INDEX TO

SECTION 01 00 01

GENERAL REQUIREMENTS

PART 6 – TEMPORARY CONSTRUCTION UTILITIES AND FACILITIES

PART 7 – SAFETY AND CONVENIENCE

PART 8 – TEMPORARY ENVIRONMENTAL CONTROL

PART 9 – PRESERVATION, RESTORATION, AND CLEANUP

PART 10 – SUBMITTALS DURING CONSTRUCTION

SECTION 01 00 01

GENERAL REQUIREMENTS

PART 1 – GENERAL

1.01 DEFINITIONS

A. Not Used

1.02 DESIGN REQUIREMENTS

A. Provide systems, equipment, and components, including supports and anchorages for the design criteria stated on the Drawings, in accordance with the provisions of the 2012 (or the latest) International Building Code (IBC) or the latest applicable Building Code and the Georgia Amendments.

B. These requirements take precedence over other requirements provided elsewhere, subject to Engineer approval.

1.03 ENVIRONMENTAL REQUIREMENTS FOR PAINTING, COATINGS, AND MATERIAL SELECTIONS

A. Throughout the individual Specification sections, the materials of construction and paint and coating systems to be used for some items are dependent upon the specific environment types to which the items will be exposed, as defined below.

B. Environment Types:

1. Interior Dry: Location inside building or structure where floor is not subject to liquid spills or wash down, nor where wall or roof slab is common to a water–holding or earth–retaining structure.

2. Interior Wet: Location inside building or structure where floor is sloped to floor drains or gutters and is subject to liquid spills or wash down, or where wall, floor, or roof slab are common to a water–holding or earth retaining structure.

3. Submerged: Location at or below top of wall of open water–holding structure, such as a basin or channel; or wall, ceiling, or floor surface inside a covered water–holding structure, such as a submersible pump station, scum pit, or manhole; or exterior below grade wall or roof surface of water–holding structure, open or covered.

4. Corrosive: Containment area or area exposed to delivery, storage, transfer, and use of chemicals.

5. Exterior: Location not protected from the weather by a building or other enclosed structure.

C. The individual Specifications define the materials of construction required for the various environment types, unless the material for the item is specifically called

out otherwise on the Drawings or Details.

PART 2 – SUMMARY OF WORK

2.01 SPECIFICATIONS AND DRAWINGS

A. The Specifications and Drawings included in these Contract Documents establish the performance, quality requirements, location, and general arrangement of materials and equipment, and establish the minimum standards for quality of workmanship and appearance. There has been no attempt to separate the Specification sections into groups for work of contractors or various trades. Should there be questions concerning the applicability or interpretation of a particular Specification section or part of a Specification section or Drawing, the questions should be directed to the Owner or Engineer prior to the submittal of a proposal for the Work under this Contract.

2.02 INCLUSIONS

A. Any part of the Work that is necessary or required to make each installation satisfactorily and legally operable, even though it is not specifically included in the Specifications or on the Drawings, shall be performed as incidental work as if described in the Specifications and shown on the Drawings. The expense of such incidental work shall be included in the lump sum bid.

B. The Contractor shall furnish all shop drawings, work drawings, labor, materials, equipment, tools, services and incidentals necessary to complete all work required to these Specifications and shown on the Contact Drawings.

C. The Contractor shall perform the work complete, in place ready for continuous service and shall include any repairs, replacements, or restoration required as a result of damages caused prior by acceptance by Owner.

D. The Contractor shall furnish and install all materials, equipment and labor which is reasonably and properly inferable and necessary for the proper completion of the work, whether specifically indicated in the Contract Documents or not.

E. Coordinate and cooperate all the work with MBR manufacturer to provide complete and fully operational system.

F. Kubota Membrane USA has been chosen to provide Flat Plate MBR membranes and related equipment for this project. Contractor shall engage Kubota to provide the materials, labor, engineering, and help with start-up, commissioning, and related for a complete and functioning system. The Kubota contact for this project is Damone Supica, who can be reached at (425)248-7897 or by email at damone.supica@kubota.com. Contact Kubota for their scope of supply and scope of work. A copy of Kubota bid will be available as an exhibit.

2.03 OWNER OCCUPANCY

A. The Owner intends to occupy and keep operational facilities in the project area

during the life of construction.

B. Cooperate with Owner to minimize conflict with existing operations and to facilitate Owner's operations.

C. Cooperate and coordinate with Owner to provide uninterrupted security and operation.

D. Contractor shall maintain uninterrupted access to compound during life of project.

E. Any impacts to traffic or operations shall be approved by the Owner at least ten business days prior to impact.

2.04 CONSTRUCTION AREAS

A. The Contractor shall limit his use of the construction areas for work and for storage, to allow for:

1. Work by Contractors.

2. Owner's Use.

3. Security.

B. Coordinate use of work site under direction of Engineer and Owner's Representative.

C. Assume full responsibility for the protection and safekeeping of products under this Contract, stored on the site.

D. Move any stored products under the Contractor's control, which interfere with operations of the Owner, or separate contractor.

E. Obtain and pay for the use of additional storage of work areas needed for Contractor operations.

2.05 PROJECT DESCRIPTION

A. A brief description of the Work is stated in these Documents. To determine the full scope of the project or any particular part of the Project, refer to the Specifications and Drawings.

B. The following additional information, though not all-inclusive, is given to assist contractors in their evaluation of the Work required to meet the Project objectives.

C. The New Water Reclamation Facility at the Travis Field project consists of the following components (this is not an all-inclusive scope of work):

1. Headwork's facility, including mechanical screening Grit removal system I associated piping and controls.

2. EQ tanks, mixing system and EQ pump station
3. Anaerobic, Pre-Anoxic, Pre-aeration, post anoxic, and membrane thickening basins including submersible mixer(s), diffused aeration system, blowers, and recycle pumps/wet well.
4. Membrane Bioreactor (MBR) basins and covered equipment area.
5. A two-story Building to provide the following:
   a. Blowers, pumps and other equipment.
   b. Storage and feed for sodium hydro chlorite, caustic soda, etc.
   c. Control Room, associated casework & equipment
   d. Electrical/MCC Room, associated equipment
   e. Mechanical Room, associated equipment
   f. Store Room
   g. Bath room and shower
   h. Breakroom
   i. Etc.
6. Monorail beam and hoist system for MBR filters.
7. Flow monitoring.
8. Screenings dumpsters and slab for screenings and grit.
9. MBR filter wash pad on grade.
10. Screening structure.
11. Plant drain pump station.
12. Associated process and non–process yard and plant piping.
13. Associated site pavement, grading and related.
14. Two diesel engine generators with fuel tank, mechanical and electrical accessories and access walkway.
15. Associated instrumentation and control equipment.
16. Associated communications system including Programmable Logic Controller (PLC), Input/output (I/O) modules and Scada.
17. Associated electrical equipment and work.
18. Associated grounding and lightning protection systems.
19. Site and facility lighting.
20. Chemical storage and delivery system
21. Effluent pumping station.
22. Water supply line.
23. Sludge dewatering system
24. UV system
25. Electrical, control, conduit, wiring, etc.
26. Plant fencing
27. MBR membranes, equipment and related.
28. Piles and other structural supports.

2.06 WORK BY OTHERS

A. Construction activities (i.e. compacting, pile driving, etc.) generate vibrations. Although the facility is segregated, nevertheless, the contractor shall monitor the excessive vibration that may damage the surrounding structures. In case the owner decided to obtain a private firm for vibration monitoring, the contractor shall cooperate with the vibration monitoring company and provide at least a 15-working days' notice to Engineer before commencing pile driving operations.

PART 3 – SEQUENCE OF OPERATIONS

3.01 SCHEDULING

A. Plan the Work and carry it out with minimum interference to the operation of the Owner and other subcontractors. Prior to starting the Work, confer with the Owner to develop an approved work Schedule.

B. It may be necessary to do certain parts of the construction work outside normal working hours in order to avoid undesirable conditions as determined by the Engineer and Owner. The Contractor shall do this work at such times and at no additional cost to the Owner.

C. The Contractor shall provide a plan and sequence of construction to ensure minimum disruption to other subcontractors and the MBR System Supplier and the Owner and shall accept the Owner's decisions for conflict resolution. The plan shall describe all operations with durations and sequence of operation. The plan shall indicate all temporary measures and connection to avoid interruptions. The plan shall be subject to the Owner's review and approval. The plan shall include shop drawing reviews, performance testing, start-up and related.

D. The Contractor shall be working onsite at the same time as the other subcontractors. All subcontractors shall coordinate their schedules with the Contractor and with each other and shall meet at a weekly construction coordination meeting for that purpose. More frequent coordination meetings may be required by the Contractor, Owner or Engineer if deemed necessary.

E. Overall Project Schedule:

1. General:

   a. Contractor shall submit with the bid proposal the name(s) of personnel who shall be responsible for the planning, scheduling, and updating of the Contractor's schedule. Contractor's personnel assigned to the planning and scheduling duties shall have substantive experience in the computer application of Critical Path Method (CPM) planning and scheduling.

   b. As a prerequisite to the approval of payment for work, Contractor shall be required to submit periodic updates to the Owner. The regularity of such updates shall be negotiated and agreed by the Contractor and Owner following contract award. Updates shall be at least monthly. All schedules submitted to the Owner shall be in a format acceptable to the Owner.

   c. Upon request by the Owner or Engineer, a current copy of the schedule shall be provided within 24 hours.

   d. Contractor shall be required to use the Precedence Diagram Method (PDM) of CPM planning and scheduling.

e. Contractor may employ a qualified Subcontractor or consultant to perform the planning; and scheduling duties. Assignment of a Subcontractor shall in no way alter or reduce the Contractor's obligations to perform the required planning and scheduling requirements.

f. It is the Contractor's sole responsibility to ensure that all of the Subcontractors and suppliers provide the required information, in sufficient detail, so that Contractor meets the requirements of the contract.

g. The Contractor shall maintain the Project Master Schedule. Contractor's schedules shall be incorporated in the development phase and at regular updates of the Project Master Schedule. Project float is for the use of the project and not for exclusive benefit of the Contractor. Float may be used to mitigate changes in the Work or other events which may delay performance or completion of the Project.

h. Work Restrictions: Show the effect of the following items, as applicable, on the schedule:

1. Coordination with existing construction.
2. Limitations of continued occupancies.
3. Uninterruptible services.
4. Partial occupancy before Substantial Completion.
5. Use of premises restrictions.
6. Environmental control.

i. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

1. Submittals.
2. Mockups.
3. Fabrication.
4. Sample testing.
5. Deliveries.
6. Installation.
7. Tests and inspections.
8. Building flush-out.
9. Startup and placement into final use and operation.

j. Construction Areas: As applicable, identify each major area of construction for major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:

1. Structural completion.
2. Temporary enclose and space conditioning.

3. Permanent space enclosure.
4. Completion of mechanical installation.
5. Completion of electrical installation.
6. Substantial Completion.

k. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Commencement of Work, Testing, Startup, Substantial Completion, Notice of Occupancy and Use, and Final Acceptance. As applicable, also include milestones for Partial Substantial Completion and Partial Notice of Occupancy and Use.

l. Recovery Schedule: When periodic update indicates the Work is fifteen or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

2. Submit detailed testing plant startup and performance monitoring schedule.

3. Progress Reports:
   a. Weekly progress coordination meetings shall be held at the jobsite and attended by the Contractor and Owner's Representative. The schedule shall be reviewed at each meeting. Immediately prior to the meeting, the Contractor shall obtain from the subcontractors the necessary information to update the Schedule to reflect progress to date. The updated Schedule shall be available at the meeting for review. At a minimum, the following items shall be reviewed at the meetings:
      1. Overall project schedule status.
      2. Activities started and completed during the previous week.
      3. The remaining duration required to complete each current activity.
      4. The remaining duration or schedule impacts for selected activities not yet started.
      5. The Change Orders and proposed sequencing changes to the network diagram.

3.02 PERMITTING

A. Contractor shall acquire all required permits associated with the work covered under this contract and shall be responsible for all required application and permit fees. Contractor shall have the necessary local licenses including a county business license.

3.03 COORDINATION

A. Other Subcontractors, employed by the Owner directly, may be completing work items on the property, independent of the scope of services for this contract. Contractor shall ensure coordination of his Subcontractor's with those employed by the Owner and the Owner.

B. If any difficulty or dispute should arise in the accomplishment of the above coordination or with concurrent activities on the property, the Owner shall be notified immediately.

C. All Subcontractors working for the Contractor on this site are subject to this requirement for cooperation, and all shall abide by the resolution agreed upon by the Contractor and Owner, without additional cost to the Owner.

3.04 EQUIPMENT AND SYSTEM TESTING

A. Specific performance testing of installed equipment and systems shall be conducted by the Contractor, Vendor, or Manufacturer's Representative in the presence of the Owner or Owner's Representative, as required in the Specifications and/or Drawings.

B. The Contractor shall furnish all labor, materials, tools, equipment, instruments, consumables, and services necessary to perform the functional and performance testing.

3.05 SEQUENCE OF CONSTRUCTION

A. Contractors shall first install tree protection (if needed) and erosion protection, and have it inspected prior to commencing work.

B. The demolition and removal of all the existing plant shall occur prior to any construction of the new plant.

PART 4 – SITE CONDITIONS

4.01 SITE INVESTIGATION AND REPRESENTATION

A. The Contractor acknowledges satisfaction as to the nature and location of the Work, access to the site through the Air National Guard gate and obtaining identification badges (via DOD) for all workers and subcontractors, the general and local conditions, particularly those bearing upon availability of transportation, disposal, handling and storage of materials, availability of labor, water, electric power, roads, and uncertainties of weather, or similar physical conditions at the Site, the conformation and conditions of the ground, the character of equipment and facilities needed prior to and during the execution of the Work, and all other matters which can in any way affect the Work or the cost thereof under this Contract.

B. The Contractor further acknowledges satisfaction as to character, quality, and quantity of surface and subsurface materials to be encountered from the contractor's inspection of the site and from reviewing any available records of exploratory work furnished by the Owner. Failure by the Contractor to become acquainted with the physical conditions of the site and all the available information will not relieve the Contractor from responsibility for properly estimating the difficulty or cost of successfully performing the Work.

C. The Contractor warrants that, as a result of examination and investigation of all the aforesaid data, the Contractor can perform the Work in a good and workman-like manner and to the satisfaction of the Owner and Engineer. The Engineer and the owner assumes no responsibility for any representations made by any of its officers or agents during or prior to the execution of this contract.

4.02 INFORMATION ON SITE CONDITIONS

A. General: Any information obtained by the Engineer regarding site conditions, subsurface information, groundwater elevations, existing construction of site facilities as applicable, and similar data will be available for inspection at the office of the Engineer upon request. Such information is offered as supplementary information only. The Engineer assumes no responsibility for the completeness or interpretation of such supplementary information.

4.03 SUBSURFACE INVESTIGATION

A. Subsurface investigations, including test borings, have been made to indicate subsurface materials at particular locations. Engineer assumes no responsibility whatsoever in respect to the sufficiency or accuracy of the interpretations made of subsurface conditions, and there is no warranty or guarantee, either expressed or implied, that the conditions indicated by such investigations are representative of those existing throughout such area, or any part thereof, or that unforeseen developments may not occur.

B. The Contractor may make arrangements with the Owner for permission to conduct, at the Contractor's own expense such additional subsurface investigation as may be necessary to verify existing conditions. Contractor shall share the results of those investigations with the Owner and Engineer.

4.04 DIFFERING SUBSURFACE CONDITIONS

A. In the event subsurface or latent physical conditions are found materially different from those indicated in these Documents and differing materially from those ordinarily encountered and generally recognized as inherent in the character of work covered in these contract Documents, the Contractor shall promptly, and before such conditions are disturbed, notify the Owner and Engineer in writing of such changed conditions.

C. The Engineer will investigate such conditions promptly and following this investigation, the Contractor shall proceed with the Work, unless otherwise instructed. If the Engineer finds that such conditions do differ from those anticipated and subsequently, cause an increase or decrease in project cost,

through materials, labor, schedule or other, then any adjustments in cost and time will be addressed as indicated in the General Conditions. The Engineer will make the final decision on all Change Orders to the contract regarding any adjustment in cost or time for completion.

4.05 UTILITIES

A. Contractor shall be responsible for identifying and locating any utilities before starting construction. Damage to any such utilities must be repaired by the Contractor at no additional cost to the Engineer or the Owner.

B. The following is a list of the major known utilities serving the Work area which should be notified if conflicts or emergencies arise during the progress of the Work:

Name of Utility

1. Electrical: Georgia Power
2. Phone: AT&T.
3. Water: City of Savannah
4. Gas: Atlanta Gas
5. Cable: Comcast

4.06 CONTRACTOR'S RESPONSIBILITY FOR UTILITY PROPERTIES AND SERVICE

A. Where the Contractor's operations could cause damage or inconvenience to telegraph, telephone, television, power, oil, gas, water, sewer, irrigation systems, or security systems, the operations shall be suspended until all arrangements necessary for the protection of these utilities and services have been made by the Contractor.

B. Notify all utility offices which are affected by the construction operation at least 72 hours in advance. Under no circumstances expose any utility without first obtaining permission from the appropriate agency or the Owner. Once permission has been granted, locate, expose, and provide temporary support for all existing underground utilities.

C. The Contractor shall be solely and directly responsible to the Owner and operators of such properties for any damage, injury, expense, loss, inconvenience, delay, suits, actions, or claims of any character brought because of any injuries or damage which may result from the construction operations under this Contract.

D. Neither the Owner nor its Representative shall be responsible to the Contractor for damages as a result of the Contractor's failure to protect utilities encountered in the Work.

E. In the event of interruption to domestic water, sewer, storm drain, or other utility services as a result of accidental breakage due to construction operations, Contractor shall promptly notify the Owner and the proper authorities. Contractor shall cooperate with said authorities and the Owner in restoration of service as promptly as possible and bear all costs of repair. In no case shall

interruption of any water or utility service be allowed to exist outside working hours unless prior approval is granted by the owner of the utility and the Owner.

F. The Contractor shall replace, at the Contractor's own expense, all existing utilities or structures removed or damaged during construction, unless otherwise provided for in these Contract Documents or ordered by the Owner.

4.07 EXISTING STRUCTURES

A. Take necessary precautions to prevent damage to existing structures whether on the surface, aboveground, or underground.

4.08 FIELD RELOCATION

A. During the progress of construction, it is expected that relocations of the Work may be necessary. Such relocations shall be made only by direction of the Owner. If existing structures are encountered which prevent the construction, and which are not properly shown the Drawings, Contractor shall notify the Owner before continuing with the construction. Engineer shall be informed and, at the direction of the Owner, shall make any necessary field revisions to avoid conflict with the existing structures. If the Contractor shall fail to so notify the Owner when an existing structure is encountered, and proceeds with the construction despite this interference, the Contractor does so at his own risk.

PART 5 – SALVAGE OF MATERIALS

5.01 MATERIAL TO BE SALVAGED

A. Salvage work shall be considered incidental to the lump sum work, and the Contractor's cost shall be included in the applicable items of work in the Proposal.

B. Contractor shall coordinate with Owner equipment and materials to be salvaged, ensuring it does not affect the critical path.

PART 6 – TEMPORARY CONSTRUCTION UTILITIES AND FACILITIES

6.01 LAYOUT OF TEMPORARY FACILITIES

A. Before starting the Work, the Contractor shall submit to the Owner their requirements for space for temporary structures and storage of materials. Should the Contractor require space in addition to that available at the jobsite, the Contractor shall make his own arrangements for storage of materials and equipment in locations other than the construction site. For the allocated space onsite, the Contractor shall submit to the Owner, for approval, the proposed plan and layout for all temporary offices, sanitary facilities, temporary construction roads, storage buildings, storage yards, temporary water service and distribution, and temporary power service and distribution. Contractor shall pay for all temporary facilities.

6.02 CONTRACTOR AND SUBCONTRACTOR'S WORK AREA

A. The Contractor and their subcontractors shall limit their operations and storage of equipment and materials to areas as directed by the Owner. The Contractor shall not disturb any areas delineated by the Owner.

B. The Contractor shall maintain the area during construction in a manner that will not obstruct operations of any existing street areas or existing plant operations. The Contractor shall proceed with their work in an orderly manner, maintaining the construction site free of debris and unnecessary equipment and/or materials.

6.03 TEMPORARY WATER

A. The Contractor will provide all temporary water required for construction. Any temporary installation shall meet all pertinent regulations. Contractor shall contact the City and obtain, install a separate water meter. Contractor shall bear costs for temporary connection to waterlines as directed by the City.

6.04 WATER FOR TESTING

A. The Contractor will provide the necessary water required for testing equipment prior to acceptance of the Work, unless otherwise specifically stated in the Specifications for the equipment, system, or facility. Contractor shall coordinate with the City of Savannah for the volume and timing of when water is used. Contractor shall pay for water needed.

6.05 TEMPORARY ELECTRIC POWER

A. Contractor shall provide separate 480 volt and 120-volt power to the site for construction activities. The permanent facility power supply will be utilized for facility testing and startup.

6.06 SAFETY REQUIREMENTS FOR TEMPORARY ELECTRIC POWER

A. Temporary electric power installation shall meet the construction safety requirements of OSHA, state, and other governing agencies. This shall be the responsibility of the Electrical Subcontractor.

6.07 SANITARY FACILITIES AND DRINKING WATER

A. The Contractor shall provide chemical toilets of suitable type and shall maintain the facilities in a sanitary condition at all times. The chemical toilet shall be of watertight construction so that no contamination of the area can result from its use. The facilities shall conform to code requirements and be acceptable to the sanitary authorities. Upon completion of the Work, the sanitary facilities shall be removed, and the area restored to its original condition.

B. Contractor shall provide suitable drinking water for their workers.

6.08 TEMPORARY TELEPHONE SERVICE

A. The Contractor shall furnish onsite telephone service for himself during the period of construction of the Contract, as he determines necessary.

6.09 STORAGE OF MATERIALS

A. All materials shall be stored in a manner that ensures the preservation of their quality and fitness for the Work. Private property shall not be used for storage purposes without the written permission of the Owner and property owners.

6.10 STORAGE BUILDINGS OR TRAILERS

A. If necessary, the Contractor shall erect or provide as-approved, temporary storage buildings and or trailers of the various sizes as required for the protection of equipment and materials. At or near the completion of the Work, and as directed by the Owner, the temporary storage buildings or trailers shall be dismantled, removed from the site, and remain the property of the Contractor.

B. Upon completion of the work, Contractor shall ensure the area designated for storage buildings and/or trailers is returned, restored according to site and/or grading or landscaping plans.

C. Combustible materials (paints, solvents, fuels, etc.) shall be stored in a well-ventilated building removed from other buildings.

6.11 STORAGE YARDS

A. The City will coordinate with the Air National Guard to obtain necessary storage area. The Contractor shall construct temporary storage yards for the storage of materials that are not subject to damage by weather conditions. Materials such as pipe, reinforcing and structural steel, shall be stored on pallets or racks, off the ground, and stored in a manner to allow ready access for inspection and inventory. Temporary gravel surfacing of the storage yards shall meet with the approval of the ANG. Contractor shall be responsible for the security of all stored materials.

6.12 DEBRIS AND WASTE DISPOSAL FACILITIES

A. The Contractor shall provide trash and debris bins, dumpsters, and containers for proper disposal of waste material. Construction and demolition berms shall be separated from organic, paper, and office material. Contractor shall be responsible for the routine removal of trash and debris.

PART 7 – SAFETY AND CONVENIENCE

7.01 CONSTRUCTION SAFETY PROGRAM

A. The Contractor shall develop and maintain for the duration of this Contract, a Safety Plan in accordance with the provisions of the Contract and applicable regulatory requirements.

B. The Owner shall review the Contractor's performance and compliance with the Safety Plan and retain an appropriate amount (up to TEN percent) of each pay request for noncompliance. The following component will be reviewed as a minimum:

1. Tool box locks.
2. Daily pre–task planning.
3. Task hazard analysis.
4. Equipment assessment checklist.
5. Housekeeping.
6. Use of personal protective equipment.
7. Safe working habits.
8. Weekly, jobsite specific, site inspections.

C. The duty of the Owner to conduct construction review of the Contractor's performance is not intended to include a review or approval of the adequacy of the Contractor's safety supervisor, the Safety Plan, or any safety measures taken in, on, or near the construction site. The contractor is responsible for all compliance.

7.02 SAFE ACCESS BY FEDERAL, STATE, AND LOCAL GOVERNMENT OFFICIALS

A. Authorized government officials shall, at all times, have safe access to the work, and the Contractor shall provide proper facilities for such access and Inspection.

7.03 TRAFFIC MAINTENANCE AND SAFETY

A. The Contractor shall comply with all rules and regulations of the ANG, state, county, and city authorities with regard to closing or restricting the use of public streets or highways. No public or private road shall be closed, except by express permission of the Owner of the and the City. Contractor shall conduct the Work so as to impose the least possible obstruction to traffic and normal commercial pursuits. Contractor shall protect all obstructions within traveled roadways by installing approved signs, barricades, and lights, where necessary for the safety of the public. The convenience of the general public and of residents adjacent to the Project, and the protection of persons and property are of prime importance and shall be provided for in an adequate and satisfactory manner.

7.04 PROTECTION OF PROPERTY

A. The Contractor shall protect stored materials, cultivated trees and crops, and other items located adjacent to the proposed work. Contractor shall notify property Owners affected by the construction at least one week in advance of the time construction begins. During construction operations, Contractor shall construct and maintain such facilities as may be required to provide access by all

property owners to their property. No person shall be cut off from access to their residence or place of business for a period exceeding four hours, unless the Contractor has made special arrangements with the affected persons.

7.05 FIRE PREVENTION AND PROTECTION

A. The Contractor shall perform all work in a fire–safe manner. The Contractor shall supply and maintain on the Site adequate fire–fighting equipment capable of extinguishing incipient fires. The Contractor shall comply with applicable federal, state, and local fire–prevention regulations and requirements of the City Fire Department. Where these regulations do not apply, applicable parts of the National Fire Prevention Standard for Safeguarding Building Construction Operations (NFP A No. 241) shall be followed.

7.06 ACCESS FOR POLICE, FIRE, AND POSTAL SERVICE

A. Contractor shall request approval from the fire department and police department to close any street or portion thereof. No closing shall be made without the Owner's and these departments approval. Contractor shall notify said departments when the streets are again passable for emergency vehicles. Contractor shall not block off emergency vehicle access to consecutive arterial crossings or dead–end streets, in excess of 300 linear feet, without special written permission from the fire department. Contractor shall conduct operations with the least interference to fire equipment access, and at no time prevent such access.

B. Contractor shall maintain postal service facilities in accordance with the requirements of the Postal Service. If necessary, Contractor shall move mailboxes to temporary locations designated by the Postal Service, and at the completion of the Work in each area, replace them in their original location and in a condition satisfactory to the U.S. Postal Service.

PART 8 – TEMPORARY ENVIRONMENTAL CONTROL

8.01 NOISE CONTROL

A. Contractor shall take every action possible to minimize noise caused by construction operations. Operate in compliance with any applicable ordinances, regulations, rules and laws in effect in area pertaining to noise.

B. Provide equipment that operates with least possible noise. Provide electrically operated equipment in work area to extent possible. Equip air intake of compressors with silencers and provide machinery operated by gearing with a type of gearing designed to reduce noise to a minimum. Equip internal combustion engines with mufflers. Maintain equipment silencing features in good condition and use at all times.

C. Comply with approved work hours. Noise shall not occur prior to 8:00 AM nor later than 6:00 PM without prior written approval from the Owner.

8.02 AIR POLLUTION CONTROL

A. Contractor shall exercise every reasonable precaution to keep air pollution to a minimum throughout life of Project.

8.03 WATER CONTROL

A. Contractor shall keep excavations free from water while site grading, structural work, pipe laying, or other construction is in progress.

1. Surface Drainage:

a. Control drainage and stormwater in accordance with the Project stormwater pollution prevention plan. Intercept and divert upstream surface drainage away from work site by use of dikes, curb walls, ditches, pipes, sumps, or other means.

b. Intercept and divert work site surface drainage away from excavation by use of dikes, curb walls, ditches, pipes, sumps, or other means.

c. Design surface drainage systems so they do not cause erosion on or offsite or cause unwanted flow of water.

d. Remove surface drainage system when no longer required.

e. Remove debris and restore site to original condition.

2. Dewatering:

a. All dewatering activities shall meet the requirements of the Site Dewatering Permit and the Owner. Dewatering shall not flood any adjacent or downstream property.

b. Subsurface (groundwater) elevations and storm water runoff vary with the time of year and rainfall amounts across the limits of construction as defined on the Contract Drawings. Neither the Engineer no the Owner can accurately estimate the water elevations that may be encountered during performance of Work.

c. The Contractor shall be responsible for dewatering areas as deemed necessary by the Contractor to allow for the proper construction of the Project and all appurtenances.

d. The Contractor shall at all times during performance of the Work provide and maintain proper equipment and facilities to remove water entering excavations. The Contractor shall keep such excavations dry so as to obtain a satisfactory foundation condition for all Work.

e. The Contractor shall not allow water to accumulate in excavations. The Contractor shall remove water to prevent

softening of the foundation bottom and soil changes detrimental to stability of sub grades and foundations. Sub grade soils which become soft, loose, quick, or otherwise unsatisfactory for support of structure as a result of inadequate dewatering or other construction methods shall be removed and replaced by crushed stone as required by the Consultant at the Contractor's expense. The bottom of excavations shall be firm and without standing water before placing structures or pipes. The Contractor shall provide and maintain pumps, well points, sumps suction and discharge lines, and other dewatering system components deemed necessary by the Contractor to convey water away from excavations.

f. The Contractor shall establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water away from the excavations to collecting or runoff areas. The Contractor shall not use trench excavations as temporary drainage ditches.

g. See Section 31 23 19.01 Dewatering.

8.04 DEBRIS CONTROL

A. The Contractor shall proceed with construction cleanup on a daily basis, as construction progresses. Cleanup consists of removal of mud, oil, grease, trash, used forms, scrap, debris, excess material, and any other items that are unsightly or can cause the tripping or slipping of workmen, ladders, or equipment.

B. Dispose of construction waste material in an authorized disposal area.

8.05 POLLUTION CONTROL

A. Contractor shall take precautions in conduct of operations as necessary to avoid contaminating water in adjacent water sources or water impoundments such as lakes, reservoirs, ditches, waterways, ponds, etc. Do not discharge pollutants such as chemicals, fuels, lubricants, bitumens, raw sewage, and other harmful waste into or alongside streams, impoundments, or into natural or man-made channels leading to them. Do not discharge water used during work on Project that has become contaminated into rivers, streams, ditches, or impoundments.

B. Conduct all earthwork, moving of equipment, water control of excavations or other operations likely to create silting, so as to minimize pollution of rivers, streams, ditches, and impoundments. Do not deposit excavated material in or so near to rivers, ditches, streams, or impoundments that it will be washed away by high water or runoff.

