - 10) Installation instructions
 - 11) Other information as required by the relevant section(s)
- d. Where literature is submitted covering a group or series of similar items, the applicable items must be clearly indicated on each copy with highlighting, or other means of identification clearly legible.
- e. Data and shop drawings shall be coordinated and included in a single submission. Multiple submissions are not acceptable except where prior approval has been obtained from the Architect. In such cases, a list of data to be submitted later shall be included with the first submission. Failure to submit shop drawings that meet the requirements of the Drawings and Specifications in ample time for review shall not entitle Contractor to an extension of contract time, and no claim for extension due to such Contractor default shall be allowed.

B. Submittal Organization:

- 1. Organize all required data in digital electronic copy, or hard copy in a 3-ring black binder of sufficient size with index tabs with number and appropriate title of specification section.
- 2. If submitted digitally, all sections shall be submitted at once, broken out by specification section into separate PDF documents. Each individual specification section submittal shall be provided with an individual cover sheet to allow for individual review of the submittal.
- 3. Provide a cover sheet and an index sheet listing all items submitted.
- 4. The second and third sheet shall be blank for stamping of submittals. All submittals are to be processed at same date; partial submittals will not and are not acceptable.
- 5. Show any revisions to equipment layout required by use of selected equipment.

C. Architect shall receive submittals no later than thirty (30) working days from contract date with Contractor and Owner.

D. Review of submittals is only for confirmation of adherence to design of project and does not relieve Contractor of final responsibility for furnishing all materials required for a complete working system and in complying with the Contract Documents in all respects.

1.09 SHOP DRAWINGS

- A. As soon as practical and within thirty days after the official award of contract and before any materials and equipment are purchased, Contractor shall submit to the Architect, for review, five (5) copies of the complete list of all materials and equipment identified and referenced to specification paragraphs together with applicable shop drawings. In addition, the names and addresses of the manufacturers, their catalog data, numbers, and trade names shall be furnished. Published performance data shall be furnished to indicate compliance with scheduled performance. This data will be marked "Reviewed" by the Architect, dated and distributed to the several parties involved, with two (2) copies returned to Contractor. The data shall include the following:

1. Equipment-room layouts drawn to 1/4" scale, including equipment and accessories, to show clearances for operating and servicing. This is to include Electrical Rooms, MDF/IDF (type) Rooms, Mechanical Rooms.
 2. Equipment and materials as indicated in each Section.
 3. Composite drawings of crowded locations where there is a possibility of conflict among trades.
- B. Verification of Dimensions:
1. Contractor shall be responsible for the coordination and proper relation of his work to the building structure and to the work of all trades. Contractor shall verify all dimensions in the field and advise the Architect of any discrepancy before performing the work. Adjustments to the work required to facilitate a coordinated installation shall be made at no additional cost to the Owner.
- C. Equipment other than that shown should be used in bids only when approved by the Architect prior to bidding. Those models and manufacturers identified in drawings and specifications were selected to provide minimum acceptable performance. These models are used in sake of brevity to establish a basis of quality, weights, performance, capacities, etc., required. Any such alternate proposals must include all necessary changes and additions to the work occasioned by such substitution including but not limited to foundations, supports, connections, piping, etc. which shall be paid for by Contractor. In the event that Contractor submits for approval any material, equipment, etc., that are not in conformity with the specifications, the Architect reserves the right to reject this equipment, and Contractor shall submit data on other equipment which meets the requirements of the specifications for approval.
- D. Installation Directions:
1. Obtain manufacturer's printed installation directions to aid in properly executing work on equipment requiring such directions.
- E. Submit such directions to Architect prior to time of installation for use in review of the work.
- F. Operating Instructions, Charts:
1. Furnish manufacturer's printed operating and maintenance instruction for equipment and systems, which, in opinion of Architect, require such instructions; obtain receipt for it.
- G. When so specified or instructed, mount operating instructions in approved frame with glass over; locate where directed.

