



34th Street Pump Station Improvements Project
SAWS Job No. 13-6004
Solicitation No. CO-00072-RA

ADDENDUM No. 6

October 20, 2016

This addendum, applicable to work designated above, is an amendment to the specification documents and as such shall be a part of and included in the Contract. Acknowledge receipt of this addendum by entering the addendum number and issue date on the space provided in submitted copies of the bid proposal.

1. Modifications to the Specifications

1.1. Table of Contents

Add Section 16000 Electrical – General Provisions and Section 16670 Lightning Protection System to the Table of Contents.

1.2. Section 16000

Add Section 16000 titled **Electrical – General Provisions** in its entirety.

1.3. Section 16670

Add Section 16670 titled Lightning Protection System in its entirety.

ACKNOWLEDGEMENT BY BIDDER

Each respondent is requested to acknowledge receipt of this Addendum by his/her signature affixed hereto and to file same and attach with his/her proposal.

The undersigned acknowledges receipt of this Addendum and the proposal submitted herewith is in accordance with the information and stipulations set forth.

Date

Signature

Tetra Tech, Inc.
Texas Registered Engineering Firm F-3924
700 N. Saint Mary's Street, Ste. 300
San Antonio, TX 78205



END OF ADDENDUM

SECTION 16000**ELECTRICAL - GENERAL PROVISIONS****PART 1 GENERAL****1.01 SCOPE OF WORK**

- A. Furnish all labor, materials and equipment required to install, test and provide an operational, electrical system as specified and as shown on the Drawings.
- B. All equipment described herein shall be submitted and furnished as an integral part of equipment specified elsewhere in these Specifications.
- C. The work shall include furnishing, installing and testing the equipment and materials detailed in each Section of Division 16.
- D. The work shall include furnishing and installing the following:
 - 1. Electrical service from the Power Company.
 - 2. Conduit, wire and field connections for all motors, motor controllers, control devices, control panels and electrical equipment furnished under other Divisions. The Contractor shall coordinate his construction schedule and electrical interface with the supplier of electrical equipment specified under other Divisions.
 - 3. Conduit, wiring and terminations for all field-mounted instruments furnished and mounted under other Divisions, including process instrumentation primary elements, transmitters, local indicators and control panels. Lightning and surge protection equipment wiring at process instrumentation transmitters. Install vendor furnished cables specified under other Divisions.
 - 4. A complete raceway system for the Data Highway Cables and specialty cable systems. Install the Data Highway Cables and other specialty cable systems, furnished under the Instrumentation Division in accordance with the system manufacturers' installation instructions. Review the raceway layout, prior to installation, with the Process Control System supplier and the cable manufacturer to ensure raceway compatibility with the systems and materials being furnished.
 - 5. Pole foundations shall be designed and installed in accordance with the structural Divisions of these Specifications.
 - 6. Telephone service from the Telephone Company.

1.02 RELATED WORK

- A. Where references are made to the Related Work paragraph in each Specification Section, referring to other Sections and other Divisions of the Specifications, the Contractor shall provide such information or work as may be required in those references, and include such information or work as may be specified.
- B. All raceways, power and control wiring related to Mechanical Division equipment that is shown on the Electrical Drawings, shall be provided under Division 16.
- C. All electrical work provided under any Division of the Specifications shall fully comply with the requirements of Division 16.