C. Contractor shall not dispose of or wash any equipment or other items in the ocean, Intracoastal Waterway or adjacent ditches.

8.06 EROSION CONTROL

A. Contractor shall use proper and acceptable methods of soil erosion and

sedimentation control for exposed earthwork and assume obligation for fines and related costs resulting from failure to provide adequate protection against soil erosion.

8.07 LIGHT CONTROL

Contractor shall not allow work light used during darkness to shine into adjacent properties. Contractor shall obtain prior written approval from Owner before working at night and using work lights.

PART 9 – PRESERVATION, RESTORATION, AND CLEANUP

9.01 SITE RESTORATION AND CLEANUP

A. At all times during the Work, Contractor shall keep the premises clean and orderly, and upon completion of the Work, repair all damage caused by equipment and leave the project free of rubbish or excess materials of any kind.

B. Contractor shall stockpile excavated materials in a manner that will cause the least damage to adjacent lawns, grassed areas, gardens, shrubbery, or fences, regardless of whether these are on private property, or on state, county, or city right–of–ways. Install silt fence around stock piles to prevent erosion. Install covering as necessary to prevent blown movement. Remove all excavated materials from grassed and planted areas and leave these surfaces in a condition equivalent to their original condition.

C. All existing drainage ditches and culverts shall be reopened, graded, stabilized, and natural drainage restored, unless otherwise indicated on the Drawings. Contractor shall restore culverts, broken or damaged, to their original condition and location.

9.02 TREE REMOVAL

A. Trees and other natural vegetation shall not be removed or disturbed in those areas designated on the Drawings to remain, disturbed or as indicated by the Contractor. Trees removed in other areas of the site shall be disposed of off the Worksite by the Contractor.

9.03 DUST PREVENTION

A. Contractor shall give all unpaved streets, roads, detours, or haul roads used in the construction area an approved dust–preventive treatment or periodically water to prevent dust. Applicable environmental regulations for dust prevention shall be strictly enforced.

9.04 PRESERVATION OF IRRIGATION AND DRAINAGE DITCHES

A. Arrange schedules so that construction will not interfere with the irrigation of cultivated lands, pasturelands or landscaped areas. Construction may proceed during the irrigation season, provided the Contractor constructs, at Contractor's own expense, temporary irrigation ditches, turnouts, and miscellaneous structures

acceptable to the owner of the property.

B. After backfilling of the trenches, restore storm drain ditches destroyed, damaged, or otherwise modified during construction, to a condition equivalent, in the opinion of the Contractor, to the condition of the ditch before construction, or as shown on the Drawings. Ditches so reconstructed shall be built in their original locations.

9.05 DISPOSAL OF WASTE MATERIALS

A. All suitable material, including soil material if excavated during construction, meeting the Project Specifications shall be reused and incorporated into the Project or stock piled in a location noted by the Owner.

B. An on-site disposal area will be provided by the Contractor for the Contractor's use for disposal of waste materials. Waste materials shall be removed from the site prior to substantial completion.

C. The Contractor shall be responsible for loading and transporting waste materials to a suitable disposal area. At no time shall excavated waste be stockpiled adjacent to the excavations.

PART 10 – SUBMITTALS DURING CONSTRUCTION

10.01 GENERAL

A. Requirements in this Section are in addition to any specific requirements for submittals specified in other Sections of these Specifications and the Contract.

B. Method for delivery of submittals to Engineer shall be coordinated and agreed upon with Engineer. Assume delivery (via mail or hand delivery) of hard copies of the submittals will be required.

C. Submitted data shall be fully sufficient in detail for determination of compliance with the Contract Documents. Coordinate submittal numbering and submittal schedule with Engineer immediately following execution of the Contract.

D. Review, acceptance, or approval of substitutions, schedules, Shop Drawings, lists of materials, and procedures submitted or requested by the Engineer shall not add to the Contract amount, and all additional costs which may result therefrom shall be solely the obligation of the Contractor.

E. The Owner is not precluded, by virtue of review, acceptance, or approval, from obtaining a shared credit for construction savings resulting from allowed concessions in the Work or materials thereof.

F. It shall not be the responsibility of the Owner to provide engineering or other services to protect the Contractor from additional costs accruing from such

approvals.

G. No equipment or material for which listings, drawings, or descriptive material is required shall be installed until the Contractor has received approved copies of the Shop Drawings.

H. No "Or Equal" material or equipment shall be installed without approval by the Engineer.

I. The review of drawings by the Engineer will be limited to general design requirements only and shall in no way relieve the Contractor from responsibility for errors or omissions contained therein.

J. Submittals will be acted upon by the Engineer as promptly as possible and returned to the Contractor not later than the time allowed for review in Paragraph Shop Drawing Submittal Procedure. Delays caused by the need for resubmittals shall not constitute reason for an extension of Contract time.

K. The Contractor shall be responsible for the accuracy and completeness of the information contained in each submittal and shall assure that the material, equipment or method of work shall be as described in the submittal. The Contractor shall verify that all features of all products conform to the specified requirements. Submittal documents shall be clearly edited to indicate only those items, models, or series of equipment, which are being submitted for review. All extraneous materials shall be crossed out or otherwise obliterated. The Contractor shall ensure that there is no conflict with other submittals and notify the Construction Manager in each case where his submittal may affect the work of another contractor or the Owner. The Contractor shall coordinate submittals among his subcontractors and all suppliers.

The Contractor shall coordinate submittals with the work so that work will not be delayed. He shall coordinate and schedule different categories of submittals, so that one will not be delayed for lack of coordination with another. No extension of time will be allowed because of failure to properly schedule submittals. The Contractor shall not proceed with work related to a submittal until the submittal process is complete. This requires that submittals for review and comment shall be returned to the Contractor stamped "No Exceptions Taken" or "Make Corrections Noted."

The Contractor shall certify on each submittal document that he has reviewed the submittal, verified field conditions, and complied with the contract documents.

10.02 SHOP DRAWING SUBMITTAL PROCEDURE

A. The Contractor or vendor shall submit a minimum of two hard copies and one electronic file in Portable Document Format (PDF), to the Engineer for review. Contractor and Engineer may alter submittal requirement based upon method of submittals and approvals agreed upon. Submittals shall be made with sufficient time to allow the Engineer not less than fifteen regular working days for examining each submittal or resubmittal.

B. If the technical content of any submittal deviates from the designs or requirements stated in the Specifications or Drawings, a letter shall accompany it explaining, in detail, the reason for each deviation.

C. Hard copies of submittals shall be legible and intact.

D. Each submittal shall have a package and submittal number that will correspond to the specification section. Coordinate numbering with Engineer before making first submittal.

E. Shop Drawings shall be accurate, distinct, and complete, and shall contain all required information, including satisfactory identification of items, units, and assemblies in relation to the Contract Drawings and Specifications.

F. Shop Drawings shall be submitted only by the Contractor and manufacturer/vendor/supplier, who shall indicate by a signed stamp on the Shop Drawings, or other approved means, that the Contractor has checked and approved the submittal, that the contents are in accordance with Contract requirements, and that the submittal has been checked for dimensions and relationship with work of all other trades involved. The practice of submitting incomplete or unchecked Shop Drawings for the Engineer to correct or finish will not be acceptable. Shop Drawings which, in the opinion of the Engineer, have not been checked by the Contractor will be considered as not complying with the intent of the Contract Documents and will be returned to the Contractor for resubmission in the proper form.

G. When the Shop Drawings have been reviewed by the Engineer, two sets of the submittal will be returned to the Contractor appropriately stamped. If major changes or corrections are necessary, the shop drawing may be rejected, and one set will be returned to the Contractor with such changes or corrections indicated, and the Contractor shall correct and resubmit the Shop Drawings in the same manner and quantity as specified for the original submittal, unless otherwise directed by the Engineer. If changes are made by the Contractor (in addition to those requested by the Engineer) on the resubmitted Shop Drawings, such changes shall be clearly explained in a transmittal letter accompanying the resubmitted Shop Drawings and as noted on the submittal.

H. The review of such Shop Drawings and catalog cuts by the Engineer shall not relieve the Contractor from responsibility for correctness of dimensions, fabrication details, and space requirements, or for deviations from the Contract Drawings or Specifications. Review by the Engineer shall not relieve the Contractor from the responsibility for errors in the Shop Drawings.

I. The Contractor agrees that shop drawing submittals processed by the Engineer do not become Contract Documents and are not Change Orders; that the purpose of the Shop Drawing review is to establish a reporting procedure and is intended for the Contractor's convenience in organizing their work and to permit the Engineer to monitor the Contractor's progress and understanding of the design.

10.03 SHOP DRAWING REQUIREMENTS

A. Shop Drawings referred to herein shall include Shop Drawings and other submittals for both shop and field-fabricated items. The Contractor shall submit, as applicable, the following for all prefabricated or manufactured structural, mechanical, electrical, plumbing, process systems, and equipment:

1. Shop Drawings or equipment drawings, including dimensions, size and location of connections to other work, and weight of equipment.

2. Catalog information and cuts.

3. Installation or placing drawings for equipment, drives, and bases.

4. Supporting calculations for equipment and associated supports specified to be designed by equipment manufacturers or suppliers.

5. Complete manufacturer's specifications, including materials description and paint system.

6. List of materials and supplies required for the equipment prior to, and during startup.

7. List of materials and supplies furnished with the equipment.

8. Samples of finish colors for selection.

9. Special handling instructions.

10. Requirements for routine maintenance required prior to plant startup.

11. List of all requested exceptions to the Contract Documents.

12. Operation and Maintenance Manuals for any equipment furnished.

B. The submittals shall include satisfactory identification of items, units, and assemblies in relation to the Specification section number, and the system or equipment identification or tag number shown on the Drawings, the Process and Instrumentation Diagram (P&ID), or as provided in the applicable Specification section.

C. Should the Contractor propose any item on their Shop Drawings, or incorporate an item into the Work, and that item should subsequently prove to be defective or otherwise unsatisfactory, regardless of the Engineer's preliminary review, the Contractor shall, at the Contractor's own expense, replace the item with another item that will perform satisfactorily.

10.04 RECORD DRAWINGS

A. The Contractor shall prepare a set of Record Drawings for the Project which will include the changes made in materials, equipment, locations, and dimensions of the Work. Each month, or as otherwise agreed, the Contractor shall submit to the

Engineer a current listing and description of each change incorporated into the Work since the preceding submittal. The Contractor shall maintain a set of Record Drawings onsite and shall update the Drawings on a weekly basis. Changes shall be identified in red on the plans.

B. Contractor shall provide project record drawings to the Owner and Engineer accurately depicting the finished work.

10.05 SUBMITTAL OF INTERFACE INFORMATION CONNECTION AND RELATIONSHIP WITH OTHER WORK

A. Where called for on the Specifications and as determined necessary by the Contractor, interface information shall be submitted as specified. This interface information shall be accurate and contain all information necessary to allow the completion of detailed design and construction of the interfacing or connecting work. The Contractor shall include in their negotiation for Contract work, such agreements as may be necessary to ensure the accuracy of Contractor's interface submittal information. In the event additional costs are incurred due to subsequent changes to information given in said interface information, such additional costs shall be borne by the Contractor.

10.06 OPERATION AND MAINTENANCE (O&M) MANUALS

A. The Contractor or Vendor shall furnish eight hard copies and one electronic version of a complete instruction manual for installation, operation, maintenance, and lubrication requirements for each component of mechanical and electrical equipment or system provided. All equipment manufacturers and suppliers shall be made aware of these requirements and all associated costs shall be included in the costs for furnishing the equipment or system. Each instruction manual furnished shall be fixed in hard-back cover, which is clearly labeled to designate the system or equipment for which it is intended with reference to the building and equipment number, and the Specification section where the item is specified.

B. Electronic versions shall be submitted in PDF format on a CD properly labeled to designate the system or equipment for which it is intended with reference to the building and equipment number, and the Specification section where the item is specified.

C. See Section 01 78 23 Operating and Maintenance Information for additional requirements.

10.07 SPARE PARTS AND SPECIAL TOOLS

A. As required for each item of equipment, and as specified in corresponding Specification Sections.

B. All equipment, spare parts, and special tools provided by Contractor or Vendor, shall be properly marked to identify the associated equipment by name, P &ID tag number (if applicable), and manufacturer part number. Parts shall be packaged in a manner for protection against damage from the elements during

shipping, handling, and long-term storage. All spare parts and special tools shall be packaged complete and shipped at one time in appropriately sized, hinged-covered, hard plastic, or metal boxes. The boxes shall be marked to indicate all contents by name and part number. Parts shall be numbered and named in accordance with the Operation and Maintenance Manual identification system.

C. Contractor or Vendor shall also supply a list of recommended spare parts in addition to those required by the Specifications.

D. Use the "Transfer Form" which can be found in Section 01 99 90 Reference Forms, to document the transfer of spare parts and special tools to the Owner.

10.08 EQUIPMENT IDENTIFICATION PLATES AND TAGS

A. Provide manufacturer's standard equipment identification plate, securely mounted on each separate equipment component with manufacturer, model number, serial number, and any other information required to obtain service or replacement parts from manufacturer.

B. Provide a 16-gauge, Type 316 stainless steel equipment tag, 3-inch minimum diameter, securely mounted to each item of equipment using stainless steel wire rope and crimps or other approved mounting method by the Engineer. Tag shall have 3/8-inch high engraved type black enamel filled letters with the equipment name and number as shown on the P&ID Drawings.

10.09 SAMPLES AND TEST SPECIMENS

A. Where required in the Specifications, and as determined necessary by the Contractor, test specimens or samples of materials, appliances, and fittings to be used or offered for use in connection with the Work shall be submitted to the Owner at the Contractor's expense, with information as to their sources, with all cartage charges prepaid, and in such quantities and sizes as may be required for proper examination and tests to establish the quality or equality thereof, as applicable.

B. All samples and test specimens shall be submitted in ample time to enable the Engineer to make any tests or examinations necessary, without delay to the Work. The Contractor will be held responsible for any loss of time due to Contractor's neglect or failure to deliver the required samples to the Owner, as specified.

C. Samples for testing shall be taken during the course of the Work, as required by the Owner.

D. Laboratory tests and examinations that the Owner elects to make in its own laboratory will be made at no cost to the Contractor, except that, if a sample of any material or equipment proposed for use by the Contractor fails to meet the Specifications, the cost of testing subsequent samples shall be borne by the Contractor.

E. All tests required by the Specifications to be performed by an independent laboratory shall be made at the sole expense of the Contractor.

F. Material used in the Work shall conform to the submitted samples and test certificates as approved by the Engineer.

10.10 CERTIFICATES OF COMPLIANCE WITH SPECIFIED STANDARDS AND CODES

A. Certificate of Compliance shall be furnished for materials specified to a recognized standard or code prior to the use of such materials in the Work. The Engineer may permit the use of certain materials or assemblies prior to sampling and testing if accompanied by a Certificate of Compliance. The certificate shall be signed by the manufacturer of the material or the manufacturer of assembled materials and shall state that the materials involved comply in all respects with the requirements of the Specifications. A Certificate of Compliance, clearly identifying what it represents, shall be furnished with each lot of material delivered to the site.

B. All materials used on the basis of a Certificate of Compliance may be sampled and tested at any time. The fact that material is used on the basis of a Certificate of Compliance shall not relieve the Contractor of the responsibility for incorporating material in the Work which conforms to the requirements of the Contract Documents. Any such material not conforming to such requirements will be subject to rejection whether in place or not.

C. The Owner reserves the right to refuse permission for use of material on the basis of a Certificate of Compliance.

D. The form of the Certificate of Compliance and its disposition shall be as directed by the Owner.

10.11 CERTIFICATES OF DESIGN

A. Where required in the Specifications, Contractor or his subcontractors or vendors shall provide engineering design services by a professional engineer licensed in the State of Georgia.

B. Where engineering design services are required by the Specifications, Subcontractor or Vendor shall provide signed and sealed documents.

10.12 PHOTOGRAPHIC DOCUMENTATION

A. Includes requirements for the following:
   1. Preconstruction photographs.
   2. Periodic construction photographs.
   3. Final completion construction photographs.

B. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.

C. Digital Photographs: Submit image files within three business days of taking photographs.

1. Digital Camera: Minimum sensor resolution of 12 megapixels.

2. Format: Minimum 3,200 by 2,400 pixels, in unaltered original files, with same aspect ratio as the sensor, uncropped, date and time stamped, in folder named by date of photograph, accompanied by key plan file.

3. Identification: Provide the following information with each image description in file metadata tag:

   a. Name of Project.
   b. Name and contact information for photographer.
   c. Name of Engineer.
   d. Name of Contractor
   e. Date photograph was taken.
   f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
   g. Unique sequential identifier keyed to accompanying key plan.

D. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of 12 megapixels, and at an image resolution of not less than 3,200 by 2,400 pixels.

E. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

1. Date and Time: Include date and time in file name for each image.

2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Architect/Engineer.

G. Preconstruction Photographs: Before starting construction, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Engineer.

1. Flag construction limits before taking construction photographs.

2. Take at least 25 photographs to show existing conditions adjacent to property before starting Work.

3. Take at least 40 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.

4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

G. Final Completion Construction Photographs: Take at least 30 color photographs after date of Substantial Completion for submission as project record documents. Engineer will inform photographer of desired vantage points.

1. Do not include date stamp.

10.13 MONTHLY PROJECT STATUS REPORT

Prepare a monthly project status report including the following:

1. Current status of Project:

    a. Schedule.
    b. Cost.
    c. MBE and WBE participation, as applicable.
    d. RFI's.
    e. Submittals.
    f. Manpower.
    g. Safety.

2. Narrative of progress achieved in previous month, activities anticipated for the next month, and issues affecting the rate of progress.

PART 11 – TESTING, CHECKOUT, AND STARTUP SERVICES

11.01 GENERAL

A. The Contractor shall test and check out all systems furnished or installed by the Subcontractor. Piping and valves shall be pressure tested and point–to–point continuity tests shall be completed for wiring. See detailed specifications for testing and checkout requirements.

B. During testing, problems arising from the Contractor's errors and omissions shall be corrected by the Contractor at their own expense.

C. The Contractor shall inform the Owner at least five days in advance of when testing will be performed.

D. The Contractor shall be present during startup to assist in any repairs that may be necessary.

PART 12 – MANUFACTURER'S SERVICES DURING CONSTRUCTION

12.01 GENERAL

A. Competent and experienced technical representatives shall represent the manufacturers of all equipment and systems as may be necessary to resolve assembly, equipment malfunctioning, controls problems, or installation problems at the Worksite which are attributable to, or associated with, the equipment furnished.

B. Provide the minimum number of person–days and trips to the Site specified in the individual Specification sections. These person–days are for the services specified and are not for resolving problems associated with installation, testing, or startup of systems or equipment that are due to deficiencies in the supplied system, equipment, or their associated installation, operation or maintenance instructions

and manuals.

12.02 MANUFACTURER'S CERTIFICATION

A. Manufacturer's representative shall certify in writing that the equipment has been inspected by a Manufacturer's authorized representative, installed in accordance with the manufacturer's recommendations, been serviced with the proper initial lubricants, that applicable safety equipment has been properly installed and that the proper electrical and mechanical connections have been made. Certificate of Proper Installation & Startup for documentation shall be forwarded to Engineer upon completion.

12.03 INSTALLATION ASSISTANCE AND INSPECTION

A. The appropriate manufacturer's representative shall be present to instruct the Contractor and Subcontractor on the proper installation procedures for the specified system or equipment. The manufacturer's representative will also inspect the ongoing installation activities to confirm that they meet all manufacturers' recommendations.

12.04 FUNCTIONAL TESTING

A. The appropriate manufacturer's representative shall be present and assist with the initial test, which shall include, but not be limited to, checking for proper rotation, alignment, speed, excessive vibration, and noisy operation. Initial equipment, system adjustment and calibrations shall be performed in the presence of the Engineer, and with the assistance of the manufacturer's representative. The above-mentioned manufacturer's certification shall include the statement that proper adjustments have been made, and that the equipment or system is ready for plant startup and operation.

B. Where the manufacturer's system or equipment includes instrumentation and controls, use forms in Section 01 99 90 Reference Forms to document proper installation, calibration, and testing.

12.05 OPERATIONAL READINESS TEST (ORT) ASSISTANCE

A. The appropriate manufacturer's representative shall be present to assist the Process Instrumentation and Control Systems (PICS) Supplier with the ORT in accordance with Process Instrumentation and Control Systems (PICS). This assistance shall include confirmation of all signals between the manufacturer's system or equipment and the PICS, as well as confirmation of proper operation of all controls internal to the manufacturer's system or equipment.

12.06 SERVICES DURING PERFORMANCE TESTING AND PLANT STARTUP

A. Where plant startup services are called for in the Specifications, or when technical assistance is necessary due to any malfunction of the equipment furnished, the manufacturer's representative shall furnish such services. The manufacturer's representative shall also assist with final performance and demonstration testing, as required by the Specifications. These services shall continue until such times as the applicable equipment has been successfully performance tested and has

been accepted by the Owner and Engineer for full–time operation. Use the attached Supplement—7, Performance Acceptance Test Sheet for documentation and forward to Owner upon completion.

12.07 TRAINING OF OWNER'S PERSONNEL

A. The manufacturer's representative shall furnish detailed instructions to the Owner's personnel for operation of the specified equipment. These training services shall include pre–startup classroom, onsite equipment instruction, and post–startup classroom, as stated in the Specifications.

B. The training session shall include theory, as appropriate, as well as specific operation and maintenance requirements. Training shall include both classroom and field training sessions. Training session time shall be acceptable to the Owner for staff to attend. Training handouts shall be prepared for each attendee. An electronic version of the handout shall be submitted to the Engineer at least one week prior to the training.

12.08 SUPPLEMENTS

A. The supplements and reference forms listed in Section 01 99 90 Reference forms are part of this Specification.

End of Section

INDEX TO

SECTION 01 15 00

CONTROL OF WORK

SECTION 01 15 00

CONTROL OF WORK

PART 1 – GENERAL

1.01 WORK PROGRESS

A. The Contractor shall furnish personnel and equipment which will be efficient, appropriate and adequately sized to secure a satisfactory quality of work and a rate of progress which will insure the completion of the work within the time stipulated in the Contract. If at any time such personnel appears to the Engineer to be inefficient, inappropriate, or insufficient for securing the quality of work required for producing the rate of progress aforesaid, the Engineer may advise the Contractor to increase the efficiency, change the character, or increase the personnel and equipment and the Contractor shall conform to such order at no additional cost to the Owner. Failure of the Engineer to give such order shall in no way relieve the Contractor of his obligations to secure the quality of the work and rate of progress required.

1.02 PRIVATE LAND

A. The Contractor shall not enter or occupy private land outside of easements, except by permission of the ANG and the City.

1.03 WORK LOCATIONS

A. Work shall be located substantially as indicated on the drawings, but the Owner and Engineer reserve the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons.

1.04 PIPE LOCATIONS

A. Exterior pipelines will be located substantially as indicated on the Drawings, but the right is reserved to the Owner, acting through the Engineer, to make such modifications in location as may be found desirable to avoid interference with existing structures or for other reasons. Where fittings, etc., are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve him from laying and jointing different or additional items where required.

B. Small interior piping is indicated diagrammatically on the Drawings, and the exact location is to be determined in the field. Piping shall be arranged in a neat, compact, and workmanlike manner, with a minimum of crossing and interlacing, so as not to interfere with equipment or access ways, and, in general, without diagonal runs.

1.05 DIMENSION OF EXISTING STRUCTURES

A. Where the dimensions and locations of existing structures are of importance in the installation or connection of any part of the Work, the Contractor shall verify such

dimensions and locations in the field before the fabrication of any material or equipment which is dependent on the correctness of such information.

1.06 OPEN EXCAVATIONS

A. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons and damage to property. The Contractor shall, at his own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workmen. Bridges provided for access to private property during construction shall be removed when no longer required. If the excavation becomes a hazard, or if it excessively restricts traffic at any point the Owner may require special construction procedures such as limiting the length of open trench, prohibiting stacking excavated material in the street, and requiring that the trench shall not remain open overnight at no additional cost.

B. The Contractor shall take precautions to prevent injury to the public and employees due to open trenches. All trenches, excavated material, equipment, or other obstacles which could be dangerous to the public shall be barricaded and well lighted at all time when construction is not in progress.

1.07 DISTRIBUTION SYSTEMS AND SERVICES

A. The Contractor shall avoid interruptions to power, water, telephone, communications, cable TV, sewer, gas, or other related utility services. He shall notify the Owner and the appropriate agency well in advance of any requirement for dewatering, isolating, or relocating a section of a utility, so that necessary arrangements may be made. The contractor shall coordinate all such arrangements.

B. If it appears that utility service will be interrupted for an extended period, the Contractor shall provide temporary service lines at the Contractor's expense. Inconvenience of the users shall be kept to the minimum, consistent with existing conditions. The safety and integrity of the systems are of prime importance in scheduling work.

1.08 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES

A. The Contractor shall assume full responsibility for the protection of all buildings, structures and utilities, public or private, including poles, signs, services to building utilities, gas pipes, water pipes, hydrants, sewers, drains and electric, communications, cable and telephone cables and other similar facilities, whether or not they are shown on the Drawings. The Contractor shall carefully support and protect all such structures and utilities from injury of any kind. Any damage resulting from the Contractor's operation shall be repaired by the Contractor at his expense.

B. The Contractor shall bear full responsibility for obtaining locations of all underground structures and utilities (including existing water services, drain lines and sewers). Services to buildings shall be maintained and all costs or charges resulting from damage thereto shall be paid by the Contractor.

C. Protection and temporary removal and replacement of existing utilities and structures as described in this Section shall be a part of the work under the Contract and all costs in connection therewith shall be included in the price established in the Bid.

D. If permanent relocation of a utility is required and is shown on the drawings, it shall be included in the contractor's base bid. The Contractor will notify the utility to perform the work as expeditiously as possible. The Contractor shall notify public utility companies in writing at least 48 hours (excluding Saturdays, Sunday and legal holidays) before excavating near their utilities.

1.09 TEST PITS

A. Contractor shall explore by test pits (or other means) for the purpose of locating and confirming underground pipeline or structures in advance of the construction. Test pits shall be backfilled immediately after the utility location and the surface shall be restored in a manner equal or better than the original condition. No separate payment will be made. Report in writing finding to Engineer and Owner.

1.10 CARE AND PROTECTION OF PROPERTY

A. The Contractor shall be responsible for the preservation of all public and private property and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be restored by the Contractor, at his expense, to a condition equal or better to existing before the damage was done, or he shall make good the damage in another manner acceptable to the Owner.

B. All sidewalks and paved areas which are disturbed by the Contractor's operations shall be restored to their original or better condition by the use of similar or comparable materials. All curbing shall be restored in a condition equal to the original construction and in accordance with the best modern practice.

C. Along the location of this work, all fences, walks, bushes, trees, shrubbery, and other physical features shall be protected and restored in a thoroughly workmanlike manner unless otherwise shown on the drawings. Fences and other features removed by the Contractor shall be replaced in the same location. All grass areas beyond the limits of construction which have been damaged by the Contractor shall be regraded and sodded to equal or exceed original conditions.

D. Trees close to the work which drawings do not specify to be removed shall be fenced or otherwise protected against injury. The Contractor shall trim all branches that are liable to damage because of his operations, but in no case shall any tree be cut or removed without prior notification to the Engineer. All injuries to bark, trunk, limbs, and roots of trees shall be repaired by dressing, cutting, and painting according to approved methods, using only approved tools and materials. All work to trees shall be performed by a licensed arborist.

E. The protection, removal, and replacement of existing physical features along the line of work or near the work shall be a part of the work under the Contract and all costs in connection therewith shall be included in the unit or lump sum prices established under the items in the Bid.

1.11 MAINTENANCE OF TRAFFIC

A. Open pits, trenches, unpaved streets, debris, or other obstructions due to construction that will prevent the normal flow of traffic during an extended construction stoppage, for any reason, shall be minimized. In the event an extended construction stoppage is found to be necessary, Contractor shall, at his own expense, provide normal traffic flow during extended construction stoppage. Extended stoppage will be defined by the Owner.

B. All excavated material shall be placed so that vehicular and pedestrian traffic may be maintained at all times. If the Contractor's operations cause traffic hazards, he shall repair the road surface, provide temporary roadways, erect wheel guards or fences, or take other safety measures which are satisfactory to the Engineer and Owner.

C. Detours around construction areas will be subject to the approval of the Owner and the Engineer. Where detours are permitted, the Contractor shall provide all necessary barricades and signs as required to divert the flow of traffic. While traffic is detoured, the Contractor shall expedite construction operations and periods when traffic is being detoured will be strictly controlled by the Owner.

1.12 WATER FOR CONSTRUCTION PURPOSES

A. The *Contractor* shall provide water for construction purposes. Contractor shall contact the City and obtain required water meter. The meter shall be install in accordance to the City requirements with appropriate backflow preventer valves.

B. *Contractor* shall provide water for hydrostatic and leakage testing

C. Leakage tests for basins shall be performed on individual basins.

D. The Contractor shall be responsible for paying for all water needed to preform retest due to failed prior test.

1.13 MAINTENANCE OF FLOW

A. The Contractor shall make sure the flow in and out of the existing pump station are uninterrupted during the progress of the work. During flow by pass during pump station upgrade, the contractor shall provide adequate means (including sufficient pumping capacity) to bypass the pump station. The entire procedure of maintaining existing flow shall be fully discussed with the Engineer and Owner well in advance of bypassing of any flow.

1.14 CLEANUP

A. During the course of the work, the Contractor shall keep the site of his operations in as clean and neat a condition as is possible. He shall dispose of all residue resulting from the construction work and at the conclusion of the work, he shall remove and haul away any surplus excavation, broken pavement, lumber, equipment, temporary structures, and any other refuse remaining from the construction operations and shall leave the entire site of the work in a neat and orderly condition. All areas shall be graded to drains. All disturbed areas shall be grassed. All pavement and walkways shall be cleaned.

1.15 COOPERATION WITHIN THIS CONTRACT

A. All firms or person authorized to perform any work under this Contract shall cooperate with the General Contractor and his subcontractors or trades and shall assist in incorporating the work of other trades where necessary or required.

B. Cutting and patching, drilling, and fitting shall be carried out where required by the trade or subcontractor having jurisdiction, unless otherwise indicated herein or directed by the Engineer.

C. General Contractor shall cooperate with MBR manufacturer during installation, testing and commissioning.

1.16 PROTECTION OF CONSTRUCTION AND EQUIPMENT

A. All newly constructed work shall be carefully protected from damage in any way. No wheeling or walking or placing of heavy loads on it shall be allowed and all portions injured shall be reconstructed by the Contractor at his own expense.

B. All structures shall be protected in a manner approved by the Owner. Should any of the floors or other parts of the structures become heaved, cracked, or otherwise damaged, all such damaged portions of the work shall be completely repaired and made good by the Contractor, at his own expense and to the satisfaction of the Owner. If, in the final review of the work, any defects, faults, or omissions are found, the Contractor shall cause the same to be repaired or removed and replaced by proper materials and workmanship without extra compensation or the materials and labor required.