1.10 PROJECT RECORD DOCUMENTS

- A. Keep a set of plans on the job, noting daily all changes to the final location and exact dimensions of switchgear, devices, fixtures, equipment, and site utilities.
- B. Turn over record document submittals (as outlined in Division 1 - General Requirements of the Specifications) to the Architect, upon submitting his request for final payment.
- C. Compile the following data daily during the work, and turn over to Architect two (2) copies, prepared in 3-ring binders for Owner's records:
1. Cover page(s) identifying the names, addresses, and telephone numbers of the following: Contractor, all sub-contractors, and all major equipment suppliers.
 2. Warranty and guarantee statements from manufacturers, Contractor, and each sub-contractor.
 3. Manufacturer's equipment operations manual and equipment maintenance instructions.
 4. Manufacturer's documentation on preventative maintenance recommendations, seasonal changeover procedures, and troubleshooting procedures.
 5. Repair parts lists for equipment and materials including name, address, and telephone number of local supplier or agent.
 6. Documentation of test methods, including test reports, results, and logs, as required by specific sections of the specifications.

7. Shop Drawings, other data, and drawings required during course of the work.

1.11 GENERAL

- A. Lines and Grades:
1. Construct work in conformity with lines and grades as indicated, using axis lines and benchmarks provided under General Construction; verify such axis lines and benchmarks.
 2. Axis lines within building will be so spaced on each floor level that mechanical work may be laid out with tape measure having length of 50 feet maximum.
 3. Benchmarks outside building will be at accessible points on building walls, from which lines and grades required for installation of mechanical and electrical work may be set.
- B. Existing Services:
1. Active Services: When encountered in work, protect, brace and support existing active sewers, gas, piping and other services where required for proper execution of the work. If existing active services are encountered that require relocation, make request in writing for determination. Do not proceed with work until written directions are received. Do not prevent or disturb operation of active services that are to remain. Outages shall be kept to a minimum and allowed only as arranged with the Architect.
 2. Inactive Services: When encountered in work, remove, cap, or plug inactive services.
 3. Interruption of Services: Where work makes temporary shutdowns of services unavoidable, shut down at night or at such times as approved by Owner, which will cause the least interference with established operating routine. Arrange to work continuously, including overtime, if required, to assure that services will be shut down only during time required to make necessary connection to existing work.
- C. Temporary Service and Lighting:
1. Maintain electrical service in operation to all portions of buildings at the construction site throughout construction. Provide temporary electrical service to all required areas of construction necessary to satisfy OSHA requirements.
 2. Provide temporary lighting at a minimum of one 950-lumen (100-watt equivalent) lamp per 400 square feet of building area, or not less than one lamp per room of 150 square feet or more. Wiring and lamp holders shall meet all codes.
 3. Provide temporary systems and remove before final acceptance of the work.
 4. Pay metering, electrical service, and utility charges associated with temporary electrical service.
- D. Existing Systems/Equipment
1. Electrical Distribution System: Verify existing components of the electrical distribution system are in good working order prior to de-energizing, and confirm that no issues are expected upon re-energizing. Verification shall include:
 - a. Visual inspection of panelboards, switchboards, feeders, and other distribution equipment associated with the scope of work.
 - b. Communication with facility maintenance staff to confirm pre-existing conditions.
 - c. Written communication to the Owner of findings. Owner reserves the right to confirm reported results prior to Contractor de-energizing and commencing renovation work.
 2. Fire Alarm System: Verify existing equipment and components of the fire alarm system are in good working order prior to de-energizing or modifying, and confirm that no issues are expected upon re-energizing. Verification shall include:
 - a. Visual inspection of control panel, devices, cables, accessories, and connections.
 - b. Communication with facility maintenance staff to confirm pre-existing conditions.
 - c. Review of previous maintenance test results.
 - d. Written communications to the Owner of findings. Owner reserves the right to confirm reported results prior to Contractor de-energizing and commencing renovation work.
- E. Electrical Wiring and Equipment for Mechanical Systems

