



ADDENDUM NO. 2
TO THE CONTRACT DOCUMENTS
for the construction of

Date: July 11, 2017
Project No.: 674010

**W.B. CASEY WATER RECLAMATION FACILITY POLISHING
PLANT AND WAS THICKENING UPGRADES**

CLAYTON COUNTY WATER AUTHORITY
CLAYTON COUNTY, GEORGIA

To All Planholders and/or Prospective Bidders:

The following changes, additions, and/or deletions are hereby made a part of the Contract Documents for the construction of the W.B. Casey Water Reclamation Facility Polishing Plant and WAS Thickening Upgrades dated May, 2017 as fully and completely as if the same were fully set forth therein:

A. CLARIFICATIONS

1. Question: Does the media in the existing DAF biofilter need to be replaced with new media after relocating the system to the WAS facility?

Response: Existing media must be removed, stored, and replaced back into the biofilter following relocation. Media is to be stored in accordance with manufacturer's instructions while relocating unit. Section 01 31 13, Project Coordination has been updated to include this provision.

2. Question: Is there a bypass pumping specification that might list additional requirements?

Response: There is no specification for bypass pumping. Bypass pumping is to be done in accordance with Section 01 31 11, Project Coordination. See specification for additional edits related to bypassing.

3. Question: Deductive Alternate No. 1 in the Bid Form (00 41 00 – 12) says, “Dissolved Air Floatation (DAF) Tanks and Building Demolition as described in Section 01 11 00, Summary of Work and on Drawing 03-C-103 of the Contract Documents.” Drawing 03-C-103 is not included in the contract documents. Please provide if necessary.

Response: Reference to drawing 03-C-103 is incorrect. Drawing to reference for DAF demolition is 03-C-109.

4. Question: Part 1.01 A. 2. e. of Section 01 11 00 lists the Decommissioning / Mothball of existing DAF Facility. Keynote 5 on drawing 03-C-109 says, "Demolish and remove Dissolved Air Flootation (DAF) Tanks (Typ. of 2), building, and all associated equipment." The dotted lines on the drawing seem to indicate that the existing facility will be abandoned in place. Please indicate whether the DAF tanks, building and equipment will be completely demolished or abandoned in place.

Response: The Base Bid shall include complete demolition of the DAF facility including removal of the buildings and all equipment. Demolition Items noted in keynote 5 and 6 on DWG 03-C-109 are part of the deductive alternate. If this alternate is deducted from the price, then the building and equipment will be abandoned in place.

5. Question: Section 02 41 00 Part 3.01 A. indicates that a portion of the DAF demolition work is part of the Base Bid while the complete demolition of the building and tanks is an Additive Alternate. There only appears to be a Deductive Alternate in the Bid Form for the DAF Facility. Please clarify the additive / deductive alternate and what portion of the demolition (if any) is to be included in the Base Bid.

Response: Complete demolition of the DAF buildings and equipment is a deductive alternate. See correction for Section 02 41 00, Demolition.

6. Question: Is it possible to obtain an unlocked version of the documents?

Response: An unlocked version of the documents will not be provided.

7. Question: Section 00 73 00 Part SC-6.05 says, "Delete General Condition 6.05 in its entirety. See Section 01 25 00." Section 01 25 00 does not appear to be part of the bid documents. Please clarify.

Response: See edits to 00 73 00. Reference to 01 25 00 has been removed.

B. PART 2, CONTRACTING REQUIREMENTS

1. Section 00 52 00, Agreement

Page 1, Paragraph 3.1.1, DELETE "720 days" and REPLACE with "750 days."

Page 1, Paragraph 3.1.1, DELETE "750 days" and REPLACE with "780 days."

2. **Section 00 73 00, Supplementary Conditions**

Page 15, SC-6.05, DELETE and REPLACE with "No consideration of approvals will be made for substitutes or "engineer-approved equals" until after the Notice to Proceed."

Page 16, SC 6.05.A.1, DELETE.

C. **PART 3, SPECIFICATIONS**

1. **Section 01 31 13, PROJECT COORDINATION**

DELETE in its entirety and REPLACE with the attached.

2. **Section 01 32 00, CONSTRUCTION PROGRESS DOCUMENTATION**

Page 1, 1.01.A.2.a, DELETE and REPLACE with "Submit during Administrative Period as defined in Section 01 31 13, Project Coordination."

3. **Section 01 50 00, TEMPORARY FACILITIES AND CONTROLS**

Page 7, 3.02.D.1.d, DELETE and REPLACE with: "Water use in excess of 20 gpm must be approved by and coordinated Owner in advance to ensure there are no conflicts with periodic maintenance (washdown, etc.) during which plant operators require higher W3 flows."

4. **Section 02 41 00, DEMOLITION**

Page 3, 3.01.A.2, DELETE and REPLACE with "2. Demolition includes Work required to decommission the existing dissolved air floatation (DAF) facility. A portion of this work is part of the Base Bid while complete demolition of the DAF building and tanks is a Deductive Alternate. Demolition items included in the Deductive Alternate Demolition are as indicated in Drawings.

5. **Section 10 14 00, SIGNAGE**

Page 2, 2.01, ADD the following:

"C. Traffic Sign (Type D):

1. Manufacturer's Premium heavy-duty aluminum reflective sign.
 - a. Type: Custom Traffic Sign.
 - b. Aluminum Gage: 80 mil.
 - c. Reflective Film: 3M Diamond Grade.
 - d. Font: Highway E.

2. Traffic Sign Post:
 - a. Type: NCHRP 350 compliant outdoor pre-drilled, tapered rail steel.
 - b. Finish: Green baked enamel.
 - c. Weight: 2 pounds per linear foot.
3. Manufacturer: RoadTrafficSigns.com”

6. **Section 10 14 00, SIGNAGE, Supplement 1 – Information and Safety Sign Schedule**

DELETE in its entirety and REPLACE with the attached.

7. **Section 31 23 23.15, TRENCH BACKFILL**

Page 10, 3.12.A, DELETE and REPLACE with the following:

“A. In-Place Density Tests: In accordance with ASTM D6938. During placement of materials, test as follows:

1. One in-place density test per lift for a minimum of 500 linear feet segment of trench below structures and roadways.
2. One in-place density test for every other lift for a minimum of 500 linear feet segment of trench outside of structures influence zone or roadway.
3. Additional tests as determined by the Engineer, if tests results indicate compaction does not meet Specifications.”

8. **Section 44 42 23.02 HIGH RATE CLARIFICATION SYSTEM**

DELETE in its entirety and REPLACE with the attached.

ADD Supplement 4 – High Rate Clarification System Proposal.

9. **Section 44 44 13.01, CHEMICAL METERING PUMPS**

Page 3, Paragraph 2.02.2, DELETE and REPLACE with “Only the listed manufacturer will be accepted. No substitutes or equals will be considered.”

Page 3, Paragraph 2.02.3, DELETE.

10. **Section 44 46 26.03, ROTARY DRUM THICKENERS**

Page 18, 3.04.A, ADD "2. Supplement 2 - Rotary Drum Thickener Proposal."

ADD Supplement 2 – Rotary Drum Thickener Proposal.

D. **STANDARD DETAILS**

1. ADD 1014-002, Chemical Delivery Entrance Sign.

E. **DRAWINGS**

No edits to drawings are being issued as part of this Addendum.

All Bidders shall acknowledge receipt and acceptance of this Addendum No. 2 in the Bid Form or by submitting the Addendum with the bid package. Bid Forms submitted without acknowledgment or without this Addendum will be considered in nonconformance.