Further, the Contractor shall be fully responsible for the satisfactory maintenance and repair of the construction and other work undertaken herein, for at least the warranty period describe in the Contract.

1.17 CONSTRUCTION WITHIN RIGHT-OF-WAY

A. Where pipe lines are installed within the DOT right-of-way, all excavation backfill and compaction for the purpose of reconstructing roadways and adjacent slopes contiguous thereto shall be in accordance with the DOT or County Standards and Specifications, whichever is applicable. Contractor shall satisfy the authorized representative of the DOT with respect to proper safety procedures, construction methods, required permitting, etc., within the DOT right-of-way.

1.18 CLEANUP AND DISPOSAL OF EXCESS MATERIAL

A. During the course of the work, the Contractor shall keep the site of his operations in as clean and as neat a condition as is possible. He shall dispose of all residue resulting from the construction work and, at the conclusion of the work, shall remove and haul away any surplus excavation, broken pavement, lumber, equipment, temporary structures, and any other refuse remaining from the construction operations, and shall leave the entire site of the work in a neat and orderly condition.

B. In order to prevent environmental pollution arising from the construction activities related to the performance of this Contract, the Contractor and his subcontractors shall comply with all applicable Federal, State, and local laws, and regulations concerning waste material disposal, as well as the specific requirements stated in this Section and elsewhere in the Specifications.

C. The Contractor is advised that the disposal of excess excavated material in wetlands, stream corridors, and plains is strictly prohibited even if the permission of the property owner is obtained. Any violation of this restriction by the Contractor or any person employed by him will be brought to the immediate attention of the responsible regulatory agencies, with a request that appropriate action be taken against the offending parties. Therefore, the Contractor will be required to remove the fill at his own expense and restore the area impacted.

PART 2 – PRODUCTS

None this Section.

PART 3 – EXECUTION

None this Section.

END OF SECTION

INDEX TO

SECTION 01 21 00

ALLOWANCES

SECTION 01 21 00

ALLOWANCES

PART 1 – GENERAL

1.01 SUMMARY

A. This section includes administrative and procedural requirements governing allowances.

1. Certain materials and equipment are specified in the Contract Documents by allowances. The equipment allowances for these **does not** include installation. Some allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment and defer definition of work to a later date when additional information is available for evaluation. Allowances are also used when the exact scope, quantity or type of work product is unknown.

B. The Contractor shall include in the Base Bid Contract Sum all allowances stated in the Contract Documents. These allowances shall cover the cost of the fees, processing, licenses, materials, labor, equipment and related required items. Allowances shall include all applicable taxes. The Contractor's scheduling, handling costs on the site, unloading, uncrating, cleaning, secure storage and protection, labor, installation costs, administration, supervision, interest, bonds, insurance, all applicable taxes, overhead, profit and other related costs (including but not limited to required permits, inspections, certifications, and testing) shall be included in the Contract Base Bid and not in the allowances.

C. Amounts specified below pertain to all applicable costs.

D. The Contractor shall provide a copy of all paid invoices with the description of the work performed or fees paid for applicable allowance items, to the Owner, with monthly Pay Request Application.

E. All allowances shall be included in the Base Bid.

F. Contractor is responsible for losses incurred from allowance items that are damaged while under his care, such as while stored or during installation.

G. Owner may adjust individual allowance amounts by transferring an amount between allowances if needed. Written confirmation is required to transfer limit amount.

1.02 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, Contractor shall advise Engineer in writing of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the work.

B. Include all allowances and the dates when a decision on an allowance is needed from Owner in project schedule. The Contractor's schedule should account for the time required to obtain competitive prices.

C. At Engineer's request, Contractor shall obtain proposals for each allowance for use in making final selections. Proposals shall include recommendations that are relevant to performing the work.

D. Purchase products and systems selected or approved or obtained by advertised bidding process by Owner and Engineer from the designated supplier. These are including:
   a- MBR equipment (Kubota USA)
   b- UV system (Enauqa)
   c- Influent screening (Parkson)
   d- Grit removal system (Hydro

1.03 SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the forms specified.

B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

1.04 UNUSED MATERIALS

A. Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

   1. If requested by Engineer, prepare unused material for storage by Owner when it is not economically practical to return the material for credit. If directed by Engineer, deliver unused material to Owner's storage space. Otherwise, disposal of unused material is Contractor's responsibility.

   2. If allowance is not used in whole or in part, the Owner shall remove an allowance from the construction contract by change order based on the value listed for the associated unit price.

1.05 COORDINATION

A. Coordinate allowance items with other portions of the work. Furnish templates as required to coordinate installation.

1.06 ADJUSTMENT OF ALLOWANCE COSTS

A. General

   1. If the cost, when determined, is more or less than the allowance, the Contract Sum shall be adjusted accordingly by change order, which will include overhead and profit for any increase or decrease from the

original allowance. The Contractor is not entitled to all or any part of an unexpended balance of the allowance.

B. Documentation

1. Submit documentation for costs or other expenses under the allowance, within ten days after completion of execution of the work or when requested by Engineer prior to execution of the work.

2. Failure to submit claims within the designated time will constitute a waiver of claims for additional costs.

3. At contract closeout, reflect all approved changes in contract amounts in the final statement of accounting.

4.

PART 2 – SCHEDULE OF CASH ALLOWANCES

All allowances noted below shall be included in the Lump Base Sum bid amount.

2.01 MBR EQUIPMENT ALLOWANCE

Allow **$2,932,077.00** (including Tax) for all MBR equipment as listed by **Kubota.**

2.02 UV DISINFECTION ALLOWANCE:

Allow **$559,170.00** (Including Tax) for all UV equipment as listed by **Enaqua.**

2.03 GRITE SYSTEM CONTINGENCY ALLOWANCE:

Allow **$376,000.00** (Including Tax) for all grit system equipment as listed by **Principal Environmental.**

2.04 INFLUENT SCREENING ALLOWANCE:

Allow **$ 761,127 .00** (Including Tax) for all Influent Screens as listed by **The TDH Company.**

2.05 PLANT SCADA SERVICES ALLOWANCE:

Allow **$ ------- .00** (Including Tax) for all plant SCAD services as listed by **The Emerson**

2.06 WORK NOT INCLUDED IN ALLOWANCE ITEMS:

Complete installation of the equipment and any other ancillary parts needed shall not be included in the allowance. All testing required by the specification shall not be included in the allowance.

PART 3 – EXECUTION

3.01 PREPARATION

A. Contractor shall examine products covered by an allowance promptly upon delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

B. Contractor shall coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

END OF SECTION

INDEX TO

SECTION 01 30 00

SPECIAL PROJECT PROCEDURES

SECTION 01 30 00

SPECIAL PROJECT PROCEDURES

PART 1 - GENERAL

1.01 PERMITS AND BUSINESS LICENSES

A. Upon notice of award, the Contractor shall immediately apply for all applicable permits not previously obtained by the Owner to do the work from the appropriate governmental agency or agencies and applicable business licenses. These permits include but are not limited to a Ga. Utility Contractors License and local building permit. No work shall commence until all applicable permits and licenses have been obtained and copies delivered to the Engineer. The costs for obtaining all permits and licenses shall be borne by the Contractor.

1.02 ACESS TO THE SITE

The Travis Field WRF facility is located within the Air National Gard (ANG) training site, and as such, all personnel, contractors, visitors, and equipment delivery drivers must obtain (or be escorted by a qualified badge person) an entry badge through the DOD. All vehicles entering the site must have proper and valid registration and liability insurance. All vehicles entering or leaving the ANG property are subject to inspection by the ANG security staffs.

1.03 TESTING & SPECIAL INSPECTION

The City uses a third-party testing firm to conduct testing required in the contract documents. However, if the test failed, the contractor shall pay for retesting.

The City requires 3rd party Special Inspection and will contract for the Special Inspections specified by the IBC.

1.04 CONTRACTOR STORAGE AREA

The Travis Field WRF construction site lacks the needed space for material and equipment storage. The ANG has provided a limited space close to the construction site for the contractor to store materials (see site map at the bottom of section). The following shall be addressed by the contractor for the duration of the construction;

A- The Contractor shall construct a temporary six-foot high chain link fence around the temporary storage area and materials as required by the ANG. The fence shall include plastic strip inserts, colored brown, so that visibility through the fence is obstructed. Fence posts may be driven, in lieu of concrete bases, where soil conditions permit.

B- The site shall be used to store construction materials such as pipe, valves, fittings, wood, steel beams, precast concrete, etc. No hazardous materials

such as paint, fuel, chemicals, etc. shall be stored on the ANG storage site.

C- Security- the contractor is responsible for 24/7 security of their equipment. The site shall be secured, and gates are locked at the end of each working day

D- Signage- The contractor shall install a sign at the gate for two point of emergency contact names and phone numbers

E- Extreme Weather- The contractor shall monitor the weather for possible high winds, tornados, and hurricanes to make sure all materials are secured in place to the satisfaction of the ANG.

F- Road Damage- The contractor shall take pictures of the existing access roads to the storage site before the construction. Any obvious excessive damage to these roads shall be repaired at contractor expense.

G- After the construction is completed, the contractor shall remove all stored materials, debris, fence, gate, etc. and return the site to original condition.

1.05 CONNECTIONS TO EXISTING SYSTEM

A. The Contractor shall perform all work necessary to locate, excavate and prepare for connections to the terminus of the existing systems all as shown on the Drawings or where directed by the Owner or Engineer. The cost of this work and for the actual connection to the existing systems shall be included in the price bid for the project and shall not result in any additional cost to the Owner.

1.06 RELOCATIONS

A. The Contractor shall be responsible for the coordination of the relocation or protection of structures, including but not limited to light poles, power poles, signs, sign poles, fences, piping, conduits, and drains that interfere with the positioning of the work as set out on the Drawings. No relocation of the items under this Contract shall be done without approval from the Engineer.

1.07 EXISTING UNDERGROUND PIPING, STRUCTURES, AND UTILITIES

A. The attention of the Contractor is drawn to the fact that during excavation, the possibility exists of the Contractor encountering various water, sewer, gas, telephone, communication, electrical, or other utility lines not shown on the Drawings. The Contractor shall exercise extreme care before and during excavation to locate and flag these lines so as to avoid damage to the existing lines. Cost for relocation of <u>all</u> existing lines shall be included in the price bid for the project. Should damage occur to an existing line, the Contractor shall bear the cost of all repairs.

B. It is the responsibility of the Contractor to ensure that all utility or other poles, the stability of which may be endangered by the close proximity of excavation, are temporarily stayed in position while work proceeds in the vicinity of the pole and

that the utility or other companies concerned be given reasonable advance notice of any such excavation by the Contractor.

C. The existing utility locations are shown without express or implied representation, assurance, or guarantee that they are complete or correct or that they represent a true picture of underground piping to be encountered. The Contractor shall be responsible for notifying the various utility companies to locate their respective utilities in advance of construction in conformance with all requirements provided for in the State and local requirements.

D. The existing piping and utilities that interfere with new construction shall be rerouted as shown, specified or required. Before any piping and utilities not shown on the Drawings are disturbed, the Contractor shall notify the Engineer of the location of the pipeline or utility as directed. Cost for relocation of existing pipelines or utilities shall be included in the price bid for the project.

E. The Contractor shall exercise care in any excavation to locate all existing piping and utilities. All utilities which do not interfere with complete work shall be carefully protected against damage. Any existing utilities damaged in any way by the Contractor shall be restored or replaced by the Contractor at his expense as directed by the Owner and the owner of the utility.

F. Contractor shall protect existing structures to remain and shall not interrupt existing left station operation without prior Owner approval and coordination.

1.08 HURRICANE AND INCLEMENT WEATHER PREPAREDNESS PLAN

A. During hurricane season the Contractor shall submit to the Engineer and Owner a Hurricane Preparedness Plan. The plan should outline the necessary measures which the Contractor proposes to perform at no additional cost to the Owner in case of a hurricane watch and subsequent plan for a hurricane warning and finally for an evacuation.

B. In the event of inclement weather, or whenever Engineer shall advise, Contractor shall insure that he and his Subcontractors shall carefully protect work and materials against damage or injury from the weather. If, in the opinion of the Engineer, any portion of work or materials is damaged due to the failure on the part of the Contractor or Subcontractor to protect the work, such work and materials shall be removed and replaced at the expense of the Contractor.

1.09 POWER SUPPLY

A. Electricity as may be required for construction and temporary power supply shall be secured and purchased by the Contractor from the power company.

1.10 DEWATERING

A. The Contractor shall conduct groundwater pumping necessary to prevent flotation of any part of the work during construction operations with his own equipment.

B. The Contractor shall pump out water and wastewater which may seep or leak into the excavations for the duration of the Contract and with his own equipment. He shall dispose of this water in an appropriate manner, without causing siltation of any downstream acres or drainage facility.

C. Contractor shall dewater as needed to perform the work or conduct testing at no additional cost to the Owner.

1.11 PUBLIC NUISANCE

A. The Contractor shall not create a public nuisance including but not limited to encroachment on adjacent lands, flooding of adjacent lands, excessive noise or dust, soil vibration or working outside the hours of 8:00 AM to 5:00 PM or working on Saturday and Sunday except by prior approval.

B. Sound levels must meet local ordinances and be no more than 90dBA. No exposure over OSHA regulations is allowed. Sound levels in excess of such are sufficient cause to have the work halted until equipment can be quieted to these levels. Work stoppage by the Owner, Engineer, or regulatory agency for excessive noise shall not relieve the Contractor of the other portions of this specification including, but not limited to, contract time and contract price.

C. Contractor shall continually monitor during the life of the activity vibration from pile driving, soil vibration and similar compaction. Activities producing measurable vibration outside the project site boundary is not allowed. Contractor shall submit monitoring results to Owner and Engineer.

D. No extra charge may be made for time lost due to work stoppage resulting from the creation of a public nuisance.

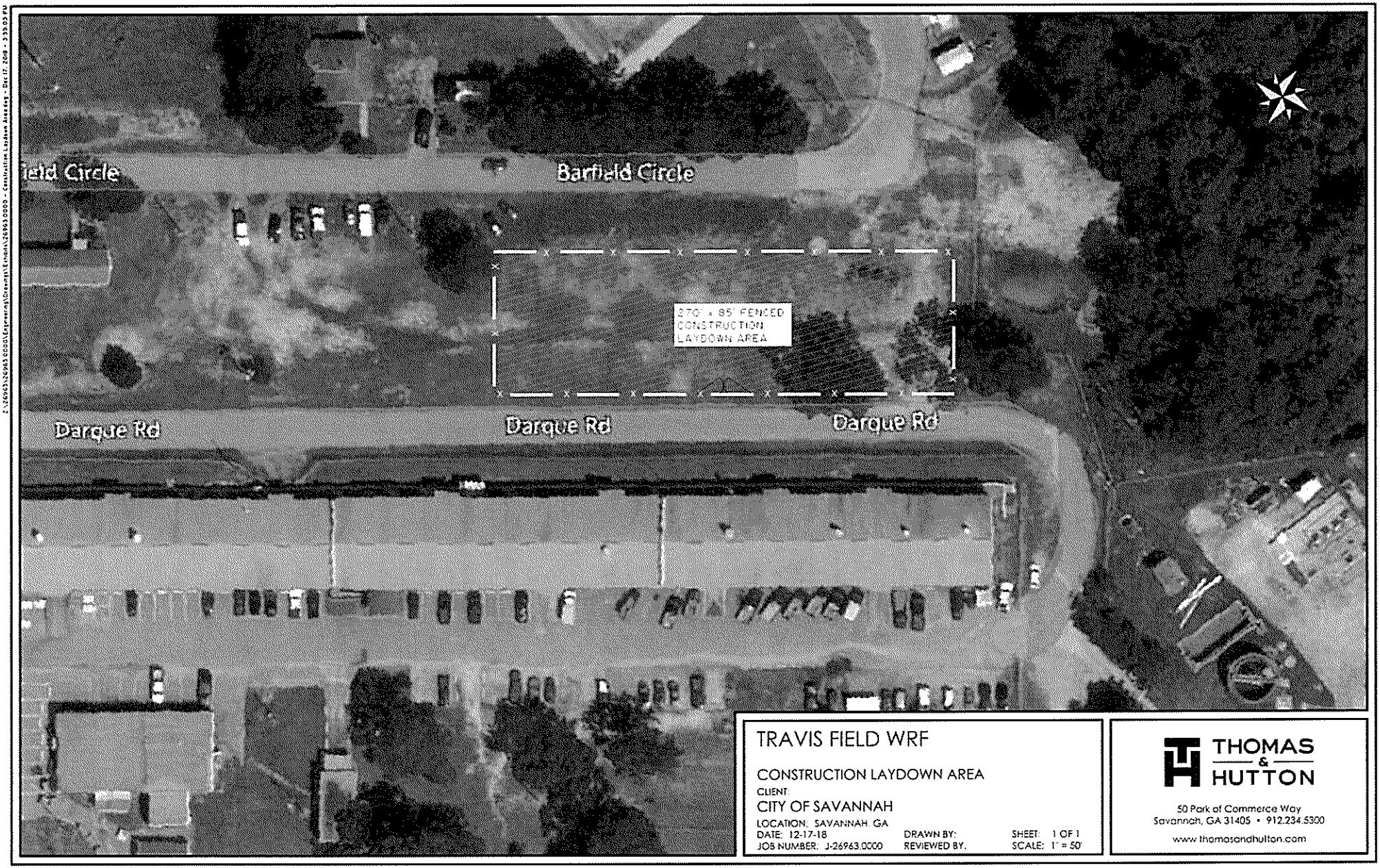
PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION



TRAVIS FIELD WRF

CONSTRUCTION LAYDOWN AREA

CLIENT:
CITY OF SAVANNAH

LOCATION: SAVANNAH, GA
DATE: 12-17-18
JOB NUMBER: J-26963.0000

DRAWN BY:
REVIEWED BY:

SHEET: 1 OF 1
SCALE: 1" = 50'

THOMAS & HUTTON

50 Park of Commerce Way
Savannah, GA 31405 • 912.234.5300
www.thomasandhutton.com

INDEX TO

SECTION 01 31 00

ADMINISTRATIVE REQUIREMENTS

SECTION 01 31 00

ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Coordination and project conditions.

B. Field engineering.

C. Preconstruction meeting.

D. Site mobilization meeting.

E. Progress meetings.

F. Pre-installation meetings.

1.02 COORDINATION AND PROJECT CONDITIONS

A. Coordinate scheduling, submittals, and work of various sections of specifications to ensure efficient and orderly sequence of installation of interdependent construction elements.

B. Verify utility requirements and characteristics of operating equipment are compatible with site utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, operating equipment.

C. Coordinate space requirements, supports, and installation of mechanical and electrical Work indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

D. In finished areas, conceal pipes, and wiring within construction. Coordinate locations of fixtures and outlets with finished elements.

E. Coordinate completion and clean-up of work of separate sections in preparation for Substantial Competition. After Utility occupancy of premises, coordinate access to site and operations for correction of defective Work.

1.03 PRECONSTRUCTION MEETING

A. Engineer will schedule meeting after Notice of Award.

B. Attendance Required: Utility, Engineer, Contractor and applicable Subcontractors.

C. Agenda:

1. Submission of lists of products, schedule of values, and progress schedule.

2. Designation of personnel representing parties in Contract, Utility.

3. Procedures and processing of field decisions, submittals, and substitutions, applications for payments, proposal request, Change Orders, and Contract Scheduling.

4. Procedures for maintaining record documents.

5. Procedures for submitting, receiving, and returning shop drawings

6. Procedures for submitting RFI

7. Scope of Work.

1.04 SITE MOBILIZATION MEETING

A. Engineer and Contractor shall schedule meeting at Project site prior to Contractor occupancy.

B. Attendance Required: Engineer, Utility, Contractor, and major Subcontractors.

C. Agenda:

1. Utility requirements and schedule of closing and bypassing the existing pump station during the pump and pump base replacement.

2. Erosion Controls

3. Underground utilities

4. Demolition procedures

5. Construction facilities and controls

6. Temporary utilities.

7. Survey and layout.

8. Schedules.

9. Procedures for testing.

10. Requirements for start-up of equipment.

11. Requirements for commissioning the plant

12. Inspection and acceptance of equipment put into service during construction period.

1.05 PROGRESS MEETINGS

Schedule and administer meetings throughout progress of the Work at minimum bi-weekly intervals.

A. Make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings.

B. Attendance Required: Job superintendent, major subcontractors and suppliers, Utility inspector, Engineer, as appropriate to agenda topics for each meeting.

1.06 PRE-INSTALLATION MEETINGS

A. When required in individual specification sections, convene pre-installation meetings at Project site prior to commencing work of specific section.

B. Required attendance of parties directly affecting, or affected by, work of specific section.

C. Notify Utility, Contractor and Engineer four days in advance of meeting date.

D. Prepare agenda and preside at meeting:

1. Review conditions of installation, preparation and installation procedures.

2. Review coordination with related work.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

INDEX TO

DIVISION I – GENERAL REQUIREMENTS

SECTION 01 33 00

SUBMITTAL PROCEDURES

DIVISION I – GENERAL REQUIREMENTS

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Submittal procedures.

B. Construction progress schedules.

C. Product Data.

D. Shop Drawings.

E. Samples.

F. Design data.

G. Test reports.

H. Certificates.

I. Manufacturer's instructions.

J. Manufacturer's field reports.

K. Erection drawings.

1.2 RELATED SECTIONS

A. Section 01 45 00 – Quality Control: Manufacturers' field services and reports.

B. Section 01 77 00 – Closeout Procedures.

1.3 SUBMITTAL PROCEDURES

A. Transmit each submittal with Engineer accepted form.

B. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix. Resubmit as specified for initial submittal. Indicate on revised drawings all changes that have been made other than those requested by the Engineer.

C. Identify Project, Contractor, Subcontractor, or supplier; pertinent drawing and detail number, and specification section number, as appropriate.

D. Apply Contractor's stamp, signed or initialed verifying review, approval, products required, field dimensions, adjacent construction Work, and coordination of

information is in accordance with the requirements of the Work and Contract Documents. Submittal without the Contractor's stamp will be returned to Contractor without Engineer's review.

E. Make all submittals far enough in advance of scheduled dates for installation to provide all required time for reviews, for securing necessary approvals, for possible revision and resubmittal, and for placing orders and securing delivery. In scheduling, allow sufficient time for the Engineer's review following the receipt of the submittal. Coordinate submission of related items. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.

F. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed Work.

G. Provide space for Contractor and Architect/Engineer review stamps.

H. When revised for resubmission, identify all changes made since previous submission.

I. Distribute PDF (hard copies if Requested) of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

1.4 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial schedule in duplicate within 30 days after date of Owner–Contractor Agreement.

B. Revise and resubmit as required.

C. Submit revised schedules with each Application for Payment, identifying changes since previous version.

D. Submit a computer generated or horizontal bar chart with separate line for each section of Work, identifying first work day of each week.

E. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.

F. Indicate estimated percentage of completion for each item of Work at each submission.

G. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates, including those furnished by Owner and required by allowances.

1.5 PRODUCT DATA

A. Product Data for Review:

1. Submitted to Engineer for review and conformance with information given in specifications and the design concept expressed in contract documents.

2. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article above.

B. Submit PDF (or number of hard copies Contractor and Owner require, plus two copies retained by Engineer).

C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

D. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

E. After review, distribute in accordance with the Submittal Procedures article above.

1.6 SHOP DRAWINGS

A. Contractor shall submit PDF (or a minimum 6 copies of each shop drawing to the Engineer for review).

B. Submitted to Engineer for review and conformance with information given in specifications and design concept expressed in contract documents. Review of shop drawings by Engineer shall not relieve Contractor of its responsibility for accuracy of shop drawings nor for furnishing of all materials and equipment required by the contract even though such items may not be indicated on shop drawings reviewed by Engineer.

C. Shop drawings shall include applicable technical information, drawings, diagrams, performance curves, schedules, templates, calculations, instructions, measurements, and similar information as applicable to the specific item for which shop drawing is prepared.

D. Do <u>not</u> use Engineer's Drawings for shop or erection purposes.

E. Each shop drawing copy shall bear a Contractor's stamp showing they have been checked. Shop drawings submitted to the Engineer without Contractor's stamp will be returned to Contractor without review.

No review will be given to partial submittals of shop drawings for items which interconnect and/or are interdependent. It is the Contractor's responsibility to assemble shop drawings for all such interconnecting and/or interdependent items, check them and then make one submittal to Engineer.

Schedule of Submittals: Within 30 days of Contract award and prior to any shop drawing submittal, Contractor shall submit a schedule showing the estimated submittal date and desired acceptance date for each shop drawing

anticipated. Time lost due to unacceptable submittals shall be the Contractor's responsibility.

1.7 SAMPLES

A. Samples for Review:

1. Submitted to Engineer for review and conformance with information given in specifications and design concept expressed in contract documents.

2. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article above.

B. Samples for Information:

1. Submitted for Engineer's knowledge as contract administrator or for the Owner.

C. Include identification on each sample, with full product information.

D. Submit the number of samples specified in individual specification sections; one of which will be retained by Engineer.

E. Reviewed samples which may be used in the Work are indicated in individual specification sections.

F. Samples will not be used for testing purposes unless specifically stated in the specification section.

1.8 DESIGN DATA

A. Submit for Engineer's knowledge as contract administrator or for the Owner.

B. Submit for information and conformance with information given in specifications and design concept expressed in contract documents.

1.9 TEST REPORTS

A. Submit for Engineer's knowledge as contract administrator or for the Owner.

B. Submit test reports for information and assessing conformance with information given in specifications and design concept expressed in contract documents.

1.10 CERTIFICATES

A. When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor, or the Contractor to Engineer, in quantities specified for Product Data.

B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or product but must be acceptable to Engineer.

1.11 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Engineer for delivery to Owner in quantities specified for product Data.

B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

C. Refer to Section 01 45 00 – Quality Control, Manufacturers' Field Services article.

1.12 MANUFACTURER'S FIELD REPORTS

A. Submit reports for Engineer's benefit as contract administrator or for the Owner.

B. Submit report in duplicate within 30 days of observation to Engineer for information.

C. Submit for information and assessing conformance with information given in specifications and design concept expressed in contract documents.

1.13 ERECTION DRAWINGS

A. Submit drawings for Engineer's benefit as contract administrator or for the Owner.

B. Submit for information and assessing conformance with information given in specifications and design concept expressed in contract documents.

C. Data indicating inappropriate or unacceptable Work may be subject to action by the Engineer or Owner.

1.14 REVIEWED SHOP DRAWINGS

A. Engineer Review.

1. Acceptable submittals will be marked "No Exceptions Taken." A minimum of three copies will be retained by the Engineer for Engineer's and Owner's use and remaining copies will be returned to Contractor.

2. Submittals requiring minor corrections before the product is acceptable will be marked "Furnish as Corrected." Contractor may order, fabricate, and ship items included in submittals, provided the indicated corrections are made.

3. Submittals marked "Revise and Resubmit" must be revised to reflect required changes and the initial review procedure repeated.

4. The "Rejected" notation is used to indicate products not acceptable. Upon return of a submittal so marked, Contractor shall repeat the initial review procedure utilizing acceptable products.

5. Only two copies of items marked "Revise and Resubmit" and "Rejected" will be reviewed and marked. One copy will be retained by Engineer and the other copy with all remaining unmarked copies will be returned to Contractor for resubmittal.

B. No Work or products shall be installed without a drawing or submittal bearing the "No Exceptions Taken" or "Furnish as Corrected" notation. Contractor shall maintain at the job site a complete set of shop drawings bearing Engineer's stamp.

C. Substitutions: In the event Contractor obtains Engineer's acceptance for use of products other than those listed first in Contract Documents, Contractor shall, at Contractor's own expense and using methods accepted by Engineer, make any changes to structures, piping and electrical work necessary to accommodate these products.

D. Use of "No Exceptions Taken" or "Furnish as Corrected" notation on shop drawings or other submittals is general and shall not relieve Contractor of the responsibility of furnishing products of proper dimension, size, quality, quantity, materials, all performance characteristics, and to efficiently perform requirements and intent of Contract Documents. Engineer's review shall not relieve Contractor of the responsibility of errors of any kind on shop drawings. Review is intended only to assure conformance with design concept of the project and compliance with information given in Contract Documents.

1.15 SUBMITTAL CHECKLIST

A. This checklist is not necessarily complete. Contractor is responsible to submit all items and materials as specified in each section.