1. Division 26 installer shall provide:
 - a. Line Voltage and hook-up to all HVAC Equipment
 - b. All conduits into accessible attic space for thermostats and sensors.
 - c. All lighting contactors, mechanically held with control relay, required coil voltage coordinated with Division 23 controls installer.
 - d. Junction Boxes (Standard Two Gang) required for controls contactor, and coordination with Division 23 controls installer. One SPD power outlet at each energy management control panel located at Division 23 controls installer.
 - e. A weatherproof receptacle within 25 feet of each piece of mechanical equipment mounted either on the roof or on the ground. This receptacle shall be GFCI type, connected to the nearest 120/208 panelboard.
 2. Division 23 installer shall provide:
 - a. All motor starters (with heaters as required).
 - b. All thermostats.
 - c. All HVAC Equipment.
 - d. All relays, contactors, and switches required to start/stop Mechanical Equipment other than switches shown on and required by Division 26.
 3. Division 23 controls installer shall provide:
 - a. All required relays
 - b. All Sensors
 - c. All conduit required above ceiling.
 - d. All control wiring.
 4. Electrical Drawings are based on the equipment and devices scheduled or called for in the specifications. Should any mechanical equipment or device associated devices be changed or accepted from those which are shown or noted, all electrical and mechanical changes shall be made at the expense of the trade initiating the change with no expense to Owner, Architect, Engineer, or their representatives.
 5. Conduit and boxes for thermostats and sensors shall be provided by Division 26 installer. A thermostat or sensor junction box and 1/2" conduit to accessible attic and/or to corridor shall be provided for each room served with HVAC equipment. Coordinate with the mechanical drawings for exact locations and requirements. Control conduits required in attic, clear spaces, and on roof shall be by Division 23 installers. Details on Electrical drawings showing HVAC, mechanical, and control equipment providing of various relays devices, wiring, and other equipment shall be provided by Division 26 installer.
- F. Objectionable Noise and Vibration:
1. Electrical equipment shall operate without objectionable noise or vibration.
 2. If such objectionable noise or vibration should be produced and transmitted to occupied portions of building or other parts of Electrical work, make necessary changes and additions, as approved, without extra cost to Owner.
- G. Uniformity:
1. Equipment and devices for communication, control, and alarm systems shall be products of a single manufacturer, for each system.
 2. Equipment and material of same type and classification shall be products of a single manufacturer and shall be interchangeable to the greatest extent possible.

1.12 PERMITS AND FEES

- A. **Permits will be permitted/issued/inspected directly by the Owner. TPWD is the governing jurisdiction on this project and Self Performs permitting & Inspections.**
- B. Utility extensions, meter fees, **and associated permit fees** charged by the utility company for permanent services will be paid directly by the Owner. Where furnished by the utility company, costs associated with permanent metering equipment and its installation will be paid directly by the Owner.

1.13 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacture of products and materials specified, with a minimum five years of documented experience.
- B. Product Listing Organization Qualifications: Organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to the authority having jurisdiction.
- C. Materials furnished under this Contract shall be new and free from defects and shall be of the quality and design specified.
- D. Materials furnished under this Contract shall conform to applicable safety standards and shall be listed for their intended application and installation location.
- E. Equipment and accessories shall be standard products of a type that has been in satisfactory use for two (2) years. Major system components shall be of the same manufacturer and shall include manufacturer's nameplate stating address, catalog model number, and capacity.
- F. Equipment and accessories not specifically described or identified by manufacturer's catalog numbers shall be designed in conformity with ASME, IEEE, and other applicable technical standards, and shall have neat and finished appearance.

1.14 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store materials and equipment in accordance with manufacturer's instructions.
- B. Protect materials and equipment, using temporary shelters or approved offsite storage facilities, from damage, injury, theft, and contamination from dirt, dust, and moisture.
- C. Provide necessary supports, frames, and foundations to adequately support and protect materials and equipment, during storage, while transporting, and at final installation.
- D. Replace materials and equipment damaged prior to final acceptance, as directed by Architect.

1.15 FLAME SPREAD PROPERTIES OF MATERIALS

- A. Materials and adhesives incorporated in this project shall conform to ASTM Standard E84, "Test Method of Surface Burning Characteristics of Building Materials" and NFPA 90. The classification shall not exceed a flame spread rating of 25 for all materials, adhesives, finishes, etc., specified for each system, and shall not exceed a smoke developed rating of 50.

1.16 ASBESTOS ABATEMENT

- A. In the event the Contractor encounters at the site material reasonably believed to be asbestos which has not been abated, the Contractor shall immediately stop work in the area affected and report the condition to the Owner. If in fact the material is asbestos and the asbestos has not been abated, the Contractor shall not resume the non-asbestos-related work in the affected area until the asbestos has been abated. The abatement action may be done in two ways, as the Owner may decide. The Owner may perform the abatement by its own forces, or the Owner may contract with a third party to perform the abatement.