CH2M HILL

Project Manager

Appended hereto and part of Addendum No. 2:

Section 01 31 13, Project Coordination, attached.

Section 01 14 00, Signage Supplement 1 – Information and Safety Sign Schedule, attached.

Section 44 42 23.02, High Rate Clarification System, attached.

Section 44 42 23.02, High Rate Clarification System, Supplement 4 – High Rate Clarification System Proposal, attached.

Section 44 46 23.03, Rotary Drum Thickeners, Supplement 2 – Rotary Drum Thickener Proposal, attached.

Standard Detail, 1014-002, Chemical Delivery Entrance Sign, attached.

END OF ADDENDUM

**SECTION 01 31 13
PROJECT COORDINATION**

PART 1 GENERAL

1.01 SUBMITTALS

A. Action Submittals:

1. Construction Sequencing Plan including the following information:
 - a. Means and methods of completing tie-ins.
 - b. Estimated duration of downtime of each facility affected by tie-in.

B. Informational:

1. Photographs.
2. Digital Images: Submit images within 5 days of being taken.
 - a. Pre-Construction photographs shall be submitted within 30 calendar days after the date of receipt by the Contractor of Notice to Proceed.
 - b. Weekly construction photographs shall be submitted within 5 days of being taken. Images must be a minimum resolution of 1024 by 768 pixels.
3. Submit updates to the Construction Sequencing Plan with each Project Schedule Submission described in Section 01 32 00 Construction Progress Documentation.
4. Submit bypass pumping plan for tie-in of 60-inch SE pipe.

1.02 RELATED WORK AT SITE

A. General:

1. Other work that is either directly or indirectly related to scheduled performance of the Work under these Contract Documents, listed henceforth, is anticipated to be performed at Site by others.
2. Coordinate the Work of these Contract Documents with work of others as specified in General Conditions.
3. Include sequencing constraints specified herein as a part of Progress Schedule.

1.03 UTILITY NOTIFICATION AND COORDINATION

- A. Coordinate the Work with various utilities within Project limits. Notify applicable utilities prior to commencing Work, if damage occurs, or if conflicts or emergencies arise during the Work.
 - 1. Electricity Company: Georgia Power.
 - a. Contact Person: Brad McBay.
 - b. Telephone: 404-608-5560.
 - c. Emergency: 404-656-4863, 1-800-241-4113.
 - 2. Telephone Company:
 - a. Contact Person: NA.
 - b. Telephone: 1-800-247-2020.
 - 3. Gas Department: Atlanta Gas Light.
 - a. Contact Person: Mark Clay.
 - b. Telephone: 678-278-5276.
 - c. Email: mtclay@agresources.com.
 - 4. Gas Department: Kinder Morgan.
 - a. Contact Person:
 - b. Telephone, General: 1-800-252-5960.
 - c. Telephone, Scheduling Hotline: 1-800-845-4383.
 - 5. Water and Sewer: Clayton County Water Authority.
 - a. Contact Person: Chris Hamilton.
 - b. Telephone: 770-302-3460.

1.04 NOTICE-TO-PROCEED AND ADMINISTRATIVE PERIOD

- A. Following the Notice-to-Proceed, a 90 day Administrative Period shall commence during which the Contractor must complete certain administrative aspects of the work as defined herein. The 1st day of the Administrative Period shall be the day of the Notice-to-Proceed. The Contractor will not be allowed to start Work on the site until the Contractor has satisfied the administrative components of the Contract and has established that they are fully prepared for Work on the site.
- B. The Contractor is advised that should the administrative conditions and requirements of these Contract Documents not be met within the administrative Period, the Owner may pursue remedies pursuant to the terms under General Conditions.
- C. Site mobilization during the Administrative Period will be at the discretion of the Owner and Engineer.
- D. During the Administrative Period, submittals listed herein must be submitted by the Contractor, reviewed by the Engineer and Owner, revised as required, resubmitted and ultimately approved by the Engineer and Owner.

E. The following must be submitted and approved by Engineer and Owner during the Administrative Period and prior to commencing Work on the Site:

1. Schedule of Values (see Section 01 29 00, Payment Procedures).
2. Preliminary Project Schedule (See Section 01 32 00, Construction Progress Documentation).
3. Detailed (Baseline) Project Schedule (See Section 01 32 00, Construction Progress Documentation).
4. Application for Payment Format (see Section 01 29 00, Payment Procedures).
5. Initial Construction Sequencing Plan (described herein).
6. Evidence of Insurance.
7. Statement of Qualification (SOQ) for land surveyor or civil engineer.
8. Initial Schedule of Submittals (see Section 01 33 00, Submittal Procedures).
9. Contractor's Personnel Chart.
10. List of emergency contacts.
11. Copies of permits and approvals for contraction as required by Laws and Regulations and governing agencies.
12. Temporary Utility Plans (see Section 01 50 00, Temporary Facilities and Controls).
13. Temporary Construction Submittals (see Section 01 50 00, Temporary Facilities and Controls).
14. Temporary Control Submittals (see Section 01 50 00, Temporary Facilities and Controls).
15. Satisfaction of all OTHER administrative requirements as established in these Contract Documents.
16. Any additional documents, plans, schedules, or the like, which will facilitate the Contractor's ability to immediately initiate construction activity.

1.05 CONSTRUCTION SEQUENCING

- A. The sequence of construction described below is not all-inclusive. The intent of the following information is to convey how the construction may be completed within the required schedule and without adversely interfering with daily facility operations of the W.B. Casey WRF.
- B. Include the following work sequences in the Progress Schedule:
1. Gas Line Relocation: The 1-inch gas line supplying the pelletizing facility must be re-routed prior to site preparation for WAS Thickening facilities.

2. Site preparation for WAS Thickening Facilities: WAS Thickening Facility requires subgrade preparation as described in Section 31 15 00, Site Preloading.
 - a. Preload must be placed within 45 days of starting Contract Work on the Site.
3. Polishing Plant Facilities and Flint River Discharge: Site preparation and construction of these facilities may commence immediately upon the start of Contract Work on the Site and shall be concurrent with the gas line relocation referenced above and site preparation for the WAS Thickening Facilities.
4. WAS Thickening, WAS Thickening Polymer Storage and Feed, temporary odor control, and the new equipment pad and piping connections for the WAS Thickening Odor Control Facility: Construction of these facilities may proceed once site preparation in the WAS Thickening area has been completed.
5. WAS Thickening Odor Control: Once WAS Thickening Facility has passed Functional Testing, the existing DAF Odor Control unit shall be disconnected from the existing DAF facilities and relocated to the new WAS Thickening Facility.
6. Demolition of existing Dissolved Air Flotation (DAF) facilities: Demolition of the existing DAF facilities may commence following successful completion of Functional and Performance Testing of the WAS Thickening Facility and the WAS Thickening Polymer Storage and Feed System. Demolition may be concurrent with relocation of the DAF odor control unit.

C. Performance Testing:

1. The Phosphorus Polishing Facility must successfully complete Functional and Performance Testing prior to the following:
 - a. Functional Testing and Performance Testing of the UV Disinfection Facility.
 - b. Functional Testing and Performance Testing of the WAS Thickening Facility

1.06 FACILITY OPERATIONS

- A. Existing plant facilities at the W.B. Casey WRF must be kept online for the duration of the Construction. Continuous operation of Owner's facilities is of critical importance. Schedule and conduct activities to enable existing facilities to operate continuously, unless otherwise specified.
- B. Perform Work continuously during critical connections and changeovers, and as required to prevent interruption of Owner's operations.