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
03 00 00 – Concrete					
	Mix Design				
	Curing Compounds				
	Joint Filler				
	Reinforcing Steel				
	Welded Wire Fabric				

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
	Dowels				
	Fiber Reinforcement				
03 30 00 – Cast-In-Place Concrete					
	Mix Design				
	Reinforcing Steel				
	Welded Wire Fabric				
	Curing Compound				
	Fiber Reinforcement				
	Non-Shrink Grout				
	Joint Filler				
03 31 00 – Concrete Formwork and Accessories					
	Mix Design				
	Reinforcement				
	Layout Plan				
	Design Loads				
05 05 23 –Metal Fastenings					
	Tie Rods				
	Bearing Plates				
	Turnbuckles				
	Bolts				
	Coating Certification				
05 12 00 – Structural Steel Framing					
	Materials				

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
	Design Loads				
	Mill Certificate				
	Mill Test Reports				
	Welder's Certificates				
08 11 13 – Hollow Metal Doors and Frames					
	Door & Frame				
08 16 16 – Fiberglass Doors and Frames					
	Door & Frame				
08 33 23 – Overhead Coiling Doors					
	Door				
08 54 13 – Fiberglass Windows					
	Windows				
08 71 00 – Door Hardware					
	Hardware				
08 80 00 – Glazing					
09 29 00 – Gypsum Board					
09 90 00 – Painting and Coating					
	Paint & Coating				
10 71 14 – Exterior Shutters					
10 80 00 – Miscellaneous Specialties					

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
11 53 13 – Laboratory Fume Hood					
12 35 53 – Laboratory Casework					
13 34 19 – Metal Building Systems					
14 24 00 – Hydraulic Elevator					
22 10 00 – Vertical Turbine Pump					
22 45 00 – Emergency Eyewash and Shower					
23 45 00 – Automatic Sampling					
25 50 00 – Plant SCADA System					
31 00 00 – Earthwork					
	Borrow				
31 09 16.23 – Driven Pile Load Tests					
	Test Method & Equipment				
	Piles				

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
31 23 19 – Sludge Dewatering System					
	All Pumps & equipment				
31 25 00 – Soil Erosion Control					
	Silt Fence				
31 37 00 – Rip–Rap					
	Stone				
	Sand–Cement Bag				
	Filter Fabric				
31 62 13 – Concrete Piles					
	Concrete Pile				
31 62 19 – Timber Piles					
	Piles				
	Preservative Treatment Certification				
	Driving Equipment				
	Pile Driving Sequence				
31 62 44 – Pile Load Test					
32 11 23 – Aggregate Base Course					
	Aggregate				
	Prime				
32 11 26 – Asphaltic Base Courses					
	Asphalt Cement				

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
	Anti-Stripping Agent				
	Mix Design				
32 11 33 – Cement – Treated Base Courses					
	Mix Design				
	Prime				
32 12 16 – Asphalt Paving					
	Tack Coat				
	Asphalt Cement				
	Anti-Stripping Agent				
	Mix Designs				
32 31 18 – Electric Gate & Chain Link Fence					
	Fence Fabric				
	Posts				
	Hardware & Accessories				
	Layout Plan				
	Finish				
32 92 00 – Turf and Grasses					
	Seed Mix – Temporary				
	Seed Mix – Permanent				
	Fertilizer				
	Lime				
33 10 00 – Water Utilities					

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
	PVC Pipe – 4"Ø and Larger				
	PVC Pipe – Smaller than 4"Ø				
	D.I. Pipe				
	Tubing for Service Lateral				
	Fittings – PVC				
	Fittings – Compact D.I.				
	Gate Valve				
	2" Ball Valves				
	Air Release Valve				
	Air/Vacuum Valve				
	Combination Air Valve				
	Corporation Stops				
	Curb Stops				
	Magnetic Marking Tape				
	Valve Boxes				
	Valve Box Collar				
	Hydrant Tees				
	Threaded Rod with Bitumastic Coating and Painting				
	Fire Hydrants				
	Restrained Joint Fittings				
	Service Saddles				

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
	Tapping Sleeves/Crosses				
	Tapping Valves				
	Backflow Prevention Devices				
	Tracing Wire				
	Service Pipe/Tubing				
	Casing Pipe				
33 30 00 – Sanitary Sewage Utilities					
	Wetwell				
	Manholes & Interior Coating				
	Boots and S.S. Straps				
	Joint Wrap				
	Joint Sealant				
	Steps				
	Piping – PVC – Gravity				
	Piping – PVC – Force Main				
	Piping – DI – Gravity				
	Piping – DI – Force Main				
	Fittings – PVC – Gravity				
	Fittings DI – Force Main				
	Frames & Covers				
	Valve Pit and Steps				

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
	Valve Pit Hatch Cover				
	Wetwell Hatch Cover				
	Pumps and Controls				
	Control Panel Enclosure and Mounting Materials				
	Frost–Proof Hydrant				
	Backflow Prevention Device				
	Fencing and Gate Hardware				
	Gate Valves/Plug Valves				
	Check Valves				
	Air Release/Vacuum Valves				
	Vent Pipe				
	Hoist and Hoist Sockets				
	Lifting Chain/Cable				
	Pumps Mounts/Intermediate and Upper Guide Brackets				
	Quick Disconnect				
	Electrical W/Generator Hook–up				
	Tracing Wire				
	Magnetic Tape				

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
	Force Main Gauges				
	Signage (Emergency #'s etc.)				
33 32 20 – Wastwater Pump Station					
	Pump & Control				
33 40 00 – Storm Drainage Utilities					
	Reinforced Concrete Pipe				
	Aluminum Pipe				
	Polyethylene Pipe				
	Gaskets				
	Drainage Structures				
	Fiberglass Grating				
	Frames, Covers & Grates				
	Subgrade Drain pipe				
	Filter Fabric				
	Tracing Wire				
33 41 01 – Storm Drain Piping					
40 05 15 – Pipe Hangers and Supports					
40 05 15.10 – Seismic Restraints					
40 05 15.15 – Expansion Control for Piping					

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
40 27 01.02 – Steel Pipe					
40 27 01.03 – Plastic Pipe					
40 27 01.04 – Copper Pipe					
40 27 01.05 – Stainless Steel Piping					
40 27 05.06 – Expansion Joints					
40 27 05.09 – Insulation for Exposed Piping and Equipment					
40 29 01 – Manual Valve and Gate Operator Appurtenances					
40 29 13 – Butterfly Valves					
40 29 19 – Eccentric Plug Valves					
40 29 27 – Nonclog Ball Valves					
40 29 50 – Specialty Valves					
40 31 00 – Fabricated Stainless Steel Gates					
40 31 05 – FRO Weirs					

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
40 40 01 – EQ Tank Jet Mixing Equipment					
40 91 00 – Process Instrumentation					
40 91 16.29 – Magnetic Flow Meters					
40 95 13 – MBR Control Panel					
40 95 20 – MBR SCADA Hardware and Software					
41 22 13 – Overhead Cranes and Hoists					
43 21 21 – Self-Priming Pumps					
43 21 39 – Submersible Pumps					
44 42 19 – Positive Displacement Blowers					
44 42 46 – Submersible Mixers					
44 42 56 – Plant Reuse Water Pump Station					
44 43 73 – Prestressed Concrete Equalization Storage Tank					
44 43 34 – Influent Drum Screen					

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
44 44 19 – Liquid Alum Feed Screen					
44 44 59 – Caustic Feed System					
44 44 73 – Ultraviolet Disinfection System (Non–Contact)					
44 45 16 – Fine Bubble Diffusers					
44 45 16.1 – Effluent Oxygenation System					
45 50 00 – Membrane Bioreactor					
46 23 66 – Grit Removal System					
46 23 67 – Grit Removal Pump					

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION

INDEX TO

SECTION 01 45 00

QUALITY CONTROL

SECTION 01 45 00

QUALITY CONTROL

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Quality assurance – control of installation.

B. Tolerances.

C. References and standards.

D. Testing laboratory services.

E. Manufacturer's field services.

1.02 RELATED SECTIONS

A. Section 01 00 01 – General Requirements: Preparation, Procedures, Submittals, Testing.

B. Individual Technical Specification sections: quality assurance requirements, submittals and testing procedures.

1.03 QUALITY ASSURANCE – CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturer's instructions, including each step-in sequence.

C. Should manufacturer's instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Perform Work by persons qualified to produce required and specified quality.

F. Verify field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.04 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturer's tolerances. Should manufacturer's tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.

C. Adjust products to appropriate dimensions and positions before securing in place.

D. Accessible routes shall not exceed maximum ADA allowable slopes.

1.05 REFERENCES AND STANDARDS

A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes, or stated in the Specifications or Drawings.

B. Conform to current versions of referenced standards, except where a specific date is established by code.

C. Obtain copies of standards where required by product specification sections.

D. The contractual relationships, duties, and/or responsibilities of the parties under Contract with the Owner, including those of the Engineer, shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.06 TESTING SERVICES

A. Contractor will appoint and employ services of an independent firm to perform testing. Contractor shall pay for testing services required by the specifications, except where stated otherwise for Special Inspections.

B. The independent firm will perform tests and other services specified in individual specification sections and as required by the Owner.

C. Testing and source quality control may occur on or off the project site. Perform off–site testing if required by the Specifications, Drawings, or Owner.

D. Copies of the reports will be submitted by the independent firm to the Engineer and Contractor. Reports shall indicate observations and results of tests and shall indicate compliance or non–compliance with applicable requirements.

E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.

1. Notify Engineer and independent firm 48 hours prior to expected time for requiring sampling, testing and observation services, unless noted otherwise in the Specifications or Drawings.

2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.

F. Testing does not relieve Contractor to perform Work to contract requirements.

G. Re–testing required because of non–conformance to specified requirements shall be performed by the same independent firm under the direction of the Engineer. Payment for re–testing shall be made by the Contractor.

1.07 MANUFACTURER'S FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, observe conditions of surfaces and installations, monitor quality of workmanship, provide training and instructions to operators, and provide start–up, testing, adjustment, and balancing of equipment, as applicable.

B. If a manufacturer's representative observes faulty practices on site related to or affecting their product, they shall report it immediately to the Contractor and Owner.

C. Observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturer's written instructions shall be documented in writing and provided to the Contractor and Engineer.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Verify existing substrate is capable of structural support or attachment of new Work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Verify utility services are available, of the correct characteristics, and in the correct locations.

3.02 PREPARATION

A. Prepare surfaces in accordance with the requirements of the individual technical Specification sections.

END OF SECTION

INDEX TO

SECTION 01 45 23

TESTING AND INSPECTING SERVICES

SECTION 01 45 23

TESTING AND INSPECTING SERVICES

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Selection and payment.

B. Contractor submittals.

C. Testing agency responsibilities.

D. Testing agency reports.

E. Limits on testing authority.

F. Contractor responsibilities.

G. Schedule of tests.

1.02 RELATED SECTIONS

A. Testing and acceptance required by public authorities.

B. Section 01 00 00 – General Requirements: Manufacturer's certificates.

C. Section 01 77 00 – Closeout Procedures: Project record documents.

1.03 REFERENCES (LATEST REVISION)

A. ASTM C 802 – Practice for Conducting an Interlaboratory Test Program to Determine the Precision of Test Methods for Construction Materials.

B. ASTM C 1077 – Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

C. ASTM C 1093 – Practice for Accreditation of Testing Agencies for Masonry.

D. ASTM D 3740 – Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

E. ASTM D 4561 – Practice for Quality Control Systems for Organizations Producing and Applying Bituminous Paving Materials.

F. ASTM E 329 – Specification for Agencies Engaged in Construction Inspection and/or Testing.

G. ASTM E 543 – Practice for Agencies Performing Nondestructive Testing.

H. ASTM E 548 – Guide for General Criteria Used for Evaluating Laboratory Competence.

I. ASTM E 699 – Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components.

1.04 SELECTION AND PAYMENT

A. Employment and payment by Contractor for services of an independent testing agency or laboratory to perform specified testing.

B. Employment of testing agency or laboratory in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

1.05 QUALITY ASSURANCE

A. Comply with requirements of practices listed in paragraph 1.03.

B. Laboratory: Authorized to operate in State in which project is located.

C. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.

D. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.

1.06 CONTRACTOR SUBMITTALS

A. Prior to start of Work, submit testing laboratory name, address, and telephone number, and names of full time registered Engineer and responsible officer.

B. Submit copy of report of laboratory facilities inspection made by Materials Reference Laboratory of National Bureau of Standards during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.

1.07 TESTING AGENCY RESPONSIBILITIES

A. Test samples of mixes submitted by Contractor.

B. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.

C. Perform specified sampling and testing of products in accordance with specified standards.

D. Ascertain compliance of materials and mixes with requirements of Contract Documents.

E. Promptly notify Engineer and Contractor of observed irregularities or non–conformance of Work or products.

F. Perform additional tests required by Engineer.

G. Attend preconstruction meetings and progress meetings.

1.08 TESTING AGENCY REPORTS

A. After each test, promptly submit three copies of report to Engineer and to Contractor.

B. Include:

1. Date issued.
2. Project title and number.
3. Name of inspector.
4. Date and time of sampling or inspection.
5. Identification of product and specifications section.
6. Location in the Project.
7. Type of inspection or test.
8. Date of test.
9. Results of tests.
10. Conformance with Contract Documents.

C. When requested by Engineer, provide interpretation of test results.

1.09 LIMITS ON TESTING AUTHORITY

A. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.

B. Agency or laboratory may not approve or accept any portion of the Work.

C. Agency or laboratory may not assume any duties of Contractor.

D. Agency or laboratory has no authority to stop the Work.

1.10 CONTRACTOR RESPONSIBILITIES

A. Deliver to agency or laboratory at designated location, adequate samples of materials proposed to be used requiring testing, along with proposed mix designs.

B. Cooperate with laboratory personnel and provide access to the Work.

C. Provide incidental labor and facilities:

1. To provide access to Work to be tested.
2. To obtain and handle samples at the site or at source of products to be tested.
3. To facilitate tests.
4. To provide storage and curing of test samples.

D. Notify Engineer and laboratory 48 hours prior to expected time for operations requiring testing services.

E. Employ services of an independent qualified testing laboratory and pay for additional samples and tests required by Contractor beyond specified requirements.

1.11 SCHEDULE OF TESTS

A. Below is a schedule of tests for the civil work. Tests related to building are elsewhere.

Section	Test	Frequency	Date	Performed By	Notes
03 30 00 – Cast-in-Place Concrete					
	Materials	As necessary			
	Mix Designs	1 per mix design			
	Strength	4 Test Cylinders for each 50 cy or less or each mix design placed daily			
	Slump	1 test per each set of cylinders			
	Air Content	1 test per each set of cylinders			
	Temperature	1 test per each set of cylinders			
31 00 00 – Earthwork					
	Compaction				
	Unpaved	1 test per horizontal layer per 10,000 sf of fill area			
	Paved	1 test per horizontal layer per 5,000 sf of subgrade			
	Building Pad	1 test per horizontal layer per 1,500 sf of fill area			
	Proof Rolling	As necessary			
32 11 23 – Aggregate Base Courses					
	Base Density	1 test per 5,000 sf			
32 12 16 – Asphalt Paving					
	Asphalt Extraction & Gradation	1 test for each 250 tons placed			
	Marshall Stability	1 test for each 250 tons placed			
	Field Density	1 test for each 250 tons placed			
	Cores	1 test for each 250 tons placed			

Water Utilities					
	Hydrostatic & Leakage	1.5 times the working pressure (no less than 150 psi). Conducted for 2 hours with maintained pressure of 150 psi (200 psi on fire main)			
	Bacteriological Samples	2 taken 24 hours apart after disinfection			
	Compaction				
	Traffic Areas	1 per 100 lf or less for each 4 ft. of depth			
	Non–Traffic Areas	1 per 500 lf or less for each 4 ft. of depth			
	Fire Flow	1 per permit			
Sanitary Sewage Utilities					
	Television Inspection of Sewers	As requested			
	Leakage	As necessary			
	Compaction				
	Traffic Areas	1 per 100 lf or less for each 4 ft. of depth			
	Non–Traffic Areas	1 per 500 lf or less for each 6 ft. of depth			
	Gravity – Air	All lines			
	Hydrostatic – Force Main	100 psi for 2 hours			
	Deflection	100% of the system			
Storm Drainage Utilities					
	Compaction				
	Traffic Areas	1 per 100 lf or less for each 4 ft. of depth			
	Non–Traffic	1 per 500 lf or less for each 6 ft. of depth			

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION

INDEX TO

SECTION 01 50 00

TEMPORARY CONSTRUCTION FACILITIES

SECTION 01 50 00

TEMPORARY CONSTRUCTION FACILITIES

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Site Plan

1. The Contractor shall prepare a site plan indicating the proposed location and dimensions of any area to be fenced and used by the Contractor, the number of trailers to be used, avenues of ingress or egress to the fenced area and details of the fence installation. Any areas which may have to be graveled to prevent the tracking of mud shall also be identified. The Contractor shall also indicate if the use of a supplemental or other staging area is desired.

B. Identification of Employees

1. The Contractor shall be responsible for obtaining badge for each employee through DOD, and for requiring each employee engaged on the work to display, identification as approved and directed by the ANG and the Owner. Prescribed identification shall immediately be delivered to the ANG security office for cancellation upon release of any employee. When required, the Contractor shall obtain and provide fingerprints of persons employed on the project. Contractor and subcontractor personnel shall wear identifying markings on hard hats clearly identifying the company for whom the employee works. All personnel shall have DOD badges and vehicle passes or decals to enter the ANG installation. Badges will be required to be worn at all times while on the installation.

C. Employee Parking

1. Contractor employees shall park privately owned vehicles in an area designated by the City and ANG. Contractor employee parking shall not interfere with existing and established parking requirements of the ANG installation.

1.02 AVAILABILITY AND USE OF UTILITY SERVICES

A. Payment for Utility Services

1. The amount of each utility service consumed shall be charged to or paid for by the Contractor. There shall be no additional cost to the Owner.

B. Meters and Temporary Connections

1. The Contractor, at its expense and in a manner satisfactory to the Owner, shall provide and maintain necessary temporary connections, distribution lines, and meter bases required to measure the amount of each utility used for the purpose of determining charges.

C. Sanitation

1. The Contractor shall provide and maintain within the construction area minimum field-type sanitary facilities approved by the Owner. Owner toilet facilities will not be available to Contractor's personnel.

D. Telephone

1. The Contractor shall make arrangements and pay all costs for telephone facilities desired.

1.03 PROTECTION AND MAINTENANCE OF TRAFFIC

A. During construction the Contractor shall provide access and temporary relocated roads as necessary to maintain traffic. The Contractor shall maintain and protect traffic on all affected roads during the construction period except as otherwise specifically directed by the Owner. Measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades, placing of lights around and in front of equipment and the work, and the erection and maintenance of adequate warning, danger, and direction signs, shall be as required by the State and local authorities having jurisdiction. The traveling public shall be protected from damage to person and property. The Contractor's traffic on roads selected for hauling material to and from the site shall interfere as little as possible with public traffic. The Contractor shall investigate the adequacy of existing roads and the allowable load limit on these roads. The Contractor shall be responsible for the repair of any damage to roads caused by construction operations. Any changes in traffic patterns or restrictions shall be approved by the ANG.

B. Barricades

1. The Contractor shall erect and maintain temporary barricades to limit public access to hazardous areas. Such barricades shall be required whenever safe public access to paved areas such as roads, parking areas, or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic. Barricades shall be securely placed, clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

1.04 CONTRACTOR'S TEMPORARY FACILITIES

A. Administrative Field Offices

1. The Contractor shall provide and maintain administrative field office facilities within the construction area at the designated site for his **superintendent, and a dedicated office trailer for the City inspectors, and the Engineer.** Office shall be located where it will not interfere with the progress of the work nor the Owners existing operations.

B. Storage Area

1. The ANG provided a temporary storage area for the duration of construction as indicated in Section 01 30 00. The Contractor shall construct a temporary six-foot high chain link fence around the temporary storage area and materials as required by the ANG. The fence shall include plastic strip inserts, colored brown, so that visibility through the fence is obstructed. Fence posts may be driven, in lieu of concrete bases, where soil conditions permit.

C. Appearance of Trailers

1. Trailers utilized by the Contractor for administrative or material storage purposes shall present a clean and neat exterior appearance and shall be in a state of good repair. Trailers which, in the opinion of the Owner, require exterior painting or maintenance will not be allowed on the property.

D. Maintenance of Storage Area

1. Fencing shall be kept in a state of good repair and proper alignment. Should the Contractor elect to traverse, with construction equipment or other vehicles, grassed or unpaved areas which are not established roadways, such areas shall be covered with a layer of gravel as necessary to prevent rutting and the tracking of mud onto paved or established roadways; gravel gradation shall be at the Contractor's discretion. Grass located within the boundaries of the construction site shall be mowed for the duration of the project. Grass and vegetation along fences, buildings, under trailers, and in areas not accessible to mowers shall be edged or trimmed neatly.

E. Security Provisions

1. Even though the site is located with the ANG, however, the contractor shall provide adequate security provisions at the temporary storage facilities. The Contractor shall be responsible for the security of its own equipment; in addition, the Contractor shall notify the ANG security staff requesting periodic security checks of the temporary storage facility.

F. Sanitary and Waste Disposal Facilities

1. The Contractor shall provide sanitary facilities for their workers, Owner, Engineer, visitors, and applicable regulatory personnel. Provide waste collections containers to handle waste from construction personal and operations.

1.05 TEMPORARY PROJECT SAFETY FENCING

A. As soon as practicable, but not later than 15 days after the date established for commencement of work, the Contractor shall furnish and erect temporary project safety fencing at the work site. The safety fencing shall be a high visibility

orange colored, high density polyethylene grid or approved equal, a minimum of 42 inches high, supported and tightly secured to steel posts located on maximum 10-foot centers, constructed at the approved location. The safety fencing shall be maintained by the Contractor during the life of the contract and, upon completion and acceptance of the work, shall become the property of the Contractor and shall be removed from the work site.

1.06 TEMPORARY FIRE PROTECTION

A. Install and maintain temporary fire-protections facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with Fire Department requirements.

B. Prohibit smoking in construction areas.

C. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.

D. Develop and supervise an overall fire-prevention and protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

E. Provide temporary fire protection suitable to the fire department.

1.07 PROTECTION

A. Contractor is responsible to provide such covering, shields, and barricades as are required to protect building occupants, equipment, stores, supplies, etc., from dust, debris, weather intrusion, water, moisture, or other cause of damage resulting from construction.

1.08 CLEANUP

A. Construction debris, waste materials, packaging material, and the like shall be removed from the work site daily. Any dirt or mud which is tracked onto paved or surfaced roadways shall be cleaned away. Materials resulting from demolition activities which are salvageable shall be stored within the fenced area described above or at the supplemental storage area. Stored material not in trailers, whether new or salvaged, shall be neatly stacked when stored.

1.09 RESTORATION OF STORAGE AREA

A. Upon completion of the project and after removal of trailers, materials, and equipment from within the fenced area, the fence shall be removed and will become the property of the Contractor. Areas used by the Contractor for the storage of equipment or material, or other use, shall be restored to the original or better condition. Gravel used to traverse grassed areas shall be removed and the area restored to its original condition, including top soil and seeding as necessary.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

INDEX TO

SECTION 01 56 39

TEMPORARY TREE AND PLANT PROTECTION

SECTION 01 56 39

TEMPORARY TREE AND PLANT PROTECTION

PART 1 – GENERAL

1.01 QUALITY ASSURANCE

A. Contractor shall provide at least one person who shall be present at all times during planting and pruning. Individual shall be thoroughly familiar with types of plants and trees involved and shall be responsible for directing the digging, cutting, planting, and maintenance of designated plant and tree materials.

B. Qualifications: Repair of tree damage shall be completed or supervised by a tree surgeon who is a member of the National Arborist Association.

C. Pre–Work Conference – Review on site with the Owner.

D. **Trees to be removed will be marked with green flagging. Trees to remain will be marked with red flagging. Trees designated as "SPECIMEN" will be marked with yellow flagging.**

PART 2 – PRODUCTS

2.01 MATERIALS

A. Provide tree protection materials, as detailed on the construction drawings.

PART 3 – EXECUTION

3.01 PROTECTION OF SPECIMEN TREES

A. Any irreparable damage to roots, trunk or bark, or any unauthorized cutting or pruning of limbs to trees designated by the Owner as "specimen" will result in a fine. This fine shall be levied through the Application for Payment as retainage and shall be used to supplement "specimen" with tree of similar value and to perform extensive "state of the art" tree surgery in an attempt to save the tree.

3.02 METHODS OF PROTECTION

A. Use the following method to protect specimen trees. Actual determination of extent and combination of methods shall be determined on site.

B. Temporary Fence Enclosures: Construct protective fencing where indicated on the construction drawings. Protective fencing shall be installed a minimum of three feet beyond the dripline. No grading, trenching, pruning, or storage of materials shall be allowed inside this area.

3.03 REPAIR OF TREES INJURED DURING CONSTRUCTION

A. Contractor shall:

1. Repair damaged trees promptly to prevent progressive deterioration caused by damage.

2. Repair to trees damaged during construction according to standard arborcultural techniques recognized by International Society of Arborculture.

3. Remove trees damaged beyond satisfactory repair as determined by Owner. Refer to FINES AND MITIGATION in this section for loss of specimen trees.

4. Temporarily cover roots exposed during construction with wet burlap to prevent roots from drying out. Cover roots with earth as soon as possible.

5. Roots Cut During Construction: Coat roots 1 1/2 inches diameter or larger with antiseptic paint.

3.04 FINES

A. Fine values for designated **"SPECIMEN"** vegetation shall be determined by the following:

Caliper	Fine
1 inch – 2 inches	$ 150.00
2 inches – 3 inches	$ 200.00
3 inches – 4 inches	$ 250.00
4 inches – 5 inches	$ 400.00
5 inches – 6 inches	$ 500.00
6 inches – 7 inches	$ 600.00
7 inches – 8 inches	$ 750.00
8 inches – 11 inches	$ 1,500.00
12 inches – 20 inches	$ 2,000.00
21 inches & larger	$ 2,500.00

3.05 MITIGATION

A. Mitigation shall be in the form of tree transplantation. Plant materials shall be from off–site (for smaller sites) or from remote areas on site. Trees shall be comparable in size, form, and species to lost "specimen" tree. Tree species, size, and planting locations shall be approved by the Owner.

END OF SECTION

INDEX TO

SECTION 01 65 00

SHIPMENT, PROTECTION, AND STORAGE

SECTION 01 65 00

SHIPMENT, PROTECTION, AND STORAGE

PART 1 – GENERAL

1.01 GENERAL

A. Equipment, products and materials shall be shipped, handled, stored, and installed in ways which will prevent damage to the items. Damaged items will not be permitted as part of the work except in cases of minor damage that have been satisfactorily repaired and are acceptable to the Owner and Engineer. Additional delivery, handling, and storage requirements, specific to an individual product, may be provided in the appropriate Specification sections.

1.02 TRANSPORATION AND DELIVERY

A. Transport and handle items in accordance with manufacturer's printed instructions.

B. Schedule delivery to reduce long term on-site storage prior to installation and operation. Under no circumstances shall equipment be delivered to the site more than one month prior to installation without written authorization from the Engineer.

C. Ship equipment, materials, and spare parts complete except where partial disassembly is required by transportation regulations or for protection of components.

D. Pack spare parts in containers bearing labels clearly designating contents and pieces of equipment for which intended.

E. Deliver spare parts at time as pertaining equipment. Deliver spare parts to owner after completion of work.

F. Coordinate delivery with installation to ensure minimum holding time for items that are hazardous, flammable, easily damaged or sensitive to deterioration.

G. Deliver products to the site in manufacturer's original sealed containers or other packing systems, complete with instructions for handling, storing, packing, protecting and installing.

H. Assume responsibility for equipment material and spare parts just before unloading from carrier at site.

I. All items delivered to the site shall be unloaded and placed in a manner which will not hamper the Contractor's normal construction operation or those of subcontractors and other contractors and will not interfere with the flow of necessary traffic.

J. Provide equipment and personnel to unload all items delivered to the site.

K. Promptly inspect shipment to assure that products comply with requirements, quantities are correct, and items are undamaged. For items furnished by others (i.e. Owner, other Contractors), perform inspection in the presence of the Engineer. Notify Engineer verbally, and in writing, of any problems

L. Pay all demurrage charges if failed to promptly unload items.

PART 2 – PRODUCTS

2.01 PIPE

A. Pipe and appurtenances shall be handled, stored, and installed as recommended by the manufacturer. Pipes with paint, tape coatings, linings, or the like shall be stored to protect the coating or lining from physical damage or other deterioration. Pipes shipped with interior bracing shall have the bracing removed only when recommended by the pipe manufacturer.

PART 3 – EXECUTION

3.01 EQUIPMENT

A. PACKAGE AND MARKING:

1. All equipment shall be protected against damage from moisture, dust, handling, or other cause during transport from manufacturer's premises to site. Each item or package shall be marked with the number unique to the specification reference covering the item.

2. Stiffeners shall be used where necessary to maintain shapes and to give rigidity. Parts of equipment shall be delivered in assembled or subassembled units where possible.

B. IDENTIFICATION:

1. Each item of equipment and valve shall have permanently affixed to it a label or tag with its equipment or valve number designated in this contract. Marker shall be of stainless steel. Location of label will be easily visible.

C. SHIPPING:

1. Bearing housings, vents, and other types of openings shall be wrapped or otherwise sealed to prevent contamination by grit and dirt.

2. Damage shall be corrected to conform to the requirements of the contract before the assembly is incorporated into the Work. The Contractor shall bear the costs arising out of dismantling, inspection, repair, and reassembly.

D. DELIVERY AND HANDLING:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.

2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

3. Deliver products to Project site in an undamaged, or sensitive to deterioration, theft, and other losses.

4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

E. FACTORY APPLIED COATINGS:

1. Unless otherwise specified, each item of equipment shall be shipped to the site of the Work with the manufacturer's shop applied epoxy prime coating. The prime coating shall be applied over clean dry surfaces in accordance with the coating manufacturer's recommendations. The prime coating will serve as a base for field-applied finish coats. Electrical equipment and materials shall be painted by manufacturer.

F. UNLOADING:

1. Unloaded and handle according to manufacturer's requirement. Contractor shall unload and store MBR manufacturer's equipment according to their instruction.

G. STORAGE:

1. During the interval between the delivery of equipment to the site and installation, all equipment, unless otherwise specified, shall be stored in an enclosed space affording protection from weather, dust, and mechanical damage and providing favorable temperature, humidity, and ventilation conditions to ensure against equipment deterioration. Manufacturer's recommendations shall be adhered to in addition to these requirements.

2. Equipment and materials to be located outdoors may be stored outdoors if protected against moisture condensation. Equipment shall be stored at least six inches above ground. Temporary power shall be provided to energize space heaters or other heat sources for control of moisture condensation. Space heaters or other heat sources shall be energized without disturbing the sealed enclosure.

   a. Store products to allow for inspection and measurement of quantity or counting of units.

   b. Store materials in a manner that will not endanger Project structure.

c. Store products that are subject to damage by the elements, under cover in a weather-tight enclosure above ground, with ventilation adequate to prevent condensation.

d. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.

e. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.

f. Protect stored products from damage and liquids from freezing.

H. PROTECTION OF EQUIPMENT AFTER INSTALLATION:

1. After installation, all equipment shall be protected from damage from, including but not limited to, dust, abrasive particles, debris and dirt generated by the placement, chipping, sandblasting, cutting, finishing and grinding of new or existing concrete, terrazzo, and metal; and from the fumes, particulate matter, and splatter from welding, brazing, and painting of new or existing piping and equipment. As a minimum, vacuum cleaning, blowers with filters, protective shieldings, and other dust suppression methods will be required at all times to adequately protect all equipment. During concreting, including finishing, all equipment that may be affected by cement dust must be completely covered. During painting operations, all grease fittings and similar openings shall be covered to prevent the entry of paint. Electrical switchgear, unit substation, and motor load centers shall not be installed until after all concrete work and sand-blasting in those areas have been completed and accepted and the ventilation systems installed.

END OF SECTION

INDEX TO

SECTION 01 75 15

EQUIPMENT – START UP

SECTION 01 75 15

EQUIPMENT START UP

PART 1 - GENERAL

1.01 SUMMARY

A. The Contractor shall:

1. Coordinate a schedule for start-up of various equipment and systems.

2. Notify the Engineer ten working days prior to start-up of each item or station.

3. Make sure all piping, grit system, screens, MBR basins, wet wells, equipment, etc. are free of construction debris prior to starting pumps, blowers, and other equipment.

4. Verify that each piece of equipment or system had been checked for proper lubrication, drive rotation, belt tension, control sequence, blockage, or other conditions which may cause damage.

5. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

6. Verify wiring and support components for equipment are complete and tested.

7. Execute start-up under supervision of responsible Manufacturer's service technician, Utility representative, Engineer, and contractor's personnel in accordance with manufacturer's instructions and in accordance to **Section 01 78 23,** and **01 78 25.**

8. Submit a written report from the equipment service technician that all equipment or system had been properly installed and is functioning correctly.

1.02 DEMONSTRATION AND INSTRUCTION

A. In addition to the requirements of Section 1.01 above, the Contractor shall:

1. Demonstrate operation and maintenance of the system to the engineer and the plant personnel prior to final acceptance. The Contractor shall provide the equipment manufacturer's representative for a minimum of one day of training to Utility personnel for each station. The Contractor shall coordinate and schedule demonstration of the system with the Wastewater Division and the engineer according to Specification **01 79 00.**

2. Utilize operation and maintenance manuals as basis for instruction. Review contents on manual with Utility personnel in detail to explain all aspects of operation and maintenance.