PART 2 - PRODUCTS - NOT USED**PART 3 - EXECUTION****3.01 GENERAL**

- A. Contractor shall be responsible for means and methods required to complete the work, including, but not limited to:
 - 1. Determine depth, routing, and exact location of existing underground utilities.

2. Relocate and repair existing underground utilities damaged during the work.
 3. Maintain all utility services during the work to existing portion of the facility that are to remain.
 4. Periodically clean, remove rubbish, and repair surfaces marred by the work.
 5. Protect work from damage by other trades.
 6. Erect barricades, protective fencing, and signs as required to prevent accidents, injuries, and theft.
 7. Revise indicated equipment locations, device arrangements, and raceway and cable routing, as required to coordinate space and clearance requirements, securing approval of Architect through submission of Shop Drawings.
 8. Accomplish all demolition and remodeling work involving his trade in a manner and completeness to provide the appearance of new construction work.
 9. Replace equipment, materials, building finishes, and structure damaged during the work.
- B. Install materials and equipment in accordance with established standards, best practices for the type of work involved, and applicable technical societies' standards.
- C. Design and construct supporting structures of strength to safely withstand stresses to which they may be subjected and to distribute properly the load and impact over the building areas.
- D. Submit detailed Shop Drawings of supports, and obtain approval before fabricating or constructing.

3.02 CUTTING AND PATCHING

- A. Ensure sleeves are set at proper times to avoid delay of the Work. Cut walls, floors, partitions, and ceilings as required for the proper installation of the work in a neat and workmanlike manner, and as approved by the Architect.
- B. Joists, beams, girders, and columns shall not be cut without first obtaining written permission from Architect.
- C. Seal openings and conduit penetrations in fire-rated and smoke-rated assemblies:
1. Ensure seals are made completely air tight.
 2. Sealing material shall be noncombustible and listed for the application.
 3. Provide materials and installation to ensure rating of assembly is not decreased.
 4. Provide materials and methods in accordance with NFPA standards, acceptable to Architect and authority having jurisdiction.
- D. Patch openings and alterations in interior walls, as approved by Architect, and prepare surfaces for accepting scheduled finish.
- E. Patch openings in exterior walls and seal to a watertight condition.

3.03 MANUFACTURER'S INSTRUCTIONS

- A. Equipment and devices shall be installed in accordance with Drawings and specifications, manufacturer's instructions, and applicable codes.
- B. Where specifications call for installation of a product to be in accordance with manufacturer's instructions, obtain applicable manufacturer's instructions.
- C. Install products in accordance with manufacturer's written instructions.
- D. Contact manufacturer to request advice and supervisory assistance during the installation, when required to ensure proper and complete installation.

3.04 CIRCUITING

- A. Maintain raceway systems serving systems of up to 150 volts to ground, separate from those serving systems of 151 to 600 volts to ground.

- B. Provide dedicated neutral conductors for branch circuits, except where multiwire branch circuits are specifically indicated to serve equipment or furniture, or where multipole branch circuits are utilized to serve equipment that does not require a neutral.
- C. Where multiwire branch circuits are specifically indicated to serve equipment or furniture, install in accordance with NEC 210.4.

3.05 INSTALLATION

- A. Coordinate installation of Division 26 work with the work of other trades to ensure systems are installed, complete, and functioning.
- B. Conduit and boxes, except mechanical controls specified otherwise, shall be provided by the Division 26 installer. Where permitted by specific specification section, low voltage wiring may be installed using open wiring methods in accessible attic space. Coordinate with, and verify with these specifications to provide required conduit and boxes at locations and heights required.
- C. Conceal electrical work in walls, floors, chases, under floors, underground and above ceilings. Branch circuits may be installed in the slab. Install in slab as directed by Structural Engineer. Coordinate the actual electrical outlets and equipment with building features and mechanical equipment as indicated on architectural, structural and mechanical drawings. Review with the Architect any proposed changes in outlet or equipment location. Relocation of outlets before installation, of up to 3 feet from the position indicated, may be directed without additional cost. Remove and relocate outlets placed in an unsuitable location when so requested by the Architect.
- D. Conduits shall not be installed in structural walls, slabs, columns, beams, and other structural elements, except where permitted on Structural Drawings or written approval of Structural Engineer.
- E. Erect equipment in neat and workmanlike manner. Align, level, and adjust for satisfactory operation and so that all parts are easily accessible for inspection, operation, maintenance and repair.