- C. When necessary, plan, design, and provide various temporary services, utilities, connections, temporary piping and heating, access, and similar items to maintain continuous operations of Owner's facility.
- D. Do not close lines, open or close valves, or take other action which would affect the operation of existing systems, except as specifically required by the Contract Documents and after authorization by Owner and Engineer. Such authorization will be considered within 72 hours after receipt of Contractor's written request.
- E. Digging shall not occur after 4 pm without the prior authorization by Owner and Engineer.
- F. Excavation Endorsement:
 - 1. Prior to initiating any excavation work on the project, the Contractor shall prepare and submit an Excavation Endorsement Form. The form identifies the specific excavation activity to be conducted, provides various items of information, and requires research by the Contractor into the area to be excavated. The form will be coordinated with Plant Operations to ensure plant endorsement of the activity. The objective of the request form is to ensure all is done to prevent breakages to existing lines or services that would in turn disrupt plant operations. Preparation and submission of the form shall be accomplished no less than 72 hours prior to the excavation activity. Upon endorsement of the request, the Contractor may commence the Work. An example of an Excavation Plan and Endorsement form is included at the end of this section.
- G. W.B. Casey WRF Main Plant Facilities:
 - 1. The main plant facilities at the W.B. Casey WRF facilities include preliminary treatment (screening and grit removal), primary clarification, secondary treatment (conventional activated sludge bioreactors and secondary clarification), and chlorine disinfection. The new Effluent Splitter Box will split the flow from the existing Secondary Clarifiers between the existing Effluent Flume and the new Phosphorus Polishing Plant. Following construction of the Effluent Splitter Box, Phosphorus Polishing Facility, UV Disinfection Facility, Flint River Effluent Flume, Cascade Aerator, and Flint River Outfall and the tie-in between the existing 60-inch secondary effluent (SE) pipe from the existing secondary clarifiers and the new Effluent Splitter Box may be completed.

2. The tie in for the 60-inch SE pipe will require bypass pumping. The Contractor is to consider the following factors in planning this work:

a. Current plant flows are as follows:

Flow Condition	Annual Average	Maximum Month Average Daily Flow
Duration (days)	365	30
Flow to W.B. Casey WRF for given duration during 2016 (mgd)	13.4	17.2

- b. Bypass pumping capacity must be 45 mgd to handle potential peak flow condition.
- c. Pump redundancy and emergency backup power must be provided to ensure continued operation in the event of a mechanical or electrical failure/outage.
- d. Bypass pumping must be accomplished with electric pumps for noise mitigation.
- e. Bypassed flow may be discharged into existing W3 Pump Station wet well or flume approach channel. Contractor to coordinate with Owner and Engineer on the timing and acceptable duration of bypassing flow to avoid issues with effluent sampling (which occurs at the W3 Pump Station) and to maintain permit compliance.
- f. One existing Bioreactor Basin and one existing Secondary Clarifier may be drained for use as equalization volume to reduce flow during tie-in activities. Use of this existing basin volume is dependent on plant flow and operational conditions at the time of tie-in and must be coordinated and approved by Owner at the time of the tie-in. Owner will be responsible for draining basins.
3. Existing WAS/Scum Pump Station: The existing WAS/Scum Pump Station will remain in service for the duration of construction with the exception of downtime required to replace pumps and complete tie ins. Downtime of this facility shall not exceed 8 hours. The existing rails may be used to install the new pumps.

H. Dewatering and Pelletizing Facility:

1. Blended sludge composed of primary sludge (PS) and thickened waste activated sludge (TWAS) is collected in the Blend Tank and pumped to the Dewatering and Pelletizing Facility. Dewatering and Pelletization is a continuous operation with the exception of one day per week (typically Sunday). During the regularly scheduled downtime of the Dewatering and Pelletization Facility, the Blend Tank is filled continuously with PS from the primary clarifiers and TWAS (currently pumped from the DAF facility).

2. The Engineer or Owner may require tie-ins and utility relocations effecting the operation to be done during the regularly scheduled Dewatering and Pelletizing Facility downtime.
3. Relocation of Odor Control unit will require the removal, storage and re-filling of media in the biofilter. Contractor is to follow manufacturer's instructions on storage and handling of biofilter media during relocation of the unit.

I. Process or Facility Shutdown:

1. It is the responsibility of the Contractor to identify any additional shutdowns required to complete the Work and coordinate and verify logistical details with Owner and Engineer.
2. Provide 14 days advance written request for approval of need to shut down a process or facility to Owner and Engineer.
3. The Contractor shall prepare and submit a detailed shut down/tie-in plan for every interconnection with or shut down of an existing facility, component, system, structure, panel, pipe, duct, ductbank, conduit or the like, associated with the project. See Tie-in Coordination Worksheet at the end of this section. The written plan shall be supplemented by drawings, sketches, and details as required to show the logic of the plan and make it understandable, and it shall address safety requirements.
4. The Contractor shall schedule a meeting with Plant Operating personnel and the Engineer. At this meeting, the Contractor shall present the Contractor's detailed plan for the proposed operation for general discussion.
5. After discussion of the plan at the meeting, changes agreed upon shall be incorporated into the plan and a copy of the plan and details shall be distributed to the Plant Operating personnel, the Engineer, and the Contractor.
6. The Owner reserves the right to postpone activities which will interfere or interrupt planned processes if conditions so dictate.
7. Power outages will be considered within 96 hours written request to Owner and Engineer. Describe the reason, anticipated length of time, and areas affected by the outage. Provide temporary provisions for continuous power supply to critical facility components.

8. The following existing plant facilities may require shutdown at some time during the Work. Shutdowns may include but are not limited to the construction activities identified below. Operational runtimes given below are typical and may vary depending on plant operational needs and current conditions at the time of construction.

Facility	Typical Operational Runtime	Construction Activity Requiring Shutdown
Dewatering/ Pelletizing	Continuous (Monday through Saturday)	Relocation of gas line Tie ins for new W3 supply lines.
Plant Water (W3) Pump Station (Pumps 801P3 and 801P4 only)	Continuous	Tie ins for new W3 supply lines.
WAS/Scum Pump Station	Continuous	Replacement of WAS/Scum Pumps Tie ins on WAS/Scum piping Installation of new sludge piping from Phosphorus Polishing Facility.

- J. Install and maintain bypass facilities and temporary connections required to keep Owner's operations on line. Sequences other than those specified will be considered upon written request to Owner and Engineer, provided they afford equivalent continuity of operations.
- K. Do not proceed with Work affecting a facility's operation without obtaining Owner's and Engineer's advance approval of the need for and duration of such Work.
- L. Relocation of Existing Facilities:
1. During construction, it is expected that minor relocations of Work will be necessary.
 2. Provide complete relocation of existing structures and Underground Facilities, including piping, utilities, equipment, structures, electrical conduit wiring, electrical duct bank, and other necessary items.
 3. Use only new materials for relocated facility. Match materials of existing facility, unless otherwise shown or specified.
 4. Perform relocations to minimize downtime of existing facilities.
 5. Install new portions of existing facilities in their relocated position prior to removal of existing facilities, unless otherwise accepted by Engineer.

M. Site Access:

1. All construction traffic is to enter the plant using Roberts Road entrance. Use of the main plant entrance is prohibited.
2. Speed limits on plant property must be observed at all times.
3. Contractor is responsible for ensuring that all vehicles owned and/or operated on site are identified as being authorized to access the Site.
4. Contractor is responsible for conveying and enforcing site access requirements to all employee and subcontractors.