3. Demonstrate start-up, operation, control adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed-upon times, at equipment location.

4. Prepare and insert additional data operations and maintenance manuals when need for additional data becomes apparent during instruction.

END OF SECTION

INDEX TO

SECTION 01 77 00

CLOSEOUT PROCEDURES

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Closeout procedures.

B. Project record documents.

C. Warranties and bonds.

D. Operation and maintenance data.

E. Maintenance services.

1.02 RELATED SECTIONS

A. Section 01 00 01 – General Requirements.

B. Section 01 99 90 – Reference Forms.

C. Section 01 78 36 - Warranties.

D. Section 01 78 33 - Bonds.

1.03 SUBSTANTIAL COMPLETION PROCEDURES

A. In addition to the requirements in the General Conditions, contractors shall follow these procedures.

1. Contractor's List of Incomplete Items:Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

2. Submittals Prior to Substantial Completion: Complete the following a minimum of ten days prior to requesting review for determining date of Substantial Completion. List items below that are incomplete at time of request.

a. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities.

b. Submit closeout submittals including but not limited to project record documents, operation and maintenance manuals, final completion construction photographic documentation, test results, and similar final record information.

c. Submit maintenance material submittals specified in individual section, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Engineer. Label with manufacturer's name and model number where applicable.

1. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items including name and quantity of each item and name and number of related Specification Section. Obtain Owner's signature for receipt of submittals.

3. Submit test, adjust, and balance records.

4. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

B. Procedures Prior to Substantial Completion: Complete the following a minimum of ten days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.

2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.

3. Complete startup and testing of systems and equipment.

4. Perform preventive maintenance on equipment used prior to Substantial Completion.

5. Engage responsible manufacturer to Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in individual equipment specifications.

6. Advise Owner of changeover in electric and other utilities.

7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.

8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.

9. Remove labels that are not permanent labels.

10. Complete final cleaning requirements, including touch up painting.

11. Touch up and otherwise repair and restore marred exposed finished to eliminate visual defects.

1.04 CLOSEOUT PROCEDURES

A. Submit written verification that the Contract Documents had been reviewed, Work has been observed at appropriate times, and the Work is complete in accordance with Contract Documents and ready for Engineer's review. Request in writing that the Engineer review the work. Then address all punch lists or discrepancy items developed from Engineer, Owner, and State's review.

B. Submit a draft to Engineer of all closeout documents for review at least 15 days prior to substantial completion.

C. Submit project record documents (see item 1.05).

D. Provide closeout submittals to Engineer (see item 1.06).

E. Provide any other submittals to Engineer required by governing or other authorities.

F. Provide Final Adjustment of Accounts (see item 1.07).

G. Provide maintenance services indicated in specification sections for one year from the date of substantial completion.

H. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

I. Site and building shall be cleaned per specifications.

1.05 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:

1. Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other modifications to the Contract.
5. Reviewed Shop Drawings, Product Data, and Samples.
6. Manufacturer's instructions for assembly, installation, maintenance, and adjustments.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Equipment Specifications: Legibly mark and record at each product section description of actual products installed, including the following:

1. Manufacturer's name and product model and number.

2. Product substitutions or alternates utilized.

3. Changes made by Addenda and modifications.

F. Project Record Drawings: Legibly mark each item to record actual construction including:

1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.

3. Where proposed and existing utilities cross, the Contractor shall measure and record the horizontal location and vertical separation between each crossing. Separation shall be measured between exteriors and pipes.

4. Field changes of dimension and detail.

5. Details not on original Contract drawings.

6. An as built of the construction with spot elevations and finished contours of the site plan and all storm pipes/inlets.

7. An as-built of the sanitary sewer, water and storm drainage systems.

8. Record drawings for building, conduits, structures, and electrical, power, communications and related.

9. Piling data locations, tip and cut-off elevations and driving records.

10. Building MEP and other building features (with changes).

G. Record drawing shall be prepared according to these conditions: The Contractor shall keep accurate, legible records of the locations, types, and sizes of sanitary lines, service laterals, manholes, cleanouts, water lines, fittings, valves, hydrants, drainage pipes, drainage structures, and other related work performed under this project. Where proposed and existing utilities cross, the Contractor shall measure and record the horizontal location and vertical separation between each crossing. Separation shall be measured between exteriors of pipes. On a set of project prints provided by the Owner, the Contractor shall prepare a set of "record" drawings from the data stated above. The horizontal locations of all portions of items installed on this project shall be accurately tied down to features that are physical and visible, such as property corner markers and permanent type structures. Invert elevations of all manholes, storm sewers and structures, sanitary sewers, and lift stations shall be clearly indicated. These

"record" drawings shall be kept clean and dry and maintained in a current state with the progress of the work. If at any time, a copy of this plan or portion of it is requested by the Owner, such copy shall be made available within 24 hours after the request is made.

Before final acceptance of the completed installation and final payment by the Owner, the Contractor shall deliver to the Engineer, three sets of "Record" Drawings accurately depicting the horizontal and vertical as–built data described in the above paragraph. "Record" drawings for the items installed on this project shall be certified by a licensed surveyor, other than Thomas & Hutton, registered in State of Georgia. The size of the drawings shall be 24" x 36". The "Record" drawings shall have a coordinate system based on the South Carolina State Plane Coordinate System, East Zone, North American Datum of 1983 (NAD83). Elevations shall be based on the North American Vertical Datum of 1929 (NGVD 29). All measurements and coordinates shown shall use the U.S. Survey flood definition. Coordinates shall be shown on all drainage storm manholes/boxes and all other related work performed under this contract, including an as built condition of all underground piping, manholes, valve boxes, storm drainage certified by a registered surveyor with spot elevations and finished 1-foot contours. Vertical data including but not limited to, structure and manhole frame and inverts, pipe inverts, control levels, bottom, site grading, and as-built grading shall be shown. In addition to the "Record" drawings, Contractor shall deliver to Engineer electronic AutoCAD (v. 14 or later) files of all the data described above on a CD-ROM.

H. Deliver final project record drawing files to Engineer in an electronic AutoCAD (v.14 or later) and three paper sets. Find project record drawing shall include Engineer comments and shall conform to regulatory agency requirements.

I. Submit final documents to Engineer at least 15 days prior to claim for final Application for Payment.

1.06 CONTRACTOR'S CLOSEOUT SUBMITTAL TO ENGINEER

A. Closure of the construction contract, including final payment to the Contractor, requires the following:

1. Contractor's submission to the Engineer of the following:

a. Project record drawings.

b. An affidavit, in the form of the AIA G706, that wages, bills for materials and equipment, and other indebtedness connected with the work have been paid (Contractor's affidavit of payment & debt and claims);

c. A certificate in the form of AIA G715 (Accord for Certificate of Insurance) issued by an authorized representative of the Contractor's insurance company certifying completed project insurance coverage as required by the contract documents;

d. A statement that the Contractor knows of no reason that the completed project insurance will not be renewable to cover the period required by the Contract Documents;

e. Consent of surety, if any, to final payment, in the form of AIA G707 (Consent of Surety to Final Payment);

f. Other information required by the Owner establishing the Contractor's payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims and security interests arising out of the contract, all in the forms as designated by the Owner;

g. Inspection reports that may not be a part of the record documents;

h. All warranties and quantities;

i. O&M Manuals;

j. Training Manuals;

k. Final Adjustment of Accounts; and

l. A list of all claims against Owner that the Contractor believes is unsettled.

m. Other documents required by the Owner and State guidelines and requirements,

1.07 FINAL ADJUSTMENT OF ACCOUNT

A. Submit a final statement of accounting to the Engineer.

B. Statement shall reflect all adjustments to the contract sum:

1. The original contract sums

2. Additions and deductions resulting from:

a. Previous change orders;

b. Unit prices;

c. Penalties and bonuses;

d. Deductions for liquidated damage; and

e. Other adjustments.

3. Total contract sum, as adjusted.

4. Previous payments.

5. Remaining sum due.

1.08 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

1.09 OPERATION AND MAINTENANCE DATA

A. Submit as directed in Section 01 78 23 Operating and Maintenance Information.

1.10 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Provide spare parts, maintenance, and extra Products in quantities specified in individual specification sections.

B. Deliver to location as directed; obtain receipt prior to final payment.

C. Crate in containers designed for prolonged storage suitable for handling with hoisting equipment containers.

D. Stencil contents on containers

1.11 WARRANTIES AND BONDS

A. Provide duplicate notarized copies and a PDF of each.

B. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers.

C. Provide Table of Contents and assemble in three D side ring binder with durable plastic cover.

D. Submit prior to final Application for Payment.

E. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

1.12 MAINTENANCE SERVICE

A. The general contractor, as part of his contract, shall engage the manufacturer representative of the major equipment to return to the site for one visit to perform the first-year maintenance and inspection. The contractor is responsible to schedule, monitor, and furnish this service. This shall include, pumps, blowers, screens, MBR equipment, UV, DO system, generator, electrical valves, and chemical system.

B. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

C. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

D. Maintenance service shall not be assigned or transferred to any agent or Subcontractor without prior written consent of the Owner.

1.13 FINAL CLEANING

A. Execute final cleanup prior to final project acceptance.

B. Remove waste and surplus materials, rubbish, and construction facilities from the site.

C. Clean all exterior paved surfaces, establish vegetation or ground cover on all disturbed areas.

D. Clean all sight-exposed interior and exterior surfaces and work areas.

E. Clean all windows, glasses, floors, monitors, cabinets, controls, etc.

F. Clean debris and sediment from all new storm pipes and structures.

G. Repair all cracked or damaged curbs, sidewalks and concrete areas. If the crack is irregular or goes through the full depth of the concrete, remove the damaged section and replace.

H. Removal all soil and other debris from the new storm system, curb, and paved areas.

I. Comply with requirements of Section 01 77 01.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION

INDEX TO

SECTION 01 77 01

CLEANING

SECTION 01 77 01

CLEANING

PART 1 – GENERAL

1.01 RELATED SECTIONS

A. Documents affecting the work of this Section include, but are not necessarily limited to, the General Conditions, the Supplementary Conditions, and other Sections in Division 1 of these Specifications.

B. In addition to standard described in this Section, comply with requirements for cleaning as described in pertinent other Sections of these Specifications.

1.02 DESCRIPTION OF WORK INCLUDED

A. Throughout the construction period, maintain the buildings and site in a standard of cleanliness as described in this Section.

B. Execute cleaning during progress of the work and at completion of the work.

1.03 QUALITY ASSURANCE

A. Conduct daily inspection, and more often if necessary, to verify that requirements for cleanliness are being met.

B. In addition to the standards described in this Section, comply with pertinent requirements of governmental agencies having jurisdiction.

C. Conduct cleaning and disposal operations to comply with all Federal, State, and local codes, ordinances, regulations, and anti-pollution laws.

PART 2 – PRODUCTS

2.01 CLEANING MATERIALS AND EQUIPMENT

A. Provide required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.

B. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.

C. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.

D. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

2.02 COMPATIBILITY

A. Use only the cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material.

PART 3 – EXECUTION

3.01 PROGRESS CLEANING

A. General

1. Retain stored items in an orderly arrangement allowing maximum access, not impeding traffic or drainage, and providing protection of materials.

2. Do not allow accumulation of scrap, debris, waste material, and other items not required for construction of the work.

3. At least twice each month, and more often if necessary, completely remove all scrap, debris, and waste material from the job site.

4. Provide adequate storage for all items awaiting removal from the job site, observing requirements for fire protection and protection of the environment.

5. Execute periodic cleaning to keep the work, the site and adjacent properties free from accumulation of waste materials, rubbish, and wind-blow debris, resulting from construction operations.

B. Site

1. Daily, and more often if necessary, inspect the site and pick up all scrap, debris, and waste material. Remove such items to the place designated for their storage.

2. Weekly, and more often it necessary, inspect all arrangements of materials stored on the site. Restack, tidy, or otherwise service arrangements to meet the requirements of paragraph 3.01, part A, Section 1.

3. Maintain the site in a neat and orderly condition at all times.

4. Provide onsite containers for the collection of waste materials, debris and rubbish. Empty as necessary to prevent overflow and nuisance odor.

C. Structures

1. Weekly, and more often if necessary, inspect the structures and pick up all scrap, debris, and waste material. Remove such items to the place designated for their storage.

2. Weekly, and more often if necessary, sweep interior spaces clean ("Clean", for the purpose of this subparagraph shall be interpreted as meaning free from dust and other material capable of being removed by use of reasonable effort and a hand-held broom).

3. As required preparatory to installation of succeeding materials, clean the structures of pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using equipment and materials required to achieve the necessary cleanliness.

4. Following the installation of finish floor materials, clean the finish floor daily (and more often if necessary) at all times while work is being performed in the space in which materials are installed *("Clean", for the purpose of this paragraph, shall be interpreted as meaning free from foreign material which, in the opinion of the Architect or Engineer, may be injurious to the finish floor material).*

3.02 DUST CONTROL

A. Clean interior spaces prior to the start of finish painting and continue cleaning on an as-needed basis until painting is finished.

B. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.

C. Control dust on the site through the use of watering trucks and other accepted means.

3.03 FINAL CLEANING

A. Execute final cleanup prior to final project acceptance.

B. "Clean", for the purpose of this Article, and except as may be specifically provided otherwise, shall be interpreted as meaning the level of cleanliness generally provided by skilled cleaners using commercial quality building maintenance equipment and materials.

C. Prior to completion of the work, remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste. Conduct final progress cleaning as described in Article 3.01.

D. Site

1. Clean project site, yard and grounds disturbed by construction activities. Unless otherwise specifically directed by the Architect or Engineer, broom clean paved areas on the site and public paved areas adjacent to the site and rake clean other surfaces of the grounds. Remove stains, spills, and other foreign deposits.

2. Completely remove resultant debris.

E. Structures

1. Exterior

a. Visually inspect exterior surfaces and remove all traces of soil, waste materials, smudges, and other foreign matter.

b. Remove all traces of splashed materials from adjacent surfaces.

c. If necessary to achieve a uniform degree of cleanliness, hose down the exterior of the structure.

d. In the event of stubborn stains not removable with water, the Architect or Engineer may require light sandblasting or other cleaning at no additional cost to the Owner.

2. Interior

a. Visually inspect interior surfaces and remove all traces of soil, waste materials, smudges and other foreign matter.

b. Remove all traces of splashed material from adjacent surfaces.

c. Remove paint droppings, spots, stains and dirt from finished surfaces.

3. Glass

a. Clean inside and outside

4. Polished surfaces

a. To surfaces requiring routine application of buffed polish, apply the polish recommended by the manufacturer of the material being polished.

5. Replace disposable air filters.

6. Clean ducts, blowers, coil units and HVAC.

F. Remove waste and surplus materials, rubbish, and construction facilities from the site.

G. Clean all exterior paved surfaces, establish vegetation or ground cover on all disturbed areas.

H. Clean all sight-exposed interior and exterior surfaces and work areas.

I. Clean debris and sediment from all new storm pipes and structures.

J. Repair all cracked or damaged curbs. If the crack is irregular or goes thru the full depth of the curb, remove the damaged section and replace.

K. Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

L. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations immediately prior to Occupancy for entire Project or for a designated portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.

b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.

c. Rake grounds that are neither planted nor paved smooth, even-textured surface.

d. Remove tools, construction equipment, machinery, and surplus material from Project site.

e. Clean exposed exterior and interior finishes to a dirt-free condition, free of grease, dust, stains, films, fingerprints, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.

g. Sweep concrete floors broom clean in unoccupied spaces.

h. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.

i. Power scrub and power buff resilient flooring surfaces, tile, and fluid-applied flooring.

j. Clean transparent materials, including mirrors and glass in doors windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.

k. Remove labels that are not permanent.

l. Wipe surfaces of mechanical and electrical equipment, elevator equipment where applicable, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection. Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.

p. Clean lighting fixtures, lamps, globes, and reflectors to functions with full efficiency.

q. Leave Project clean and ready for occupancy.

M. Schedule final cleaning as approved by the Architect or Engineer to enable the Owner to accept a completely clean work.

N. Prior to final completion or Owner occupancy, Contractor shall conduct an inspection of sight-exposed interior and exterior surfaces and all work areas to verify that the entire work is clean.

3.04 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion and final cleaning.

B. Repair of remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repair or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.

2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.

a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

3.05 CLEANING DURING OWNER'S OCCUPANCY

A. Should the Owner occupy the work or any portion thereof prior to its completion by the Contractor and acceptance by the Owner, responsibilities for interim and final cleaning shall be as determined by the Architect or Engineer in accordance with the General Conditions of the Contract.

END OF SECTION

INDEX TO

SECTION 01 78 23

OPERATION AND MAINTENANCE INFORMATION

SECTION 01 78 23

OPERATING AND MAINTENANCE INFORMATION

PART 1 – GENERAL

1.01 SCOPE

A. Operation and maintenance (O&M) instructions shall be provided in accordance with this section and as required in the technical sections of this project manual. O&M information shall be provided for each maintainable piece of equipment, equipment assembly or subassembly, and material provided or modified under this contract.

B. O&M instructions must be submitted and accepted before on-site training may start.

PART 2 – INFORMATION

2.01 SUBMISSION OF OPERATION AND MAINTENANCE DATA

Submit Operation and Maintenance (O&M) Data specifically application to this contract and a complete and concise depiction of the provided equipment, product, or system. Organize and present information in sufficient detail to clearly explain O&M requirements at the system, equipment, component, and subassembly level. Include an index preceding each submittal. Submit in accordance with this section. Provide hard and digital copies.

A. Package Quality

1. Documents must be fully legible. Poor quality copies and material with hole punches obliterating the text or drawings will not be accepted.

B. Package Content

1. Data package content shall be as shown in the paragraph titled "Schedule of Operation and Maintenance Data Packages." Comply with the data package requirements specified in the individual technical sections, including the content of the packages and addressing each product, component, and system designated for data package submission.

C. Changes to Submittals

1. Manufacturer-originated changes or revisions to submitted data shall be furnished by the Contractor if a component of an item is so affected subsequent to acceptance of the O&M Data. Changes, additions, or revisions required by the Engineer for final acceptance of submitted data, shall be submitted by the Contractor within ten calendar days of the notification of this change requirement.

2.02 TYPES OF INFORMATION REQUIRED

A. GENERAL:

1. O&M information shall contain the names, addresses, and telephone numbers of the manufacturer, the nearest representative of the manufacturer, and the nearest supplier of the manufacturer's equipment and parts. In addition, one or more of the following items of information shall be provided as applicable.

B. OPERATING INSTRUCTIONS:

1. Specific instructions, procedures, and illustrations shall be provided for the following phases of operations:

   a. SAFETY PRECAUTIONS: List personnel hazards for equipment and list safety precautions for all operating conditions.

   b. OPERATOR PRESTART: Provide requirements to set up and prepare each system for use.

   c. START-UP, SHUTDOWN, AND POST SHUTDOWN PROCEDURES: Provide a control sequence for each of these operations.

   d. NORMAL OPERATIONS: Provide control diagrams with data to explain operation and control of systems and specific equipment.

   e. EMERGENCY OPERATIONS: Provide emergency procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage to systems and equipment. Include emergency shutdown instructions for fire, explosion, spills, or other foreseeable contingencies. Provide guidance on emergency operations of all utility systems including valve locations and portions of systems controlled.

   f. OPERATOR SERVICE REQUIREMENTS: Provide instructions for services to be performed by the operator such as lubrication, adjustments, and inspection.

   g. ENVIRONMENTAL CONDITIONS: Provide a list of environmental conditions (temperature, humidity, and other relevant data) which are best suited for each product or piece of equipment and describe conditions under which equipment should not be allowed to run.

C. PREVENTIVE MAINTENANCE:

1. The following information shall be provided for preventive and scheduled maintenance to minimize corrective maintenance and repair:

a. LUBRICATION DATA: Provide lubrication data, other than instructions for lubrication, in accordance with paragraph 2.02-B.1. f.

1. A table showing recommended lubricants for specific temperature ranges and applications;

2. Charts with a schematic diagram of the equipment showing lubrication points, recommended types and grades of lubricants, and capacities; and

3. A lubrication schedule showing service interval frequency.

2. PREVENTIVE MAINTENANCE PLAN AND SCHEDULE: Provide manufacturer's schedule for routine preventive maintenance, inspections, tests, and adjustments required to ensure proper and economical operation and to minimize corrective maintenance and repair. Provide manufacturer's projection of preventive maintenance man-hours on a daily, weekly, monthly, and annual basis including craft requirements by type of craft.

D. CORRECTIVE MAINTENANCE:

Manufacturer's recommendations shall be provided on procedures and instructions for correcting problems and making repairs.

1. TROUBLESHOOTING GUIDES AND DIAGNOSTIC TECHNIQUES: Provide step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.

2. WIRING DIAGRAMS AND CONTROL DIAGRAMS: Wiring diagrams and control diagrams shall be point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job-specific wiring and control work. On diagrams, number electrical and electronic wiring and pneumatic control tubing and the terminals for each type identically to actual installation numbering.

3. MAINTENANCE AND REPAIR PROCEDURES: Provide instructions and list tools required to restore product or equipment to proper condition or operating standards.

4. REMOVAL AND REPLACEMENT INSTRUCTIONS: Provide step-by-step procedures and list required tools and supplies for removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings, and adjustments required. Instructions shall include a combination of test and illustrations.

5. SPARE PARTS AND SUPPLY LISTS: Provide lists of spare parts and supplies required for maintenance and repair to ensure continued service or operation without unreasonably delays. Special consideration is required for

facilities at remote locations. List spare parts and supplies that have a long lead time to obtain.

6. CORRECTIVE MAINTENANCE MANHOURS: Provide manufacturer's projection of corrective maintenance man-hours including craft requirements by type of craft. Corrective maintenance that requires participation of the equipment manufacturer shall be identified and tabulated separately.

E. APPENDICES:

1. The following information shall be provided; include information not specified in the preceding paragraphs but pertinent to the maintenance or operation of the product or equipment.

   a. PARTS IDENTIFICATION: Provide identification and coverage for all parts of each component, assembly, subassembly, and accessory of the end items subject to replacement. Include special hardware requirements, such as requirement to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items. When illustrations omit the part numbers and description, both the illustrations and separate listing shall show the index, reference, or key number which will cross-reference the illustrated part to the listed part. Parts shown in the listings shall be grouped by components, assemblies, and subassemblies.

   b. WARRANTY INFORMATION: List and explain the various warranties and include the servicing and technical precautions prescribed by the manufacturers or contract documents to keep warranties in force.

   c. PERSONNEL TRAINING REQUIREMENTS: Provide information available from the manufacturers to use in training designated personnel to operate and maintain the equipment and systems properly.

   d. TESTING EQUIPMENT AND SPECIAL TOOL INFORMATION: Provide information on test equipment required to perform specified tests and on special tools needed for the operation, maintenance, and repair of components.

   e. CONTRACTOR INFORMATION: Provide a list that includes the name, address, and telephone number of the General Contractor and each Subcontractor who installed the product or equipment, or system. For each item, also provide the name, address, and telephone number of the manufacturer's representative and service organization most convenient to the project site. Provide the name, address, and telephone number of the product, equipment, and system manufacturers.

PART 3 – EXECUTION

3.01 TRANSMITTAL PROCEDURE

A. Unless otherwise specified, O&M manuals, information, and data shall be submitted as follows:

1. Submit one draft copy of completed volumes 30 days prior to final walk through. This copy will be reviewed and returned after final inspection, with Engineer comments. Only complete sets of O&M instructions will be reviewed for acceptance. Revise content of all document sets as required prior to final submission.

2. Submit five (confirm with Owner and Engineer final number required prior to submittal) hard copies of revised final volumes and one electronic PDF copy (CD) within ten days of conducting the final walk through.

3. Hard copies shall be submitted in commercial quality, durable, D-ring binders.

B. For ease of identification, each manufacturer's brochure and manual shall be appropriately labeled with the equipment name and equipment number as it appears in the project manual. The information shall be organized in the binders in numerical order by the equipment numbers assigned in the project manual. The binders shall be provided with a table of contents and tab sheets to permit easy location of desired information.

C. If manufacturers' standard brochures and manuals are used to describe O&M procedures, such brochures and manuals shall be modified to reflect only the model or series of equipment used on this project. Extraneous material shall be crossed out neatly or otherwise annotated or eliminated.

END OF SECTION

INDEX TO

SECTION 01 78 25

PLANT TESTING, STARTUP, AND COMMISSIONING

SECTION 01 78 25

PLANT TESTING, STARTUP, AND COMMISSIONING

PART 1 – GENERAL

1.01 DESCRIPTION

A. Provide planning, functional completion testing, startup and commissioning as indicated and specified. Section includes:

1. Plant Checkout Plan.
2. Functional Completion Testing.
3. Startup.
4. Commissioning.
5. Performance Testing.

1.02 REFERENCES

A. American National Standards Institute (ANSI):

1. B31.1: Power Piping Code.

B. American Water Works Association (AWWA):

1. C600: Installation of Ductile-Iron Water Mains and Their Appurtenances.

1.03 DEFINITIONS

A. The Plant Checkout Plan (the Plan) incorporates all aspects of functional completion testing, startup, commissioning, performance testing, training, and reliability tests to ensure the facility operates properly and meets design intent and performance.

B. Functional Completion Testing is testing of the equipment and unit process systems to confirm that construction and installation has been completed in anticipation of initial startup of the equipment and unit process systems. Functional Completion Testing includes:

1. Physical Checkout shall be defined as the process of physically inspecting products after they have been installed in the Work to determine if the Products have been properly and completely installed and are ready for startup.
2. Functional Completion Testing shall be defined as testing that is performed by the Contractor, with Supplier or manufacturer certified technician, on

Products after they have been installed in the Work, and after the performance of physical checkout, for proving that the tested Products meet the requirements of the pertinent technical specifications. Administrative, test criteria, and minimum technical requirements for field testing are specified in Paragraph 1.08 of this Section.

C. Startup (clean water) shall be defined as the operation of equipment or unit process systems using clean water, air, or other fluids and gases as necessary to demonstrate the operation of the equipment or unit process systems with other equipment that is a part of, or a treatment process for the Facility. Administrative and minimum technical requirements for startup are specified in Paragraph 1.09 of this Section. **(Based on MBR process this may take up to 20 days).**

D. Commissioning shall be defined as the operation of equipment of unit process systems using wastewater, process liquids or process solids, plant support equipment, and plant utilities to demonstrate equipment or unit process systems are capable of processing water or wastewater at specified flows and conditions for a sustained period of operation as required by this section or equipment or unit process systems are ready to begin Performance Testing. Administrative and minimum technical requirements for Commissioning are specified in Paragraph 1.10 of this Section **(Based on MBR process this may take up to 120 days).**

E. Performance Testing is defined as a test to demonstrate the specified output of the equipment and unit process systems while maintaining regulatory compliance with Federal, State, and Local government regulations and minimum compliance with the equipment or unit process systems performance requirements and guarantees. **(Based on MBR process this may take up to 30 days).**

F. The Testing and Startup Coordinator shall be defined as the person provided by the Contractor to coordinate and oversee the total spectrum of testing and inspection activities required by the Contract Documents. The Testing and Startup Coordinator shall have been in responsible charge of at least two similar Projects in the last four years.

G. Startup Coordinator shall be the primary contact to execute the Plant check out plan.

1.04 ROLES AND RESPONSIBILITES

A. The Contractor shall provide all outside services, materials, labor, chemicals, supplies, test equipment and other items necessary to perform the Testing, Startup and Commissioning specified herein. In addition, the Contractor shall arrange for and provide the participation or assistance of quality control technicians, Supplier's or manufacturer technical representative(s), and required governmental agency representatives, as necessary.

B. The Contractor shall provide the services of a certified plant operator who is familiar with the MBR operation to conduct the plant start-up and commissioning. Manufacturer's representative(s) for every component to include, influent pumps, influent screens, grit removal systems, EQ mixers and pump station, MBR system, MBT system, chemical system, solids separation system (belt press, polymer feed, sludge

transfer pump, dry sludge pump, etc.), UV system. D.O system, drain pump station, meters, samplers, Reuse pumping system station, actuating valve, generator, and effluent pumps and control shall be on site during the following tasks:

1. Preliminary Equipment Checks and Field Testing.
2. Clean Water Testing of Membranes (Closed Loop)
3. Plant Wide Clean Water Testing (Closed Loop)
4. MBR Seeding and Introduction of Wastewater
5. Startup and MLSS Concentrations.
6. Commissioning
7. Final Performance Testing

C. The Supplier's technical representative's activities required by this Section are in addition to the requirements for vendor training and other services specified elsewhere in the Contract Documents. Timing for the performance of these services is to be defined in the Contractors Plant Checkout Plan.

D. The Engineer will review and comment on the Contractor's deliverables, observe the physical activities, the shop and field testing, witness functional testing, and maintain the permanent record of all testing results, and provide verification of conformance to the specifications. The Engineer's right to review work, witness tests or monitor or assess the Work and activities does not relieve the Contractor of its obligation to comply with the requirements of the Contract Documents nor does it imply completion of the Work.

1.05 SUBMITTALS

A. Submit the following shop drawings.

1. Submit a Plant Checkout Plan for the facility, with a listing of tests, activities, and an associated timeline.

B. Qualification Data:

1. Submit resumes for each team member proposed for testing, startup, and commissioning.

a. Include a minimum of three startup and commissioning references including: project name, project location, contact person's name, contact person's telephone number, contact persons role during the project, dates of startup, and commissioning.

1.06 QUALITY ASSURANCE

A. Preparation of the plant checkout plan, functional completion testing, and startup and commissioning shall be performed by personnel:

1. Trained and experienced in O&M of the described equipment.

2. Familiar with the treatment or unit process.

1.07 PLANT CHECKOUT PLAN

A. The Contractor shall be responsible for preparing, coordinating, and executing the Plan.

1. The Contractor shall use the resources of the equipment and unit process systems suppliers in this work, particularly for specific equipment and unit process systems.

2. An initial draft of the Plan shall be submitted as indicated here:

a. The initial draft of the Plant Checkout Plan shall be completed and submitted by the Contractor to the Engineer for review. The Engineer will require at least 15 days to review the submittal and return with any comments.

b. The Contractor shall incorporate the Engineer's comments into the revised Plan within 15 days of the receiving comments and reissue the Plan to the Engineer and Owner.

c. The Contractor shall regularly schedule meetings with the Engineer and Owner to review and coordinate activities required by the Plan.

B. The Contractor shall provide a dedicated field staff to support the Plan activities. A Startup Coordinator shall be responsible for day to day activities and shall be the primary contact with the Engineer regarding Plan activities. Support staff shall include, but not be limited to designated mechanical, electrical and instrumentation and control engineers and technicians, and operating staff.