3.06 SPACE REQUIREMENTS

- A. Determine in advance of purchase that equipment and materials proposed for installation will fit into the confines indicated. Allow for adequate clearances as required by applicable codes, and for repair, maintenance, and replacement.
- B. Base equipment arrangements and clearance requirements on equipment Contractor intends to install, creating Shop Drawings and making note during submittal process of potential spatial conflicts.
- C. Final arrangements of equipment to be installed shall be subject to the Architect's review.
- D. Equipment Arrangements:
 - 1. Arrange equipment and conduit as shown in the Drawings, making minor rearrangements where necessary to suit the equipment approved, to comply with equipment manufacturer recommendations, and to fit the structural conditions.
 - 2. Provide Shop Drawings and obtain agreement of the Architect before proceeding with such rearrangements.
 - 3. Ensure that the combination of proposed equipment will fit into the allotted space shown on Drawings with adequate clearances for maintenance and servicing.
 - 4. Allow adequate space for clearance in accordance with the Code requirements and the requirements of the local inspection department.
- E. Equipment that is too large to permit access through available stairways, doorways, shafts and windows along path to final location shall be delivered and set in place prior to constructing partitions that would create such obstructions.

3.07 RELATED ELECTRICAL PROVISIONS

- A. Electric control, motors, relays, thermostats, terminal, limiting switches, and similar devices and components on equipment shall be furnished as part of the equipment. Connections, controls, and interlocks to equipment shall be installed in accordance with Division 26 Drawings and specifications. Provide raceway system, conductors, control cabling, grounding, and disconnecting means as required for a complete system.
- B. Install connections required to systems of greater than 50 volts to ground, as part of the Division 26 work, even when associated equipment is furnished by another trade.
- C. Low voltage control, communication, and temperature control wiring shall be the responsibility of the trade installing the associated system.
 - 1. Where open wiring systems are permitted, trade installing each system shall provide appropriate supports dedicated to the specific system.
 - 2. Provide raceway systems where open wiring is not permitted, such as within walls, exposed in area subject to physical damage, and above areas with open ceilings.

3.08 TESTING

- A. During the progress of the work and upon completion, test systems as specified and as required by authorities having jurisdiction, Owner, and Architect. Test systems as part of Division 26 work. Provide services of qualified personnel, testing equipment, and apparatus.
- B. Test wiring systems to ensure they are free of short circuits and ground faults, and have insulation resistance from phase and neutral conductors to ground in accordance with ANSI and IEEE standards.
- C. Prior to the execution of testing, submit proposed test procedures recording forms, list of personnel, and test equipment to Architect for review.

3.09 CLOSE OUTS AND GUARANTEES

- A. Final Acceptance Review:
 - 1. Make a careful inspection of the entire project and ensure that the work is ready for final acceptance before contacting Architect to make final observation visit.
 - 2. Deliver to Architect all necessary bonds, warranties, receipts, affidavits, certifications of payment, and releases of liens, prepared and signed in advance, together with a letter of transmittal listing each paper included, at or before final observation visit. Verify that each document is consistent with requirements of the Contract Documents.
 - 3. The following will be required at time of final acceptance:
 - a. Final clean-up completed.
 - b. Systems are fully operational; material and devices installed and tested.
 - c. Ground tests (megger readings) performed and documented with two (2) copies of method used and results attached.
 - d. Project Record Documents.
- B. Training:
 - 1. Upon completion of the work and at a time designated by Architect, provide formal training session for the Owner's operating personnel.
 - 2. Training session shall include instruction on proper operation and maintenance of electrical equipment and systems and shall identify location of components.
 - 3. In addition to time requirements of specific sections, provide 4-hour training session.
- C. Adjustments:
 - 1. Adjust equipment and devices and run reasonable operating tests together with more specific tests indicated in the separate sections of the specifications.
 - 2. If equipment does not function satisfactorily after the first adjustments are made, continue the work until satisfactory corrections and adjustments have been made.
 - 3. Ensure proper performance, functioning, integration, and balance of equipment.