1.07 ADJACENT FACILITIES AND PROPERTIES

A. Examination:

1. After Effective Date of the Agreement and before Work at Site is started, Contractor, Engineer, and affected property owners and utility owners shall make a thorough examination of pre-existing conditions including existing buildings, structures, and other improvements in vicinity of Work, as applicable, which could be damaged by construction operations.
2. Periodic reexamination shall be jointly performed to include, but not limited to, cracks in structures, settlement, leakage, and similar conditions.

B. Documentation:

1. Record and submit documentation of observations made on examination inspections in accordance with Article Construction Photographs and Article Audio-Video Recordings.
2. Upon receipt, Engineer will review, sign, and return one record copy of documentation to Contractor to be kept on file in field office.
3. Such documentation shall be used as indisputable evidence in ascertaining whether and to what extent damage occurred as a result of Contractor's operations, and is for the protection of adjacent property owners, Contractor, and Owner.

1.08 GAS LINE ENCROACHMENT

- A. As a part of this work new pipelines and utilities to be installed by the Contractor will cross four gas lines. It is the Contractor's responsibility to coordinate construction and encroachment activities within the Natural Gas Easement with gas companies.

1.09 CONSTRUCTION PHOTOGRAPHS

A. General:

1. Photographically document all phases of the Project including preconstruction, construction progress, and post-construction.
2. Engineer shall have right to select subject matter and vantage point from which photographs are to be taken.
3. Digital Images: No post-session electronic editing of images is allowed. Stored image shall be actual image as captured without cropping or other edits.
4. Photographs shall include the date and time marking of the recording.

B. Preconstruction and Post-Construction:

1. After Effective Date of the Agreement and before Work at Site is started, and again upon issuance of Substantial Completion, take a minimum of 200 exposures of Construction Site and property adjacent to perimeter of Construction Site.
2. Particular emphasis shall be directed to structures both inside and outside the Site.
3. Format: Digital, minimum resolution of 1024 by 768 pixels and 24-bit, millions of color.

C. Construction Progress Photos:

1. Photographically demonstrate progress of construction, showing every aspect of Site and adjacent properties as well as interior and exterior of new or impacted structures.
2. Weekly: Take 25 digital photographs, minimum resolution of 1024 by 768 pixels and 24-bit, millions of color.
3. Monthly: Take 50 digital photographs, minimum resolution of 1024 by 768 pixels and 24-bit, millions of color to document monthly progress and for inclusion with each payment application.

D. Documentation:

1. Digital Images:
 - a. Electronic image shall have date taken embedded into image.
 - b. Archive using a commercially available photo management system that provides listing of photographs including date, keyword description, and direction of photograph.
 - c. Label file folders or database records with Project and Owner's name, and month and year images were produced.

1.10 REFERENCE POINTS AND SURVEYS

- A. Location and elevation of bench marks are shown on Drawings.
- B. Contractor's Responsibilities:
 - 1. Provide additional survey and layout required to layout the Work.
 - 2. Verify location and elevation, in state plane coordinates, of existing benchmarks.
 - 3. Check and establish exact location of existing facilities prior to construction of new facilities and any connections thereto.
 - 4. In event of discrepancy in data by Owner, request clarification before proceeding with Work.
 - 5. Retain professional land surveyor or civil engineer registered in state of Project who shall perform or supervise engineering surveying necessary for additional construction staking and layout.
 - 6. Maintain complete accurate log of survey work as it progresses as a Record Document.
 - 7. On request of Engineer, submit documentation.
 - 8. Provide competent employee(s), tools, stakes, and other equipment and materials as Engineer may require to:
 - a. Establish control points, lines, and easement boundaries.
 - b. Check layout, survey, and measurement work performed by others.
 - c. Measure quantities for payment purposes.

1.11 CONTRACTOR ORGANIZATION

- A. In order to ensure a minimum level of management and supervision for the execution of the Work under this project, the Owner requires that the staff selected for the Work as indicated in the Contractor's Personnel Chart is in place on site for the periods of time that Work falls under the assigned duties, disciplines, areas, or the like.
- B. Contractor's Personnel Chart:
 - 1. Must be provided during the Administrative Period.
 - 2. Must reflect project personnel from Notice-to Proceed to project completion.
 - 3. The Contractor's Personnel Chart shall indicate (at a minimum) the following positions:
 - a. Project Director.
 - b. Construction Manager/Sr. Superintendent.
 - c. Foreman.
 - d. Safety Manager.
 - e. Scheduler.
 - 4. Of the above-listed positions, one person may not hold more than one position.

- C. General descriptions of the duties for which each position is responsible are provided herein, and the corresponding experience requirements. The Contractor is to recognize that this is a minimal organizational requirement and that additional management and support staff needed to support the Work are clearly the option of the Contractor. Failure to comply with the minimum organizational requirements will be considered a breach of contract, and appropriate action will be taken by the Owner. The Contractor is also advised that a different organization of the staff may be presented to the Engineer and Owner for consideration, however, the minimum equivalent staffing level and capabilities will still be required and approval of a different staff organization is not guaranteed.
- D. Project Director – Position in direct responsible charge of project activities, inclusive of schedule, quality, cost, staffing, and safety. Position requires a minimum of a Bachelor of Science degree plus 20 years of experience in construction, or 25 years of experience in construction, with no less than 10 years in direct project management of construction of water/wastewater facilities or industrial fluid process facilities, one of which was at least \$20 million in construction value.
- E. Construction Manager / Sr. Superintendent – Reports to Project Director. Position in direct responsible charge of construction activities associated with all facilities/structures, site work, and surveying / layout. Also responsible for plant or system outage planning and coordination, excavation endorsements, equipment installation certification, start-up planning, equipment and system start-up, and other duties as required for the coordination and management of the construction activities. Position requires a minimum of 20 years of experience in construction, with no less than 10 years in direct supervision or management of construction of water/wastewater facilities or industrial fluid process facilities, one of which was at least \$20 million in construction value.
- F. Foremen - Report to the Superintendent. Responsible for the direct supervision of trades and crafts, which includes daily planning for materials and tools necessary to support the Work.
- G. Safety Manager – Reports to the Project Director. Responsible for establishing and monitoring Contractor's site-wide safety program. Provides for training of Contractor and other personnel on site in accordance Contractor's safety program. Also responsible for safety inspections and compliance with Contractor and statutory safety requirements.
- H. Scheduler - Reports to Commercial / Business Manager. Position in direct responsible charge of schedule management for the Project (refer to Section 01 32 00, Construction Progress Documentation). Position requires a minimum of 10 years of experience in construction, with no less than 5 years in use of Primavera to schedule construction work.

PART 2 PRODUCTS (NOT USED)**PART 3 EXECUTION****3.01 CUTTING, FITTING, AND PATCHING**

- A. Cut, fit, adjust, or patch Work and work of others, including excavation and backfill as required, to make Work complete.
- B. Obtain prior written authorization of Engineer before commencing Work to cut or otherwise alter:
 - 1. Structural steel, steel reinforcement, structural column or beam, elevated slab, trusses, or other structural member.
 - 2. Weather-resistant or moisture-resistant elements.
 - 3. Efficiency, maintenance, or safety of element.
 - 4. Work of others.
- C. Refinish surfaces to provide an even finish.
 - 1. Refinish continuous surfaces to nearest intersection.
 - 2. Refinish entire assemblies.
 - 3. Finish restored surfaces to such planes, shapes, and textures that no transition between existing work and the Work is evident in finished surfaces.
- D. Restore existing work, Underground Facilities, and surfaces that are to remain in completed Work including concrete-embedded piping, conduit, and other utilities as specified and as shown on Drawings.
- E. Make restorations with new materials and appropriate methods as specified for new Work of similar nature; if not specified, use recommended practice of manufacturer or appropriate trade association.
- F. Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces and fill voids.
- G. Remove specimens of installed Work for testing when requested by Engineer.

