CITY OF GEORGETOWN, TEXAS

San Gabriel WWTP Rehabilitation

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ADDENDA

Addendum No. 1
Addendum No. 2
Addendum No. 3
Addendum No. 4

CITY OF GEORGETOWN, TEXAS
PECAN BRANCH PACKAGE PLANT
BALANCE OF PLANT

SECTION CIP 1 - PB
DEFINITION OF TERMS

The following additions, deletions, modifications, and clarifications shall be incorporated into the San Gabriel Change Order. These items shall have the full force and effect as the San Gabriel Contract Documents and cost involved shall be included in the Change Order price.

SUPPLEMENTAL PAGE

1. Page CIP -1, Paragraph CIP1.01.A, **DELETE** Item No. 6 "CONTRACTOR" in its entirety and **REPLACE WITH** the following:

   "6. PACKAGE PLANT SUPPLIER (SUPPLIER) – Supplier who is engaged in a separate contract with Owner to provide a steel, field-erected Wastewater Treatment Package Plant as well as associated supporting process-mechanical equipment."

2. Page CIP-1, Paragraph CIP1.01.A, **ADD** the following definitions after Item No. 6 "PACKAGE PLANT SUPPLIER (SUPPLIER). **RENUMBER** subsequent definitions as appropriate.

   "7. GENERAL CONTRACTOR – The entity that is selected by Owner under this contract to install, furnish, or provide project components that are not the responsibility of the Electrical Contractor or the Package Plant Supplier but which are necessary for an operational wastewater treatment plant. General Contractor is responsible for the majority of site civil work and will assist other entities in installation and testing, as defined in the Drawings.

   8. ELECTRICAL CONTRACTOR – Contractor responsible for the work defined in a separate contract, which includes all electrical and instrumentation gear which are not furnished and installed by the Package Plant Supplier or General Contractor but which are necessary for an operational wastewater treatment plant.

   9. GEORGETOWN ELECTRIC - Term used to refer to City of Georgetown's electric utility company."

END OF SUPPLEMENT

TECHNICAL SPECIFICATIONS

SECTION CIP3 - PB – SUMMARY OF WORK

CIP3.01 SCOPE OF WORK

A. This specification covers the requirements for furnishing all necessary labor, materials, equipment, and incidentals necessary to construct the Pecan Branch Wastewater Treatment Package Plant in coordination with the other entities as shown on the Drawings and specified herein.

B. Sheets G-9 and G-10 identify the responsibilities of various contractors through multiple contracts for construction of the Pecan Branch Package Plant and associated modifications to the Pecan Branch WWTP.

C. Definitions:

1. The following defines the various entities working on this project including those identified in the Scope of Work Delineation Table, as shown on Sheet G-8 and G-9.

    a. *Package Plant Supplier (Supplier)* – Supplier who is engaged in a separate contract with Owner to provide a steel, field-erected Wastewater Treatment Package Plant as well as associated supporting process-mechanical equipment.

    b. *General Contractor* – The entity that is selected by Owner under this contract to install, furnish, or provide project components that are not the responsibility of the Electrical Contractor or the Package Plant Supplier but which are necessary for an operational wastewater treatment plant. General Contractor is responsible for the majority of site civil work and will assist other entities in installation and testing, as defined in the Drawings.

    c. *Electrical Contractor* – Contractor responsible for the work defined in a separate contract, which includes all electrical and instrumentation gear which are not furnished and installed by the Package Plant Supplier or General Contractor but which are necessary for an operational wastewater treatment plant.

    d. *Georgetown Electric* – Term used to refer to City of Georgetown's electric utility company.

D. The Work is located within the City of Georgetown's extraterritorial jurisdiction at the address 3502 FM 971, Georgetown, TX 78626.

E. The Work by the General Contractor for the Pecan Branch WWTP Balance of Plant (as shown on the Specifications and Drawings) includes, but is not necessarily limited to, the following:

1. Complete shop drawing submittal process for the civil, geotechnical, site civil, process mechanical and all other miscellaneous equipment as specified herein.

2. Temporary sedimentation and erosion control including preparation of the shared contractor staging area.

3. Complete all necessary site/civil work including excavation and grading as well as providing subgrade and base material, except for excavation work required for new ductbanks by the Electrical Contractor as shown on the Drawings.

4. Participate in meetings with the other contractors to coordinate the scheduling and progress of work, as specified in Section 013100.

5. Mobilization – Including move-in costs, insurance, bonds, etc.

6. Provide all piping to and from the Package Plant (PP) including 16-inch PP Influent (INF), 16-inch PP Effluent (EFF) and Filter Influent (FI), 6" – PP Waste Activated Sludge (WAS), 12-inch and 20-inch Low Pressure Air (LPA), 8" – Backwash Waste (BWW), and 1" x 3" – Aluminum Sulfate as shown on the Drawings.

    - Scope of Work includes open trench construction.

7. Provide process mechanical equipment including but not limited to: valves, spare influent lift pumps, installed sludge transfer pumps, chemical dosing pumps, flow meter vault, and package plant ancillary equipment as shown on the Drawings.

8. Site Concrete Work including concrete foundation for field-erected steel package plant, miscellaneous equipment pads, generator pad, stair landing pads, pipe supports, sidewalks, etc.

9. Provide pipe supports as shown on the Drawings.

10. Coordinate with Package Plant Supplier to complete all installation of package plant materials and equipment to make ready for testing and commissioning.

11. Testing of new piping systems and equipment.

12. Process equipment commissioning, plant start-up and training, including provision of temporary pumping needed to seed sludge from the existing sludge tanks at the site to the steel package plant.

13. Site Work – Includes site preparation, grading, seeding, road repair, and related work.

14. Re-vegetation.

5. Demobilization and Clean-up.

CIP3.02 WORK BY OTHERS

A. The following work will be performed by others prior and concurrently to the start of the Work in this Contract.

1. The Electrical Contractor scope of work consists of furnishing, delivering, installing, commissioning, OWNER training, and providing all labor and materials required for the procurement and installation of electrical and instrumentation and controls for both the permanent Pecan Branch Wastewater Treatment Plant and the Temporary Package Plant Equipment and associated improvements.

2. The Package Plant Supplier scope of work consists of furnishing, delivering, constructing, and commissioning a steel activated sludge aeration basin, clarifier, and sludge holding basin as well as ancillary equipment necessary for a fully functional activated sludge treatment plat. The Package Plant Supplier will also furnish and deliver a cloth media filter in a stainless steel tank.

3. The Electrical Contractor will be furnishing Ductbanks and routing electrical equipment to equipment.

4. City of Georgetown Electric will provide the pad-mounted transformer and disconnect switch.

CIP3.03 WORK SEQUENCE

A. Perform work in sequence as agreed upon at the Pre-Construction Conference. Through the duration of construction activities, the Package Plant supplier, General Contractor, and Electrical Contractor to coordinate with one another and with the Owner during installation and commissioning of all equipment installation for Work Sequence as described below.

B. Regulatory discharge requirements for the plant effluent mandate adequate treatment of discharged wastewater from the plant. The intent of this section is to provide a framework for the General Contractor to perform the work in a sequence and manner such that continuous, uninterrupted treatment of wastewater and waste flows at the existing Pecan Branch WWTP facilities are maintained throughout the construction period.

C. The Supplier, General Contractor, and Electrical Contractor shall coordinate all work sequencing and shutdowns with the Owner and Engineer. General Contractor shall provide a 72-hour notice to the Owner prior to any tie-ins and connections to existing system.

D. The Site may only allow the following shutdowns, if required:

1. In general, the maximum shutdown period will be for 4 hours. All outages will require approval from the Owner and coordination with operation staff.

2. At any time, the minimum amount of pumps in operation at the influent lift station must be four (4) pumps. Electrical Contractor and General Contractor to inform the OWNER a minimum two (2) weeks in advance of taking pumps out of service for MCC modifications.

3. Any equipment necessary to complete the tie-ins shall be provided by the Contractor.

E. The following construction sequencing issues, critical tie-ins, and other considerations shall be taken into account by the General Contractor in the development of the construction schedule. These items are presented to assist the various entities and are not all-inclusive.

1. Submit and receive approval from Engineer for all applicable submittals.

2. Installation of erosion/sedimentation controls prior to any construction activities.

3. Any piping tie-ins must be coordinated. Coordinate with Owner and Engineer.

4. Electrical Contractor to complete all underground electrical work prior to General Contractor pouring any concrete pads or installing process yard piping.

a. Coordinate conduit stub-ups with approved shop drawings for correct placement.

F. General Contractor to receive approval for all applicable O&M Manuals.

G. General Contractor to provide Operational Readiness Testing and Functional Demonstration Testing for equipment furnished in scope (pumps).

H. General Contractor to complete startup of equipment and training of Owner's staff for equipment furnished (pumps).

I. Achieve Substantial Completion as defined in the Standard Form of Construction Agreement of this Contract.

J. Achieve Final Completion as defined in the Standard Form of Construction Agreement of this Contract.

CIP3.04 PROGRESS OF THE WORK

A. The Work shall be started within one day following the effective date of the Notice to Proceed, and the Work shall be executed with such progress as may be required to prevent any delay to the general completion of the project. The Work shall be executed at such times and in or on such parts of the project, and with such personnel, materials, and equipment to assure completion of the Work in the time established by the Agreement.