4. Where tests are required by Architect to ascertain equipment capacities in the installed condition, run approved tests, provide required instruments and apparatus, and submit certified statements of test results.
 5. Ensure instruments are in proper calibration and meet approval of Architect.
- D. Completeness:
1. Ensure absolute completeness of the work, including adjustments, balancing, testing, and commissioning; and ensure proper operation in all respects.
 2. Install systems complete and functional in all respects, including installation of such items as trim, fittings, cabling, and accessories.
 3. Protect the work from damage. Provide required temporary shelters to adequately protect apparatus above the floor of the construction and the covering of apparatus in the completed building with tarpaulins or other protective covering.
 4. Replace equipment and rework installation, where equipment has been damaged during the course of the project.
- E. Cleaning: Equipment shall be thoroughly cleaned and degreased, cuttings and other foreign substances.
- F. Warranty:
1. Guarantee work, equipment, and materials for a period of one (1) year from date of substantial completion acceptance. Defects in labor and materials occurring during this period shall be immediately repaired or replaced by Contractor at no additional cost to the Owner.
 2. Warranty shall not be construed to include the normal maintenance of the various components of the system covered by these specifications.
 3. Neither the final payment nor any provisions in Contract Documents shall relieve Contractor of the responsibility for faulty materials or workmanship.
 4. Remedy any defects due faulty materials and workmanship and pay for damage to other work resulting therefrom.
 5. Owner shall give notice of observed defects with reasonable promptness.

END OF SECTION 26 05 00

SECTION 33 3010**WASTEWATER DUPLEX LIFT STATION
PART 1 - GENERAL**

- 1.1 SCOPE OF WORK
 - A. The equipment manufacturer shall furnish for installation one complete factory built duplex wet well lift station including all equipment necessary for operation in accordance with the Contract Drawings and Specifications stated herein.
 - B. The lift station shall have a firm capacity of 80 gpm.
 - C. The lift station shall be comprised of the following components:
 - a. One (1) wet well
 - b. Two (2) Submersible grinder type pumps in parallel
 - c. Control Panel
 - d. Level Controls
 - e. Piping and valves
 - f. Alarm system
- 1.2 RELATED WORK
 - A. Refer to owner's general conditions and special conditions
- 1.3 SUBMITTALS
 - A. Complete assembly, foundation support, foundation subgrade, and installation drawings, together with detailed specifications and data covering pumps, motors, materials used, parts, devices and other accessories forming a part of the equipment furnished shall be submitted for approval.
 - B. The submittal data and drawings shall include:
 - 1. Setting plans showing outline dimensions and weights of pumps, bases, motors, and control enclosures.
 - 2. Pump Manufacturer, Pump type and model number
 - 3. Assembly drawing, nomenclature and material list, O & M manual, and parts list.
 - 4. Impeller type, diameter, through-let dimensions, sphere size, number of vanes and identification number.
 - 5. Complete motor performance data
 - 6. Complete performance test curves showing full range head vs. capacity, NPSH required and hydraulic efficiency
 - 7. Complete list of materials used for construction.
 - 8. Complete List of Spare Parts
 - C. This submittal shall include all the necessary information and shall not be limited to the following:
 - 1. Performance data as specified below and curves, and horsepower requirements.
 - 2. Functional description of any internal instrumentation and control supplied including list of parameters monitored, controlled, or alarmed.
 - 3. Provide contact information (name, address and phone number) of nearest service centers and a listing of the Manufacturer's representative's services available at these locations, including contact details of the nearest parts warehouses capable of providing full parts replacement and/or repair services.
 - 4. The pump manufacturer shall have to provide address of an authorized service center capable of completely servicing the proposed pumps within 100 miles of the project site. The pump manufacturer shall have a direct factory service center/stocking facility capable of servicing and which stocks identical complete drive units to and spare parts for, the proposed pumps within 100 miles of the project site.
 - 5. Manufacturer's Warranty.
 - D. Partial or incomplete submittals will not be reviewed by the Engineer

1.4 QUALITY ASSURANCE

- A. All components shall be furnished by a single Manufacturer who is fully experienced, reputable, and qualified in the design and manufacture of duplex wet well lift station of similar size and capacity, and shall present proof of successful operations involving each piece of equipment furnished.
- B. The pumps shall be suitable for pumping raw sewage and shall be designed and fully guaranteed for this use.
- C. All pump performance documentation, including flow/head curves, shall adhere to the Hydraulic Institute Standards and shall allow no negative tolerance on flow, head, hydraulic efficiency or any other criteria deemed by the engineer to be necessary to evaluate pumping system performance.
- D. The Manufacturer shall inspect components of the system after installation as required to identify and correct any defects.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Acceptable Manufacturers:
 - a. Homa
 - b. Approved Equal