3.02 SUPPLEMENTS

- A. The supplements listed below, following “End of Section”, are part of this Specification.
 - 1. Excavation Plan and Endorsement (Dig Notice).
 - 2. Tie-In Coordination Worksheet.

END OF SECTION

INFORMATION AND SAFETY SIGN SCHEDULE										
Sign								Lettering		Other Requirements ⁶
Number ¹	Sign Type ²	Detail ³	Size WxH ⁴	Color	Mounting					
					Location	Method	Height to Top	Height/ Style/ Color	Message	
D-1	C	1014-001	20"x14"	White	Pipe Post	Bolts	5'-6"	1" min./ Helvetica/ Black	DANGER High Voltage	Provide at UV Disinfection
D-2	C	1014-001	20"x14"	White	Pipe Post	Bolts	3'-6"	1" min./ Helvetica/ Black	DANGER No Smoking	Provide at WAS Thickening
D-3	C	1014-001	20"x14"	White	Wall	Bolts	3'-6"	1" min./ Helvetica/ Black	DANGER Nonpotable Water Not for Drinking	Provide at interior hose valves
D-4	C	1014-001	20"x14"	White	Pipe Post	Bolts	3'-6"	1" min./ Helvetica/ Black	DANGER Nonpotable Water Not for Drinking	Provide at exterior hose valves
C-1	C	1014-002	20"x14"	Yellow	Hanging	Chain	5'-6"	1" min./ Helvetica/ Black	CAUTION Equipment Starts Automatically	Provide on each non-submerged, automatically starting piece of equipment Hang from equipment
W-1	C	1014-003	20"x14"	Orange	Pipe Post	Bolts	5'-6"	1" min./ Helvetica/ Black	WARNING Corrosive Materials Wear Required Protection	Provide at Phosphorus Polishing Coagulant Storage and Feed System
W-2	C	1014-003	20"x14"	Orange	Wall	Bolts	5'-6"	1" min./ Helvetica/ Black	WARNING Eye Protection Required in this Area	Provide at entrance to each polymer facility

INFORMATION AND SAFETY SIGN SCHEDULE										
Sign								Lettering		Other Requirements ⁶
Number ¹	Sign Type ²	Detail ³	Size WxH ⁴	Color	Mounting					
					Location	Method	Height to Top	Height/ Style/ Color	Message	
W-3	C	1014-003	20"x14"	Orange	Pipe Post	Bolts	5'-6"	1" min./ Helvetica/ Black	WARNING Eye Protection Required in this Area	Provide at Phosphorus Polishing Coagulant Storage and Feed System
I-1	C	N/A	As Required	White	Pipe Post	Bolts	5'-6"	1" min./ Helvetica/ Black	*Coagulant Fill Station	*Contractor to match message format of existing fill stations on site Provide at Phosphorus Polishing Coagulant Storage and Feed System at the fill station
T-1	D	1014-004	24"x24"	Green ⁷	Traffic Sign Post	Bolts	9'-0"	2 ½"	Chemical Delivery Vehicle Entrance	Locate one (1) sign in field as directed by Engineer
¹ Numbers refer to a particular sign type with a particular message. ² Letters refer to Sign Types specified in this section. ³ Numbers refer to Design Details that show sign layout. ⁴ WxH= Width by Height ⁵ Verify requirements for this sign with Regulations in state where Project is located. ⁶ Provide (30) additional Type C signs to be selected by the Owner during construction. ⁷ Match color of existing green signs located at the Plant.										

HAZARDOUS MATERIAL SIGN SCHEDULE										
Number ¹	Material	Sign Type ²	Detail ³	Health Hazard (Blue)	Flammability Hazard (Red)	Instability Hazard (Yellow)	Special Hazard (White)	Mounting		
								Location	Method	Height to Top
H-1	Coagulant- Ferric Sulfate (66% solution)	H	1014-006	2	0	0		Tank ⁵	adhesive	5'-6"
H-2	Polymer	H	1014-006	2	1	0		Wall ⁶	bolts	5'-6"
¹ Numbers refer to a particular sign type with a particular message. ² Letters refer to Sign Types specified in this section. ³ Numbers refer to Design Details that show sign layout. ⁴ WxH= Width by Height ⁵ Provide on each tank ⁶ Provide at entrance to each facility that stores this chemical ⁶ Verify requirements for this sign with Regulations in state where Project is located.										

SECTION 44 42 23.02
HIGH RATE CLARIFICATION SYSTEM

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes the high rate clarification system equipment to be supplied by the high rate clarification system supplier and installation requirements for the new Phosphorus Polishing Process at the W.B. Casey Water Reclamation Facility (WRF).
- B. The system supplier shall be Suez North America who has provided equipment data and sizing to the Engineer during the design of this project. This data has been used by the Engineer in the layout of equipment to be provided by the system supplier to the Contractor.
- C. The Contractor shall furnish and install a complete operational clarification system.
- D. The clarification (DENSADeg®) equipment shall be Contractor-provided (furnished and installed).
- E. The cost of equipment and services provided by system supplier is stated in the Quotation Form, the cost of receiving, unloading, proper storage, installation, startup, and testing shall be included as part of the Lump Sum Bid amount.
- F. Unit Responsibility:
 - 1. The Work requires that the equipment specified herein shall be complete with all accessories and appurtenances, and shall be the end product of one responsible system manufacturer or responsible system supplier.
 - 2. The Contractor shall obtain each system from the responsible supplier of the equipment. The Supplier shall furnish all components and accessories of the system to enhance compatibility, ease of operation in conformance with the specified performance, features and functions.
 - 3. Contractor is responsible for coordinating shop drawings and scheduled delivery.
 - 4. In the event that defective materials are delivered to the Contractor it is the system suppliers responsibility to replace defective materials. Additional labor by the Contractor as a result of the defective materials is the responsibility of the system supplier.

1.02 SCOPE OF SUPPLY

1. Items provided by DENSADEG® Manufacturer (Contractor-purchased):
 - a. Mixers:
 - 1) Rapid Mixer:
 - a) 531M.
 - 2) Reactor Mixer and Reactor Draft Tube:
 - a) 532M.
 - b. Settling Tank Equipment:
 - 1) Sludge Scraper Mechanism and Drive:
 - a) 533M.
 - 2) Lamella Tube Modules and Lamella Tube Support Beams.
 - 3) Collection Troughs and Collection Trough Supports.
 - 4) Rotating Scum Trough with Electric Actuator:
 - c. 536M Sludge Recirculation and Blowdown System Equipment:
 - 1) Sludge Recirculation Pumps:
 - a) 534P1/ 534P2.
 - 2) Sludge Blowdown Pumps:
 - a) 535P1/ 535P2.
 - 3) Pressure Switches and Gauges:
 - a) 534PSL1/PE1A.
 - b) 534PSL2/PE2A.
 - c) 534PI1/PSH1/PE1B.
 - d) 534PI2/PSH2/PE2B.
 - e) 535PSL1/PE1A.
 - f) 535PSL2/PE2A.
 - g) 535PI1/PSH1/PE1B.
 - h) 535PI2/PSH2/PE2B.
 - 4) Flowmeter: 534FE/FIT.
 - d. Operating Bridge and Walkways including framing, grating, railing, connections and anchorage to supporting structure. Reference drawings for delineation of walkways to be provided by the system supplier and contractor.
 - e. Sampling Sink:
 - 1) PVC Piping for sample lines.
 - 2) PVC ball valves for each sample line.
 - 3) Sink with 3 inches drain.
 - f. W3 Spray Ring.
 - g. DENSADEG® Control System Equipment and Programming.
 - h. Adjustable Frequency Drive (AFD) panels for:
 - 1) Rapid Mix Drive: 531AFD.
 - 2) Reactor Drive: 532AFD.
 - 3) Scraper Drive: 533AFD.
 - 4) Sludge Recirculation Pumps: 534AFDX, (X=1,2).