1.03 SUBMITTALS

- A. Submit Shop Drawings, in accordance with Division 1 requirements, for equipment, materials and all other items furnished under each Section of Division 16, except where specifically stated otherwise. An individually packaged submittal shall be made for each Section, and shall contain all of the information required by the Section. Partial submittals will not be accepted and will be returned unreviewed.
- B. Submittals will not be accepted for Section 16000.
- C. Each Section submittal shall be complete, contain all of the items listed in the Specification Section, and shall be clearly marked to indicate which items are applicable on each cut sheet page. The Submittal shall list any exceptions to the Specifications and Drawings, and the reason for such deviation. Shop drawings, not so checked and noted, will be returned unreviewed.
- D. The Contractor shall check shop drawings for accuracy and contract requirements prior to submittal to the Engineer. Errors and omissions on approved shop drawings shall not relieve the Contractor from the responsibility of providing materials and workmanship required by the Specifications and Drawings. Shop drawings shall be stamped with the date checked and a statement indicating that the shop drawings conform to Specifications and Drawings. Only one Specification Section may be made per transmittal.
- E. Material shall not be ordered or shipped until the shop drawings have been approved. No material shall be ordered or shop work started if shop drawings are marked "APPROVED AS NOTED CONFIRM", "APPROVED AS NOTED RESUBMIT" or "NOT APPROVED".
- F. Shop Drawings, O&M Manuals, and other documentation, shall be submitted as listed in each of the individual Electrical Specification Sections.
 - 1. Submit operations and maintenance data for equipment furnished under this Division, in accordance with Division 1. The manuals shall be prepared specifically for this installation and shall include catalog data sheets, drawings, equipment lists, descriptions, parts lists, etc, to instruct operating and maintenance personnel unfamiliar with such equipment.
 - 2. Manuals shall include the following as a minimum:
 - a. A comprehensive index.
 - b. A complete "As-Built" set of approved shop drawings.
 - c. A complete list of the equipment supplied, including serial numbers, ranges and pertinent data.
 - d. A table listing of the "as left" settings for all timing relays and alarm and trip setpoints.
 - e. System schematic drawings "As-Built", illustrating all components, piping and electric connections of the systems supplied under this Section.
 - f. Detailed service, maintenance and operation instructions for each item supplied.
 - g. Special maintenance requirements particular to this system shall be clearly defined, along with special calibration and test procedures.
 - h. The operating instructions shall also incorporate a functional description of the entire system, with references to the systems schematic drawings and instructions.
 - i. Complete parts list with stock numbers, including spare parts.

- G. Up-to-Date Record Drawings shall be promptly furnished when the equipment installation is complete. Payment will be withheld until Record Drawings have been furnished and approved.
- H. At the time of jobsite delivery of the equipment, the Contractor shall have an approved shop drawing in his possession for the Owner's Inspector and Owner's Engineer, for verification.

1.04 REFERENCE CODES AND STANDARDS

- A. Electric equipment, materials and installation shall comply with the National Electrical Code (NEC) and with the latest edition of the following codes and standards:
 - 1. National Electrical Safety Code (NESC)
 - 2. Occupational Safety and Health Administration (OSHA)
 - 3. National Fire Protection Association (NFPA)
 - 4. National Electrical Manufacturers Association (NEMA)
 - 5. American National Standards Institute (ANSI)
 - 6. Insulated Cable Engineers Association (ICEA)
 - 7. Instrument Society of America (ISA)
 - 8. Underwriters Laboratories (UL)
 - 9. Factory Mutual (FM)
 - 10. City of San Antonio Electrical Codes
- B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.
- C. All material and equipment, for which a UL standard exists, shall bear a UL label. No such material or equipment shall be brought onsite without the UL label affixed.
- D. If the issue of priority is due to a conflict or discrepancy between the provisions of the Contract Documents and any referenced standard, or code of any technical society, organization or association, the provisions of the Contract Documents will take precedence if they are more stringent or presumptively cause a higher level of performance. If there is any conflict or discrepancy between standard specifications, or codes of any technical society, organization or association, or between Laws and Regulations, the higher performance requirement shall be binding on the Contractor, unless otherwise directed by the Owner/Engineer.
- E. In accordance with the intent of the Contract Documents, the Contractor accepts the fact that compliance with the priority order specified shall not justify an increase in Contract Price or an extension in Contract Time nor limit in any way, the Contractor's responsibility to comply with all Laws and Regulations at all times

1.05 ELECTRICAL EQUIPMENT ENCLOSURE TYPES FOR AREA CLASSIFICATIONS

- A. Unless otherwise specified herein or shown on the Drawings, electrical equipment enclosures and associated installations shall have the following ratings:
 - 1. Provide NEMA 7/8 combination enclosures for either indoor or outdoor use in hazardous (classified as Class 1, Division 1, Groups B, C and D), as defined in NFPA 70.

2. Provide NEMA 12 enclosures, unless otherwise specified herein or shown on the Drawings, for all dry, indoor above grade locations. These areas shall be limited to electrical rooms, administration areas, control rooms and storage rooms.
3. Provide NEMA 4X 316 Stainless Steel enclosures for all other locations.
4. NEMA Types 1 or 1A enclosures will not be permitted, unless specifically stated in the Specification for the equipment, or shown on the Drawings.

1.06 SERVICE AND METERING

- A. The power company serving this project is City Public. Service shall be obtained at 34.5kv Volts, 3 Phase, 3 Wire, 60 Hz from a pad mounted transformer furnished and installed by CPS.
- B. The power company shall be responsible for the following work:
 1. Furnishing and installing the primary overhead conductors and pole line.
 2. Furnishing and installing the riser pole, primary cutouts, lightning arresters and grounding.
 3. Furnishing and installing primary cables.
 4. Furnishing and installing transformer.
 5. Termination of underground primary cables at riser pole.
 6. Termination of underground primary cables at the transformer.
 7. Furnishing meter base and enclosure.
- C. The Contractor shall be responsible for the following work:
 1. Obtain an estimate from the power company for the work described in this SERVICE AND METERING paragraph and include the cost of the power company work in the Bid Price.
 2. Furnishing and installing the primary conduits and cables.
 3. Furnishing and installing the transformer pad and grounding with oil containment as per power company requirements.
 4. Termination of underground primary cables at the riser pole.
 5. Furnishing and installing secondary conduits and cables.
 6. Furnishing and installing a power company approved metering current transformer enclosure.
 7. Installing meter base.
 8. Furnishing and installing an empty conduit with pull line from the metering C.T. enclosure to the meter enclosure. Conduit size and type shall be approved by the power company.
 9. Coordinate the electrical service installation with the Power Company.
- D. Submit shop drawings for the following items to the power company for approval:
 1. Meter base
 2. Primary cable

3. Metering instrument and installation.

1.07 CODES, INSPECTION AND FEES

- A. Equipment, materials and installation shall comply with the requirements of the local authority having jurisdiction.
- B. Obtain all necessary permits and pay all fees required for permits and inspections.
- C. The Owner will negotiate with the electric utility for the costs of new or revised services and make payment to the electric utility for such costs, but the Contractor shall be responsible for the coordination with the electric utility during the installation of such services.
- D. Make all arrangements with the power company for obtaining electrical service, pay all power company charges and furnish all labor and material required for the electrical service.

1.08 SIZE OF EQUIPMENT

- A. Investigate each space in the structure through which equipment must pass to reach its final location. Coordinate shipping splits with the manufacturer to permit safe handling and passage through restricted areas in the structure.
- B. The equipment shall be kept upright at all times during storage and handling. When equipment must be tilted for passage through restricted areas, brace the equipment to ensure that the tilting does not impair the functional integrity of the equipment.

1.09 RECORD DRAWINGS

- A. As the work progresses, legibly record all field changes on a set of Project Contract Drawings, hereinafter called the "Record Drawings". The Record Drawings and Specifications shall be kept up to date throughout the project.
- B. The Record Drawings shall be reviewed in a meeting with the Owner/Engineer on a monthly basis.
- C. Record Drawings shall accurately show the installed (as-built) condition of the following items:
 1. One-line Diagram(s).
 2. Raceways and pullboxes.
 3. Conductor sizes and conduit fills.
 4. Panel Schedule(s).
 5. Control Wiring Diagram(s).
 6. Lighting Fixture Schedule(s).
 7. Lighting fixture, receptacle and switch outlet locations.
 8. Underground raceway and duct bank routing.
 9. Plan view, sizes and locations of switchgear, distribution transformers, substations, motor control centers and panelboards.
- D. Submit a typical example of a schedule of control wiring raceways and wire numbers, including the following information:
 1. Circuit origin, destination and wire numbers.

2. Field wiring terminal strip names and numbers.
- E. As an alternate, submit a typical example of point-to-point connection diagrams showing the same information, may be submitted in place of the schedule of control wiring raceways and wire numbers.
- F. Submit the record drawings and the schedule of control wiring raceways and wire numbers (or the point-to-point connection diagram) to the Owner/Engineer.
- G. The Contractor's retainage shall not be paid until the point-to-point connection diagrams have been furnished to the Owner/Engineer.

1.10 EQUIPMENT INTERCONNECTIONS

- A. Review shop drawings of equipment furnished under other related Divisions and prepare coordinated wiring interconnection diagrams or wiring tables. Submit copies of wiring diagrams or tables with Record Drawings.
- B. Furnish and install all equipment interconnections.