B. If the General Contractor, for his convenience and at his own expense, should desire to carry on his work at night or outside regular hours, he shall submit a written approval request to the City and he shall allow ample time for satisfactory arrangements to be made for inspecting the work in progress. The General Contractor shall pay the expenses for extra inspection required for work outside regular hours. Normal working hours for this purpose are Monday through Friday 7:00 a.m. to 5:00 p.m. Saturdays are only allowed with prior City approval. The General Contractor shall light the different parts of the Project as required to comply with all applicable Federal and State regulations and with all applicable requirements of the City of Georgetown.

CIP3.05 CONSTRUCTION SCHEDULE

A. The General Contractor shall, within five (5) days after the effective date of the Notice to Proceed, provide and submit to the City for approval, the Schedule for the project. A complete updated schedule shall be submitted with monthly pay requests. The Schedule shall account for all the work of the General Contractor and his Subcontractors and suppliers. In addition to all reasonably important construction activities, the Schedule shall provide for the proper sequence of construction considering the various crafts, purchasing time, submittal approval, material delivery, equipment fabrication, and similar time-consuming factors.

B. The Schedule shall include, as a minimum, the earliest starting and finish dates, and latest starting and finish dates, and the total float for each task or item. The General Contractor shall update (monitor) the schedule as necessary and shall submit to the City a copy of the updated schedule (monthly) at the same time the pay estimate is prepared. The schedule shall contain all of the items of the Periodic Estimate and Pay Schedule.

While the General Contractor bears full responsibility for scheduling all phases and stages of the Work to ensure its successful prosecution and completion within the time specified in accordance with all provisions of these Specifications, the General Contractor is specifically required to complete fully or complete such stages of work to enable his Subcontractors and suppliers to complete their work within the respective times specified.

C. If the City determines that operations are falling behind schedule at any time during the construction period, the City may require the General Contractor to add to his plant, equipment and/or construction forces, including increases in working hours, in such quantities as are required to bring operations back on schedule. Upon receipt of written communication from the City requiring such addition, the General Contractor shall furnish same at no additional cost to the City.

CIP3.06 PRECONSTRUCTION CONFERENCE

A. A Pre-Construction Conference shall be held as soon as possible after Award of Contract and before work is started. The conference will be held at 295 Southeast Inner Loop, Georgetown Texas 78626. The conference will be attended by:

1. General Contractor's Office Representative.
2. General Contractor's General Superintendent.

3. Any subcontractors' or suppliers' representatives whom the General Contractor may desire to invite or the City may request.
4. Engineer's Representatives.
5. City's Representatives.
6. Electrical Contractor Representatives.
7. Package Plant Supplier Representatives.
8. Such other individuals that the City may invite.

B. The Pre-Construction Conference will include but not be limited to the following subjects:

1. Check of required bonds and insurance certifications.
2. Liquidated damages.
3. Shop drawing submittal and approval procedure.
4. Chain of command, direction of correspondence, and coordinating responsibility between various Contractors.
5. Schedule of periodic job meetings for all involved.
6. Introduction of the key project personnel.
7. Equal opportunity requirements.
8. Laboratory testing of material requirements.
9. Inventory of material stored on site provisions.
10. Progress estimate and payment procedure.
11. Discussion of General and Electrical Contractor's Safety program.
12. Scheduled plan for work requiring interruption of existing operations and other entities on Site.
13. Review of the Specifications.
14. Discussion of General Contractor's storage facilities for the Project.

C. The Engineer will preside at the conference, prepare the minutes of the meeting and distribute copies of same to all participants who so request by fully completing the attendance form to be circulated at the beginning of the conference.

CIP3.07 CONSTRUCTION MEETINGS

A. Periodic Construction meetings shall be held at intervals designated by the City, generally monthly to review the progress at the project, submittals, upcoming activities, pay requests, etc. The General Contractor is expected to have at least the project Manager or Superintendent present for all meetings. Attendance at the meetings shall not be directly paid for but shall be considered subsidiary to the items of the Contract.

B. In the event the General Contractor is 30 minutes late or more or fails to attend a Construction Meeting without 48 hours prior notice, the General Contractor shall be billed the time for the Engineer(s) to represent the City at $250.00 per hour up to two (2) hours.

CIP3.08 COORDINATION WITH CITY'S OPERATIONS AND EXISTING FACILITIES

A. Several parts of the proposed Work under this Contract connect with or into existing facilities. The General Contractor shall plan carefully the schedule of that portion of the Work which will affect the existing facilities. Such plans and schedules shall be subject to the approval of the City of Georgetown.

B. Work which requires shutdown or in any way impedes the operations of existing facilities shall be closely coordinated with the City of Georgetown. A minimum of 72 hours written notice shall be given to the City of Georgetown for all shutdowns and work that will impede treatment operations.

C. Immediately after the award of a Contract for this Project, the General Contractor shall outline and submit a scheduled plan for installation of the work, which requires interruption of operations.

CIP3.09 GENERAL CONTRACTOR'S USE OF PREMISES

A. General Contractor shall assume full responsibility for security of all materials and equipment stored on the site.

B. If directed by the City, move any stored items, which interfere with operations of the City, other contractors, or the public.

C. Obtain and pay for use of additional storage or work areas at no additional cost to the City if needed to perform the Work.

D. General Contractor shall submit to the City for approval a plan of operations, designating proposed areas of the property to be used for his operations, material storage, equipment storage, employee's parking, offices and shops. The area shall effect minimal interference with the present operations.

E. Any damage to existing facilities, including contamination, which may be caused by General Contractor's personnel, callers, visitors, materials or equipment, shall be repaired or corrected at the sole expense of the General Contractor.

F. Any fence that is damaged or removed by the General Contractor will be replaced at the General Contractor's expense in like kind, and to the satisfaction of the City.

G. General Contractor shall pick up any trash left by construction forces regularly to maintain a clean and orderly site.

END OF SECTION

CITY OF GEORGETOWN, TEXAS
PECAN BRANCH PACKAGE PLANT
BALANCE OF PLANT

SECTION 011000 - PB
SUMMARY

The following additions, deletions, modifications, and clarifications shall be incorporated into the San Gabriel Change Order. These items shall have the full force and effect as the San Gabriel Contract Documents and cost involved shall be included in the Change Order price.

SUPPLEMENTAL PAGE

1. Page 011000 - 1, Paragraph 1.4.A, **REVISE** the Project Identification to **READ AS "**Pecan Branch Wastewater Treatment Package Plant Project."

2. Page 011000 - 1, Paragraph 1.4.B, **REVISE** the Owner's address to "510 W. 9th Street, Georgetown, Texas 78626."

3. Page 011000 - 1, Paragraph 1.4.C, **REVISE** the Engineer's address to "8130-1 N. Capital of Texas Highway, Suite 250, Austin, TX 78731."

END OF SUPPLEMENT

CITY OF GEORGETOWN, TEXAS
PECAN BRANCH PACKAGE PLANT
BALANCE OF PLANT

SECTION 015000 - PB
TEMPORARY FACILITIES AND CONTROLS

The following additions, deletions, modifications, and clarifications shall be incorporated into the San Gabriel Change Order. These items shall have the full force and effect as the San Gabriel Contract Documents and cost involved shall be included in the Change Order price.

SUPPLEMENTAL PAGE

1. Page 015000 - 1, Paragraph 1.3.C, **DELETE** in its entirety and **REPLACE WITH** the following:

   "Water Service: Pay water-service use charges for water used by all entities for construction operations. Contractor is required to include the cost and permitting for the construction water meter and any other utility services in the construction contract."

2. Page 015000 - 9, Paragraph 3.7.C, **DELETE** "Section 311000 Site Clearing" and **REPLACE WITH** "Section G6 - Sedimentation and Temporary Erosion Control."

END OF SUPPLEMENT

CITY OF GEORGETOWN, TEXAS
PECAN BRANCH PACKAGE PLANT
BALANCE OF PLANT

SECTION 018819 - PB
TIGHTNESS TESTING PERFORMANCE REQUIREMENTS

The following additions, deletions, modifications, and clarifications shall be incorporated into the San Gabriel Change Order. These items shall have the full force and effect as the San Gabriel Contract Documents and cost involved shall be included in the Change Order price.

SUPPLEMENTAL PAGE

1. Page 018819 - 4, Paragraph 3.7.A, **DELETE** in its entirety and **REPLACE WITH** the following:

   "A Test following structures for tightness:

   1. Package Plant Treatment Unit.
   2. Tertiary Filter Unit 3."

END OF SUPPLEMENT

CITY OF GEORGETOWN, TEXAS
PECAN BRANCH PACKAGE PLANT
BALANCE OF PLANT

SECTION 099679 - PB
ATMOSPHERIC PROTECTION AND PLANT SERVICE AREAS COATINGS

The following additions, deletions, modifications, and clarifications shall be incorporated into the San Gabriel Change Order. These items shall have the full force and effect as the San Gabriel Contract Documents and cost involved shall be included in the Change Order price.

SUPPLEMENTAL PAGE

1. Page 099679 - 1, Paragraph 1.2.A.1, **DELETE** in its entirety and **REPLACE WITH** the following:

    "1. Exterior Non-submerged Substrates:
        a. Ductile iron piping for all above grade Package Plant Process Piping.
        b. Ductile iron piping for above grade Influent and Effluent of Filter Unit No. 3.
        c. Plastic substrate."

2. Page 099679 - 5, **ADD** Paragraph 3.2.**E** as follows:

    "E. Plastic Substrates: Solvent wipe per SSPC-SP1 to remove dirt, grease, and any other surface contamination. Lightly abrade entire surface and repeat solvent wipe process."