1. The Contractor must engage a **certified plant operator** for oversight during start-up, testing, and plant commissioning. The City's staff will be present to learn about the plant in commissioning and witnessing performance testing activities specified herein.

a. The Contractor may require assistance of Owner's operating maintenance staff in witnessing the performance testing activities, at the convenience of the Owner.

b. These activities shall be incorporated in the Plan in defining responsibilities of the Plan participants.

C. The Plant Checkout Plan shall define:

1. The logical and systematic performance of physical inspections, field and functional tests, startup, commissioning, and performance testing including:

a. A chronological schedule of all testing and inspection activities.

b. A checklist of all inspection and testing activities broken down by location, discipline, system, and device or item.

c. All blank forms proposed by the Contractor for verification or recording of the functional completion testing, startup, commissioning and performance testing.

d. An index which cross references the forms to their intended application(s).

e. A list of all suppliers' certifications, including those required by the applicable technical specifications. Provisions shall also be included for retesting, in the event it is required.

2. A list of participants in functional completion testing, startup, commissioning, and subsequent performance testing.

3. A list of special test equipment required for functional testing, startup, commissioning, and performance testing.

4. Sources of the test media (wastewater, water, power, air, etc.) for functional completion testing.

5. The proposed method of delivery of the media to the equipment to be tested during functional completion testing, startup, commissioning, and performance testing.

6. Temporary or interim connections for the sequencing of multiple units during functional completion testing, startup, commissioning, and performance testing.

7. Ultimate disposal of the test media after functional completion testing, startup, commissioning, and performance testing.

D. The Plant checkout plan shall be reviewed by the Engineer and Owner, modified or revised as necessary by the Contractor, then re-reviewed by the Engineer. The Contractor shall continue to update the Plan, working in conjunction with the Engineer and Owner, prior to the start of the scheduled equipment checkout. Each specific element of the plan must receive opportunity for review or comment by the Owner, two weeks prior to the actual commencement of testing as defined herein.

E. The Contactor shall designate, in the Plan, a Startup Coordinator, to coordinate and manage the activities defined in the Plan.

1.08 FUNCTIONAL COMPLETION TESTING

A. Functional Completion Testing shall be completed as construction and installation of equipment is completed to demonstrate that the equipment is ready for equipment and unit process systems startup.

1. Functional Completion Testing shall be done in coordinated manner based on the Plant Checkout Plan prepared by the Contractor.

a. The Owner's operating and maintenance staff shall be allowed to observe for the purposes of familiarization and training.

b. Additional witnesses, such as the Engineer, may be present to represent the Owner.

2. Functional Completion Testing procedures and documentation forms shall be developed by the Contractor. The procedures shall include a listing of items inspected for Functional Completion Testing.

3. If any equipment or unit process systems do not meet Functional Completion Testing requirements, it shall be the responsibility of the Contractor to make the necessary corrections or replacements and repeat the test.

4. The equipment and unit process systems shall not be started up or put into service until the Functional Completion Testing is completed as evidenced by a completed Functional Completion Testing certificate for the equipment or subsystem.

5. Modifications to the equipment and unit process systems required to meet Functional Completion Testing requirements shall be provided by the contractor, and all retesting shall be performed at no additional cost to Owner.

6. A Functional Completion Testing Certificate form shall be prepared by the Contractor for each piece of equipment or unit process and submitted to the Engineer and Owner for review.

1.09 STARTUP (For more information on MBR Startup see Section 45 44 00)

A. Startup activities for the Facility shall not be initiated until the Functional Completion Testing is satisfactorily completed for the equipment or unit process systems.

B. The requirements of this section shall be satisfactorily completed prior to beginning Commissioning for the equipment and unit process systems.

C. The Contractor shall be responsible for startup.

1. The Owner's operating and maintenance staff shall be allowed to observe for the purposes of familiarization and training.

2. Additional witnesses, such as the Engineer, may be present to represent the Owner.

D. For equipment or unit process systems that do not meet the specified Startup requirements, it shall be the responsibility of the Contractor to make the necessary corrections or replacements and repeat Startup at no additional cost to the Owner.

E. Startup Reports for each piece of equipment or unit process shall be completed and submitted by the Contractor to the Engineer and Owner.

F. The Contractor shall not begin Commissioning until Startup certificate is completed and is submitted.

1.10 COMMISSIONING (For more information on MBR Commissioning see Section 45 44 00)

A. Commissioning activities for the Facility shall not be initiated until the requirements of Startup are completed for the equipment or unit process systems.

B. The requirements of this section shall be satisfactorily completed prior to beginning Performance Testing for equipment and unit process systems.

C. Commissioning shall be used by the Contractor and equipment or unit process suppliers to adjust, fine tune, modify, and prepare the equipment or system for continuous operation and Performance Testing as noted in Section 1.11.

1. Equipment shall not be operated without the guidance of qualified personnel having the knowledge and experience necessary to conduct proper operation thereof and obtain valid results.

2. All required adjustments, test, operation checks, and Startup and Commissioning activities shall be provided by qualified personnel.

3. Contractor shall be responsible for planning, supervising, and executing the Startup and Commissioning of the equipment and unit process systems with the assistance of equipment or unit process systems suppliers in accordance with the Plan.

D. The Contractor shall be responsible for Commissioning under the direction of its Startup Coordinator.

1. *The contractor is responsible for operation of the plant during commissioning and performance testing. The contractor shall engage a certified plant operator (approved by the MBR manufacturer) to operate the plant until the City acceptance of the system*

2. The contractor shall provide raw materials, chemicals, seed sludge, water, and utilities during testing, commissioning, and performance testing.

3. The Owner's operating and maintenance staff shall be allowed to observe for the purposes of familiarization and training.

4. Additional witnesses, such as the Engineer, may be present to represent the Owner.

E. For equipment or unit process systems that do not meet Commissioning requirements, it shall be the responsibility of the Contractor to make the necessary

corrections or replacements and repeat Commissioning and performance testing at no additional cost to the Owner.

F. The equipment or unit process systems shall not be Performance Tested or otherwise placed into service until Commissioning is completed as evidenced by a completed Commissioning certificate for the equipment or unit process systems.

G. Commissioning Certificates for each piece of equipment or unit process shall be completed and submitted by the Contractor, or manufacturer rep. to the Engineer and Owner.

1.11 PERFORMANCE TESTING (For more information on MBR Performance Testing see Section 45 44 00)

A. Performance Testing is defined as a test to demonstrate the specified output of the equipment and unit process systems while maintaining regulatory compliance with Federal, State, and Local government regulations and minimum compliance with the equipment or unit process systems performance requirements and guarantees for a minimum of thirty days.

B. During the performance testing, daily equal volume composite samples from the influent and effluent shall be obtained by the Contractor (or Owner if contractor makes prior arrangements for the owner to assist).

C. These samples will be for the measurement of the following parameters by the independent certified lab:
1. BOD_5.
2. TSS.
3. TKN.
4. NH_3-N.
5. TP as P
6. TN.
7. Flow.

D. The treated effluent shall meet these parameters:

Parameter	Effluent Limits
BOD_5	<5 mg/L
TSS	<5 mg/L
TKN	<10 mg/L
NH_3-N	<1 mg/L
TP as P	<0.5mg/L
TN	<10 mg/L
Fecal	200 (count/100 mL)

1.12 OPERATING PERIOD

A. Operating period is defined as a 30-day period that the Owner operates the plant while the contractor provides personnel which are available to answer questions, address operational issues and equipment malfunctions and adjustments, and similar items during the initial operating period.

PART 2 – PRODUCTS

Not used

PART 3 – EXECUTION

3.01 PLANT CHECKOUT PLAN

A. The Plan shall include the following items as a minimum:

1. Cover Sheet with Plant identification, title, date, and other information as needed to properly identify the specific information for the Facility.

2. Status and revisions sheet with appropriate dates and signatures spaces to document the development and status of the document.

3. Table of Contents including Appendix.

4. Equipment and systems descriptions with anticipated break down for individual startup activities. This section shall define the individual "packages" for startup activities for the equipment or unit process systems.

5. Schedule of events and other activities covered by the Plan.

   a. The schedule shall define dates for completing activities for equipment and unit process systems.

   b. The schedule shall be the Contactor's best estimate of time sequence at the time of issuance.

   c. The Contractor shall submit schedule updates to the Plan as necessary and at least monthly.

   d. The schedule shall follow the required sequencing as specified herein.

6. Sign-off sheets consisting of certification forms or completion reports required by the specifications shall be included in the Plan. Standard forms shall be developed by the Contractor for this purpose.

7. Reports, test results and other supporting data shall be collected by the Contractor for documentation of the specific details leading to the certification or completion.

B. Following shall be the sequence for completing functional completion testing, startup, commissioning, and performance testing activities required by the Plan.

1. Influent pump Station
2. Influent Screens
3. Grit Removal System
4. EQ Tank Mixer & Pump Station

5. MBR Process (see Section 45 50 00 for more information)
6. Digester and MBT
7. UV Disinfector
8. Drain pump station
9. Sludge Dewatering
10. Chemical feed system
11. Standby generator
12. D.O improvements
13. Effluent Pump Station system.

C. Any variation in the startup sequence deemed necessary by the Contractor shall be reviewed by the Engineer prior to changing the sequence.

3.02 FUNCTIONAL COMPLETION TESTING

A. Provide 15 working days written notice to the Engineer for each Functional Completion Test so that the Engineer may witness the functional completion tests. The Engineer may witness the performance of any or all Functional Completion Testing, at the Engineer's option.

B. Testing shall be conducted in accordance with the accepted Plan using applicable standard techniques reviewed by the Engineer and Owner.

1. Local and remote instrumentation may be used to record test data where it is determined the devices have been calibrated and are sufficient to obtain necessary data.

C. The Contractor shall develop standard data sheets to document Functional Completion Testing requirements have been met for all equipment and unit process systems included in the Plan.

1. As equipment testing is completed, the appropriate data sheet shall be completed and signed by the responsible party and submitted to the Engineer for review and acceptance.

2. Data values shall be stated in the engineering units noted in the equipment specifications.

D. A detailed Functional Completion Test plan shall be prepared and submitted to the Engineer for review and comment as noted paragraph 1.08 above.

1. The plan shall be prepared by the Contractor in conjunction with the equipment or subsystem supplier and shall become a part of the overall Plan.

E. In the event no reference to procedures is made, or no procedures for startup and commissioning are contained in a technical specification for the following test parameters, the following shall be the checkout requirements. Should their requirements conflict with the Supplier's recommendations or in any way be less stringent that the Supplier's requirements, they shall be superseded by the Supplier's requirements for checkout testing.

1. Measurement of wearing ring clearances for all pumps requiring assembly, so equipped:

   a. Take two readings taken opposed to each other by 90 degrees.

   b. All measured clearances shall be within Supplier's specifications for new installation. Replace and recheck rings found to be out of round or out of specified tolerance.

2. Measure of Impeller Bore for all pumps requiring assembly:

   a. Take two readings opposed to each other by 90 degrees.

   b. All measured clearances shall be within Supplier's specifications for new installation. Replace and recheck impellers found to be out of round or out of specified tolerance.

3. Measurement of shaft runout for all rotating equipment requiring assembly:

   a. Remove bearings from the shaft. Support shaft on pedestal rollers or in a lathe.

   b. Check each shoulder on the shaft.

   c. Take two readings for each shoulder, opposed to each other by 90 degrees.

   d. All measured clearances shall be within Supplier's specifications for new installations. Replace and recheck shafts found to be out of round or out of specified tolerance.

4. Vibration Measurements:

   a. Provide vibrational signature testing and documentation for each piece of direct drive or close coupled rotating equipment with a motor HP of 100 or above and a rated operating speed in excess of 1999 RPM.

   b. Unless specified otherwise, the current edition of the Hydraulic Institute Standard, "Acceptable Field Vibration Limits" shall be the standard for vibrational testing.

   c. Take all specified vibrational readings in three directions: vertical, horizontal, and axial.

   d. Provide vibrational measurements in the following engineering units:

      1. Displacement in thousandths of an inch (mils), peak to peak.

      2. Velocity in inches per second (ips), peak to peak.

3. Acceleration in feet per second per second (lg=32.3 ft. /sec. /sec.) zero to peak.

4. Spike energy in g-SE.

5. The vibrational readings shall be less than the device rotating frequency, and within the operating band specified by the Supplier.

6. Amplitude Allowable Maximums:

RPM	Amplitude inches peak to peak:
3,000 and above	0.001
1,500 – 2,999	0.002
1,000 – 1,499	0.0025
999 and below	0.003

5. Belt Drives:

a. All belts shall ride within the sheave and not slip to the groove(s).

b. Belt tension shall be in accordance with Supplier's recommendations.

c. Pulley alignment shall be within Supplier's recommendations.

6. Gear Drives and Reducers:

a. Check gears for lash at no less than three points around the gear.

b. Rotate gears a full 360 degrees while checking alignment.

7. Coupling/Shaft Alignment:

a. Perform all final alignments and checks with a dial indicator or a laser device. Feeler gauges and straight edges are not acceptable.

b. Eliminate soft foot conditions prior to aligning.

c. When checking for final soft foot, any displacement in excess of 0.002" must be corrected.

d. When checking for pipe strain, any displacement in excess of 0.002 inches requires piping realignment.

e. Alignments will not be regarded as final until the grout is set, and all piping has been attached. Demonstrate that alignment is not changeg by attachment of piping.

f. Shim the driving element, never the driven element.

g. Take bracket sag connections into account when using a dial indicator. Bracket sag shall be determined on a rigid pipe.

h. Mount a dial indicator to the driven element so that it can be rotated. Rotate both elements while aligning.

i. When aligning three coupled elements, align gear reduction elements with the driven element first, then align the driver to the gear reduction element.

j. Check all four alignments, i.e., angular alignment in the vertical and horizontal planes and parallel alignment in the vertical and horizontal planes.

k. The acceptable alignment accuracy for flexible couplings is +0.005 inches, or the Supplier's specifications, whichever is more stringent.

l. The dial indicators must be perpendicular to the alignment surface.

m. Number hold down nuts prior to tightening. Loosen in reverse order. Tighten in ascending order.

n. Use only clean, deburred shims. Clean the machine base and feet from rust or burrs prior to alignment.

8. Measure of Noise (dBA):

a. Eliminate noise sources generated by adjacent construction activity prior to testing.

b. Establish a background noise level prior to testing.

c. Perform noise level testing on each installed device as required by the technical specifications.

d. The maximum noise level exposure is 65 dBA over eight hours continuous for office, shop, and other areas where the Owner's personnel will be performing their duties.

e. The maximum noise level at five feet from the generator shall be 65 dBA.

9. Hydrostatic Testing:

a. AWWA C600 standards latest edition are the standards for all hydrostatic testing.

b. Visually inspect all welds prior to testing, for cracks, undercut on surface greater than 1/32-inches deep, lack of fusion on surface, reinforcement greater than Table 127.4.2 located in ANSI B31.1 Power Piping, and incomplete penetration (when accessible). Repair or rework as directed by the Engineer.

c. At no time during hydrostatic testing shall any part of the piping system be subjected to a stress greater than 90 percent of its yield strength at test temperature.

d. After ten minutes of full hydrostatic test pressures, make an examination for leakage of all joints, connections, and all regions of high stress, such as around openings and thickness transition sections.

e. Unless otherwise specified, the minimum required hydrostatic test pressure shall be one and a half times the design pressure as specified or 150 psi minimum or as indicated.

F. The Contractor shall furnish the service of an authorized, competent representative of the equipment or unit process supplier to supervise and coordinate the Functional Completion Testing program.

1. Instrument readings and other test data shall be tabulated by the Contractor.

G. Document Requirements:

1. Certificates are required for all Functional Completion Testing for equipment and unit process systems. Four copies of the completed certificates shall be supplied for review by the Engineer. Contents of the certificate shall be supplied for review by the Engineer. Contents of the certificate shall be at a minimum:

a. Contractor Review Comments and Approval Page. This page shall include Certification by the preparer that he or she is the person responsible for the test data and the data is authentic and accurate. This page shall include a listing and signature of all witnesses to the test.

b. Equipment Suppliers Review Comments and Approval Page. This page shall include Certification by the equipment or unit process systems suppliers that the equipment or unit process systems are properly installed and suitable for startup.

c. Process, Equipment, and P&ID's involved in this Functional Completion Test.

d. Schedule.

e. Test Descriptions/Procedures.

1. Equipment or unit process systems tested.
2. Test dates.
3. Electrical Inspection and Tests.
4. Test results.

5. Any repairs or corrections required to obtain acceptable test results.
6. Calibration sheet for instrumentation or devices used for testing but not part of plant installation.
7. Copies of calibration records for plant installed instrumentation.

f. Certify Mechanical Installation. Inspection and certification to be conducted by equipment representative. Inspect and certify that each piece of equipment meets the following requirements:

1. Not damaged in transportation or installation.
2. Properly installed with no undue force imposed from piping or supports.
3. Is properly lubricated.
4. Motor rotation is correct.
5. Free of overheating.
6. Free of vibration.
7. Free of noise.
8. Functions without overloading.
9. Piping and other connections are completed.
10. No leaks at equipment connections (static pressure testing).

g. Certify Electric Valve Mechanics and Installation.

h. Inspect and certify that each valve meets the following requirements:

1. Not damaged in transportation or installation.
2. Properly installed with no undue force imposed from piping or supports.
3. Is properly lubricated.
4. Motor rotation is correct.
5. Free of overheating.
6. Free of vibration.
7. Free of noise.
8. Properly opens / closes
9. Piping and other connections are completed.
10. No leaks at equipment connections (static pressure testing).

i. Instrumentation and Control Inspection and Test.

2. Tests certificates shall be submitted no later than 30 calendar days, after testing ends. The Engineer and Owner shall have 30 calendar days to complete a review and return with exceptions noted.

3.3 STARTUP (For more information on MBR Startup see Section 45 44 00)

A. Provide 15 days written notice to the Engineer for each startup procedure so that the Engineer may witness each startup procedure. The Engineer may witness the performance of any or all each startup procedure, at the Engineer's option.

B. Startup shall begin after Functional Completion Testing, when the equipment or unit process systems are subject to full operation using a process flow substitute.

1. Startup activities shall be carried out to show the equipment and unit process systems are functional.

2. The various vendors, equipment suppliers and manufacturers shall provide on-site supervision and assistance for Startup services for the new facility.

C. The Contractor shall coordinate all startup activities for equipment and unit process systems in accordance with the accepted Plan. The Contractor shall develop a detailed Startup plan as part of that Plan that includes the following as a minimum:

1. Description of the overall, general startup process.

2. List of equipment and unit process systems included for Startup activities.

3. Detailed startup sequence of activities.

4. Equipment and system boundaries as shown using marked-up P&IDs.

5. Listing of staff and responsibilities for activities.

D. Startup Requirements: The following are minimum requirements for completion of Startup activities:

1. Startup shall show that the equipment or unit process systems are suitable for continuous operation.

a. Startup shall also demonstrate that local and remote instrumentation and controls are functioning properly and communicating with each other properly.

b. Equipment or unit processes shall be operated for a minimum of 72 hours without interruptions in service.

c. If the startup fails, the contractor will be responsible for redoing the startup testing at no additional costs to the Owner.

E. Document Requirements

1. A Startup certificate shall be prepared and submitted to the Engineer for review and returned with any exceptions noted. The reports shall include, but not be limited to, the following:

a. Contractor Review Comments and Approval Page. This page shall include Certification by the preparer that he/she is the person responsible for the test data and the data is authentic and accurate. This page shall include a listing and signature of all witnesses to the test. Certification by the Contractor that the equipment or the unit process systems were operated continuously for the specified period and that the equipment or unit process systems operated in compliance with the specified operating conditions, parameters and performance and that the equipment or unit process systems are suitable for Commissioning.

b. Equipment Suppliers Review Comments and Approval Page. This page shall include Certification by the equipment or unit process systems suppliers that the equipment or unit process systems have been started up properly and operated within the design parameters. Certification by the equipment or unit process systems supplier that the equipment or the unit process systems were operated continuously for the specified period and that the equipment or unit process systems operated in compliance with the specified operating conditions, parameters and performance and that the equipment or unit process systems are suitable for Commissioning.

c. Engineer Review Comments and Approval Page.

d. Process, Equipment, and P&IDs Involved in this startup test.

e. Final Startup Schedule.

f. Test Description and Procedures.

1. Equipment or unit process systems tested.

2. Test dates.

3. Electrical Inspection and Tests.

4. Test results.

5. Any repairs or corrections required to obtain acceptable test results.

6. Calibration sheet for instrumentation or devices used for testing but not part of plant installation.

g. Appendix:

1. A summary of all data used in the calculations, including source, and formulas with all terms defined.

2. Calculations for all data submitted, fully defined.

3. Copies of all raw field data sheets, including those indicating sampling point locations, and notes.

4. Production and operational data.

5. Calibration procedures and work sheets for sampling equipment.

6. Copies of calibration records for instrumentation.

3.04 COMMISSIONING (For more information on MBR Commissioning see Section 45 44 00)

A. Provide 15 working days written notice to the Engineer for each commissioning procedure so that the Engineer may witness each commissioning procedure. The Engineer may witness the performance of any or all each commissioning procedure, at the Engineer's option.

B. Commissioning shall begin after Startup Testing, wherein the equipment or unit process systems are subjected to full operation using the process flows.

1. On successful completion of Startup, process flows and solids shall be used for commissioning the equipment and unit process systems to show the equipment and unit process systems function properly. Commissioning shall confirm the proper operation of the equipment and unit process systems with process fluids and process solids, adjustments shall be made, and the equipment or unit process systems shall be optimized and brought into compliance with design criteria.

2. The various vendors, equipment suppliers and manufacturers shall provide on-site supervision and assistance for Commissioning services for the new facility.

C. The Contractor shall coordinate all Commissioning activities for equipment and unit process systems in accordance with the accepted Plan. The Contractor shall develop a detailed Commissioning plan as part of that Plan that includes the following as a minimum:

1. Description of the overall, general Commissioning process.

2. List of equipment and unit process systems included for Commissioning activities.

3. Detailed Commissioning sequence of activities.

4. Equipment and system boundaries as shown using marked-up P&IDs.

5. Listing of staff and responsibilities for activities.

D. Commissioning Requirements: The following are minimum requirements for completion of Commissioning activities:

1. Commissioning shall show that the equipment and unit process systems are capable of continuous operation using process liquids and solids, chemicals, and utilities; and that the flows, wastewater, operating parameters, and performance requirements have been demonstrated for a minimum of seven days of continuous operation, or the period required in the equipment specifications, whichever is longer.

    a. Shutdowns that occur because of power outages, acts of God, or failure of support systems not part of this contract will not be a cause of failure of the seven days of continuous operation.

2. If the commissioning fails, the contractor will be responsible for redoing the commissioning at no additional cost to the Owner.

E. Documentation Requirements:

1. A Commissioning report shall be prepared and submitted to the Engineer for review and retuned with any exceptions noted. The reports shall include, but not be limited to, the following:

    a. Contractor Review Comments and Approval Page. This page shall include Certification by the preparer that he or she is the person responsible for the test data and the data is authentic and accurate. This page shall include a listing and signature of all witnesses to the test. Certification by the Contractor that the equipment or the unit process systems were operated continuously for the specified period and that the equipment or unit process systems operated in compliance with the specified operating conditions, parameters and performance; and that the equipment or unit process systems are suitable for Performance Testing.

    b. Equipment Suppliers Review Comments and Approval Page. This page shall include Certification by the equipment or unit process systems suppliers that the equipment or unit proves systems have been started up properly and operated within the design parameters. Certification by the equipment or unit process systems supplier that the equipment or the unit process systems were operated continuously for the specified period and that the equipment or unit process systems operated in compliance with the specified operating conditions, parameters and performance; and that the equipment or unit process systems are suitable for Performance Testing.

    c. Engineer Review Comments and Approval Page.

    d. Process, Equipment, and P&IDs Involved in this startup commissioning test.

    e. Commissioning Schedule.

    f. Test Description and Procedures.

1. Equipment or unit process systems tested.
2. Test dates.
3. Electrical Inspection and Tests.
4. Test results.
5. Any repairs or corrections required to obtain acceptable test results.
6. Calibration sheet for instrumentation or devices used for testing but not part of plant installation.

g. Appendix:

1. A summary of all data used in the calculations, including source, formulas with all terms defined.
2. Calculations for all data submitted, fully defined.
3. Copies of all raw field data sheets, including those indicating sampling point locations, and notes.
4. Production and/or operational data.
5. Calibration procedures and work sheets for sampling equipment.
6. Copies of calibration records for instrumentation.

3.05 PERFORMANCE TESTING

(For more information on MBR Performance Testing see Section 45 44 00)

A. Begin a seven-day Performance Test after successful commissioning and approval by regulatory agencies including, but not limited to Georgia EPD.

END OF SECTION

INDEX TO

SECTION 01 78 33

BONDS

SECTION 01 78 33

BONDS

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Preparation and submittal of bonds.

B. Time and schedule of submittals.

1.02 RELATED SECTIONS

A. City's front end documents – Invitation to Bid and Instruction to Bidders.

B. Document General Conditions – EJCDC: Performance bond and labor and material payment bonds.

C. Section 01 77 00 –Closeout Procedures: Contract closeout procedures.

D. Section 01 78 23 – Operation and Maintenance Data.

E. Individual Specifications Sections: Bonds required for specific Products or Work.

1.03 FORM OF SUBMITTALS

A. Bind in commercial quality 8–1/2 x 11 appropriately sized, D-ring binders with durable covers.

B. Cover: Identify each binder with typed or printed title BONDS with title of Project; name, address, and telephone number of Contractor and equipment supplier; and name of responsible company principal.

C. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of Product or work item.

D. Separate each bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principals.

E. Provide a summery sheet of all bonds.

1.04 PREPARATION OF SUBMITTALS

A. Obtain bonds executed by responsible Subcontractors, suppliers, and manufacturers, in accordance with timeframes listed herein.

B. Verify documents are in proper form, contain full information, and are notarized.

C. Co–execute submittals when required.

D. Retain bonds until time specified for submittal.

1.05 TIME OF SUBMITTALS

A. For equipment or components of equipment put into service during construction with Owner's permission, submit documents within ten days of Owner's acceptance.

B. Make other submittals within ten days of date of final acceptance of the item or Work, prior to final Application for Payment.

C. For items or Work for which acceptance is delayed beyond date of completion, submit within ten days of acceptance, listing the date of acceptance as the beginning of the bond period.

END OF SECTION

INDEX TO

SECTION 01 78 36

WARRANTIES

SECTION 01 78 36

WARRANTIES

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Preparation and submittal of warranties.

B. Time and schedule of submittals.

1.02 RELATED SECTIONS

A. General Conditions – EJCDC: Warranties and correction of work.

B. Section 01 77 00 – Closeout Procedures: Contract closeout procedures.

C. Section 01 78 23 – Operation and Maintenance Data.

D. Individual Specifications Sections: Warranties required for specific Products or Work.

1.03 FORM OF SUBMITTALS

A. Bind in commercial quality 8–1/2 x 11, appropriately sized, D- ring binders with durable covers.

B. Cover: Identify each binder with typed or printed title WARRANTIES with title of Project; name, address, and telephone number of Contractor and equipment supplier; and name of responsible company principal.

C. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual. Identify each item with the name of Product or work item and the number and title of the specification section in which it is specified.

D. Separate each warranty with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

E. Provide a summery sheet of all warranties.

1.04 PREPARATION OF SUBMITTALS

A. Obtain bonds executed by responsible Subcontractors, suppliers, and manufacturers, in accordance with timeframes listed herein.

B. Verify documents are in proper form, contain full information, and are notarized.

C. Co–execute submittals when required.

D. Retain warranties until time specified for submittal.

1.05 TIME OF SUBMITTALS

A. For equipment or components of equipment put into service during construction with Owner's permission, submit documents within ten days of Owner's acceptance.

B. Make other submittals within ten days of date of final acceptance of the item or Work, prior to final Application for Payment.

C. For items or Work for which acceptance is delayed beyond date of final completion, submit within ten days of acceptance, listing the date of acceptance as the beginning of the warranty period.

END OF SECTION

INDEX TO

SECTION 01 79 00

DEMONSTRATION AND TRAINING

SECTION 01 79 00

DEMONSTRATION AND TRAINING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Specifications, apply to this Section.

1.02 SUMMARY

A. Section includes administrative and procedural requirements for instructing utilities personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.

2. Training in operation and maintenance of systems, subsystems, and equipment.

3. General Contractor to make **video** of all equipment and components training and start-up. A copy of the training shall be made to the owner and the Engineer for future reference.

1.03 INFORMATION SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' name for each training module. Include outline for each training module.

B. Qualification Data: For instructor, demonstrating qualifications and ability to instruct on maintenance and care of system, equipment, and products.

C. Schedule of Demonstration and Training: Prepare a schedule in tabular form of all demonstration and training required in individual Specification Sections including:

1. Specification Section number and title.

2. Description of required demonstration and training.

D. Attendance Record: For each training module, submit list of participants and length of instruction time.

1.04 QUALITY ASSURANCE

A. Instructor Qualifications: A factory-authorized service representative, experienced in operation and maintenance procedures and training. Manufacturer's sales staff is not acceptable.

B. Pre-instruction Conference: Conduct conference at Project site to review methods and procedures related to demonstration and training.

PART 2 – PRODUCTS

2.01 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Provide trainee manuals.

C. Training Modules: For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Including the following:

   a. System, subsystem, and equipment descriptions.

   b. Operating standards.

   c. Regulatory requirements.

   d. Equipment function.

   e. Operating characteristics.

   f. Limiting conditions.

   g. Performance curves.

2. Documentation: Review the following items in detail:

   a. Emergency manuals.

   b. Operations manuals.

   c. Maintenance manuals.

   d. Project record documents.

   e. Identification systems.

   f. Warranties and bonds.

   g. Maintenance service agreement and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

a. Instructions on meaning of warnings, trouble indications, and error messages.

b. Instructions on stopping.

c. Shutdown instructions for each type of emergency.

d. Operating instructions for conditions outside of normal operating limits.

e. Sequences for electric or electronic systems.

f. Special operating instructions and procedures.

g. A tour of the installation identifying the location of all system components.

4. Operations: Include the following, as applicable:

a. Startup procedures.

b. Equipment or system break-in procedures.

c. Routine and normal operating instructions.

d. Regulation and control procedures.

e. Control sequences.

f. Safety procedures.

g. Instructions on stopping.

h. Normal shutdown instructions.

i. Operating procedures for emergencies.

j. Operating procedures for system, subsystem, or equipment failure.

k. Seasonal and weekend operating instructions.

l. Required sequences for electric or electronic systems.

m. Special operating instructions and procedures.

n. Sequence of operation.

5. Adjustments: Include the following:

a. Alignments.

b. Checking adjustments.

c. Noise and vibration adjustments.

d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

a. Diagnostic instructions.

b. Testing and inspection procedures.