1.11 MATERIALS AND EQUIPMENT

- A. Materials and equipment shall be new, except where specifically identified on the Drawings to be re-used.
- B. The Contractor shall not bring onsite, material or equipment from a manufacturer, not submitted and approved for this project. Use of any such material or equipment, will be rejected, removed and replaced by the Contractor, with the approved material and equipment, at his own expense.
- C. Material and equipment shall be UL listed, where such listing exists.
- D. The Contractor shall be responsible for all material, product, equipment and workmanship being furnished by him for the duration of the project. He shall replace the equipment if it does not meet the Contract Documents.

1.12 JOBSITE DELIVERY, STORAGE AND HANDLING

- A. Prior to jobsite delivery, the Contractor shall have successfully completed all submittal requirements, and present to the Owner/Engineer upon delivery of the equipment, an approved copy of all such submittals. Delivery of incomplete constructed equipment, or equipment which failed any factory tests, will not be permitted.,
- B. Equipment and materials shall be handled and stored in accordance with the manufacturer's instructions, and as specified in the individual Specification Sections.

1.13 WARRANTIES

- A. Manufacturer's warranties shall be as specified in each of the Specification Sections, with a 2 year minimum.

1.14 EQUIPMENT IDENTIFICATION

- A. Identify equipment (disconnect switches, separately mounted motor starters, control stations, etc) furnished under Division 16 with the name of the equipment it serves. Motor control centers, control panels, panelboards, switchboards, switchgear, junction or terminal boxes, transfer switches, etc, shall have nameplate designations as shown on the Drawings.

PART 2 PRODUCTS (NOT USED)**PART 3 EXECUTION****3.01 INTERPRETATION OF DRAWINGS**

- A. The Drawings are not intended to show exact locations of conduit runs. Coordinate the conduit installation with other trades and the actual supplied equipment.
- B. Install each 3 phase circuit in a separate conduit unless otherwise shown on the Drawings.
- C. Unless otherwise approved by the Owner/Engineer, conduit shown exposed shall be installed exposed; conduit shown concealed shall be installed concealed.
- D. Where circuits are shown as "home-runs" all necessary fittings and boxes shall be provided for a complete raceway installation.
- E. Verify the exact locations and mounting heights of lighting fixtures, switches and receptacles prior to installation.
- F. Except where dimensions are shown, the locations of equipment, fixtures, outlets and similar devices shown on the Drawings are approximate only. Exact locations shall be determined by the Contractor and approved by the Owner/Engineer during construction. Obtain information relevant to the placing of electrical work and in case of any interference with other work, proceed as directed by the Owner/Engineer and furnish all labor and materials necessary to complete the work in an approved manner.
- G. Circuit layouts are not intended to show the number of fittings, or other installation details. Furnish all labor and materials necessary to install and place in satisfactory operation all power, lighting and other electrical systems shown.
- H. Redesign of electrical or mechanical work, which is required due to the Contractor's use of a pre-approved alternate item, arrangement of equipment and/or layout other than specified herein, shall be done by the Contractor at his/her own expense. Redesign and detailed plans shall be submitted to the Owner/Engineer for approval. No additional compensation will be provided for changes in the work, either his/her own or others, caused by such redesign.
- I. Raceways and conductors for lighting, switches, receptacles and other miscellaneous low voltage power and signal systems as specified are not shown on the Drawings. Raceways and conductors shall be provided as required for a complete and operating system. Refer to riser diagrams for signal system wiring. Homeruns, as shown on the Drawings, are to assist the Contractor in identifying raceways to be run exposed and raceways to be run concealed. Raceways installed exposed shall be near the ceiling or along walls of the areas through which they pass and shall be routed to avoid conflicts with HVAC ducts, cranes hoists, monorails, equipment hatches, doors, windows, etc. Raceways installed concealed shall be run in the center of concrete floor slabs, above suspended ceilings, or in partitions as required.
- J. The Contractor shall run all conduit and wire to RTU and/or PLC termination cabinets, where designated on the Drawings. The conduit and wire as shown on the interface drawings may not necessarily be shown on the floor plan.
- K. Install conductors carrying low voltage signals (typically twisted shielded pair cables) in raceways totally separate from all other raceways containing power or 120 volt control conductors.

- L. Raceways and conductors for thermostats controlling HVAC unit heaters, exhaust fans and similar equipment are not shown on the Drawings. Provide raceways and conductors between the thermostats, the HVAC equipment and the motor starters for a complete and operating system. All raceways and power conductors shall be in accordance with Division 16. Raceways shall be installed concealed in all finished space and may be installed concealed or exposed in process spaces. Refer to the HVAC drawings for the locations of the thermostats and controls.
- M. Raceways and conductors for the fire alarm, sound and page party systems are not shown on the Drawings. Provide raceways and conductors as required by the system manufacturer for a complete and operating system. All raceways and power conductors shall be in accordance with Division 16. Raceways shall be installed concealed in all finished spaces and may be installed exposed or concealed in process spaces.

3.02 EQUIPMENT PADS AND SUPPORTS

- A. Electrical equipment pads and supports, of concrete or steel including structural reinforcing and lighting pole foundations, are shown on the Structural Drawings.
- B. No electrical equipment or raceways shall be attached to or supported from, sheet metal walls.

3.03 SLEEVES AND FORMS FOR OPENINGS

- A. Provide and place all sleeves for conduits penetrating floors, walls, partitions, etc. Locate all necessary slots for electrical work and form before concrete is poured.
- B. Exact locations are required for stubbing-up and terminating concealed conduit. Obtain shop drawings and templates from equipment vendors or other subcontractors and locate the concealed conduit before the floor slab is poured.
- C. Where setting drawings are not available in time to avoid delay in scheduled floor slab pours, the Owner/Engineer may allow the installations of such conduit to be exposed. Requests for this deviation must be submitted in writing. No additional compensation for such change will be allowed.
- D. Seal all openings, sleeves, penetration and slots as specified in Section 16110.

3.04 CUTTING AND PATCHING

- A. Cutting and patching shall be done in a thoroughly workmanlike manner. Saw cut all concrete and masonry prior to breaking out sections.
- B. Core drill holes in concrete floors and walls as required. Contractor shall obtain written permission from the Owner/Engineer before core drilling any holes larger than 2 inches.
- C. Install work at such time as to require the minimum amount of cutting and patching.
- D. Do not cut joists, beams, girders, columns or any other structural members.
- E. Cut opening only large enough to allow easy installation of the conduit.
- F. Patching to be of the same kind and quality of material as was removed.
- G. The completed patching work shall restore the surface to its original appearance or better.
- H. Patching of waterproofed surfaces shall render the area of the patching completely waterproofed.

- I. Remove rubble and excess patching materials from the premises.
- J. When existing conduits are cut at the floor line of wall line, they shall be filled with grout of suitable patching material.

3.05 INSTALLATION

- A. Any work not installed according to the Drawings and this Section shall be subject to change as directed by the Owner/Engineer. No extra compensation will be allowed for making these changes.
- B. All dimensions shall be field verified at the job site and coordinated with the work of all other trades.
- C. Electrical equipment shall be protected at all times against mechanical injury or damage by water. Electrical equipment shall not be stored outdoors. Electrical equipment shall be stored in dry permanent shelters as required by each Specification Section. Do not install electrical equipment in its permanent location until structures are weather-tight. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and tested as directed by the Owner/Engineer, or shall be replaced at no additional cost at the Owner/Engineer's discretion.
- D. Equipment that has been damaged shall be replaced or repaired by the equipment manufacturer, at the Owner/Engineer's discretion.
- E. Repaint any damage to the factory applied paint finish using touch-up paint furnished by the equipment manufacturer. If the metallic portion of the panel or section is damaged, the entire panel or section shall be replaced, at no additional cost to the Owner.

3.06 PHASE BALANCING

- A. The Drawings do not attempt to balance the electrical loads across the phases. Circuits on motor control centers and panelboards shall be field connected to result in evenly balanced loads across all phases.
- B. Field balancing of circuits shall not alter the conductor color coding requirements as specified in Section 16120.

3.07 MANUFACTURER'S SERVICE

- A. Provide manufacturer's services for testing and start-up of the equipment as listed in each individual Specification Section. All settings, including those settings and arc flash labels required by the Power System Study, shall be made to the equipment and approved by the Owner/Engineer prior to energizing of the equipment.
- B. Testing and startup shall not be combined with training. Testing and start-up time shall not be used for manufacturers warranty repairs.

3.08 TESTS AND SETTINGS

- A. Test systems and equipment furnished under Division 16 and repair or replace all defective work. Make adjustments to the systems as specified and/or required.
- B. Prior to energizing electrical equipment, make all tests as required by the individual specification Sections. Submit a sample test form or procedure and submit the required test reports and data to the Owner/Engineer for approval at least two weeks prior to the startup of the tested equipment. Include names of all test personnel and initial each test.

- C. Check motor nameplates for correct phase and voltage. Check bearings for proper lubrication.
- D. Check wire and cable terminations for tightness.
- E. Check rotation of motors prior to energization. Disconnect driven equipment if damage could occur due to wrong rotation. If the motor rotates in the wrong direction, the rotation shall be immediately corrected, or tagged and locked out until rotation is corrected.
- F. Verify all terminations at transformers, equipment, capacitor connections, panels, and enclosures by producing a 1 2 3 rotation on a phase sequenced motor when connected to "A", "B" and "C" phases.
- G. Mechanical inspection, testing and setting of circuit breakers, disconnect switches, motor starters, control equipment, etc for proper operation.
- H. Check interlocking, control and instrument wiring for each system and/or part of a system to prove that the system will function properly as indicated by schematic and wiring diagrams.
- I. Check the ampere rating of thermal overloads for motors and submit a typed record to the Owner/Engineer of same, including MCC cubicle location and load designation, motor service factor, horsepower, full load current and starting code letter. If inconsistencies are found, new thermal elements shall be supplied and installed.
- J. Verify motor power factor capacitor ratings.
- K. Testing shall be scheduled and coordinated with the Owner/Engineer at least two weeks in advance. Provide qualified test personnel, instruments and test equipment.
- L. Refer to the individual equipment sections for additional specific testing requirements.
- M. Make adjustments to the systems and instruct the Owner's personnel in the proper operation of the systems.

3.09 TRAINING

- A. The Contractor shall provide manufacturer's training as specified in each individual section of the Specifications.

END OF SECTION

SECTION 16670**LIGHTNING PROTECTION SYSTEM****PART 1 GENERAL****1.01 SCOPE OF WORK**

- A. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish and install a lightning protection system that fully meets the UL Standards listed herein. The Contractor shall provide an inspection of each new structure, or modified existing structure, by Underwriters Laboratories and shall obtain a Master Label for each new or modified structure.
- B. The Contractor shall employ the services of a licensed lightning protection systems engineering company to design and install the lightning protection system and prepare detailed installation drawings and material specifications.
- C. The Franklin Rod system shall be used. Other systems such as the early stream emissions (EME) are not acceptable.

1.02 RELATED WORK

- A. Section 16000 Electrical – General Provisions
- B. Section 16196 Low Voltage AC Surge Protective Devices (SPDs)
- C. Section 16660 Grounding System

1.03 SUBMITTALS

- A. Shop Drawings: Submit for approval the following:
 - 1. Complete design drawings, for each structure and the site, showing the type, size, and locations of all grounding, down conductors, through roof/through wall wall assemblies, roof conductors and air terminals, shall be submitted to the Engineer for approval.
 - 2. Manufacturer's technical information for the materials proposed for use in the systems.
- B. Submit UL master label for installation.

1.04 REFERENCE CODES AND STANDARDS

- A. All products and components shown on the Drawings and listed in this specification shall be designed, manufactured, and installed according to latest revision of the following standards (unless otherwise noted):
 - 1. NFPA 70 – National Electrical Code (NEC)
 - 2. NFPA 780 – Lightning Protection Code
 - 3. LPI 175 - Lightning Protection Institute Installation Standard
 - 4. UL 96A – Installation Requirements for Lightning Protection Systems
- B. All equipment specified in this Section of the Specifications shall bear the appropriate label of Underwriters Laboratories.

1.05 QUALITY ASSURANCE

- A. The manufacturer of this equipment shall have produced similar equipment for a minimum period of five years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- B. The lightning protection system shall conform to the requirements and standards for lightning protection system of the LPI, UL and NFPA. standard requirements
- C. All components and material shall be new and of the latest field proven design and in current production. Obsolete components or components scheduled for immediate discontinuation shall not be used.

1.06 JOBSITE DELIVERY, STORAGE AND HANDLING

- A. Prior to jobsite delivery, the Contractor shall have successfully completed all submittal requirements, and present to the Owner/Engineer upon delivery of the equipment and materials, an approved copy of all such submittals.
- B. Protect equipment and materials during shipment, handling, and storage by suitable complete enclosures. Protect equipment from exposure to the elements and keep thoroughly dry.
- C. Protect painted surfaces against impact, abrasion, discoloration, and other damage. Repaint damaged painted surfaces to the satisfaction of the Owner/Engineer.

1.07 WARRANTY

- A. The Manufacturer shall warrant the system and equipment to be free from defects in material and workmanship for 2 year from date of final acceptance of the equipment. Within such period of warranty the Manufacturer shall promptly furnish all material and labor necessary to return the equipment to new operating condition. Any warranty work requiring shipping or transporting of the equipment shall be performed by the Manufacturer, at no expense to the Owner.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following Manufacturers are acceptable:
 - 1. Thompson Lightning Protection Company, St. Paul, MN.
 - 2. Heary Bros. Lightning Protection, Springville, NY.
 - 3. Harger Lightning Protection, Inc., Libertyville, IL.
 - 4. Advanced Lightning Technology, Argyle, Texas
 - 5. East Coast Lightning Equipment, Winstead, Ct.
- B. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety.

2.02 GENERAL

- A. The system to be furnished under this specification shall be the standard product of manufacturers regularly engaged in the production of lightning protection equipment and shall be the manufacturer's latest approved design.
- B. All equipment shall be new and of a design and construction to suit the application where it is used in accordance with accepted industry standards and LPI, UL, and NFPA standard requirements.
- C. At the point where an electrical service of 1000 Volts or less is generated, a surge protection device shall be provided and installed, complying with UL96A, for a UL Master Label Certificate of Inspection. The surge protection device shall comply with UL Standard 1449 Third Edition, as a Type 1 or Type 2 lightning rated unit of 20ka or more, as specified in Section 16196 Low Voltage AC Surge Protective Devices (SPDs).

2.03 MATERIALS

- A. Class I or Class II materials may be utilized for Class I structures, not exceeding 75 feet above grade. All other structures shall utilize Class II materials.
- B. Unless otherwise specified herein, all materials shall be tin plated copper with bolts of 316 stainless steel, and used in accordance with LPI, UL and NFPA code requirements.
- C. Aluminum materials, with bolts of 316 stainless steel, shall be used only on aluminum, galvalume or galvanized metal structures. Where aluminum, galvalume or galvanized metal parapet caps are used, the entire roof lightning protection equipment shall utilize aluminum components. Approved transitional components shall be used for transitions to aluminum materials. Down leads and grounding shall utilize tinned copper with the bimetal transition occurring at the bi-metal through roof assembly.
- D. All air terminal bases for flat roof areas shall be of the adhesive type.
- E. Conductors shall be tinned copper, (aluminum where installed on aluminum roofs), consisting of wire size, stranding, and weight in accordance with NFPA 780
- F. Conductor fasteners shall be an approved type of non corrosive metal, and have ample strength to support conductors. Cable fasteners shall be of the adhesive type.
- G. All cable connectors shall be tin coated copper cast bronze with screw pressure type 316 stainless steel bolts and nuts.
- H. Where any part of a protection system is exposed to potential mechanical injury, protect it by covering it with PVC conduit.

PART 3 EXECUTION

3.01 INSTALLATION

- A. All materials shall be installed by experienced workmen that specialize in this type of work. The lightning protection system shall be installed per approved shop drawings and UL and NFPA recommended practices.
- B. Install air terminals on structure steel framework bonded to the downcoming cables.
- C. Bond structure steel framework to the down-comer cables.
- D. Bond all metal pipes and metal structures to the down-comer cables.
- E. All concealed conductors shall be installed in Schedule 40 PVC conduit.

- F. All components of the system, on or above the roof, shall be connected to the system ground.

3.02 TESTING

- A. The Contractor shall employ the services of a UL field inspector, for inspection of the system upon completion of the installation. The Contractor shall assume full responsibility for the correctness of the installation and shall make any and all corrections and additions deemed necessary by the UL inspector. The Contractor shall pay for all costs of the UL inspection and any subsequent re-inspections as required.
- B. Inspection and testing to be performed by personnel regularly engaged in the installation and testing of Master Labeled lightning protection systems.
- C. Inspect the system for proper installation.
- D. Test the complete system for continuity to the electrical grounding system.
- E. An application shall be made to the Underwriters Laboratories Inc. for inspection and certification, and shall be delivered to the Engineer, confirming that all concealed components have been monitored during job construction.
- F. A UL Certification shall be provided for each and every new structure, including all parts of existing structures that are expanded, as defined by NFPA 780 and UL 96A. A Master Label shall be obtained for all structures.

END OF SECTION