3. Page 099679 - 7, **ADD** subparagraph 3.6.A.**3** as follows:

    "3. Plastic Piping and, where scheduled to be painted, plastic components. Note: Provide UV and weather protection for plastic coating system.

        a. Polyurethane over Epoxy System:

            1) Prime Coat or equal product:
                a) CAR: Carboguard 890.
                b) PPG: Amerlock 2/400.
                c) SWC: Macropoxy 646 FC Epoxy.
                d) TNE: Series 66.

            2) Topcoat: MPI Gloss Level 5 or 6; or equal product:
                a) CAR: Carbothane 133HB.
                b) PPG: Pitthane Ultra.
                c) SWC: Acrolon 218.
                d) TNE: Series 1094."

END OF SUPPLEMENT

SECTION 400507 – PB - HANGERS AND SUPPORTS FOR PROCESS PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: Hanger and support assemblies for process piping.

B. Related Requirements:

1. Section 031000 “Concrete Forming and Accessories” for execution requirements for placement of inserts or sleeves in concrete forms specified by this Section.
2. Section 033000 “Cast-in-Place Concrete” for execution requirements for placement of concrete housekeeping pads specified by this Section.
3. Section 400506 “Couplings, Adapters, and Specials for Process Piping.”
4. Section 400519 “Ductile Iron Process Pipe.”
5. Section 400523 “Stainless Steel Process Pipe and Tubing.”

1.3 DEFINITIONS

A. Ferrous Metal: Iron, steel, stainless steel, and alloys with iron as principal component.

B. Wetted or submerged: Submerged, on the wet side of basins, below top of channel or tank wall, under cover or slab of channel or tank, or in other damp locations.

C. “Pipe” or “piping” shall mean all piping, piping system(s), hose, tube, fittings, joints, valves, and similar appurtenances.

D. Supports: wherever the word “supports” or “pipe supports” are used, they shall mean pipe supports, hangers, structural connections, concrete inserts (if allowed), anchors, guides, bolts, expansion units, restraints and all restraint, hanging, supporting, allowing controlled expansion, or other means of attaching piping along with the necessary appurtenances.

1.4 COORDINATION

A. Coordinate Work of this Section with piping and equipment connections specified in other Sections and indicated on Drawings.

1.5 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's catalog data including load capacity.

B. Shop Drawings: Submit scaled piping layouts for each system. Indicate flow stream, pipe size(s), material(s), schedule(s), lining(s), critical dimensions between pipes, equipment and building features. Indicate by schedule pipe hanger/support type and locations. Provide details of each type of hangers, supports, anchors, and guides.

1.6 INFORMATIONAL SUBMITTALS

A. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

B. Welders' Certificate: Submit welders' certification of compliance with AWS D1.1, verifying qualification within previous 12 months.

C. Qualifications Statements:

1. Submit qualifications for manufacturer, fabricator, installer, and licensed professional.
2. Submit manufacturer's approval of installer.

1.7 DELIVERY, STORAGE AND HANDLING

A. Inspection: Accept materials onsite in original factory packaging, labeled with manufacturer’s identification.

B. All parts shall be properly protected.

1. Protect products from weather and construction traffic, dirt, water, chemical, and damage by storing in original packaging.
2. Crate, deliver, and uncrate all supports and hangers to protect them against any damage.
3. Damage or deterioration shall occur during a prolonged delay from the time of shipment until installation is completed.
4. Finished metal surfaces not galvanized, that are not of stainless-steel construction, or that are not coated, shall be grease coated, to prevent rust and corrosion.

1.8 QUALITY ASSURANCE

A. Perform Work according to AWS D1.1 for welding hanger and support attachments to building structure.

B. Perform Work according to TCEQ and City of Georgetown standards.

C. Maintain one copy of each standard affecting the Work of this Section onsite.

1.9 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this Section with minimum three years' documented experience.

B. Fabricator: Company specializing in fabricating products specified in this Section with minimum three years' documented experience.

C. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience and approved by manufacturer.

1.10 CONDITIONS

A. Field Measurements: Verify field measurements prior to fabrication. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 GENERAL

A. Support pipe and appurtenances connected to equipment to prevent any strain being imposed on the equipment. Comply with manufacturer’s requirements regarding piping loads being or not being transmitted to their equipment. Submit certification stating that such requirements have been met.

B. Support and secure all pipe and tubing in the intended position and alignment to prevent significant stresses in the pipe or tubing material, valves, fittings, and other pipe appurtenances. Install all supports to adequately secure the pipe against excessive dislocation due to thermal expansion and contraction, internal flow forces, and all probable external forces such as equipment, pipe, and personnel contact. Any structural steel members required to brace any piping from excessive dislocation shall conform to the applicable requirements of Section 055000 “Metal Fabrications” and shall be furnished and installed under this Section.

C. Contractor may propose minor adjustments to the piping arrangements in order to simplify the supports, or in order to resolve minor conflicts in the work. Such an adjustment might involve minor change to a pipe centerline elevation so that a single trapeze support may be used.

D. Pipe supports:

1. Ensure that point loadings are not induced, and pipe loads are distributed evenly along the pipe circumference.
2. Piping is not to be supported from other piping or from metal stairs, ladders, and walkways, unless specifically directed or authorized by the Engineer.

E. Restraints, flexible connections, expansion items, and related items as included in other specifications (especially Sections 400506 “Couplings, Adapters, and Specials for Process Piping” and other individual pipe sections) and shown on Drawings.

2.2 PERFORMANCE REQUIREMENTS/DESIGN CRITERIA

A. Use standard products from approved manufacturers for all supports and appurtenances wherever possible, and ensure they are adequate to maintain the supported load in proper position under all operating conditions. Any reference to a specific figure number of a specific manufacturer is for the purpose of establishing a type and quality of product and not to be considered as proprietary. Note that different materials required, as specified in Part 2 MATERIALS, may require different figures or model numbers than those shown.

1. Minimum working factor of safety: consider 5 times the ultimate tensile strength of the material for all items, with the exception of springs, assuming 10 feet of water-filled pipe being supported and normal test pressures.
2. Design for all loads using a safety factor of 5.

B. Pipe Schedule is included in the Contract Drawings.

2.3 MATERIALS

A. For support of metallic pipe:

1. Submerged, all treatment basins and facilities, Buried, or Within Outdoor Structures (vaults, etc.): Type 316 stainless steel.
2. Within Chemical Areas: Epoxy coated steel for all supports inside chemical containment areas. Epoxy coating will extend at least 6 inches above containment berm for any and all supports higher than the secondary containment.
3. Other Locations: steel with galvanizing where noted.
4. Additional Requirements (including dielectric insulation): See following Paragraphs.

B. For support of non-metallic pipe:

1. Submerged, Buried, or Within Vaults: Type 316 stainless steel or FRP.
2. Within Chemical Areas: Epoxy coated steel for all supports inside chemical containment areas. Epoxy coating will extend at least 6 inches above containment berm for any and all supports higher than the secondary containment.
3. Other Locations: steel with galvanizing where noted; all with local stress protection shields.
4. Additional Requirements (including stress protection shields): See following Paragraphs.

C. Wherever stainless steel is noted, use Type 316 unless noted otherwise.

2.4 INSULATION

A. See Drawings and Section 404213.

2.5 ANCHOR BOLTS/SYSTEMS

A. Anchoring Devices: Design, size, and space support anchoring devices, including anchor bolts, inserts, and other devices used to anchor support, to withstand shear, and pullout loads imposed by loading and spacing on each particular support.

1. DO NOT USE ADHESIVE ANCHOR BOLTS ON ANY PIPE SUPPORT HUNG FROM A ROOF OR CEILING, unless specifically noted otherwise.

B. Post-installed anchors in concrete shall have current published ICC-ES Evaluation Report indicating the anchor is approved for installation in cracked concrete.

C. Include latest edition of the following specification and recommended practices as part of this specification as if written herein. Wherever requirements conflict, the more stringent shall govern.

1. ACI 318, Appendix D.
2. ACI 355.2, Mechanical Anchors “Qualification of Post-Installed Mechanical Anchors in Concrete”.
3. Anchor manufacturer’s published installation requirements.

D. Expansion anchors:

1. Ensure the length of expansion bolts is sufficient to place the wedge portion of the bolt a minimum of 1 inch behind the steel reinforcement.
2. Manufacturers:

a. Power-Stud+ SD4 and Power-Stud+ SD6 by Powers Fasteners, Brewster, NY.
b. Kwik Bolt as manufactured by Hilti USA, Tulsa, Oklahoma.
c. Wej-it by Wej-it Expansion Products, Inc., Broomfield, Colorado.
d. Or Approved Equal.

E. Unless otherwise noted: Type 316 stainless steel for all anchors.

F. Size of anchor bolts as designed by manufacturer, 1/2 inch minimum diameter, or as shown on Drawings.

G. Anchors to concrete in chemical areas shall be epoxy secured vinyl ester FRP all thread, insertion depth and size as required by the manufacturer for the design loads. Nuts, bolts, and hardware shall all be vinyl ester FRP construction.

2.6 HANGER RODS

A. Where use of steel is allowed, use hot-rolled steel for hanger rods. Machine-thread the rods and, except for stainless steel, galvanize them after fabrication. The strength of the rod should be based on its root diameter.

1. Attach hanger rods to concrete structures using single or continuous concrete inserts by the named support manufacturers above. Where use of steel is allowed, use malleable iron or steel with galvanized finish.