7. Maintenance: Include the following:

a. Inspection of procedures.

b. Types of cleaning agents to be used and methods of cleaning.

c. List of cleaning agents and methods of cleaning detrimental to product.

d. Procedures for routine cleaning.

e. Procedures for preventative maintenance.

f. Procedures for routine maintenance.

g. Instruction on use of special tools.

8. Repairs: Include the following:

a. Diagnosis instructions.

b. Repair instructions.

c. Disassembly; component removal, repair, and replacement; and reassembly instructions.

d. Instructions for identifying parts and components.

e. Review of spare parts needed for operation and maintenance.

f. Product support/service model.

g. Purchasing of replacement parts.

9. Instruction specific to Instrumentation and Controls, Electrical, Lighting Controls, or any other new technology that is integrated with another system: Include the following:

a. Overview and theory.

b. Wiring diagrams, including the one-line diagram.

c. Graphics packages and touch screens for the system.

d. Alarms and diagnostics.

e. Reporting functions dynamically and historically.

f. Remote access to the system.

g. Database back-up and maintenance.

h. Replacement and re-programming of replacement parts.

i. Programming.

j. Help files and other troubleshooting documentation.

D. Operation and Maintenance Manuals: Provide appropriate Operation and Maintenance manuals in each training session so that the detail drawings and maintenance activities are outlined and discussed for each application.

PART 3 - EXECUTION

3.01 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module.

B. Set up instructional equipment at instruction location.

3.02 INSTRUCTION

A. Engage qualified instructors to instruct personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Coordinate schedule for all training with Engineer and provide the following:

a. Minimum three weeks notification.

b. Training matrix in calendar format.

c. Training outline for each session.

2. Do not schedule until equipment has been started up, commissioned, and is currently operating in its normal condition.

3. Do not schedule overlapping training sessions.

4. Schedule training sessions for a maximum of four hours per day; afternoons preferred.

5. Provide separate training session on each system for operational/maintenance groups and user groups.

6. Training sessions will be cancelled and rescheduled unless the following documentation is received:

   a. Instruction qualifications.

   b. Evidence that equipment has been started up, commissioned, and is currently operating in its normal condition.

   c. Operation and Maintenance manuals.

C. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION

INDEX TO

SECTION 01 79 01

EQUIPMENT AND SYSTEM PERFORMANCE AND OPERATIONAL TESTING

SECTION 01 79 01

EQUIPMENT AND SYSTEM PERFORMANCE AND OPERATIONAL TESTING

PART 1 – GENERAL

1.01 DESCRIPTION

A. This section contains requirements for the Contractor's performance in documenting testing work required under this contract. In addition, this section contains requirements the for the Contractor's performance during installed performance testing of all mechanical, electrical, instrumentation, and HVAC equipment and systems, including structures for watertight construction, provided under this. This section supplements but does not supersede specific testing requirements found elsewhere in this project manual.

B. After equipment has been shown thru functional completion testing to be ready for equipment and process start up, the following outline applies for the MBR process.

1. Startup (clean water testing) is defined as the operation of equipment or unit process systems using clean water, air, or other fluids and gases as necessary to demonstrate the operation of the equipment or unit process systems with other equipment that is a part of or a treatment process for the Facility. (up to 20 days)

2. Commissioning is defined as the operation of equipment of unit process systems using wastewater, process liquids or process solids, plant support equipment, and plant utilities to demonstrate equipment or unit process systems are capable of processing water or wastewater at specified flows and conditions for a sustained period of operation as required by this section or equipment or unit process systems are ready to begin Performance Testing. (up to 120 days)

3. Performance Testing is defined as a test to demonstrate the specified throughout of the equipment and unit process systems while maintaining regulatory compliance with Federal, State, and Local government regulations and minimum compliance with the equipment or unit process systems performance requirements and guarantees. (up to 20 days)

4. During the performance testing, daily equal volume composite samples from the influent and effluent shall be obtained by the Contractor (or Owner if contractor makes prior arrangements for the owner to assist).

5. These samples will be for the measurement of the following parameters by the contractor:
   a. BOD
   b. TSS
   c. TKN
   d. NH3
   e. TP

f. TN
g. Flow

6. The treated effluent shall meet these parameters:

	Parameter	Effluent Limits
a.	BOD_5	<5 mg/L
b.	TSS	<5 mg/L
c.	TKN	<13 mg/L
d.	NH_3-N	<1mg/L
e.	TP as P	<0.5 mg/L
f.	TN	<10 mg/L
g.	Fecal/Coliform	200/100 mL

7. Operating period: is defined as a 60-day period that the Owner operates the plant while the contractor provides personnel which are available to answer questions, address operational issues and/or equipment malfunctions/adjustments and similar items during the initial operating period.

C. Performance Testing shall be completed for items of equipment and unit process systems to confirm that the equipment or unit process systems meet the Guaranteed Performance Criteria and the equipment and unit process systems performance criteria specified for the equipment or unit process. Performance Testing shall include testing requires by regulatory agencies or environmental regulations. Performance Testing shall be performed to demonstrate the specified throughput of the equipment and unit process systems while maintaining regulatory compliance with Federal, State, and Local government regulations and minimum compliance with the equipment or unit process systems performance requirements and guarantees.

D. The information collected shall be used as a basis for determining acceptability of the equipment or unit process systems to meet performance requirements.

E. If any of the equipment or unit process systems fail to meet the specified requirements and guarantees, it shall be the responsibility of the Contractor and equipment suppliers to make the necessary corrections or replacements and repeat the test. This procedure shall be followed until all equipment meets the guaranteed performance requirements and has been accepted by the Engineer.

F. All modifications required to meet performance criteria, and all retesting shall be performed at no additional cost to the Owner. This includes payment of all engineering fees and expenses associated with the Owner's other Consultant's observation of the retest.

G. Corrective work resulting from failed performance shall be immediately scheduled and work shall commence within one week unless there is supportable proof that this is impossible. In that case, the Contractor shall request in writing an extension of time indicating the exact time the corrective work will begin.

H. In the event that the equipment of unit process systems does not meet pass/fail criteria of the Performance Guarantees within the extension period stipulated in the

Contract, the Engineer shall determine acceptance per the provisions included in the Contract.

1.02 QUALITY ASSURANCE

A. CONTRACTOR'S QUALITY ASSURANCE MANAGER:

1. The Contractor shall appoint an operations engineer or equally qualified operations specialist as Quality Assurance Manager to manage, coordinate, and supervise the Contractor's quality assurance program. The Quality Assurance Manager shall have at least five years of total experience, or experience on at least five separate projects, in managing the startup commissioning of mechanical, electrical, instrumentation, HVAC, process, piping systems, and MBR systems. The quality assurance program shall include:

   a. A testing plan setting forth the sequence in which all testing work required under this project manual will be implemented.

   b. A documentation program to record the results of all equipment and system tests.

   c. An installed performance testing program for all piping, mechanical, electrical, instrumentation, and HVAC equipment and systems installed under this contract.

   d. A calibration program for all instruments, meters, monitors, gages, and thermometers installed under this contract.

   e. A calibration program for all instruments, gages, meters, and thermometers used for determining the performance of equipment and systems installed under this contract.

   f. A testing schedule conforming to the requirements specified in paragraph 01 79 01-2.02 C.

      1. For the purposes of this section, a system shall include all items of equipment, devices and appurtenances connected in such a fashion as their operation or function complements, protects or controls the operation or function of the others. The Quality Assurance Manager shall coordinate the activities of all subcontractors and suppliers to implement the requirements of this section.

B. CALIBRATION:

1. All test equipment (gages, meters, thermometers, analysis instruments, and other equipment) used for calibrating or verifying the performance of equipment installed under this contract shall be calibrated to within plus or minus two percent of actual value at full scale. Test equipment employed for individual test runs shall be selected so that expected values as indicated by the detailed performance specifications will fall between 60 and 85

percent of full scale. Pressure gages shall be calibrated in accordance with ANSI/ASME B40.1. Thermometers shall be calibrated in accordance with ASTM E77 and shall be furnished with a certified calibration curve.

2. Liquid flow meters, including all open channel flow meters and all meters installed in pipelines with diameters greater than two inches shall be calibrated in situ using either the total count or dye dilution methods. Gas flow meters installed in piping systems with diameters greater than six inches shall be calibrated in situ using the pitot tube velocity averaging method. Flow meter calibration work shall be performed by individuals skilled in the techniques to be employed. Calibration tests for flow metering systems shall be performed over a range of not less than ten percent to at least 75 percent of system full scale. At least five confirmed valid data points shall be obtained within this range. Confirmed data points shall be validated by not less than three test runs with results which agree within plus or minus two percent.

C. REFERENCES:

1. This section contains references to the following documents. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly. In the event of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

2. Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids). If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.

Reference	Title
ANSI/ASME B40.1	Gauges Pressure Indicating Dial Type—Elastic Element
ASTM E77	Method for Verification and Calibration of Liquid-in-Glass Thermometers
ASHRAE 41.8	Standard Methods of Measurement of Flow of Gas
Dye Dilution Calibration Method	Flow Measurements in Sanitary Sewers By Dye Dilution, Turner Designs Mountain View, California,
	Flow Measurement in Sewer Lines by the Dye Dilution Method, Journal of the Water Pollution Control Federation, Vol. 55, Number 5, May 1983, pg. 531

Reference	Title
	Flow Measurement in Open Channels and Closed Conduits, Vol 1, U.S. Department of Commerce, National Bureau of Standards, pg. 361
	Techniques of Water-Resources Investigations of the United States Geological Survey, Chapter 16, Measurement of Discharge Using Tracers

1.03 SUBMITTALS

A. Submittal shall consist of the following:

1. A complete description of the Contractor's plan for documenting the results from the test program in conformance with the requirements of paragraph 01 79 01-2.02 A, including:

   a. Proposed plan for documenting the calibration of all test instruments.

   b. Proposed plan for calibration of all instrument systems, including flow meters and all temperature, pressure, weight, and analysis systems.

   c. Sample forms for documenting the results of field pressure and performance tests.

2. The credentials and certification of the testing laboratory proposed by the Contractor for calibration of all test equipment.

3. Preoperational check-out procedures reviewed and approved by the respective equipment manufacturers.

4. Detailed testing plans, setting forth step-by-step descriptions of the procedures proposed by the Contractor for the systematic testing of all equipment and systems installed under this contract.

5. A schedule and subsequent updates, presenting the Contractor's plan for testing the equipment and systems installed under this contract.

6. A schedule establishing the expected time period (calendar dates) when the Contractor plans to commence operational testing of the completed systems, along with a description of the temporary systems and installations planned to allow operational testing to take place.

7. A summary of the Quality Assurance Manager's qualifications, showing conformance to paragraph 01 79 01-1.02 A requirements.

PART 2 – PRODUCTS

2.01 GENERAL

A. The Contractor shall prepare test plans and documentation plans as specified in the following paragraphs. The Engineer will not witness any test work for the purpose of acceptance until all test documentation and calibration plans and the specified system or equipment test plans have been submitted and accepted.

2.02 DOCUMENTATION

A. DOCUMENTATION PLANS:

1. The Contractor shall develop a record keeping system to document compliance with the requirements of this Section. Calibration documentation shall include identification (by make, manufacturer, model, and serial number) of all test equipment, date of original calibration, subsequent calibrations, calibration method, and test laboratory.

2. Equipment and system documentation shall include date of test, equipment number or system name, nature of test, test objectives, test results, test instruments employed for the test, and signature spaces for the Engineer's witness and the Contractor's quality assurance manager. A separate file shall be established for each system and item of equipment. These files shall include the following information as a minimum:

   a. Metallurgical tests
   b. Factory performance tests
   c. Accelerometer recordings made during shipment
   d. Field calibration tests[1]
   e. Field pressure tests[1]
   f. Field performance tests[1]
   g. Field operational tests[1]

3. Section 01 99 90 contains samples showing the format and level of detail required for the documentation forms. The Contractor is advised that these are samples only and are not specific to this project nor to any item of equipment or system to be installed under this contract. The Contractor shall develop test documentation forms specific to each item of equipment and system installed under this contract. Acceptable documentation forms for all systems and items of equipment shall be produced for review by the Engineer as a condition precedent to the Contractor's receipt of progress payments in excess of 50 percent of the contract amount. Once the Engineer has reviewed and taken no exception to the forms proposed by the Contractor, the Contractor shall produce sufficient forms, at his expense, to provide documentation of all testing work to be conducted as a part of this contract.

B. TEST PLANS:

[1]Each of these tests is required even though not specifically noted in detailed specification section.

1. The Contractor shall develop test plans detailing the coordinated, sequential testing of each item of equipment and system installed under this contract. Each test plan shall be specific to the item of equipment or system to be tested. Test plans shall identify by specific equipment or tag number. Each device or control station to be manipulated or observed during the test procedure, and the specific results to be observed or obtained. Test plans shall also be specific as to support systems required to complete the test work, temporary systems required during the test work, subcontractors' and manufacturers' representatives to be present and expected test duration. As a minimum, the test plans shall include the following features:

    a. Step-by-step proving procedure for all control and electrical circuits by imposing low voltage currents and using appropriate indicators to affirm that the circuit is properly identified and connected to the proper device.

    b. Calibration of all analysis instruments and control sensors.

    c. Performance testing of each individual item of mechanical, electrical, and instrumentation equipment. Performance tests shall be selected to duplicate the operating conditions described in the project manual.

    d. System tests designed to duplicate, as closely as possible, operating conditions described in the project manual.

2. Test plans shall contain a complete description of the procedures to be employed to achieve the desired test environment.

3. As a condition precedent to receiving progress payments in excess of 75 percent of the contract amount, or in any event, progress payments due to the Contractor eight weeks in advance of the date the Contractor wishes to begin any testing work (whichever occurs earliest in the project schedule), the Contractor shall have submitted all test plans required for the systematic field performance and operational tests for all equipment and systems installed under this contract. The Contractor shall reproduce the plans in sufficient number for the Contractor's purposes and an additional ten copies for delivery to the Engineer. No test work shall begin until the Contractor has delivered the specified number of final test plans to the Engineer.

C. TESTING SCHEDULE:

1. The Contractor shall produce a testing schedule setting forth the sequence contemplated for performing the test work. The schedule shall be in bar chart form, plotted against calendar time, shall detail the equipment and systems to be tested, and shall be coordinated with the Contractor's construction schedule. The schedule shall show the contemplated start date, duration of the test and completion of each test. The test schedule shall be submitted no later than four weeks in advance of the date testing is to begin. The Engineer will not witness any testing work for the purpose of acceptance until the Contractor has submitted a schedule to which the

Engineer takes no exception. The test schedule shall be updated weekly, showing actual dates of test work, indicating systems and equipment testing completed satisfactorily and meeting the requirements of this project manual.

a. The cost for the labor to conduct the testing shall be included in the lump sum cost of the project. The cost of test media, chemicals, electric power, and natural gas will be included in the lump sum cost of the project. The cost of test media, chemicals, electric power, and natural gas for any retesting will be accomplished at no additional cost to the Owner.

b. The tests shall be conducted in accordance with applicable industry standard techniques.

1. Local and remote on-site instrumentation equipment may be used to record test data where it is determined to be sufficiently accurate to obtain the necessary data for the performance evaluation.

2. Where special analysis and emissions testing are required, or other resources are needed for testing, the Contractor shall be responsible for providing them.

3. Where local instrumentation is available, manual logging of the data shall be done in conjunction with the instrumentation readings to verify remote instrumentation readings.

4. Any necessary adjustment to test results shall be made by use of standard formulas and relationships.

2. All data values shall be reported both as "measured" and corrected as required by the performance or regulations. Data values shall be stated in the engineering units noted for guaranteed performance or regulatory compliance.

3. Performance Testing shall be witnessed by the Engineer and Owner.

PART 3 – EXECUTION

3.01 GENERAL

A. The Contractor's quality control manager shall organize teams made up of qualified representatives of equipment suppliers, subcontractors, the Contractor's independent testing laboratory, and others, as appropriate, to efficiently and expeditiously calibrate and test the equipment and systems installed and constructed under this contract. The objective of the testing program shall be to demonstrate, to the Engineer's complete satisfaction, that the structures, systems, and equipment constructed and installed under this contract meet all performance requirements and the facility is ready for the commissioning process to commence.

In addition, the testing program shall produce baseline operating conditions for the Owner to use in a preventive maintenance program.

3.02 CALIBRATION OF FIXED INSTRUMENTS

A. Calibration of analysis instruments, sensors, gages, and meters installed under this contract shall proceed on a system-by-system basis. No equipment or system performance acceptance tests shall be performed until instruments, gages, and meters to be installed in that particular system have been calibrated and the calibration work has been witnessed by the Engineer.

B. All analysis instruments, sensors, gages, and meters used for performance testing shall be subject to recalibration to confirm accuracy after completion, but prior to acceptance of each performance test. All analysis instruments, sensors, gages, and meters installed under this contract shall be subject to recalibration as a condition precedent to commissioning.

3.03 START UP TESTS

A. GENERAL:

1. Tests shall consist of the following:

   a. Pressure and leakage tests.

   b. Electrical testing as specified in the applicable section.

   c. Wiring and piping, individual component, loop, loop commissioning, and tuning testing as described in the applicable section.

   d. Preoperational checkout for all mechanical and HVAC equipment. Preoperational check-out procedures shall be reviewed and approved by the respective equipment manufacturers.

   e. Initial operation tests of all mechanical, electrical, HVAC, and instrumentation equipment and systems to demonstrate compliance with the performance requirements of this project manual.

2. In general, tests for any individual system shall be performed in the order listed above. The order may be altered only on the specific written authorization of the Engineer after receipt of a written request, complete with justification of the need for the change in sequence.

B. PRESSURE AND LEAKAGE TESTS:

1. Pressure and leakage tests (including air tests for gravity lines) shall be conducted in accordance with applicable portions of these. All acceptance tests shall be witnessed by the Engineer. Evidence of successful completion of the pressure and leakage tests shall be the Engineer's signature on the test forms prepared by the Contractor.

C. FUNCTIONAL CHECKOUT:

1. Prior to energization (in the case of electrical systems and equipment), all circuits shall be rung out and tested for continuity and shielding in accordance with the procedures required in elsewhere.

D. COMPONENT CALIBRATION AND LOOP TESTING:

1. Prior to energization (in the case of instrumentation system and equipment), all loops and associated instruments shall be calibrated and tested in accordance with the procedures required in elsewhere.

E. ELECTRICAL RESISTANCE:

1. Electrical resistance testing.

F. PREOPERATIONAL TESTS:

1. Preoperational tests shall include the following:

   a. Alignment of equipment using reverse dial indicator method.

   b. Preoperational lubrication.

   c. Tests per the manufacturers' recommendations for prestart preparation and preoperational check-out procedures.

G. FUNCTIONAL TESTS:

1. GENERAL: Once all affected equipment has been subjected to the required preoperational check-out procedures and the Engineer has witnessed and has not found deficiencies in that portion of the work, individual items of equipment and systems may be started and operated under simulated operating conditions to determine as nearly as possible whether the equipment and systems meet the requirements of these specifications. If available, plant effluent may be employed for the testing of all liquid systems except gaseous, oil, or chemical systems. If not available, potable water shall be employed as the test medium. Test media for these systems shall either be the intended fluid or a compatible substitute. The equipment shall be operated a sufficient period to determine machine operating characteristics, including noise, temperatures and vibration; to observe performance characteristics; and to permit initial adjustment of operating controls. When testing requires the availability of auxiliary systems such as looped piping, electrical power, compressed air, control air, or instrumentation which have not yet been placed in service, the Contractor shall provide acceptable substitute sources, capable of meeting the requirements of the machine, device, or system at no additional cost to the Owner. Disposal methods for test media shall be subject to review by the Engineer. During the functional test period, the Contractor shall obtain baseline operating data on all equipment with motors greater than 1 horsepower to include amperage, bearing temperatures, and vibration. The baseline data shall be collected for the Owner to enter in a preventive maintenance system.

Test results shall be within the tolerances set forth in the detailed specification sections of this project manual. If no tolerances have been specified, test results shall conform to tolerances established by recognized industry practice. Where, in the case of an otherwise satisfactory functional test, any doubt, dispute, or difference should arise between the Engineer and the Contractor regarding the test results or the methods or equipment used in the performance of such test, then the Engineer may order the test to be repeated. If the repeat test, using such modified methods or equipment as the Engineer may require, confirms the previous test, then all costs about the repeat test will be paid by the Owner. Otherwise, the costs shall be borne by the Contractor. Where the results of any functional test fail to comply with the contract requirements for such test, then such repeat tests as may be necessary to achieve the contract requirements shall be made by the Contractor at his expense.

The Contractor shall provide, at no expense to the Owner, all power, fuel, compressed air supplies, water, and chemicals, all labor, temporary piping, heating, ventilating, and air conditioning for any areas where permanent facilities are not complete and operable at the time of functional tests, and all other items and work required to complete the functional tests. Temporary facilities shall be maintained until permanent systems are in service.

2. RETESTING: If under test, any portion of the work should fail to fulfill the contract requirements and is adjusted, altered, renewed, or replaced, tests on that portion when so adjusted, altered, removed, or replaced, together with all other portions of the work as are affected thereby, shall, unless otherwise directed by the Engineer, be repeated within reasonable time and in accordance with the specified conditions. The Contractor shall pay to the Owner all reasonable expenses incurred by the Owner, including the costs of the Engineer, as a result of repeating such tests.

3. POSTTEST INSPECTION: Once functional testing has been completed, all machines shall be rechecked for proper alignment and realigned, as required. All equipment shall be checked for loose connections, unusual movement, or other indications of improper operating characteristics. Any deficiencies shall be corrected to the satisfaction of the Engineer. All machines or devices which exhibit unusual or unacceptable operating characteristics shall be disassembled and inspected. Any defects found during the inspection shall be repaired or the specific part or entire equipment item shall be replaced to the complete satisfaction of the Engineer at no cost to the Owner.

3.04 COMMISSIONING

A. The Contractor shall provide system operation testing. After completion of all start up testing, the Contractor shall fill all process units and process systems, except those employing domestic water, oil, air, or chemicals, with plant effluent water. All domestic water, oil, air, and chemical systems shall be filled with the specified fluid.

B. Upon completion of the filling operations, the Contractor shall circulate water through the completed facility for a period of not less than 48 hours, during which all parts of the system shall be operated as a complete facility at various loading conditions, as directed by the Engineer. The testing period shall commence after this initial period of variable operation. This testing period shall be 14 days. Should the testing period be halted for any reason related to the facilities constructed or the equipment furnished under this contract, or the Contractor's temporary testing systems, the testing program shall be repeated until the specified continuous period has been accomplished without interruption. All process units shall be brought to full operating conditions, including temperature, pressure, and flow.

C. As-built documents of facilities involved shall be accepted and ready for turnover to the Owner at the time of the testing.

3.05 PERFORMANCE TESTING

Performance Testing is defined as a test to demonstrate the specified throughout of the equipment and unit process systems while maintaining regulatory compliance with Federal, State, and Local government regulations and minimum compliance with the equipment or unit process systems performance requirements and guarantees. (minimum 30 days).

3.06 INDEPENDENT TESTING ORGANIZATION

A. The Contractor shall be responsible for the contracting of an Independent Testing Organization and shall be responsible for payment of their services.

B. The testing organization will be under the direct supervision of the Contractor, with input from the equipment and unit process systems suppliers, and the Engineer.

1. All instructions, and any other type contact or correspondence shall be through the Contractor.

2. The Contractor shall submit qualifications for the Independent Testing Organization to the Engineer for review.

3.07 TEST COORDINATION

A. Where required, the Contractor shall furnish an authorized competent representative of the equipment or unit process systems suppliers to attend and coordinate the test program.

1. Test coordinator scope of services shall include preliminary instructions and orientation of Contactor's personnel prior to the actual test, instructions throughout the test period, recommended variations, if required, to assure validity of the test, and posttest instructions for system shutdown or continued operation as required by the Engineer.

2. Instrument readings and other test data shall be tabulated by the Contractor.

3. Data sheet copies shall be submitted to the Engineer for review and analysis at the end of each testing day.

B. The Contractor will work closely with the equipment or unit process systems supplier to aid in coordination of required plant functions involving systems not furnished by the suppliers of the equipment or unit process systems being tested. This shall include but is not limited to support equipment, utilities, and support processes.

3.08 TEST METHODS

A. Methods of data collections and analysis used for Performance Testing to show compliance shall be as required by regulatory agencies, industry standards and as specified with the equipment or unit process systems.

3.09 RESPONSIBILITIES

A. Responsibility for performance testing shall be with the Contractor. These assignments shall be detailed and assigned as part of the detailed test plan.

B. Manual logging of operations parameters shall be the responsibility of the Contractor, equipment, or unit process systems supplier.

C. Collections of samples shall be the responsibility of the Independent Testing Organization and may be performed by the Independent Testing Organization.

D. The Independent Testing Organization shall be responsible for tagging all samples, and for the orderly transfer to the Independent Testing Organization.

1. Both the Contractor and the testing organization shall be responsible for completing a Chain-of-Custody log of all samples.

E. All laboratory testing of samples shall be the responsibility of the Independent Testing Organization and shall be performed at the testing organization's laboratory. The Contractor shall be responsible for operating the equipment or unit process systems.

3.10 REPORTS

A. Reports are required for all tests specified in the individual specifications for equipment and unit process. Four copies of preliminary test reports shall be supplied to the Engineer for review and returned with any applicable notes.

B. Tests reports shall be submitted no later than ten calendar days after testing ends. The Contractor shall assist and furnish required information in a timely manner including operating data sheets.

C. The reports shall include, but not be limited to, the following:

1. Cover. Including name and location of the plant, the equipment or unit process systems tested, name and address of the testing organization, and dates of the test.

2. Certification. A page including a certification by the report preparer that he or she is the person responsible for the test data, and one by the Contractor or equipment or unit process systems certifying authenticity and accuracy of the report.

3. Table of Contents.

4. Introduction. Pertinent background information shall be presented in this Section. The information shall include, but not be limited to, the following:

   a. Equipment or unit process systems tested.
   b. Test purpose.
   c. Name and address of suppliers, and testing organization.
   d. Test dates.
   e. Items of performance criteria tested.
   f. Names of persons present for test.
   g. Any other important background information.

5. Summary. A comprehensive summary of the test results with sufficient information and data necessary to evaluate the process with respect to the applicable performance specifications. This information shall include, but not be limited to, the following:

   a. A summary of the test results.

   b. Comparison of test results with required performance criteria.

   c. Process and operation data or parameters that can be used to verify operation at performance criteria.

   d. A description and results of any analyses of samples collected during the test that supports the test results.

   e. Discussion of errors, both real and apparent, in the test.

6. Methods. A description of the sampling and analytical methods used.

7. Operation. Facility Operation during Testing shall contain:

   a. Presentation of the process data for the test, with calculations where necessary to show the solids throughput or production to demonstrate that the operating conditions are sufficiently representative of those required for testing. Calculations may be included in the Appendix.

   b. Process and control equipment flow diagram.

8. Appendix.

   a. A summary of all data used in the calculations, including source, formulas with all terms defined.

b. Calculations for all data submitted, fully defined.

c. Copies of all raw field data sheets, including those indicating sampling point locations, and notes.

d. Laboratory report, complete with analytical data sheets and chain of custody list.

e. Production and/or operational data.

f. Calibration procedures and work sheets for sampling equipment.

g. Copies of calibration records for instrumentation.

h. Pertinent correspondence concerning test.

i. Any other information necessary to assist the Owner in deciding of compliance with the contract documents or to assist the Agency in making a determination of compliance with Federal, State, and Local regulations.

END OF SECTION

SECTION 01 99 90

REFERENCE FORMS

The forms listed below and included in this section are referenced from other sections of the project manual (not all forms may be referenced or used):

Form No.	Title
01300–A	Submittal Transmittal Form
01660–A	Equipment Test Report Form
01730–A	Operation and Maintenance Transmittal Form
01730–B	Equipment Record Form
01730–C	Equipment Record Form
09900–A	Coating System Inspection Checklist
11000–A	Manufacturer's Installation Certification Form
11000–B	Manufacturer's Instruction Certification Form
11000–C	Unit Responsibility Certification Form
11002–A	Rigid Equipment Mount Installation Inspection Checklist
11060–A	Motor Data Form
16000–A	Wire and Cable Resistance Test Data Form
16000–B	Installed Motor Test Data Form
16000–C	Dry Transformer Test Data Form
16000–D	Motor Control Center Test Form
16000–E	Medium Voltage Motor Starter Test Form
16000–F	Medium Voltage Switchgear Test Form
16000–G	Protective Relay Test Form
16000–H	Low Voltage Switchgear Test Form
16000–I	Medium Voltage Load Interrupter Switch Test Form
16000–J	Liquid–Filled Transformer Test Form
16000–K	Automatic Transfer Switch Test Form
16000–L	Neutral Grounding Resistor Test
17000–A	Loop Wiring and Insulation Resistance Test Data Form
17000–B	Control Circuit Piping Leak Test Form
17000–C	Controller Calibration Test Data Form
17000–D	Panel Indicator Calibration Test Data Form
17000–E	Recorder Calibration Test Data Form
17000–F	Signal Trip Calibration Test Data Form
17000–G	Field Switch Calibration Test Data Form
17000–H	Transmitter Calibration Test Data Form
17000–I	Miscellaneous Instrument Calibration Test Data Form
17000–J	Individual Loop Test Data Form
17000–K	Loop Commissioning Test Data Form

01300–A. SUBMITTAL TRANSMITTAL FORM:
SUBMITTAL TRANSMITTAL

Submittal Description: _____ Submittal No:[1] _____

Spec Section: _____

	Routing	Sent	Received
OWNER:	Contractor/CM		
PROJECT:	CM/Engineer		
	Engineer/CM		
CONTRACTOR:	CM/Contractor		

We are sending you ☐ Attached ☐ Under separate cover via _____

☐ Submittals for review and comment ☐ Product data for information only

Remarks: _____

Item	Copies	Date	Section No.	Description	Review Action [a]	Reviewer initials	Review comments attached

[a] **Note: NET = No exceptions taken; MCN = Make corrections noted; A&R = Amend and resubmit; R = Rejected**
Attach additional sheets if necessary.

[1]See paragraph 01300-4.0 A, Transmittal Procedure.

Contractor

Certify either A or B:

☐ A. We have verified that the material or equipment contained in this submittal meets all the requirements, including coordination with all related work, specified (no exceptions).

☐ B. We have verified that the material or equipment contained in this submittal meets all the requirements specified except for the attached deviations.

No.	Deviation

Certified by: _____

Contractor's Signature

NOTE: This example equipment test report is provided for the benefit of the Contractor and is not specific to any piece of equipment to be installed as a part of this project. The example is furnished as a means of illustrating the level of detail required for the preparation of equipment test report forms for this project.