2.2 WET WELL

- A. The wet well shall be constructed of watertight glass fiber-reinforced polyester suitable for use in sanitary sewer applications. The resulting reinforced plastic material shall meet stiffness requirements as per ASTM Standard D3753. Wet well constructed of reinforced concrete is acceptable. Contractor shall provide complete design of concrete wet well to engineer and TPWD for approval
- B. The fiber-reinforced polyester wet well shall be 4-feet in diameter (inside of wall) and 8-feet deep.
- C. Provide passive ventilation pipe for wet well to include screening to prevent the entry of birds and insects to the wet well.
- D. Provide 2" NPT stubout from side of wet-well for future odor-control connection.
- E. The wet well floor shall have a smooth finish and design of wet well shall prevent deposition of solids under normal operating conditions.
- F. All pipe penetrations into the wet well shall be watertight. Seal all penetrations.
- G. The wet well shall have a lockable cover with aluminum or cast-iron access hatch. Access hatch shall have a safety cable harness attached.
- H. Wet well and cover with access hatch shall be grounded.
- I. Wet well shall have a jib crane mount in lieu of a rail system. Jib crane shall be the same manufacturer and model of the existing jib crane at the state park. Jib crane shall fit a 3-inch davit.
- J. Wet well and pumps shall be fed by single phase electrical power and be connected and operational with building backup generator.

2.3 LIFT STATION PUMPS AND MOTORS

- A. The raw wastewater pump shall conform to the following specifications:
 - 1. The pumps shall be solids handling grinder type, capable of handling raw and unscreened sewer and passing solids through a 2-inch diameter force main.
 - 2. Pumps shall have the following characteristics and meet the following service conditions:

Submersible Pumps

| | |
|--------------------|---------|
| Flow @ rated point | 80 gpm |
| TDH @ rated point | 8.05 ft |

| | |
|------------------|--------------------|
| Rated Pump Speed | 3,450 rpm |
| Motor Size | 2.4 hp |
| Motor Voltage | 230v/ single phase |
| Discharge Size | 2-inch |

3. Casings shall be gray cast iron, ASTM A-48, Class 35B. Casing bolts and nuts shall be AISI type 316 stainless steel.
4. All submerged surfaces or surfaces contacting raw sewage shall be stainless steel, brass or factory applied corrosion resistant coated suitable for a raw sewage submerged environment.
5. Casing Seals: All mating surfaces where watertight sealing is required shall be machined and fitted with nitrile rubber O-rings. Fitting shall be such that sealing is accomplished by metal-to-metal contact between machined surfaces, resulting in controlled compression of nitrile rubber O-rings without the requirement of a specific torque limit to effect this. No secondary sealing compounds, rectangular gaskets, elliptical O-rings, grease, or other devices shall be used.
6. Bearings: The pump shaft shall rotate on two permanently lubricated ball or roller bearings. Bearing shall have a minimum L-10 life of 20,000 hours, at continuous maximum load and speed. The shaft shall be of sufficient diameter to assure rigid support of the impeller and to prevent excessive vibration at all operating speeds.
7. Cables: Include necessary cables for power connection, moisture detection, and overload protection, sheathed, coded, and suitable for submersible pumps, and of sufficient length for direct connection to the terminal boxes indicated. All cables shall be connected to the pumps and tested at the factory. The cable entry seal shall consist of a single elastomer grommet with washers located on either side. A compression fit of the grommet seals the cable and entry from the exterior fluid. The cable entry assembly shall allow easy replacement of cable by using the same cable entry grommet.
8. Pump Shaft Seal: Each pump shall have two mechanical seals, mounted in tandem, each operating independently of the other. The seals shall be hydro-dynamically lubricated with a buffer chamber between the seals. The lower seal shall be replaceable without disassembly of the seal chamber and without the use of special tools. Pump-out vanes shall be present on the backside of the impeller to keep contaminants out of the seal area. Seals shall be locally available.
9. Chopper Impeller: The impeller shall be gray cast iron class 35B, dynamically balanced, semi-open, multi vane, grinder capable of handling solids, fibrous material and sludge.
10. Each pump motor shall be cooled by the surrounding environment and pumped fluid. Cooling system must allow up to 15 motor starts per hour. The pump motor shall be suitable for continuous operation under submerged, partially submerged, or dry conditions.
11. Each pump, including the motor and wiring, shall be approved by a nationally-approved testing agency for submersible service. The system shall be rated Class 1, Division 1, Group C and D, service as determined by the National Electric Code and approved by a nationally-recognized testing agency (UL or FM) at the time of bidding of the project.
12. Motors shall be rated for explosion proof service and to pump continuously in a non-submerged condition at an ambient temperature of 105° F.
13. One pump shall be equipped with an automatically operating mixing valve mounted directly on the pump volute. The automatic valve shall be actuated through a self-contained hydraulic system and operated by differential pressure across the valve. The valve shall not require any external power source or control to operate.