2.7 SINGLE PIPE HANGERS

A. Unless otherwise indicated, pipe hangers and supports shall be standard catalogued components, conforming to the requirements of MSS-41, 58, or 69 and shall be of the following type:

1. Anvil International.
2. Equal models by: Carpenter & Patterson, Inc., Woburn, MA; Cooper B-Line; Gulf State Manufacturing; or Unistrut Northeast, Cambridge, Massachusetts.

B. Support single pipes with hangers suspended by hanger rods from structural steel members, concrete ceilings, the bottom of trapeze hangers, and wall-mounted steel angle brackets.

C. Use welded steel wall brackets similar to Carpenter and Patterson, Figure Nos. 68, 79, 84, or 139 for hanging pipes near walls, beams, columns, etc., when they are located an excessive distance from ceilings or the underside of beams. Ensure that attachments for single pipes resting on top of bracket pipe supports meet the requirements specified under multiple pipe hangers.

2.8 MULTIPLE PIPE HANGERS

A. Suspend multiple pipes running parallel in the same horizontal plane that are adjacent to each other using trapeze-type hangers or wall brackets. Where steel use is allowed, trapeze hangers must consist of galvanized structural steel channels supported from galvanized threaded rods or attached to concrete walls, columns, or structural steel support members.

B. Except as otherwise specified herein, pipe anchors used for attaching pipe to trapeze or multiple pipe wall brackets shall be anchor or pipe chairs similar to:

1. Anvil Fig. 175.
2. Cooper B-Line B3147A or B3147B.
3. Where use of steel is allowed, material of construction shall be galvanized steel. Chair U bolts shall be tightened to allow freedom of movement for normal expansion and contraction except where pipe must be anchored to control direction of movement or act as a thrust anchor.

2.9 SINGLE PIPE SUPPORTS FROM BELOW

A. Single pipes located in a horizontal plane close to the floor shall be Pedestal type: Schedule 40 pipe stanchion, saddle, and anchoring flange.

1. Nonadjustable Saddle: MSS SP 58, Type 37 with U-Bolt.

    a. Anvil, Figure 259.
    b. Cooper B-Line, Figure B3090.
    c. Or Approved Equal.

2. Adjustable Saddle: MSS SP 58, Type 38 without clamp.

    a. Anvil, Figure 264.
    b. Cooper B-Line, Figure B3093.

c. Or Approved Equal.

B. Pipes less than 3 inches in diameter:

1. Hold in position by supports fabricated from steel C channel, welded post base similar to Unistrut, Figure P2072A, where use of steel is allowed; and pipe clamps similar to Unistrut, Figures P1109 through 26.
2. Where required to assure adequate support, fabricate supports using two vertical members and post bases connected by horizontal member of sufficient load capacity to support pipe.
3. Fasten supports to nearby walls or other structural member to provide horizontal rigidity.
4. More than one pipe may be supported from a common fabricated support.

C. Pipes 3 inches in diameter and larger:

1. Support by adjustable stanchions.
2. Provide at least 4 inch adjustment.
3. Flange mount to floor.

2.10 WALL SUPPORTED SINGLE AND MULTIPLE PIPES

A. Single or multiple pipes located adjacent to walls, columns, or other structural members shall be supported using welded steel wall brackets, where use of steel is allowed, as manufactured by Carpenter and Patterson, Figure No. 69, 84, or 139.

B. Where noted, multiple pipes may be supported on C-channel with steel brackets similar to Unistrut pipe clamps; with pipe anchor chairs; or equal.

C. Individual pipes, up to 8-in diameter, where noted, may use MSS Type 8 pipe clamps as noted on the Drawings.

D. Securely fasten all members to wall, column, etc., using double-expansion shields or other method as approved by the Engineer. Provide additional wall bearing plates as required.

2.11 BASE ANCHOR SUPPORT

A. Bend Support: Where pipes change direction from horizontal to vertical via a bend, install a welded or cast base bend support to carry the load. Fasten to the floor, pipe stanchion, or concrete pedestal using expansion anchors or other method as approved by the Engineer.

B. Concrete Supports: Where indicated, securely fasten pipe bends to concrete supports with suitable metal bands as required and approved by the Engineer. Isolate piping from poured concrete with a neoprene insert.

2.12 VERTICAL PIPE SUPPORTS

A. Where vertical pipes are not supported by a Unistrut type system as specified, they shall be supported in one of the following methods.

1. For pipes 1/4 to 2 inches in diameter:

    a. Provide extension hanger ring with an extension rod and hanger flange.
    b. The rod diameter shall be as recommended by the manufacturer for the type of pipe to be supported.
    c. Where use of steel is allowed, the hanger ring shall be steel- or PVC-clad depending on the supported pipe material of construction. The hanger ring shall be equal to Carpenter & Patterson, Figure Nos. 81.
    d. Where use of steel is allowed, the anchor flange shall be galvanized malleable iron similar to Carpenter and Patterson, Figure No. 85.

2. For pipes equal to or greater than 2 inch diameter:

    a. Extended pipe clamps similar to Carpenter & Patterson, Figure No. 267 may be used.
    b. Attach hanger to concrete structures using double expansion shields,
    c. Attach hanger to metal support members using welding lugs similar to Carpenter & Patterson, Figure No. 114.

B. Pipe supports shall be provided for closely spaced vertical piping systems required to provide a rigid installation. The interval of vertical support spacing shall be as specified, but in no case shall vertical interval exceed 12 feet. The support system shall consist of a framework suitably anchored to floors, ceilings, or roofs.

C. Unless otherwise specified, shown, or specifically approved by the Engineer, vertical runs exceeding 12 feet shall be supported by base elbows/tees, clamps, brackets, wall rests, and pipe collars, all located as required to ensure a rigid installation.

D. Pipe riser clamps, per MSS SP58, shall be used to support all vertical pipes extending through floor slabs. Where use of steel is allowed, riser clamps shall be galvanized steel manufactured by:

1. Carpenter & Patterson, Figure No. 128.
2. Anvil, Figure 261.
3. Cooper B-Line, Figure B3373.
4. Or equal.

E. Copper-clad or PVC-coated clamps shall be used on copper pipes. Insulation shall be removed from insulated pipes prior to installing riser clamps. Insulation shall not be damaged by clamp installation.

2.13 SPECIAL SUPPORTS

A. Frame Work Supports:

1. Vertical and horizontal supporting members shall be U-shaped channels similar to Unistrut, Series P1000. Vertical piping shall be secured to the horizontal members by pipe clamps or pipe straps. See pipe clamp and strap requirements.
2. For piping 3 inch and smaller, framework shall be as manufactured by:

a. Unistrut Corporation.
b. Power-Strut (or Ackinstrut where fiberglass systems are specified).
c. Multi-Strut by Carpenter-Paterson.
d. Or equal.

3. For piping larger than 3 inches, the support frame shall be fabricated from structural stainless steel or steel shapes, depending upon the support location, and secured through the use of drop in, adhesive or expansion anchors.
4. Furnish assemblies complete with all nuts, bolts, and fittings required for a complete assembly including end caps for all Unistrut members.
5. Electrical Conduit Support: Under Division 26.
6. Design of each individual framing system shall be responsibility of Contractor. Submit shop drawings and show all details of installation, including dimensions and types of supports. In all instances the completed frame shall be adequately braced to provide a complete rigid structure when all the piping has been attached. See also Article SUPPORT AND RESTRAINT.

B. Supports not otherwise described in this Section shall be fabricated or constructed from standard structural stainless steel or steel shapes in accordance with applicable provisions of Section 055000 “Metal Fabrications,” or Unistrut-type frame; have anchor hardware similar to items previously specified herein; shall meet the minimum requirements listed below; and be subject to the approval of Engineer.

C. Additional Pipe Support Situations:

1. Supporting Multiple Chemical and Related Piping:

a. Location: As indicated on Drawings or otherwise required, especially adjacent to chemical pumps.
b. Use: Framework support.
c. Materials: FRP, with proper local stress protection.

2.14 SHOP FACTORY FINISHING

A. Prepare and prime metallic (except stainless steel) supports.

2.15 ACCESSORIES

A. Insulation Shield: Install on insulated non-steel piping. Oversize the rollers and supports, as required. Manufacturers:

1. Anvil, Figure 167.
2. Cooper B-Line, Series B3151.
3. Or Approved Equal.

B. Welding Insulation Saddle: Install on insulated metal pipe. Oversize the rollers and supports, as required. Manufacturers:

1. Anvil, Figure 160.

2. Cooper B-Line, Series B3160.
3. Or Approved Equal.

C. Vibration Isolation Pad: Install under base flange of pedestal type pipe supports adjacent to equipment and where required to isolate vibration.

1. Isolation pads to be neoprene, waffle type.
2. Manufacturers:

a. Mason Industries, Type W.
b. Korfund.
c. Or Approved Equal.

D. Dielectric Barrier:

1. Install between carbon steel members and copper or stainless-steel pipe.
2. Install between stainless steel supports and non-stainless steel ferrous metal piping.
3. Isolate stainless steel piping from ferrous materials, including galvanized steel by use of neoprene sheet material and protection shields.

E. Electrical Isolation: Install 1/4 by 3 inch neoprene rubber wrap between submerged metal pipe and oversized clamps.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify field dimensions as indicated on Drawings.

3.2 INSTALLATION

A. Obtain permission from Engineer before using powder-actuated anchors.

B. Obtain permission from Engineer before drilling or cutting structural members.

C. Inserts:

1. Install inserts for placement in concrete forms. Before setting inserts, all drawings and figures shall be checked that have a direct bearing on the pipe location. Responsibility for the proper location of pipe supports is included under this Section.
2. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 inches and larger.
4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

D. Pipe Hangers and Supports:

1. Support horizontal piping as indicated on Drawings, depending upon pipe size.
2. Install support systems in accordance with MSS SP58, unless shown otherwise. Install pipe anchors where required to withstand expansion thrust loads and to direct and control thermal expansion.
3. Proceed with installation of piping and supports only after any building structural work has been completed and new concrete has reached its 28-day compressive strength.
4. The installation of pipe support systems shall not interfere with the operation of any overhead bridge cranes, monorails, access hatches, etc. No piping shall be supported from stairs, other pipes, ladders, and walkways unless authorized by Engineer.
5. Repair mounting surfaces to original condition after attachments are made.
6. Brace horizontal pipe movements by both longitudinal and lateral sway bracing.
7. Where supports are required in areas to receive chemical resistant seamless flooring, install supports prior to application of flooring system.

E. Insulation:

1. Provide clearance in hangers and from structure and other equipment for installation of insulation.

F. Equipment Bases and Supports:

1. Provide housekeeping pads of concrete, minimum 4 inches thick and extending 6 inches beyond supported equipment. Comply with Section 033000 “Cast-in-Place Concrete.”

G. Prime Coat:

1. Prime coat exposed steel hangers and supports.
2. Conform to Section 099679 “Atmospheric Protection and Plant Service Areas Coatings – Supplemental Document.”
3. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

3.3 FIELD QUALITY CONTROL

A. Test pipe support systems after installation in conjunction with respective piping pressure tests. If any part of the pipe support system proves to be defective or inadequate, it shall be repaired, augmented or replaced to the satisfaction of Engineer.

B. After the work is installed, but before it is filled for startup and testing, the Support System Design Engineer shall inspect the work and shall certify its complete adequacy. Each system shall be inspected and certified in the same way.

C. Submit a report, including all field modifications and including all certificates.

1. Insert state where project is located.
2. The report shall be subject to the review of the Engineer.

3.4 CLEANING

A. Keep equipment interior clean as installation progresses.

END OF SECTION 400507

SECTION 400524 – PB STEEL PROCESS PIPE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Steel pipe.
2. Fittings.
3. Hot-dip galvanized coating and lining.

B. Related Requirements:

1. Section 400506 “Couplings, Adapters, and Specials for Process Piping”: Pipe penetrations, restrained joints, flexible connections, expansion joints and loops, and sleeve-type couplings.
2. Section 400507 “Hangers and Supports for Process Piping”: Hangers, anchors, sleeves, and sealing of piping to adjacent structures.
3. Section 400551 “Common Requirements for Process Valves”: Common product requirements for valves for placement by this Section.

1.3 COORDINATION

A. Coordinate Work of this Section with piping and equipment connections specified in other Sections and indicated on Drawings.

1.4 ACTION SUBMITTALS

A. Product Data:

1. Submit manufacturer information regarding pipe and fittings.
2. Details of hot dip galvanized procedures for pipe coating and lining.

B. Shop Drawings:

1. Indicate layout of piping systems, including equipment, critical dimensions, sizes, and material lists, locations of all expansion joints, supports, anchors, harnessing, valves, etc.
2. Identify flange locations as required for field connections (field welding not allowed) and for any expansion joints as required.

C. Complete schedule of all components included in the pipeline drawings, indicating the materials and schedule number of thickness of all pipe, the materials and class of all fittings and valves.

1.5 INFORMATIONAL SUBMITTALS

A. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

B. irements.

C. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

D. Qualifications Statements:

1. Submit qualifications for manufacturer, installer, and licensed professional.
2. Submit manufacturer's approval of installer.

1.6 QUALITY ASSURANCE

A. Permanently mark each length of pipe with manufacturer's name or trademark and indicate conformance to standards.

B. Perform Work according to ASTM, ANSI, and AWWA standards.

C. Roll or permanently inscribe the manufacturer's name or trademark, the year of manufacture and the ASTM or API specification number on the pipe surface at the manufacturer's plant. Alternately, stencil the manufacturer's name or trademark, year of manufacture and ASTM or API specification number on the pipe surface.

D. Utilize only certified welders, having current certificates conforming to the requirements of the ASME code to perform all welding on steel pipes. Welders to be qualified under the requirements of Section IX Welding Qualifications, of the ASME Boiler and Pressure Vessel Code.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years' experience.

B. Welders: AWS qualified within previous 12 months for employed weld types.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

B. Store materials according to manufacturer instructions.

C. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Protect piping and appurtenances by storing off ground.
3. Provide additional protection according to manufacturer instructions.

1.9 AMBIENT CONDITIONS

A. Minimum Conditions: Do not store or handle uninstalled lined pipes or fittings at temperatures below zero degrees F.

1.10 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 STEEL PIPE AND FITTINGS

A. General Service Piping (up through 24-inch diameter):

1. Comply with ASTM A53/A53M; Grade B
2. Type: Welded, Seamless, Butt welded, or Electric welded.
3. Schedule: 10S
4. Finish: Hot-dip galvanized.
5. Minimum yield strength of 30,000 psi, fusion welded in accordance with the Code for Pressure Piping, ASME B31.1, to develop full plate strength.
6. Dimensions for steel pipe in accordance with ASME B36.10M. Pipe fabricated with straight-seam welds or spiral-seam welds. Straight seam pipe will have not more than two longitudinal butt-welded seams. Girth seams butt welded and not be closer than 6 feet apart except in specials and fittings. Spiral lap welded steel pipe is not allowed.
7. Provide pipe in lengths of approximately 20 feet.
8. Circumferential deflection of all pipe in-place shall not exceed 2.0 percent of pipe diameter.
9. Fabricated from carbon steel sheet ASTM A570 (Grades 30, 33, 36, or 40) or from plate ASTM A36, A283 (Grades C or D), A572 (Grade 42), or coil ASTM A139 (Grades B or C). Minimum material yield strength shall be 35,000 psi.
10. Maximum steel carbon content of 0.25 percent. Minimum elongation of 22 percent in a 2-inch gauge length.
11. Pipe wall thickness shall be designed for the design pressure specified herein with an additional allowance for the herein specified surge. Pipe design shall also account for pipe handling considerations.
12. Fittings shall be per AWWA C200 and C208. Fittings shall be of the same wall thickness, lining, and coating as the piping they are connected to. Use largest number of

pieces for mitered bends feasible (unless indicated otherwise on Drawings). Maximum deflection angle for any section of the bend shall be 11.25 degrees.

13. Pipe ends/joints shall be flanged at equipment, valves, and where otherwise shown on the Drawings.
14. Flanges

    a. Flanges and blind flanges shall conform to ANSI B16.5, Class 125, AWWA C207, Class D for working pressure of 150 psi or less or Class E for all others and as compatible with valves and appurtenances attached to it; use higher pressure flanges to mate to valves or equipment flanges with higher ratings. They shall be welded neck or slip on type as required to meet the service noted. Welding shall be in accordance with AWWA C206. Slip-on flanges shall be welded to the pipe with fillet welds on both sides. Welding neck type flanges shall be butt-welded to the pipe.
    b. Drilling and size of flanges and bolts must be coordinated to insure compatibility; larger bolt holes as required for insulating flanges.
    c. Flange faces shall be flat faced and shall be normal to the pipe axis with a maximum tolerance of 0.005 in/ft of flange diameter. Angular deflection (or layback) of the flange face shall not exceed 0.75 degree from a plane surface and shall be uniform within 0.010-inch. All flanges, after welding to the pipe, shall be measured and shall be refaced, if necessary, to bring them within the specified tolerances. Flanges shall only be welded in the shop.
    d. The machined faces of all flanges shall be shop-coated with rust-preventive compound. Edges and back faces of attached flanges and blind flanges shall be shop coated with a primer compatible with the application of the final field coating. The inside of blind flanges shall be epoxy coated in accordance with AWWA C210.
    e. Bolts shall be ASTM A307, Grade B, heavy hex nut, installed length to project approximately 1/2-inch beyond surface of nuts.
    f. Gaskets for all services other than air shall be cloth-inserted rubber, 1/8-inch full face type. Garlock 3000, John Crane Co. Style 777, or equal.
    g. Flange insulating kits shall be utilized between all dissimilar metals and where otherwise noted.

        1) Insulating gaskets shall be JM Red Devil Type E full-face gasket, or approved equal.
        2) Insulating sleeves and washers shall be one piece when flange bolt diameter is 1-1/2-inch or smaller and shall be made of acetyl resin. For bolt diameters larger than 1-1/2-inch, insulating sleeves and washers shall be two piece and shall be made of polyethylene or phenolic. Steel washers shall be in accordance with ASTM F436.

15. All piping assemblies shall be shop assembled with flanged ends. Shop welding of fabrications shall be done according to the procedures and by welders certified per ASME Section IX. Welds shall be any inert gas shielding process using only extra low carbon filler metals. Welds shall have a bead height of nor more than 1/16-in. Butt welds shall have 100 percent penetration to the interior or backside of the weld joint. Cross-sectional thickness of welds shall be equal or greater than that of the parent metal.

2.2 FINISHES

A. Hot dip galvanizing of steel pipe shall conform to ASTM-A53.

2.3 SOURCE QUALITY CONTROL

A. Testing:

1. Provide shop inspection and testing of completed pipe sections.

B. Engineer reserves the right to perform shop inspections of the manufacture of the pipe. Provide at least 30 days' notice to the Engineer prior to the beginning of any work so that inspection may be arranged. Furnish all facilities required for the inspection of materials and workmanship in the shop.

1. Inspection may include, welding inspection, review of certified material test reports, traceability check, and witness of assembly and fit-up.
2. Prior to manufacture, the pipe fabricator shall supply the following information on suppliers of plate, piping, and other components: Items(s) furnished, company name and address, contact name, telephone and fax number. The Engineer reserves the right to visit any or all of the suppliers and conduct inspections at their facilities.
3. The inspector has the authority to reject any material or work that does not meet the requirements of the Contract Documents.
4. Inspection at the shop is intended as a means of facilitating the work and avoiding errors. Shop inspection does not relieve the responsibility for furnishing proper materials or workmanship.
5. Engage inspectors to inspect welded connections and to perform tests and prepare test reports. Perform non-destructive testing as required by the specification under which the pipe is manufactured.
6. Correct or reweld and retest deficient welds to the specified requirements as determined by the Engineer and/or an independent testing lab.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field dimensions are as indicated on Drawings.

B. Inspect existing flanges for nonstandard bolt-hole configurations or design and verify that new pipe and flange mate properly.

3.2 PREPARATION

A. Thoroughly clean pipe and fittings before installation.

B. Surface Preparation:

1. Clean surfaces to remove loose rust, mill scale, and other foreign substances

3.3 INSTALLATION

A. According to AWWA M11

B. Run piping straight along alignment as indicated on Drawings, with minimum number of joints.

C. Fittings:

1. Clean gasket seats thoroughly and wipe gaskets clean prior to installation.
2. Install fittings according to manufacturer instructions.
3. Bolts:

    a. Determine torque per AWWA M11.
    b. Tighten bolts progressively, drawing up bolts on opposite sides until bolts are uniformly tight.
    c. Use torque wrench to tighten bolts to manufacturer instructions.
    d. Project 1/4-inch beyond the nut when joint with gasket is assembled.

D. Provide required upstream and downstream clearances from devices as indicated on Drawings.

E. Install piping with sufficient slopes for venting or draining liquids and condensate to low points.

F. Support exposed piping as specified in Section 400507 “Hangers and Supports for Process Piping” and as required on the Drawings. Where temporary supports are used during construction, provide sufficient strength and rigidity to prevent shifting or distortion of the pipe.

G. Provide expansion joints as specified in Section 400506 “Couplings, Adapters, and Specials for Process Piping”, and provide pipe guides as specified in Section 400507 “Hangers and Supports for Process Piping”, to compensate for pipe expansion due to temperature differences.

H. Dielectric Fittings: Provide between dissimilar metals.

3.4 TOLERANCES

A. Circumferential deflection of all pipe in-place: not to exceed 2.0 percent of the pipe diameter.

3.5 FIELD QUALITY CONTROL

A. Cleaning:

1. Keep pipe interior clean as installation progresses.
2. After installation, clean pipe interior of soil, grit, loose mortar, and other debris.
3. Galvanized Surfaces: Clean bolted connections and abraded areas and repair galvanizing to comply with ASTM A780.

B. Inspection:

1. Inspect for damage to pipe galvanizing and for other defects that may be detrimental as determined by Engineer.
2. Repair damaged piping or provide new, undamaged pipe.

3. After installation, inspect for proper supports and interferences.

C. Replace pipe or fittings with mortar cracks wider than 1/16 inch.

D. Pressure Testing:

1. Test Pressure: As specified in PART 2.
2. Conduct pneumatic test for sufficient time to visually inspect all joints or a minimum of 30 minutes at specified test pressure. There shall be no drop in test pressure in this time.
3. Observe joints, fittings, and valves under test.
4. Correct visible or audible leaks shall and then re-test the line.
5. After satisfactory completion of the test, vent the line and allow it to return to atmospheric pressure.

END OF SECTION 400524

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CITY OF GEORGETOWN, TEXAS
PECAN BRANCH PACKAGE PLANT
BALANCE OF PLANT

SECTION 400531 - PB
THERMOPLASTIC PROCESS PIPE

The following additions, deletions, modifications, and clarifications shall be incorporated into the San Gabriel Change Order. These items shall have the full force and effect as the San Gabriel Contract Documents and cost involved shall be included in the Change Order price.

SUPPLEMENTAL PAGE

1. Page 400531 - 5, Paragraph 2.1.B.2, **ADD** the following:

    "c. Long radius bends required for dual containment piping."

END OF SUPPLEMENT

CITY OF GEORGETOWN, TEXAS
PECAN BRANCH PACKAGE PLANT
BALANCE OF PLANT

SECTION 400551-A - PB
TABLE 1 - VALVE SCHEDULE

The following additions, deletions, modifications, and clarifications shall be incorporated into the San Gabriel Change Order. These items shall have the full force and effect as the San Gabriel Contract Documents and cost involved shall be included in the Change Order price.

SUPPLEMENTAL PAGE

1. Page 400551-A, TABLE 1, **REVISE** the Process Mechanical Valve Schedule to include the valves as shown on attached table.

END OF SUPPLEMENT

SECTION 400551–A - PB
TABLE 1
PROCESS MECHANICAL VALVE SCHEDULE

Tag Number	*Tag Typ*	*Valve Size (Inches)*	*End Connection*	*Working Pressure (psi)*[4]	*Service Fluid* [2]	*Actuator Type* [3]	*Notes*	*Drawing Number*	*Spec Section*
PV-150-01	PV1	16”	FLANGED	40	INF	MANUAL		IA-1 / MA-1	400562
PV-180-01	PV1	16”	FLANGED	40	INF	MANUAL		IA-1 / MA-1	400562
PV-180-03	PV1	8”	FLANGED	40	INF	MANUAL		IA-1 / MA-1	400562
PV-180-02	PV1	16”	FLANGED	40	PP INF	MANUAL		IJ-1 / MJ-2	400562
GV-375-01	GV4	16”	FLANGED	10	PP CEFF	MANUAL		IJ-1 / MJ-4	400561
GV-400-01	GV4	16”	MECH JOINT	10	PP CEFF	MANUAL		CY-1.4	400561
N/A	INSERTION	20”	N/A	10	PP CEFF	MANUAL		CY-1.4 / ME-1	INSTA-VALVE OR EQUAL
BFV-401-01	-	20”	FLANGED	10	FI	MOTOR ACTUATED	RELOCATE EXISTING VALVE	IE-1	-
BFV-402-01	-	6”	FLANGED	10	BWW	MOTOR ACTUATED	BY FILTER MFR	IE-1	-
BFV-402-02	-	6”	FLANGED	10	BWW	MOTOR ACTUATED	BY FILTER MFR	IE-1	-
BFV-402-03	-	6”	FLANGED	10	BWW	MOTOR ACTUATED	BY FILTER MFR	IE-1	-
BFV-403-01	BFV1	6”	FLANGED	10	BWW	MANUAL		IE-1 / ME-1	400564
BFV-403-02	BFV1	6”	FLANGED	10	BWW	MANUAL		IE-1 / ME-1	400564
CV-410-01	SCV1	6”	FLANGED	15	BWW	MANUAL		IE-1 / ME-2	400565.23
CV-410-02	SCV1	6”	FLANGED	15	BWW	MANUAL		IE-1 / ME-2	400565.23
BFV-410-01	BFV1	6”	FLANGED	15	BWW	MANUAL		IE-1 / ME-2	400564
BFV-410-02	BFV1	6”	FLANGED	15	BWW	MANUAL		IE-1 / ME-2	400564
PV-816-01	PV1	8”	FLANGED	30	PP WAS	MANUAL		IG-1 / MG-1	400562
PV-816-02	PV1	8”	FLANGED	30	PP WAS	MANUAL		IG-1 / MG-1	400562
PV-816-03	PV1	8”	FLANGED	30	PP WAS	MANUAL		IG-1 / MG-1	400562
PV-816-04	PV1	8”	FLANGED	30	PP WAS	MANUAL		IG-1 / MG-1	400562
PV-817-03	PV1	6”	FLANGED	FIELD VERIFY	SL	MANUAL		IG-1 / MG-1	400562
PV-817-01	PV1	6”	FLANGED	FIELD VERIFY	WAS	MANUAL		IG-1 / MG-1	400562
CV-370-01	SCV1	6”	FLANGED	30	PP WAS	MANUAL		IJ-1 / MJ-3	400565.23

Tag Number	*Tag Typ*	*Valve Size (Inches)*	*End Connection*	*Working Pressure (psi)*[4]	*Service Fluid* [2]	*Actuator Type* [3]	*Notes*	*Drawing Number*	*Spec Section*
CV-370-02	SCV1	6”	FLANGED	30	PP WAS	MANUAL		IJ-1 / MJ-3	400565.23
PV-370-01A	PV1	6”	FLANGED	30	PP WAS	MANUAL		IJ-1 / MJ-3	400562
PV-370-02A	PV1	6”	FLANGED	30	PP WAS	MANUAL		IJ-1 / MJ-3	400562
PV-370-01B	PV1	6”	FLANGED	30	PP WAS	MANUAL		IJ-1 / MJ-3	400562
PV-370-02B	PV1	6”	FLANGED	30	PP WAS	MANUAL		IJ-1 / MJ-3	400562

NOTES:

(1) Scheduled valves are limited to only process mechanical valves which are manually operated valves 4-inches and larger, and all process mechanical valves that have electric motor, solenoid or pneumatic operators. No fire protection or plumbing valves are included. For Plumbing, Building Mechanical, and Fire Protection valves see Divisions 21, 22, and 23.