CITY OF SAMPLE

EXAMPLE WATER TREATMENT PLANT
STAGE IV EXPANSION PROJECT

ABC Construction Company, Inc., General Contractor
XYZ Engineering, Inc., Construction Manager

EQUIPMENT TEST REPORT

Equipment Name: Sludge Pump
Equipment Number: P25202
Specification Ref: 11390
Location: East Sedimentation Basin Gallery

	Contractor		Construction Manager	
	Verified	Date	Verified	Date
PREOPERATIONAL CHECKLIST				
Mechanical				
Lubrication				
Alignment				
Anchor bolts				
Seal water system operational				
Equipment rotates freely				
Safety guards				
Valves operational				
Hopper purge systems operational				
Sedimentation tank/hopper clean				
O&M manual information complete				
Manufacturer's installation certificate complete				
Electrical (circuit ring–out and high–pot tests)				
Circuits:				
Power to MCC 5				
Control to HOA				
Indicators at MCC:				
Red (running)				
Green (power)				
Amber (auto)				
Indicators at local control panel				

	Contractor		Construction Manager	
	Verified	Date	Verified	Date
Wiring labels complete				
Nameplates:				
MCC				
Control station				
Control panel				
Equipment bumped for rotation				
Piping Systems				
Cleaned and flushed:				
Suction				
Discharge				
Pressure tests				
Temporary piping screens in place				
Instrumentation and Controls				
Flowmeter FE2502F calibration				
Calibration Report No.				
Flow recorder FR2502G calibrated against transmitter				
VFD speed indicator calibrated against independent reference				
Discharge overpressure shutdown switch calibration				
Simulate discharge overpressure Shutdown				
FUNCTIONAL TESTS				
Mechanical				
Motor operation temperature satisfactory				
Pump operating temperature satisfactory				
Unusual noise, etc?				
Pump operation: 75 gpm/50 psig				
Measurement:				
Flow				
Pressure:	Test gage number:			
Alignment hot				
Dowelled in				
Remarks:				
Electrical				
Local switch function:				
Runs in *HAND*				
No control power in *OFF*				
Timer control in *AUTO*				
Overpressure protection switch PS2502C functional in both *HAND* and *AUTO*				
Overpressure protection switch PS2502C set at 75 psig				

PLC 2500 set at 24–hour cycle, 25 min *ON*				
OPERATIONAL TEST				
48–hour continuous test. Pump cycles as specified, indicators functional, controls functional, pump maintains capacity, overpressure protection remains functional, hour meter functional				

RECOMMENDED FOR BENEFICIAL OCCUPANCY

_____

Construction Manager_____ Date _____

ACCEPTED FOR BENEFICIAL OCCUPANCY

_____

Owner's Representative_____ Date _____

01730–A. OPERATION AND MAINTENANCE TRANSMITTAL FORM:

Date: _____
To: _____
_____
_____
_____
Attention: _____

Submittal No:[2] _____
Contract No: _____
Spec. Section: _____
Submittal Description: _____
From: _____
_____

Checklist	Contractor		Construction manager	
	Satisfactory	N/A	Accept	Deficient
1. Table of contents				
2. Equipment record forms				
3. Manufacturer information				
4. Vendor information				
5. Safety precautions				
6. Operator prestart				
7. Start–up, shutdown, and post-shutdown procedures				
8. Normal operations				
9. Emergency operations				
10. Operator service requirements				
11. Environmental conditions				
12. Lubrication data				
13. Preventive maintenance plan and schedule				
14. Troubleshooting guides and diagnostic techniques				
15. Wiring diagrams and control diagrams				
16. Maintenance and repair procedures				
17. Removal and replacement instructions				
18. Spare parts and supply list				
19. Corrective maintenance man–hours				
20. Parts identification				
21. Warranty information				
22. Personnel training requirements				
23. Testing equipment and special tool information				

[2]See paragraph 01300-4.0 A, Transmittal Procedure.

Remarks: _____

Contractor's Signature

01730–B. EQUIPMENT RECORD FORM:

EQUIP DESCRIP		EQUIP LOC	
EQUIP NO.	SHOP DWG NO.	DATE INST	COST
MFGR		MFGR CONTACT	
MFGR ADDRESS			PHONE
VENDOR		VENDOR CONTACT	
VENDOR ADDRESS			PHONE

MAINTENANCE REQUIREMENTS	D	W	M	Q	S	A	Hours
LUBRICANTS: RECOMMENDED:							
ALTERNATIVE:							
MISC. NOTES:							

RECOMMENDED SPARE PARTS			
PART NO	QUAN	PART NAME	COST

ELECTRICAL NAMEPLATE DATA			
EQUIP			
MAKE			
SERIAL NO.		ID NO.	
MODEL NO.		FRAME NO.	
HP	V	AMP	HZ
PH	RPM	SF	DUTY
CODE	INSL. CL	DES	TYPE
NEMA DES	C AMB	TEMP RISE	RATING
MISC.			
MECHANICAL NAMEPLATE DATA			
EQUIP			
MAKE			
SERIAL NO.		ID NO.	
MODEL NO.		FRAME NO.	
HP	RPM	CAP	SIZE
TDH	IMP SZ	BELT NO.	CFM
PSI	ASSY NO.	CASE NO.	
MISC			

01730–C. EQUIPMENT RECORD FORM:

EQUIP DESCRIP		EQUIP LOC	
EQUIP NO.	SHOP DWG NO.	DATE INST	COST
MFGR		MFGR CONTACT	
MFGR ADDRESS			PHONE
VENDOR		VENDOR CONTACT	
VENDOR ADDRESS			PHONE

MAINTENANCE REQUIREMENTS	D	W	M	Q	S	A	Hours

09900–A COATING SYSTEM INSPECTION CHECKLIST

Area or Structure to be coated: _____

Coating System (from paragraph 09900–2.01): _____

Date: _____

Contract Package No. _____

Coating Type _____

Coating System Manufacturer (CSM): _____

Coating System Applicator: _____

General Contractor: _____

Step 1: Completion of Cleaning and Substrate Decontamination Prior to Abrasive Blast Cleaning.

Representing	Name	Signature	Date
Contractor			
Coating System Applicator			

Step 2: Installation of Protective Enclosure of Structure or Area and Protection of Adjacent Surfaces or Structures NOT TO BE COATED.

Representing	Name	Signature	Date
Contractor			
Coating System Applicator			

Step 3: **Completion of Ambient Condition Control in Structure or Building Area and Acceptance of Ventilation System in Structure or Area as it applies to application and curing requirements for the coating system.**

Representing	Name	Signature	Date
Contractor			
Coating System Applicator			

Step 4: **Completion of Surface Preparation for Concrete and Metallic Substrates to Be Coated.**

Representing	Name	Signature	Date
Contractor			
Coating System Applicator			

Step 5: **Completion of Primer Application.**

Representing	Name	Signature	Date
Contractor			
Coating System Applicator			

Step 6: **Completion of Concrete Repairs If Required and Related Surface Preparation Rework Prior to Coating System Application.**

Representing	Name	Signature	Date
Contractor			
Coating System Applicator			

Step 7: **Completion of Concrete Filler/Surface Application to Concrete.**

Representing	Name	Signature	Date
Contractor			
Coating System Applicator			

Step 8: **Completion of First Finish Coat Application and of Coating System Detail Treatment at Transitions or Terminations.**

Representing	Name	Signature	Date
Contractor			
Coating System Applicator			

Step 9: **Completion of Second Finish Coat Application and of Coating System Detail Treatment at Transitions and Terminations.**

Representing	Name	Signature	Date
Contractor			
Coating System Applicator			

Step 10: **Completion of Full and Proper Cure of Coating System.**

Representing	Name	Signature	Date
Contractor			
Coating System Applicator			

Step 11: **Completion of Adhesion Testing of Cured Coating System on Concrete and Metallic Substrates and Acceptance of Holiday (Continuity) Testing of Coating System on Concrete and Metallic Substrates.**

Representing	Name	Signature	Date
Contractor			
Coating System Applicator			

Step 12: **Completion of Localized Repairs to Coating System Following Adhesion and Continuity Testing.**

Representing	Name	Signature	Date
Contractor			
Coating System Applicator			

Step 13: **Final Acceptance of Coating System Installation Including Final Clean–Up of the Work Site Complying with Specification Requirements and the CSM's Quality Requirements.**

Representing	Name	Signature	Date
Contractor			
Coating System Applicator			

11000–A. MANUFACTURER'S INSTALLATION CERTIFICATION FORM:

Contract No: _____ Specification section: _____

Equipment name: _____

Contractor: _____

Manufacturer of equipment item: _____

The undersigned manufacturer of the equipment item described above hereby certifies that he has checked the installation of the equipment and that the equipment, as specified in the project manual, has been provided in accordance with the manufacturer's recommendations, and that the trial operation of the equipment item has been satisfactory.

Comments: _____

_____

_____

_____

_____

_____ _____

Date Manufacturer

_____

Signature of Authorized Representative

_____ _____

Date Contractor

_____

Signature of Authorized Representative

11000–B. MANUFACTURER'S INSTRUCTION CERTIFICATION FORM:

Contract No: _____ Specification section: _____

Equipment name: _____

Contractor: _____

Manufacturer of equipment item: _____

The undersigned manufacturer certifies that a service engineer has instructed the wastewater treatment plant operating personnel in the proper maintenance and operation of the equipment designated herein.

Operations Check List (check appropriate spaces)	
Start–up procedure reviewed	
Shutdown procedure reviewed	
Normal operation procedure reviewed	
Others:	
Maintenance Check List (check appropriate spaces)	
Described normal oil changes (frequency)	
Described special tools required	
Described normal items to be reviewed for wear	
Described preventive maintenance instructions	
Described greasing frequency	
Others:	

_____ _____
Date Manufacturer

_____
Signature of Authorized Representative

_____ _____
Date Signature of Owner's Representative

_____ _____
Date Signature of Contractor's Representative

11000–C. UNIT RESPONSIBILITY CERTIFICATION FORM

(Project Title)

CERTIFICATE OF UNIT RESPONSIBILITY
for Specification Section _____

_____
(Section title)

In accordance with paragraph 11000–1.02 C of the contract documents, the undersigned manufacturer of driven equipment ("manufacturer") accepts unit responsibility for all components of equipment furnished to the Project under specification Section_____ ,_and for related equipment manufactured under Sections_____, _____, and _____ .

We have reviewed the requirements for Sections 11000 (and 11050 where applicable) and all sections referencing this (these) section(s), including but not limited to drivers, supports for driving and driven equipment and all other specified appurtenances to be furnished to the Project by manufacturer. And, we have further reviewed, and modified as necessary, the requirements for associated variable speed drives and motor control centers. We hereby certify that all specified components are compatible and comprise a functional unit suitable for the specified performance and design requirements whether or not the equipment was furnished by us. We will make no claim nor establish any condition that problems in operation for the product provided under this specification Section _____ are due to incompatibility of any components covered by this Certificate of Unit Responsibility. Nor will we condition or void any warranty for the performance of the product of this specification Section _____ due to incompatibility of any components covered under this Certificate of Unit Responsibility.

Our signature on this Certificate of Unit Responsibility does not obligate us to take responsibility for, nor to warrant the workmanship, quality, or performance of related equipment provided by others under specification Sections _____, _____, and _____. Our obligation to warranty all equipment provided by us shall remain unaffected.

_____
Notary Public

_____
Commission expiration date

Seal:

_____
Name of Corporation

_____
Address

By: _____
Duly Authorized Official

_____
Legal Title of Official

Date: _____

11002–A. RIGID EQUIPMENT MOUNT INSTALLATION CHECKLIST

(CLIENT, PROJECT NAME)

Equipment Tag No.: _____ Date: _____

Grout Product Name and Type: _____

Grouting System Manufacturer: _____

Grouting Application Contractor: _____

General Contractor: _____

Step 1: Verify Equipment Anchor Installation Conformance to Equipment Pad Details

Name: _____ Date___/___/___
Contractor Rep.

Name: _____ Name: _____
Construction Manager Millwright

Step 2: Completion of Cleaning and Concrete Substrate Preparation Prior to Grouting

Name: _____ Date___/___/___
Contractor Rep.

Name: _____ Name: _____
Construction Manager Grouting Contractor Rep.

Name: _____
Grout Manufacturer's Technical Rep.

Step 3: Equipment Leveling.

Name: _____ Date___/___/___
Contractor Rep.

Name: _____ Name: _____
Construction Manager Millwright

Step 4: **Installation of Protection of Adjacent Surfaces or Structures NOT TO BE GROUTED**

Name: _____ Date___/___/___
Contractor Rep.

Name: _____ Name: _____
Construction Manager Grouting Contractor Rep.

Name: _____
Grout Manufacturer's Technical Rep.

Step 5: **Preparation and Construction of Forms and Epoxy Grout Filling Standpipes**

Name: _____ Date___/___/___
Contractor Rep.

Name: _____ Name: _____
Construction Manager Grouting Contractor Rep.

Name: _____
Grout Manufacturer's Technical Rep.

Step 6: **Completion of Ambient Condition Control in Structure or Building Area and Acceptance of Ambient Conditions as They Apply to Application and Curing Requirements for the Grouting System**

Name: _____ Date___/___/___
Contractor Rep.

Name: _____ Date___/___/___
Grouting Contractor Rep.

Name: _____ Date___/___/___
Grout Manufacturer's Technical Rep.

Name: _____ Date___/___/___
Construction Manager

Step 7: Epoxy Grout Installation

Name: _____ Date___/___/___
Contractor Rep.

Name: _____ Name: _____
Construction Manager Grouting Contractor Rep.

Name: _____
Grout Manufacturer's Technical Rep.

Step 8: Completion of Full and Proper Cure of Epoxy Grout

Name: _____ Date___/___/___
Contractor Rep.

Name: _____ Date___/___/___
Grouting Contractor Rep.

Name: _____ Date___/___/___
Grout Manufacturer's Technical Rep.

Name: _____ Date___/___/___
Construction Manager

Step 9: Completion of Localized Repair of Grout Voids

Name: _____ Date___/___/___
Contractor Rep.

Name: _____ Date___/___/___
Grouting Contractor Rep.

Name: _____ Date___/___/___
Grout Manufacturer's Technical Rep.

Name: _____ Date___/___/___
Construction Manager

Step 10: **Final Acceptance of Grouting System Installation Including Final Clean–Up of the Work Site Complying with All Specification Requirements and the GSM's Quality Requirements**

Name: _____ Date___/___/___
Contractor Rep.

Name: _____ Date___/___/___
Grouting Contractor Rep.

Name: _____ Date___/___/___
Grout Manufacturer's Technical Rep.

Name: _____ Date___/___/___
Construction Manager

11060–A. MOTOR DATA FORM:

Equipment Name_____ Equipment No(s) _____

Project Site Location _____

Nameplate Markings

Mfr:		Mfr Model:		Frame:		Horsepower:	
Volts:		Phase:		RPM:		Service Factor:	
FLA:		LRA:		Frequency:		Amb Temp Rating:	°C
Time rating:				Design Letter:			
	(NEMA MG1–10.35)				(NEMA MG–1.16)		
KVA Code Letter:				Insulation Class:			

The following information is required for explosion–proof motors only:

A. Approved by UL for installation in Class _____, Div _____, Group _____

B. UL frame température code ____ (NEC Tables 500–8B)

The following information is required for all motors 1/2 horsepower and larger:

A. Guaranteed minimum efficiency _____
(Paragraph 11060–2.04 G)

B. Nameplate or nominal efficiency _____

Data Not Necessarily Marked on Nameplate

Type of Enclosure:			Enclosure Material:		
Temp Rise:	°C (NEMA MG1–12.41,42)				
Space Heater included?	☐ Yes	☐ No	If Yes:	Watts	Volts
Type of motor winding over–temperature protection, if specified:					

Provide information on other motor features specified:

_____

16000–A. WIRE AND CABLE RESISTANCE TEST DATA FORM:

Wire or Cable No.:_____ Temperature, °F _____

Location of Test	Insulation resistance, megohms
1.	
2.	
3.	
4.	
5.	
6.	
7	

.

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

16000–B. INSTALLED MOTOR TEST FORM:

Motor Equipment Number _____ Date of test _____

Equipment Driven _____

MCC Location _____

				Ambient temp	°F
Resistance:					
Insulation resistance phase–to–ground megohms:					
Phase A		Phase B		Phase C	
Current at Full Load:					
Phase		Current, amps			
Phase		Current, amps			
Phase		Current, amps			
Thermal Overload Device:	Manufacturer/catalog #		Amperes		
Circuit breaker (MCP) setting:					

Motor Nameplate Markings:

Mfr		Mfr Model		Frame		HP	
Volts		Phase		RPM		Service factor**	
Amps		Freq		Ambient temp rating			°C
Time rating			Design letter**				
	(NEMA 1–10.35)			(NEMA MG–1.16)			
Code letter			Insulation class				

**Required for 3–phase squirrel cage induction motors only.

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

16000–C. DRY TRANSFORMER TEST DATA FORM:

(Note: Use Data Form for dry type transformers with voltage rating of 600 Vac or less and sizes to 167 kVA single phase and 500 kVA three phase. Use NETA Test Forms and Test Procedures for higher voltages and larger transformers.)

Equipment Tag No.: _____ Temperature Rating: _____

Description/Location: _____ Feeder size/Source: _____

Primary Voltage: _____ Secondary Voltage: _____ Winding Connection: _____

A. VISUAL INSPECTION

Transformer Inspection	Pass	Fail	Note
1. Nameplate data as specified			
2. Mechanical condition			
a. Free of dents and scratches			
b. Anchored properly			
c. Shipping brackets removed			
d. Spacing from wall per nameplate			
3. Grounding *			
a. Equipment grounding			
b. System grounding			

B. INSULATION–RESISTANCE TESTS:

Perform tests with calibrated megohmeter. Apply 1000 Vdc test voltage for 60 seconds and record readings in megohms at 30–seconds and 60–seconds intervals.

Test Group	Resistance between		30–second reading	60–second reading	Absorption Ratio Index 60–sec. / 30–sec.
Primary Winding to ground	A	GRD			
	B	GRD			
	C	GRD			
Secondary Winding to ground with * N–G Bond removed	a	GRD			
	b	GRD			
	c	GRD			
Primary Winding to Secondary Winding	A	a			
	B	b			
	C	c			

Submit resistance readings to the Construction Manager immediately after the tests that are less than the manufacturer's recommended value or less than 10–megohms. Record the Absorption Ratio Index values for future reference. Ratio must be 1.0 or greater, with infinity (∞) equal to 1.0.

Contractor Representative Certified: _____ Date _____

Owner Representative Witnessed: _____ Date _____

16000–D. MOTOR CONTROL CENTER TEST FORM:

Equipment No. _____ Ambient room temperature _____

Location _____

A. MECHANICAL CHECK:

All bolted connections either bus to bus or cable to bus shall be torqued to the manufacturer's recommendations.

B. ELECTRICAL TESTS:

1. Measure insulation resistance of each bus section phase to phase and phase to ground for 1 minute using a megohmmeter at 1000 volts.

Test results (megohms)			
Phase		Phase	
A–GRD		A–B	
B–GRD		B–C	
C–GRD		C–A	

2. Set the circuit breaker in the starter unit to comply with the requirements of NEC, Article 430–52 and Table 430–152.

3. Motor overload heater elements shall be sized and installed based on the actual nameplate full load amperes of the motor connected to the starter.

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

16000–E. MEDIUM VOLTAGE MOTOR STARTER TEST FORM:

Equipment No. _____

Location _____

Room Temperature _____

The protective devices shall be set in accordance with the specification before the tests are performed.

1. Measure contact resistance (micro–ohms)

Phase:	A		B		C	

Contacts shall be replaced if resistance exceeds 50 micro–ohms.

2. Perform an insulation resistance test (1000 volts DC for 1 minute).

Phase	A		B		C		
Pole to ground							megohms
Across open pole							megohms
Pole to pole	AB		BC		CA		megohms

3. Perform minimum pickup voltage tests on trip and close coils.

4. Motor RTDs shall be tested by using a hot oil bath. The temperature at which the sensor trips shall be recorded for each RTD.

5. The Contactor shall be tripped by operation of each protective device.

16000–F. MEDIUM VOLTAGE SWITCHGEAR TEST FORM:

Equipment No. _____

Location _____

Room Temperature _____

The protective devices shall be set in accordance with the specification before the tests are performed.

1. Measure contact resistance (micro–ohms)

Phase:	A		B		C	

Contacts shall be replaced if resistance exceeds 50 micro–ohms.

2. Perform an insulation resistance test (1000 volts DC for 1 minute).

Phase	A		B		C		
Pole to ground							megohms
Across open pole							megohms
Pole to pole	AB		BC		CA		megohms

3. Perform minimum pickup voltage tests on trip and close coils.

4. Verify the instrument transformer ratios. Check the transformer's polarity electrically.

5. The Contactor shall be tripped by operation of each protective device.

16000–G. PROTECTIVE RELAY TEST FORM:

Location _____

Switchgear Breaker No. _____

Protective Relay Description _____

The protective relays shall be tested in the following manner:

1. Each protective relay circuit shall have its insulation resistance tested to ground.

2. Perform the following tests on the specified relay setting:

   a. Pickup parameters on each operating element.

   b Timing test shall be performed at three points on the time dial curve.

   c. Pickup target and seal-in units.

The results shall be recorded and signed. A copy shall be given to the Construction Manager in accordance with paragraph 16000–1.05 B.

16000–H. LOW VOLTAGE SWITCHGEAR TEST FORM:

Equipment No. _____

Location _____

Room Temperature _____

The protective devices shall be set in accordance with the specification before the tests are performed.

1. Measure contact resistance (micro–ohms)

Phase:	A		B		C	

Contacts shall be replaced if resistance exceeds 50 micro–ohms.

2. Perform an insulation resistance test (1000 volts DC for 1 minute).

Phase	A		B		C		
Pole to ground							megohms
Across open pole							megohms
Pole to pole	AB		BC		CA		megohms

3. Minimum pickup current shall be determined by primary current injection.

4. Long time delay shall be determined by primary injection at three hundred percent (300%) pickup current.

5. Short time pickup and time delay shall be determined by primary injection of current.

6. Instantaneous pickup current shall be determined by primary injection.

7. Trip unit reset characteristics shall be verified.

8. Auxiliary protective devices, such as ground fault or under voltage relays, shall be activated to ensure operation of shunt trip devices.

16000–I. MEDIUM VOLTAGE LOAD INTERRUPTER SWITCH TEST FORM:

Equipment Number _____

Location _____

Date _____

1. Measure switch blade resistance (micro–ohms).

Phase:	A		B		C	

Contacts shall be replaced if resistance exceeds 50 micro–ohms.

2. Perform an insulation resistance test (1000 volts DC for 1 minute).

Phase	A		B		C		
Pole to ground							megohms
Across open pole							megohms
Pole to pole	AB		BC		CA		megohms

The results shall be recorded and signed. A copy shall be given to the Construction Manager in accordance with paragraph 16000–2.06 B.

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

16000–J. LIQUID–FILLED TRANSFORMER TEST FORM:

Equipment Number _____

Location _____

Date/Weather Conditions _____

A. Perform the "Insulation–Resistance Test" and "Dielectric Absorption Test" using Form 16000–C, Dry Transformer Test Data Form.

B. Perform an applied voltage (low frequency dielectric) test in accordance with ANSI C57.12.90, paragraph 10.5, Applied Voltage Test. Applied voltage levels shall be 75 percent of recommended factory test levels or recommended test levels of ANSI C57.12.00, Table 5.

C. Insulating oil shall be sampled and shall be laboratory tested for the following:

1. Dielectric strength.
2. Acid neutralization.
3. Interfacial tension.
4. Color.
5. Power factor.

D. Perform a turns ratio test between the windings for all tap positions.

E. The temperature and pressure switches shall be tested using a hot oil bath and air pump.

The results shall be recorded and signed by the Contractor and Construction Manager. A copy shall be given to the Construction Manager in accordance with paragraph 16000–2.06 D. Any readings which are abnormal to ANSI industry standards shall be reported to the Construction Manager.

16000–K. AUTOMATIC TRANSFER SWITCH TEST FORM:

Equipment Number _____

Location _____

Date _____

1. Perform an insulation resistance test (1000 volts DC for 1 minute):

Phase	A		B		C		
Pole to ground							megohms
Pole to pole	AB		BC		CA		megohms

2. Perform the following operations and initial:

   a. Manual transfer _____

   b. Loss of normal power; __sec delay

   c. Return to normal power; _____sec delay

The results shall be recorded and signed. A copy shall be given to the Construction Manager in accordance with paragraph 16000–2.06 B.

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

16000–L. NEUTRAL GROUNDING RESISTOR TEST:

Equipment No. _____

Location _____

The pickup and time delay setting on the ground fault relay shall be set in accordance with Section 16431.

1. The transformer neutral insulation resistance shall be measured with and without the grounding resistor connected to insure no parallel ground paths exist.

2. The protective relay pickup current shall be determined by injecting test current into the current sensor. The pickup current should be within 10 percent of the dial setting. Record the dial setting and actual pickup tie.

3. The relay timing shall be tested by injecting 150 and 300 percent of pickup current into the current sensor. The relay timing shall be in accordance with the manufacturer's published time–current characteristic curves. Record the relay timing at 150 and 300 percent of pickup current.

4. The circuit interrupting device shall be operated by operating the relay.

The results shall be recorded and signed by the Contractor and Construction Manager. A copy shall be given to the Construction Manager in accordance with paragraph 16000–2.06 B.

17000–A. LOOP WIRING AND INSULATION RESISTANCE TEST DATA FORM:

Loop No.: _____

List all wiring associated with a loop in table below. Make applicable measurements as indicated after disconnecting wiring.

Wire No.	Panel Tie	Field TB	Continuity Resistance [a]		Insulation Resistance[b]			
			Cond./ Cond.	Cond./ Shield	Shield/ Gnd.	Shield/ Cond.	Cond./ Gnd.	Shield/ Shield
A			—	(A/SH)				
B			(A/B)	—				
C			(A/C)	—				
D			(A/D)	—				
etc.								

NOTES:

a. Continuity Test. Connect ohmmeter leads between wires A and B and jumper opposite ends together. Record resistance in table. Repeat procedure between A and C, A and D, etc. Any deviation of ±2 ohms between any reading and the average of a particular run indicates a poor conductor, and corrective action shall be taken before continuing with the loop test.

b. Insulation Test. Connect one end of a 500 volt megger to the panel ground bus and the other sequentially to each completely disconnected wire and shield. Test the insulation resistance and record each reading.

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

17000–B. CONTROL CIRCUIT PIPING LEAK TEST FORM:

Loop No.:_____

List tubing associated with loop in table below. Make applicable measurements after isolating any air consuming pilots from circuit.

Tube No.	Tubing Equivalent Length of 1/4–Inch Copper[a]	Test Period (seconds)	Permitted Pressure Drop (psi)[b]	Measured Pressure Drop (psi)
A				
B				
C				
D				
Etc.				

NOTES:

a. Convert actual tubing and air motor volume to equivalent 1/4–inch copper tubing.

b. Pressure drop shall not exceed 1 psi per hundred feet 1/4–inch tubing per 5 seconds.

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

17000–C. CONTROLLER CALIBRATION TEST DATA FORM:

Tag No. and Description: _____

Make & Model No.: _____ Serial No.: _____

Input: _____ Process Variable (PV) Scale: _____

Output: _____ Output Scale: _____

PV Scale Calibration

% of Range	Input	Expected Reading	Actual Reading	% Deviation
0				
50				
100				
			% Deviation Allowed:	

Connect output to PV for following tests:

Set Point (SP) Indicator Accuracy			Output Meter Accuracy			Controller Accuracy		
SP	PV Reading	Expected % Dev.	Actual Reading	Expected Reading	Actual % Dev.	Output	Output	% Dev.
(0%)								
(50%)								
(100%)								
% Deviation Allowed:				% Deviation Allowed:			% Deviation Allowed:	

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

17000–D. PANEL INDICATOR CALIBRATION TEST DATA FORM:

Tag No. and Description: _____

Make & Model No.:_____ Serial No.:_____

Input: _____

Scale: _____ Range: _____

PV Scale Calibration

% of Range	Input	Expected Reading	Actual Reading	% Deviation
0				
50				
100				
			% Deviation Allowed:	

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

17000–E. RECORDER CALIBRATION TEST DATA FORM:

Tag No. and Description: _____

Make & Model No.: _____ Serial No.: _____

Input: _____ Chart: _____

Scale: _____ Range: _____

% of Range	Input	Expected Reading	Actual Reading	% Deviation
0				
50				
100				
			% Deviation Allowed:	

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

17000–F. SIGNAL TRIP CALIBRATION TEST DATA FORM:

Tag No. and Description: _____

Make & Model No.: _____ Serial No.: _____

Input: _____

Scale: _____ Range: _____

Set Point(s): _____

After setting set point(s), run signal input through entire range and calculate deadband.

Set Point	Incr. Input Trip Point	Decr. Input Trip Point	Calc. Deadband	Required Deadband

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

17000–G. FIELD SWITCH CALIBRATION TEST DATA FORM:

Tag No. and Description: _____

Make & Model No.: _____ Serial No: _____

Input: _____

Range: _____

Set Point(s): _____

Simulate process variable (flow, pressure, temperature, etc.) and set desired set point(s). Run through entire range of switch and calculate deadband.

Set Point	Incr. Input Trip Point	Decr. Input Trip Point	Calc. Deadband	Required Deadband

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

17000–H. TRANSMITTER CALIBRATION TEST DATA FORM:

Tag No. and Description: _____

Make & Model No.: _____ Serial No.: _____

Input: _____

Output: _____

Range: _____ Scale: _____

Simulate process variable (flow, pressure, temperature, etc.) and measure output with appropriate meter.

% of Range	Input	Expected Reading	Actual Reading	% Deviation
0				
50				
100				
			% Deviation Allowed:	

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

17000–I. MISCELLANEOUS INSTRUMENT CALIBRATION TEST DATA FORM:

(For instruments not covered by any of the preceding test forms, the Contractor shall create a form containing all necessary information and calibration procedures.)

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

17000–J. INDIVIDUAL LOOP TEST DATA FORM:

Loop No.: _____

Description: (Give complete description of loop's function using tag numbers where appropriate.)

P&ID No.: (Attach copy of P&ID.)

a. Wiring tested:
(Attach test form 17000–A)

b. Instrumentation tubing/piping tested:
(Attach test form 17000–B)

c. Instruments calibrated:
(Attach test forms 17000–C through I)

d. List step–by–step procedures for testing loop parameters. Test loop with instruments, including transmitters and control valves, connected and functioning. If it is not possible to produce a real process variable, then a simulated signal may be used with the Construction Manager's approval.

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

17000–K. LOOP COMMISSIONING TEST DATA FORM:

Loop No.: _____

a. Loop tested:
(Attach test form 17000–J)

b. Controlled or connected equipment tests confirmed:

c. Give complete description of loop's interface with process.

d. With associated equipment and process in operation, provide annotated chart trace of loop response to changes in set points for verification of performance. This chart should demonstrate 1/4–amplitude damping as output adjusts to set point change. Show set points, starting and finishing times on chart, as well as any other pertinent data.

Connect 2–pen recorder to process variable (PV) and to controller output. Use 1 inch/second chart speed.

Pen 1 – PV – Connections:

Pen 2 – Output – Connections:

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative