

## **Section C-2 – Construction Specifications**

### **Site Security**

The Company shall secure the site and the Company’s equipment against loss from theft, weather or vandalism. Company shall also provide safety protection at open excavations as required by local, state, or federal law and good industrial practice. Company shall furnish, install, and maintain all fencing and gates necessary for the safe execution of the work.

### **Construction QA/QC**

The Company is responsible for providing a Quality Assurance/Quality Control (QA/QC) Program for all quality control testing and inspections necessary for completion of the work. As part of the QA/QC Program, the Company shall submit a QA/QC Plan, no later than 60 days after award of contract, which establishes the protocols to be used to maintain an effective construction quality control program. The QA/QC Plan shall identify the personnel, their qualifications, inspection procedures and documentation, sampling and test procedures, frequency and number of tests, laboratory and field test standards, and materials requiring testing that will be used to ensure an end product that complies with the approved design and specifications. The QA/QC Program shall address all construction and manufacturing operations, both on-site and off-site, and shall be keyed to the proposed construction sequence. The QA/QC Program shall be submitted for review and the Company shall modify the QA/QC Program as necessary to address the comments and requests of the City. The City will provide comments to the Contractor within 30 days. The City shall be notified of the inspection and testing schedule in advance and reserves the right to perform inspections and verification testing in addition to the Company’s QA/QC Program, to confirm contract compliance requirements. The Company shall thoroughly test and inspect materials, equipment, and work in order to assure that the requirements of the approved design and specifications are met. The Company shall remove and replace all materials, equipment, and work which are defective or which do not meet the requirements of the approved design and specifications.

### **Work Area**

Company shall clearly identify in the field the extent of the work area and provide fencing and signage. Company shall maintain all activities within the work area, staging area, and access corridors as identified.

### **Survey**

Company shall perform a topographic survey of the well sites and working areas.

### **Existing Utilities**

The utilities shown on the drawings have been located with the best available recorded information. Generally, utility locations have not been field surveyed. The Company shall call the local utility service alert agency and coordinate field locations of all facilities. Additionally, the Company shall pothole all buried utilities prior to excavating trenches in the area of the utility. Any and all utilities damaged during construction shall be immediately repaired at the Company’s expense.

### **Compaction**

The term relative compaction as used in these specifications is defined as the ratio of in-place field dry density to maximum laboratory dry density of the soil expressed as a percentage. The laboratory

maximum dry density shall be determined in accordance with ASTM D1557. The in-place field dry density shall be determined in accordance with ASTM D1556 or ASTM D2922.

### **Corrosion Protection and Cathodic Protection Systems**

Level of corrosion protection is to be determined by the Company, to provide the required service life in the environment to which the piping and equipment will be exposed. As a minimum, conform to manufacturer’s recommendations for service lives specified as follows:

- 50 years for concrete structures
- 50 years for buried pipelines
- 50 years for above-grade structures, with periodic recoating every 10 years
- 50 years for equipment cabinets, shrouds and housings, with periodic recoating every 20 years
- 10 years for the wearing surfaces of pumps and other mechanical equipment

### **Construction Staking**

The Company shall furnish and set all construction stakes, points, nails, and marks to establish the lines and grades required for the completion of the work. The Company may substitute laser control for grading, trenching and pipe placement staking. All survey work shall be conducted under the direct supervision of a CA licensed land surveyor.

### **Trench and Excavation Shoring Plan**

The Company shall submit to the City in accordance with Section 6500 of the Labor Code of the State of California, in advance of excavation, a detailed plan for excavations 5 feet or more in depth showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation of such excavations. This plan shall also show how shoring protects existing structures influenced by the adjacent excavation. The plan shall be prepared by a California-registered Civil or Structural Engineer.

### **Dewatering Plan**

If required by site conditions, the Company shall develop a dewatering plan that will meet NPDES discharge requirements. The Company shall also develop a SWPPP and obtain approval from the City.

### **Materials On-Site**

The Company may use excavated materials such as stone, gravel, sand, or other materials within the area of construction, if such materials meet the requirements of the geotechnical recommendations.

### **As-Built Drawings**

The Company shall prepare and submit as-built drawings showing all installed equipment and facilities as designed and constructed. All drawings shall be stamped by a California-registered Professional Engineer (PE). The horizontal and vertical locations of all the constructed facilities shall be included. All as-builts, upon completion, shall be submitted to the City both on Mylar and in electronic (CD) format, AutoCad’s latest version.

## Equipment Startup and Testing

Equipment testing and startup are required for satisfactory completion of the construction phase of the contract and therefore shall be completed prior to operation of the facility.

- a. **Definitions.** For purposes of equipment startup and testing, the following definitions shall apply:
  - *Manufacturer's Representative.* Employee of manufacturer who is factory trained and knowledgeable in the technical aspects of the products and systems.
  - *Functional Testing.* Tests necessary to demonstrate that the installed equipment and systems function as specified and operate in the manner intended.
  - *Startup Period.* Startup of any portion of the entire facility will be considered complete when the facility or designated portion has properly operated without interruption. This period is in addition to specified functional or performance testing and training.
  - *Acceptance Testing.* The operation of the entire facility to demonstrate the successful operation and integration of all the elements, including but not limited to: wastewater treatment, generator set, solids handling, pump stations, instrumentation and control system and PRV control valves. This is covered in Section C-3.
- b. **Equipment Testing:**
  - The Company shall furnish the services of a manufacturer's representative for each piece of major equipment, to inspect, to check, and to adjust, if necessary, the equipment installation. In each case, the Company shall arrange to have the manufacturer's representative revisit the jobsite as often as necessary until any and all trouble is corrected and the equipment installation and operation is acceptable to the manufacturer's representative.
  - The Company shall furnish the manufacturer's representative a written report, certifying that the equipment has been properly installed and lubricated, is in accurate alignment, is free from any undue stress imposed by connecting piping or anchor bolts, and has been operated satisfactorily under full-load conditions.
  - The Company shall schedule all equipment testing. The manufacturer's representative and the operating personnel and the owner's representative will witness equipment testing.
- c. **Functional Testing:** Functional (or run) testing shall be required for meters, generator sets, pumps, and equipment control systems. The Company shall furnish the services of a manufacturer's representative to assist with the test. Testing shall include checking for proper rotation, alignment, speed, excessive vibration, quiet operation, and full capability of all required functions. The Company shall perform initial equipment and system adjustment and calibrations in the presence and with the assistance of the manufacturer's representative. Prior to treatment plant operational testing, unit processes shall be tested using plain water.

- d. **Startup:** The Company shall conduct, with the assistance of the manufacturer’s representative, startup and field tests of equipment, systems, and subsystems.
- e. Other construction testing shall include, but is not limited to:
  - Verify instrument signals are received properly at wire terminal cabinet by manual stimulation.
  - Verify PLC ladder logic is simulated and proven to respond as designated (e.g., alarm failure conditions and trip signals).
  - Verify that simulated signals, including alarms, are received and properly indicated at the Operations Control Station.
  - Verify that software displays the screens for each of the unit processes and for the overall treatment process.
- f. **Acceptance Testing:** After all functional and equipment tests have been performed and all equipment has successfully met startup requirements, the facility shall be operated as a complete system for commissioning, to demonstrate overall plant performance for the performance test plan, as described in Section C.3.