(2) Process Fluid Abbreviations: PP INF= Package Plant Raw Influent; PP CEFF = Package Plant Clarified Effluent, PP WAS = Package Plant Waste Activated Sludge, FI = Filter Influent, BWW = Backwash Waste, SL = Sludge Suction, WAS = Waste Activated Sludge

(3) See Section 400557 for Operator requirements.

(4) See pipe schedule for line test pressures and specifications for valve design pressure requirements. For valves at pump stations, confirm with pump manufacturer for flow and pressure requirements.

(5) This schedule is provided for Contractor’s convenience and does not relieve them of requirements to install all valves shown on the Drawings.

Valve Type Summary	
Valve Type	Description
ARV1	Air Release Valves for Water Service
ARV2	Thermoplastic Air Release Valves
AVRV	Air/Vacuum relief Valves for Water Service
ASR	Air Release Valves for Wastewater Service
ASC	Combination Air Valves for Wastewater Service
BFV1	AWWA Butterfly Valves
BFV2	Cartridge Seat Process Duty Butterfly Valves
BFV3	High Performance Butterfly Valves
BFV4	Butterfly Valves for Low Pressure Air Service (Metal Body)
BFV5	Cartridge Seat Thermoplastic Butterfly Valves
BFV6	Boot Seat Thermoplastic Butterfly Valves
CAV1	Combination Air Valves for Water Service
CAV2	Combination Air Valves for Water Service with Anti Surge Mechanism
BPREG	Backpressure Regulating/Inline Pressure-relief Valves
DV2	Plastic Diaphragm Valves
SRV	Surge Relief Valve
VPBV	Vee Port Ball Control Valves
BV3	Two Piece Brass Body Ball Valves, 3-Inch and Smaller
BV8	Thermoplastic Ball Valves
VPBV	Vee-Port Ball Valve
RFCV	Rubber Flapper Check Valves 3-inch and Larger
RPZBP	Reduced Pressure Zone Backflow Preventers
DDCV1	Double Disk Check Valve -Blower Discharge Service
TDCV	Tilting Disk Check Valves
SCV1	Iron Body Swing Check Valves 4-inch and larger
SCV2	Alloy Body Swing Check Valves for Saline Service
GV1	Double Disc Gate Valves
GV2	Double Revolving Disc Gate Valves
GV3	Solid Wedge, Metal-Seated Gate Valves
GV4	Solid Wedge, Resilient-Seated Gate Valves
GV5	General-Duty Gate Valves-Smaller than 3 inches
GV6	Plastic Gate Valves
PRV1	Pressure Reducing Valves
PRV2	Thermoplastic Pressure Reducing Valves
PV1	Eccentric Plug Valves
PV3	Eccentric Plug Valves with Modulating Actuator for flow control
SV1	Solenoid Valves 2” and Larger
SV2	Solenoid Valves Smaller than 2”

END OF SECTION 400551-A

CITY OF GEORGETOWN, TEXAS
PECAN BRANCH PACKAGE PLANT
BALANCE OF PLANT

SECTION 400564 - PB
BUTTERFLY VALVES

The following additions, deletions, modifications, and clarifications shall be incorporated into the San Gabriel Change Order. These items shall have the full force and effect as the San Gabriel Contract Documents and cost involved shall be included in the Change Order price.

SUPPLEMENTAL PAGE

1. Page 400564 – 3 **ADD** the below as Paragraph 2.2. **RENUMBER** the subsequent paragraphs as required.

"2.2 AWWA BUTTERFLY VALVES- Tag Type BFV1

A. Manufacturers:

1. DeZurik, Val-Matic, M&H, Kennedy, Pratt.
2. Substitutions: Not permitted.

B. Description:

1. Comply with AWWA C504, Class B. Flanged end connections per ASME B16.1.
2. Minimum Design Pressure: 250 psi.
3. Maximum Process Fluid Temperature: 85 deg F
4. Body Style: Short Body Flanged.
5. Shaft: One or two piece, mechanically secured to disc, capable for mechanical separation from disc without damage to shaft or disc.
6. Bearings: Self-lubricating.
7. Shaft Seals/Packing:

    a. Self- compensating V-type- primary means
    b. Multiple O-rings for up to 24-inch
    c. Pull down seals using a square braid of graphite fiber for over 24-inch
    d. Retained by bolted retainer plate or gland, clips not acceptable
    e. Retained by stuffing box with follower gland for over 24-inch
    f. Replacement without removal of valve from line.
    g. Adjustment without disturbing actuator assembly for over 24-inch

8. Seats:

    a. Mounting: On body or disc.

b. For body mounted seats, supply machined metal seating edges on disc. Seats mechanically retained and adjustable with common tools for valves larger than 24-inch.
c. For disc mounted seats, fasten with a segmented or one-piece machined metal retaining ring, and self-locking bolts or set screws, fully adjustable with common tools. Machined metal seat ring installed in the valve body
d. Type: Resilient and replaceable. Field adjustable and replaceable.

C. Actuator:

1. Per valve schedule.
2. Gear Actuators for Manual Valves: Comply with AWWA C504.

D. Materials:

1. Body: Cast iron, ASTM A126.
2. Stem: Carbon steel with ASTM A276 Type 316 stainless steel journals.
3. Disc: Cast iron, ASTM A126 or Ductile iron, ASTM A536.
4. Seats:

a. Elastomer: EPDM.
b. Retaining Ring: ASTM A276 Type 316 stainless steel.
c. Seat Ring: ASTM A276 Type 316 stainless steel**.**

5. Bearings:

a. Sleeve: Nylatron.
b. Thrust: Bronze ASTM 763, Alloy C99500.

6. Connecting Hardware: ASTM A276 Type 316 stainless steel.

E. Finishes:

1. As specified in Section 400551 “Common Requirements for Process Valves.”
2. Manufacturers standard fusion bonded epoxy.
3. NSF 61 compliant for potable water service valves.”

END OF SUPPLEMENT

CITY OF GEORGETOWN, TEXAS
PECAN BRANCH PACKAGE PLANT
BALANCE OF PLANT

SECTION 404213 - PB
PROCESS PIPING INSULATION

The following additions, deletions, modifications, and clarifications shall be incorporated into the San Gabriel Change Order. These items shall have the full force and effect as the San Gabriel Contract Documents and cost involved shall be included in the Change Order price.

SUPPLEMENTAL PAGE

1. Page 404213 - 6, Paragraph 3.3.A.2.c, **REVISE** to **READ AS** follow:

    "c. All Pipe Sizes 4 inches and smaller, including the following:

        1) Exposed service water piping serving outdoor hose station / yard hydrants.
        2) Hose piping to Package Plant."

END OF SUPPLEMENT

CITY OF GEORGETOWN, TEXAS
PECAN BRANCH PACKAGE PLANT
BALANCE OF PLANT

SECTION 432513 - PB
SUBMERSIBLE SOLIDS HANDLING PUMPS

The following additions, deletions, modifications, and clarifications shall be incorporated into the San Gabriel Change Order. These items shall have the full force and effect as the San Gabriel Contract Documents and cost involved shall be included in the Change Order price.

SUPPLEMENTAL PAGE

1. **ADD** the attached Short Version Equipment Specification to furnish three (3) shelf spare Submersible Solids Handling Pumps.

END OF SUPPLEMENT

Approved for Construction: Y__ N _X_

SHORT VERSION EQUIPMENT SPECIFICATION

ATTACHMENTS INCLUDED ☐

GENERAL

JOB:	Pecan Branch Package Plant	SERVICES REQUIRED (YES/NO)							ISSUE DATE	09/15/25
LOCATION:	City of Georgetown	Y	DESIGN	Y	PROVIDE TO SITE	N	INSTALL		REVISIONS	1.
NO:	2048-302544	N	STARTUP	Y	O&M MANUALS	Y	TEST	Y OPER. TRAINING		2. Date:

EQUIPMENT NAME	LOCATION	EQUIPMENT TAG
Submersible Sewage Pumps - Shelf Spares Hydromatic	Pecan Branch Influent Lift Station Wet Well(s)	Refer to Owner

MECHANICAL/PHYSICAL DATA

WEIGHT	NO. OF UNITS: 3	SPECIAL REQUIREMENTS/PERFORMANCE CRITERIA:	
Per Pump Supplier	STATUS	Coordinate with Owner and Pump MFR for Special Requirments	
DIMENSIONS	3 SHELF SPARE	DRIVE TYPE:	
Pump Dimensions: Per Pump Supplier	N/A STAND BY	Variable Frequency Drive	
CAPACITY	CONNECTION SIZES	SUBMITTALS	WARRANTY (YES/NO)
Design Flow: 1,500 GPM	Suction: 6 - inches / 150# ANSI	Shop Testing - Non-witnessed Factory Hydrostatic and Performance Tests per Hydraulic Institue Standards	YES - Details to be determined
Design Head: 40-ft		Field Testing - ADD BRIEF LANGUAGE HERE IF CITY DECIDES THEY WANT SOME TYPE OF WARRANTY AND TO SWITCH IT IN AND OUT	Equipment free of defects in material and workmanship for 2-years from Substantial Completion
	Discharge: 6 - inches / 150# ANSI	Field Service - Instruct Owner on proper storage, installation, operation and maintenance of equipment.	
Notes: (3) Inverter Duty Submersible Pump by Hydromatic. Coordinate with Owner and Pump Supplier for shelf spares of Submersible Pumps with Inverter Duty Motors capable of passing 3" solids with 2 vanes	MISC. DESIGN CRITERIA Minimum Impeller Diameter for Casing - 9.00" Maximum Impeller Diameter for Casing - 11.00"		

SPEED	MATERIALS OF CONSTRUCTION:	ACCESSORIES/REMARKS:
1,750 rpm	Pump Casing - Cast Iron, ASTM A48, CL30	6" Submersible non-clog pump with trimmed impeller, lower bearing RTD, stainless steel impeller wear ring, 50' cords, SS Kellum grips, 316 stainless steel pump lifting chain
SERVICE	Casing Wear Ring - Cast Iron, ASTM A48, CL30	1 - Item seal failure/temp sensor relay as required for control panel
Raw Sewage	Impeller - Cast Iron, ASTM A48, CL30	1 - Item bearing RTD relay as required for control panel
	Impeller Wear Ring - CA15 Hardened Stainless Steel	1 - Item 6" x 6" base elbow with sealing flange, if needed
	Motor Housing - Cast Iron, ASTM A48, CL30	3 - Items Pressure Gauge as required on Sheet MA-1 and Section 407313
	Cooling Jacket - Cast Iron, ASTM A48, CL30	Pump suitable to attach to either existing Hydromatic guiderails and discharge elbow or existing Flowserve guiderail and discharge elbow. Field Verify before Procurement.
	Seal Plant - Cast Iron, ASTM A48, CL30	
	Bearing Plate - Cast Iron, ASTM A48, CL30	
	Cable Entry - Cast Iron, ASTM A48, CL30	
	Hardware - Type 316 Stainless Steel	
	Shaft - Type 416 Stainless Steel	
	Upper Mechanical Seal Faces - Carbon Ceramic	
	Lower Mecahnical Seal Faces - Silicon Carbide / Silicon Carbide	SPARE PARTS:
	Upper Bearing - Deep Groove Ball Bearings	(2) Upper Mechanical Seals
	Lower Bearings - Tapered Roller Bearings	(2) Lower Mecahnical Seals
	O-Rings - Buna - N	(2) O-ring Kits
	Cable Entry Grommet - Neoprene	(1) Power Cable
	Seal Oil - Environmentally Friendly	(1) Sensor Cable
	Power and Control Cable - UL Listed - W, SOOW, (1) and (1)	(3) Nameplates
	Impeller Key - Type 416 Stainless Steel	
	Impeller Bolt - Type 316 Stainless Steel	

CLASS OR RATING	PAINTING/COATINGS :	DESIGN TEMP.	DESIGN PRESSURE.	FLUID TYPE
Factory Mutual CSA Approved X-Proof Class 1, Division 1 Hazardous Location	Factory Provided	Ambient Temp Range of 30 to 120 degrees F	40 PSI	Raw Sewage

ELECTRICAL

ELECT POWER (YES/NO)	CONNECTED AMPS	REMARKS:
YES		
STANDBY POWER (YES/NO)	MAX. STARTS/DAY (HOUR)	
NO	8	

MOTOR TYPE	HP	ENCLOSURE
INVERTER-DUTY	30	
MOTOR SPEED	VOLTAGE	PHASE
1,760 RPM	460	3
POWER FACTOR CORRECTION	PANEL ENCLOSURE:	
1.15	NEMA 4X (304 SS)	

INSTRUMENTATION

INST/CONT. REQ. (YES/NO)	NORMAL CONTROL MODE: Automatic
N/A	N/A use existing Control Panel and Instrumentation on Site
TYPE (MANUAL/AUTO)	
N/A	
INST. PKG BY MANUF. (YES/NO)	
N/A	
CONTROL PANEL ENCLOSURE:	
N/A	

ENVIRONMENTAL

	YES/NO	REMARKS		YES/NO	REMARKS
INSIDE BUILDING?	NO		WASH DOWN?	NO	
DAMP AREA?	YES		CORROSIVE AREA?	YES	
SUBJECT TO FREEZING?	YES		DUSTY AREA?	NO	
SUBJECT TO DIRECT SUN?	NO		EXPLOSIVE AREA?	YES	
			SUBJECT TO FLOODING?	YES	

EQUIPMENT SELECTION

SELECTED MANUFACTURER	MODEL	DELIVERY SCHEDULE
Hydromatic	S6A	WKS AFTER SHOP DWG. APPR.
ALTERNATIVE MANUFACTURER(S)	MODEL(S)	DELIVERY SCHEDULE
None Allowed		WKS AFTER SHOP DWG. APPR.
		WKS AFTER SHOP DWG. APPR.
		WKS AFTER SHOP DWG. APPR.
		WKS AFTER SHOP DWG. APPR.

SUBMITTALS

		REVIEWED BY			SUBMITTALS DUE:
1.	Assembly and installation drawing including minimum water level for pump operation, pump weight, materials list, and spare parts list		Structural	NA Bldg Mechanical	
2.	Cataglog performance curves with clearly stated preferred operating range and actual operating range for variable speeds.		Instrumentation		
3.	Complete Motor Data, wiring diagrams, and schematics of all power and control systems.		Electrical		
4	Statement regarding the minimum speed at which the pump can operator		Process Mechanical		
5	Non-witneessed (but certified) pump performance tests, per ANSI/HI 14.6 (Hydraulic Performance Acceptance Tests) and 11.6 (Submersible Pump Mechanical & Electrical Acceptance Tests).				

TESTING

TESTING PROCEDURES:
Factory Test pumps with Inverter-Duty Motor at Design Conditions as listed above.
Start-up Testing - ADD LANGUAGE TO TEST PUMPS IN WETWELL (SEE MASTER SPEC LANGUAGE)

CITY OF GEORGETOWN, TEXAS
PECAN BRANCH PACKAGE PLANT
BALANCE OF PLANT

SECTION 463344 - PB
PERISTALTIC METERING PUMPS

The following additions, deletions, modifications, and clarifications shall be incorporated into the San Gabriel Change Order. These items shall have the full force and effect as the San Gabriel Contract Documents and cost involved shall be included in the Change Order price.

SUPPLEMENTAL PAGE

1. Page 463344 - 1, Paragraph 1.2.A.1, **DELETE "**Sodium Bisulfite Facility" and **REPLACE WITH** "Aluminum Sulfate (Alum)".

2. Page 463344 - 5, Paragraph 2.1.F "Application Schedule", **REVISE** the text to **READ AS:**

   "F. Application Schedule:

      1. Supply peristaltic metering pumps to convey alum from the Chemical Storage Tanks to the dosing locations identified on the Contract Drawings.

         a. Pump Tag: ALFP-01, ALFP-03, ALFP-04.

            1) Chemical: Aluminum Sulfate (Alum).
            2) Formulation: Al2(SO4)3.
            3) Solution Strength Weight: 48.5%.
            4) Solution pH: 1.9-2.4.
            5) Specific Gravity at 25 degrees C: 1.315 - 1.345.
            6) Viscosity, cp at 25 degrees C: 5 - 25."

3. Page 463344 - 6, Paragraph 2.1.G "Peristaltic Metering Pump Schedule" **REVISE** the text to **READ AS:**

   "G. Peristaltic Pump Metering Pump Schedule:

      1. Pump Tag: ALFP-01, ALFP-03, ALFP-04.

         a. Pump Type: Peristaltic.
         b. Operation Range, gph: 0.1 - 14.5.
         c. Max Operating Discharge Pressure, psi: 16.3.
         d. Suction Lift, ft: 4.73.
         e. NPIPa, psi: 22.7.
         f. Pump Discharge Capacity, gph: 31.7.
         g. Pump Pressure Capacity, psi: 60.
         h. Max RPM: 140.
         i. Maximum Motor Power: 1/2 hp or associated DC motor if applicable.

j. Suction and Discharge Piping: 1-inch.
k. P&ID Reference No.: IF-1."

4. Page 463344 - 6, Paragraph 2.2.A, **REPLACE** "Watson Marlow Qdos" **WITH** "Watson Marlow Qdos 120".

5. Page 463344 - 8, Paragraph 2.2.E.1.a, **REVISE** the text to **READ AS**:

" a. Three alum feed pumps (ALFP-01, ALFP-03, and ALFP-04) will dose chemical from the Chemical Storage Tanks to the dosing locations identified on Contract Drawings. They will operate in a lead/lag/lead configuration."

6. Page 463344 - 10, Paragraph 2.2.E.3.a.3, **REPLACE** "125 RPM maximum" **WITH** "140 RPM maximum".

7. Page 463344 - 11, **DELETE** Part 2.3.A through Part 2.3.E. **REPLACE WITH** the following and **RENUMBER** the following items as appropriate:

"2.3 PUMP MOUNTING SYSTEMS

A. Provide necessary pipe and equipment supports, anchor bolts, mounting hardware, pumps, valves, and process connections to connect to existing pump mounts and piping as shown on Contract Drawings.

B. Anchor Bolts: Type 316 stainless steel.

C. Construct pipe and equipment supports of corrosion-resistant non-metallic material."

8. Page 463344 - 14, Paragraph 2.5.A.1, **REVISE** "Sodium Bisulfite" to **READ AS** "Aluminum Sulfate."

9. Page 404213 - 6, Paragraph 3.3.A.1.c, **REVISE** to **READ AS** follows:

"c. Pipes: All above ground aluminum sulfate chemical lines to Package Plant."

END OF SUPPLEMENT