- 2.4 LIFT STATION PIPES AND VALVES
- A. All pipes in the station shall be minimum ductile iron pipe or schedule 80 PVC
 - B. The lift station pipes shall have flanged or flexible connections to allow for removal of pumps and valves without interruption of the lift station operations.
 - C. Each pump shall have a separate suction pipe that uses an eccentric reducer.
 - D. All wiring shall be in rigid conduit or seal tight flexible conduit and shall be in accordance with the National Electric Code.
- 2.5 RAIL SYSTEM
- A. The pumps shall be freestanding not have a rail system for access to the wet well. Wet well will shall have a Jib crane mount for placement and removal.
- 2.6 PUMP CONTROLS
- A. The pump system shall be provided with a local control panel. Local control panels shall be freestanding, pedestal mounted, with NEMA 4X stainless steel enclosure ratings.
 - B. Local control panels shall house controls and wiring for drive units, motor starters, transformers, circuit breakers, voltage barriers, panel-mounted devices, relays, terminal strips, alternator controls, and other appurtenances as necessary for each motor. Power feed to local control panels shall be 240V AC, single-phase, 60 Hz. Identified terminal strips shall be provided for the connection of external conductors to equipment-mounted junction boxes. All equipment shall be shipped from the factory ready for service after connection of conductors to equipment, controls, and local control panels. Provide high-level alarm relay with panel contact and top-mounted weather-proof alarm light, 100 watt bulb, red globe with guard. Provide condensate protection with heater and adjustable thermostat.
 - C. Each local control panel shall be provided with a local/off/automatic (LOA) selector switch, and start and stop push buttons. When the LOA switch is placed in the "local" position, the pump shall start and stop when its local start and stop push buttons are engaged. When the LOA switch is placed in the "off" position, the pump shall not operate. When the LOA switch is placed in the "automatic" position, the pumps shall be start and stop based on the level sensors.
 - D. The lift station shall have electrical control panel in combination with four (4) liquid level sensors.
 - E. Level sensors shall be mercury switches encapsulated in a polypropylene float with exterior weight or the tie down straps on the float cable as required.
- 2.7 EMERGENCY PROVISIONS
- 1. The lift station shall include an audiovisual alarm system and the alarm system shall transmit all alarm conditions through use of a supervisory control and data acquisition (SCADA) system to a continuously monitored location.
 - 2. The alarm shall self-activate for a power outage, pump failure or a high wet well water level. Alarm shall have a backup power supply located within the control panel.

PART 3 - EXECUTION

- 3.1 INSTALLATION
- A. When the lift station is completely installed, electrical connections completed, and all equipment ready for service, the equipment manufacturer shall provide the service of a qualified representative to start-up the equipment and instruct the operator in the proper operation and maintenance of the system. The manufacturers shall turn over to the operator at this time the operating and maintenance manual.

3.2 MANUFACTURER'S WARRANTY

- A. The Pump Manufacturer shall warrant to the original purchaser all new equipment manufactured by it to be free of defects in material and workmanship. In the event a component fails to perform under normal use or is proven defective in service, the Manufacturer shall repair or replace, at his discretion, such defective part within two (2) years following substantial completion. He shall further provide, without cost, such labor as may be required to replace, repair or modify major components. The repair and maintenance of items normally consumed in service such as seals, grease, light bulbs etc. shall be considered as part of routine maintenance and upkeep. It is not intended that the Manufacturer assume responsibility for contingent liabilities or consequential damages of any nature resulting from defects in design, material, workmanship or delays in delivery, replacement or otherwise.

END OF SECTION 33 3010