- i. Equipment surface preparation.
 - j. Lubrication oil and grease for mechanical equipment as specified by the manufacturer.
 - k. Spare parts and special tools as recommended by the system supplier.
2. No “or-equal” or substitute products will be considered.

B. Work by the installing Contractor:

- 1. The following items are supplied by others:
 - a. Structural:
 - 1) Tanks for housing high rate clarification equipment.
 - 2) Embedded wall spools in concrete tank walls for the various process pipe connections.
 - 3) Grating, walkways, and stairways as defined on Drawings.
 - 4) Structurally supported cover system in clarification zone.
 - 5) Protective coatings for concrete.
 - b. Mechanical:
 - 1) Chemical piping for associated chemical systems (ferric sulfate and polymer) up to structure
 - 2) All washwater and plant water piping, including hose bibs and piping for spray system.
 - 3) Tank drain piping, drain valves, gates and operators, excluding rotating scum trough and rotating scum trough actuator.
 - 4) Transfer piping from rapid mix zone to reactor zone.
 - 5) All piping associated with sludge blowdown and sludge recycle system.
 - 6) Influent and effluent piping to the DENSEDEG unit.
 - 7) FRP Enclosure for Sample Sink.
 - 8) Valves with electric motor actuators:
 - a) 534FV1/FV2.
 - b) 535FV1/FV2.
 - 9) Sludge Influent Manual 6” Plug Valves (4 total).
 - 10) Sludge Discharge Swing Check Valves (4 total).
 - 11) Air Release Valves:
 - a) 534ARV.
 - b) 535ARV.
 - 12) W3 Valve with electric motor actuator: 532FV.
 - c. Electrical:
 - 1) Electrical wiring interconnections (including wiring, conduit and other appurtenances required to provide power connections as needed) from the electrical power source, MCC, and AFDs to the system PLC control panels, mixers, mechanisms, and pumps.

- 2) Instrumentation wiring, conduit and other appurtenances required to provide connections as needed between terminal boxes at the equipment, pumps, and the system control panels.
- 3) Ethernet communications connection to the Owner's SCADA system.
- d. Other:
 - 1) Receiving, unloading and safe storage of equipment at site or a storage facility meeting environmental requirements stipulated by system supplier until ready for installation.
 - 2) Equipment installation.
 - 3) Raw materials, chemicals, and utilities during equipment testing.
 - 4) Laboratory services, operating and maintenance personnel during equipment checkout, startup and operations.
 - 5) Onsite painting or touchup painting of equipment, with the exception of painting required due to damage incurred prior to equipment being received onsite.

1.03 DESIGN REQUIREMENTS

- A. Design structural components including anchorage and bracing in accordance with Section 01 61 00, Common Product Requirements and to the following:
 1. Design railing in accordance with Section 05 52 16, Aluminum Railings.
 2. Vibration Criteria: The ratio of the natural frequency of the structural frame (of the Operating Bridge and Walkways) to the operating frequency of the machinery shall be greater than 1.5.
 3. Maximum Deflection criteria:
 - a. Vertical deflection for total load conditions shall not exceed 1/240 of span.
 - b. Vertical deflection for live load conditions shall not exceed 1/360 of span.
 - c. Horizontal deflection for wind load conditions (10-year recurrence interval) shall not exceed 1/240 of span.
 - d. Acceptable deflection limits for supported equipment.
- B. Design beam connections to walls to allow walls to deflect under horizontal loading conditions without transferring loads to beams:
 1. Where both ends of a beam are attached to walls, provide fixed pinned connection at one end and slip or sliding pinned connection at the other.

2. Where continuous beams are attached to multiple walls, provide one attachment point as fixed pinned connection and all other attachments with slip or sliding pinned connections.
- C. Design and detailing shall be performed by a qualified professional engineer registered in the state where Project will be constructed.
- D. Structural components to be designed in accordance with Section 01 88 15, Anchorage and Bracing.

1.04 DEFINITIONS

- A. DENSADeg®: A three-staged enhanced flocculation system combined with lamella settling creating a high rate clarification process.
- B. DENSADeg® Manufacturer: SUEZ Treatment Solutions Inc.; 8007 Discovery Drive, Richmond, VA 23229.
- C. Alarm torque: 90 percent of Design Running Torque.
- D. Certified Welding Inspector (CWI): As defined in AWS QC 01.
- E. Cutout Torque: 120 percent of Design Running Torque.
- F. Design Running Torque: Torque used to select size, strength, and type of material and components for mechanism and drive system and at which or below will provide continuous 24-hour per day clarifier operation for period not less than 20 years at design torque condition and rotational speed specified herein, without damage, permanent deformation or overload, and equal to 50 percent on overload device scale. Design Running Torque is applied at the output of the low speed final reduction unit.
- G. Slenderness Ratio: Ratio of unbraced length to least radius of gyration.
- H. Submerged Metal: Metal below gear head drive and a plane 24 inches above weir elevation indicated.

- I. Ultimate torque: 200 percent of Design Running Torque and below which no portion of mechanism will be damaged if operated for only short periods of time (a few seconds) and equal to 100 percent on overload device scale. Ultimate Torque is applied at the output of the low speed final reduction unit.

Parameters	Maximum	Average
Alkalinity (mg/L as CaCO ₃)	-	75
TSS (mg/L)	12	3.0
PH	7.3	6.8
Temperature (°F)	81	70
Total Phosphorus (mg/L)	1.50	0.5
Soluble Non-Orthophosphorus (mg/L)		Not to Exceed 0.1

1.05 SYSTEM DESCRIPTION

- A. The DENSADeg[®] process is a high rate clarifier/ thickener treatment unit using enhanced flocculation and settling. Following secondary clarification prior to surface water discharge, flow is sent through the three stage high rate clarification process to achieve phosphorus removal prior to discharge to comply with permit limits.
- B. A coagulant is added in the first rapid mix zone and dispersed in the influent flow and transferred via a transfer pipe into the reactor zone.
- C. Recycled sludge is also introduced in the reactor zone along with polymer to promote enhanced flocculation and settling by acting as a ballast and therefore accelerating the settling of the flocs.
- D. Flow then passes through a transition zone into the clarification area where settling of the floc particles occurs. Settling efficiency is increased using lamella tube settlers. The sludge is collected out of the bottom of the sludge hopper and pumped out for recycle or removed from the system and sent to solids handling. Clarified effluent overflows the v-notch launders and collects in a common effluent trough.

1.06 PROCESS PERFORMANCE REQUIREMENTS:

- A. The Contractor is responsible for the proper installation, calibration, and testing of SUEZ-supplied equipment. SUEZ is responsible for the treatment performance of the DENSADEG system when operated in accordance with the approved Operation and Maintenance Manual.
1. Typical Influent Characteristics:
 2. Clarified Effluent Guarantee at a maximum of 8 MGD: Given raw water characteristics within the above ranges, the clarified effluent guarantee at 8 MGD will be as follows:

Parameters	Clarified Water Values
Clarified Water TSS (mg/L) Raw Value 1 – 30	< 10
Total Phosphorus (mg/L) Raw Value 1-30	<0.3

3. The above clarified water quality guarantee will be based upon the following range of chemical dosages:
 - a. Ferric Sulfate Coagulant: no greater than 40 mg/l as applied product in accordance with jar testing performed by SUEZ.
 - b. Anionic Polymer: Up to 1.0 mg/l as emulsion polymer.
4. The system must be able to hydraulically pass a peak hour flow of 18 mgd.
5. Maximum Sludge Recycle Pump Rates: The maximum percent of flow handled by each sludge recycle pump shall be 5 percent of design flow.

1.07 SUBMITTALS

- A. Action Submittals:
1. Shop Drawings from SUEZ for SUEZ-Supplied Equipment and from Contractor for Contractor-Furnished Items:
 2. Complete list of all system components to be provided including materials of construction.
 3. Equipment: Submit shop drawings indicating but not limited to the following:
 - a. Detailed bills of materials.
 - b. Outline dimensions and assembly details.
 - c. Where applicable, component details, specification sheets, motor data sheets, performance curves, calibration data and catalogue cutsheets.
 - d. Materials of construction and construction details.

- e. Make, model, weight, and horsepower of each equipment assembly.
4. Complete motor nameplate data, as defined by NEMA, motor manufacturer, and including any motor modifications. See requirements of Section 26 20 00, Low Voltage AC Induction Motors.
5. AFD data in accordance with the requirements of Section 26 29 23, Low Voltage Adjustable Frequency Drive System.
6. Control Panels: Submit Shop Drawings indicating, but not limited to the following:
 - a. Detailed bills of materials.
 - b. Outline dimensions and assembly details.
 - c. Dimensioned internal and external layout details.
 - d. Schematic and wiring diagrams.
 - e. Wiring diagram for system supplied panels. Including logic integral to system supplied.
 - f. Terminal block arrangement.
 - g. Component details, specification sheets, data sheets, calibration data and catalogue cutsheets.
 - h. Materials of construction and construction details.
7. Data table which lists registers of all data to be exported to and exported from the plant control system via Ethernet port. Data tables shall include:
 - a. All physical inputs and outputs.
 - b. All calculated variables.
 - c. All set points (which will be changed by operator entry at the plant control system).
 - d. Flow data from the plant control system used to control the DENSADEG process.
8. Drawings:
 - a. Structural, mechanical, and electrical detailed drawings showing equipment fabrications and interface with other items including dimensions, size, and locations of connections to other work, and weights of associated equipment.
 - b. Detailed structural drawings should contain loading criteria and plan.
 - c. Performance data curves showing head, capacity, horsepower demand, pump efficiency, and net positive suction head requirements over the entire operating range of the pump.
 - d. Layout of control panel face showing all pushbuttons, switches, instruments, indicating lights, and similar devices.
 - e. Complete system schematic (elementary) wiring diagrams.
 - f. Complete system interconnection diagrams between controller, drive motors, and related components or controls external to system, including wire numbers and terminal board point identification.

9. Other submittals as required by Section 40 99 90, Package Control Systems.
10. Anchorage and bracing data sheets and drawings as required by Section 01 88 15, Anchorage and Bracing.
11. Hydraulic headloss calculations for the DENSADeg: minimum, average, normal maximum and instantaneous flows and headloss data.

B. Informational Submittals:

1. Factory Functional Test Reports.
2. Shipping, storage and protection, and handling instructions.
3. Manufacturer's printed installation instructions.
4. Equipment Testing Procedure:
 - a. Submit test procedures for the following tests for review, comment, and approval at least 30 days in advance of notice to conduct testing:
 - 1) Functional Testing.
 - 2) Performance Testing.
5. Manufacturer's Certificate of Proper Installation, in accordance with Section 01 43 33, Manufacturers' Field Services.
6. List of special tools, materials, and supplies furnished with equipment for use prior to and during startup and for future maintenance.
7. Operation and Maintenance Manuals:
 - a. In accordance with Section 01 78 23, Operation and Maintenance Data.
 - b. Provide comprehensive Operation and Maintenance Manual covering all equipment used for the DENSADeg® process. Incorporate operation and maintenance data from other manufacturers into one Operation and Maintenance Manual for the complete system.
8. Maintenance Summary Forms.
9. Executed warranties and proof of bonding.
10. Structural calculations of the components and system including grating, framing, railing, equipment bolting and anchorage and bracing for all equipment provided by the system supplier.
11. Anchorage and Bracing calculations as required by Section 01 88 15, Anchorage and Bracing.
12. Welding Procedures, Qualifications, and Inspection Report: As specified in Section 05 05 23, Welding.

C. Contract Closeout Submittals: Manufacturer's warranty.

1.08 QUALITY ASSURANCE

A. Qualifications:

1. Drawings of structural components and systems shall be sealed, signed and dated by a registered civil or structural engineer licensed in the state where Project will be constructed.
2. Calculations of structural components and systems shall be sealed, signed and dated by a registered civil or structural engineer licensed in the state where Project will be constructed.
3. Welding shall be as specified in Section 05 05 23, Welding.

1.09 GUARANTEE AND WARRANTY

A. Warranty:

1. The Manufacturer shall warrant the equipment being supplied to the Owner against all defects in workmanship and materials for a period of 1 year from the date of startup or 18 months from shipment, provided that the plant installation, startup and subsequent operations are performed in strict accordance with written and oral instructions provided by the Manufacturer.
2. The Manufacturer shall replace or repair any part or parts that are determined to be defective during the warranty period, provided that the defects are not a result of misuse or neglect.

- B. Performance Guarantee: System supplier shall guarantee phosphorus removal to below 0.3 mg/L at influent flows up to 8.0 million gallons per day based upon the influent characteristics shown above.

1.10 SCHEDULE

- A. SUEZ shall provide DENSADeg submittals to the Contractor within 8 weeks of receiving an executed purchase order for the equipment.
- B. The DENSADeg equipment shall be delivered to the Site within 16 weeks of receipt of the approved Shop Drawings.
- C. Final 10 percent of payment shall be withheld until completion of 3-month trial period to demonstrate successful phosphorus removal at various influent loading. Trial period shall commence following successful completion of Performance Testing.

1.11 PATENTS

- A. The DENSADEG® manufacturer shall assume all costs of patent fees or licenses for equipment or processes, and shall safeguard and save harmless the Owner and its agents from damages, judgments, Claims, and expenses arising from license fees or claimed infringements or any letters of patent or patent right, or because of royalty or fee for the use of any equipment or process, structural feature, or arrangement of any of the component parts of the installation; and the price stipulated for all such patent fees, licenses, or other costs pertaining thereto.

1.12 DELIVERY, STORAGE & HANDLING

- A. Shipment, delivery, and handling requirements are specified in Section 01 61 00, Common Product Requirements.
- B. The contractor shall be responsible for receiving, unloading and storing all equipment and components provided as part of the system.

PART 2 PRODUCTS

2.01 GENERAL

- A. System supplier shall provide complete equipment with all necessary components, accessories and appurtenances required to make a complete and operable system.
- B. System subunits and equipment shall be prefabricated, preassembled and factory tested before shipment to the site.
- C. System supplier shall provide the equipment as described herein:
 - 1. Equipment shall be new and unused and shall be the system suppliers most current product line at the time of the product submittal.
 - 2. Equipment shall fully comply with OSHA standards.

2.02 SERVICE CONDITIONS

- A. The DENSEDEG system will be used for phosphorus polishing of secondary effluent from the W.B. Casey Water Reclamation Facility (WRF).
- B. The W.B. Casey WRF is a 24 mgd plant (MMADF basis) with the following existing unit processes: screening, grit removal, primary clarification, biological treatment in a conventional activated sludge process, secondary clarification, and chlorine disinfection. A portion of this flow will be further treated for phosphorus removal in the DENSEDEG system. Flow will be diverted to the DENSEDEG system upstream of the existing chlorine disinfection.

- C. System Configuration: The system shall consist of three zones: rapid mix, reactor, and clarification zones.

2.03 HIGH RATE CLARIFICATION SYSTEM EQUIPMENT

A. Mixers:

1. Equipment Tag Numbers:
 - a. Rapid Mixer: 531M.
 - b. Reactor Mixer: 532M.
2. Mixer Performance Requirements:
 - a. Mixers shall be the top entering type. Motor and gear reducer shall be supported from the mixer housing to form an integral unit. Mixers shall be designed as necessary to uniformly mix polishing plant flow without stratification at all conditions listed in this section.
 - b. The vertical position of the impellers shall be based on the manufacturer's recommendations.
 - c. Mixers to be sized by the manufacturer as a part of the DENSADeg system to properly treat to the limits defined above. Manufacturer shall replace mixers at no cost to the owner if sufficient mixing is not achieved by the manufacturer's design.
 - d. Mixing Cycle: Continuous.
3. Rapid Mixer:
 - a. Total Number of Mixers: 1.
 - b. Rapid Mix Zone Dimensions:
 - 1) 7 feet – 3.5- inch long.
 - 2) 5 feet – 10-inch wide.
 - 3) 22 feet – 6-inch SWD.
 - 4) 24 feet – 6 inch wall height.
 - c. Service:
 - 1) Secondary Effluent with a TSS concentration of 1 mg/L to 12 mg/L and ferric sulfate up to 40 mg/L.
 - d. Materials of construction to be 316 SSTL.
4. Reactor Mixer:
 - a. Total Number of Mixers: 1.
 - b. Reactor Zone Dimensions:
 - 1) 18 feet – 4-inch long.
 - 2) 18 feet – 4-inch wide.
 - 3) 22 feet – 0-inch SWD.
 - 4) 24 feet – 0-inch wall height.
 - c. Service: Secondary effluent dosed with ferric sulfate and recycle sludge from the clarifier zone and polymer up to 1.0 mg/L.
 - d. Materials of construction to be steel ASTM A36/A36M.

5. Mixer Speed:
 - a. Rapid Mixer: 45.0 rpm.
 - b. Reactor Mixer: as required by manufacturer.
6. Mixer Assembly:
 - a. Each mixer assembly shall consist of a heavy duty speed reducer, electric motor, baseplate, agitator shaft, and mixing impellers.
 - b. Mixer Gear Drive:
 - 1) The mixer gear drive must be built in accordance with current AGMA Standards.
 - 2) The AGMA calculated drive horsepower rating shall be stamped on the drive nameplate.
 - c. Noise Level: When in operation, no piece of equipment shall exceed 85 dBA at 3 feet from any part of the drive assembly per AGMA 299.01.
 - d. Safety Devices: The completed work shall include all necessary permanent safety devices, such as machinery guards, emergency stops, and similar items required by OSHA, and other federal, state, and local health and safety regulations.
 - e. Designed with an output shaft system suitable for the loadings imposed by the specific duty.
 - f. Service Factors: Service factors shall be applied in the selection and design of components where so indicated in individual sections.
 - g. Flanges and Pipe Threads: Flanges on equipment shall comply with ANSI B16.1, Class 125; or B16.5, Class 150, unless otherwise indicated. Threaded flanges and fittings shall have standard taper pipe threads complying with ANSI/ASME B1.20.1
 - h. The speed reducers, shafts and impellers shall be manufactured by the mixer manufacturer.
7. Gears:
 - a. Except as otherwise indicated, gears shall be of the all helical or combination helical and spiral-bevel type, designed and manufactured in accordance with AGMA Standards, with a minimum service factor of 2.0, a minimum L-10 bearing life of 100,000 hours based on full motor nameplate horsepower and a minimum efficiency of 94 percent. Worm gears shall not be used.
 - b. Gear speed reducers or increasers shall be of the enclosed type, oil- or grease-lubricated and fully sealed, with a breather to allow air to escape but keep dust and dirt out. The casing shall be of cast iron or heavy-duty steel construction with lifting lugs and an inspection cover for each gear train. An oil level sight glass, oil flow indicator, and oil drain shall be furnished and installed for easy access. All gearing shall be contained in a single housing. The use of external gear motors or auxiliary reduction modules are not permissible.

- c. The thermal rating of gear speed reducers shall exceed the design mechanical rating. External cooling devices are not acceptable.
 - d. Gears and gear drives as part of an equipment assembly shall be shipped fully assembled for field installation.
 - e. Material selections shall comply with AGMA values and the manufacturer's recommendations. Input and output shafts shall be properly designed for the service and load requirements. Gears shall be computer-matched for minimum tolerance variation. The output shaft shall be of a dry-well construction.
 - f. Where gear drive input to output shafts connect to couplings or sprockets, the gear drive manufacturer shall supply matching key.
 - g. The mixer drive consisting of a speed reducer and motor shall be factory mounted to a common open type extended pedestal base that provides access to the low speed impeller shaft coupling above the mounting platform. The base shall be made of ASTM A36 carbon steel. Pedestal mounting shall be identical to the standard mixer baseplate mounting. Pedestal shall be factory coated the same as the mixer.
8. Drive Bearings:
 - a. Antifriction type, ball bearings or roller bearings. In conformance with the standards of the Anti-Friction Bearing Manufacturers Association, Inc. (AFBMA).
 - b. All bearings within the drive, including output shaft bearings, shall have minimum AFBMA L-10 lives of 100,000 hours when operating at full motor nameplate horsepower at design speed.
 9. Motor: In accordance with Section 26 20 00, Low-Voltage AC Induction Motors, and the induction motor data sheet supplements to this section.
 10. Adjustable Frequency Drives (AFDs): In accordance with Section 26 29 23, Low-Voltage Adjustable Frequency Drive Systems, and as specified herein.
 11. Anchor Bolts: As specified in Section 05 50 00, Metal Fabrications. Number and size as recommended by system supplier. Bolts shall be Type 316 stainless steel, 1/2-inch minimum diameter.
 12. Shafts:
 - a. The mixer shaft shall be solid Type 316 stainless steel or steel ASTM A36/A36M sized to handle all shaft loads with a maximum combined shaft stress of 6,000 psi and a maximum rotational speed not to exceed 75 percent of the first critical. Use the weight of the mixer shaft and impellers for calculation the shaft critical speed.

- b. All exposed rotating mixer shafts and rotating components shall be provided with a totally enclosed expanded stainless steel safety guard in conformance with OSHA requirements. Banded access openings with screwed covers shall be furnished where required for access to lubrication fittings.
 - c. The minimum shaft diameter for the mixers shall be 2-1/2 inches. Shafts shall be designed such that the maximum stress shall not exceed 8,000 psi under maximum operating loads. It shall be of overhung design; the use of submerged bearings is not permitted.
 - d. Shaft supporting the impellers shall be removable from the gear speed reducer without disturbing the internal gearing of the gear speed reducer.
 - e. Impeller hubs shall be removable from the shaft. The removable impeller blades shall be bolted to the hub.
13. Impellers:
- a. The impellers shall be designed and operated at a speed which does not require dynamic balancing. The turbines shall be of each manufacturer's design as necessary to meet the power requirements. The turbines shall be removable and shall have manufacturer's standard shaft attachment.
 - b. Impeller shall be constructed of Type 316 stainless steel or steel ASTM A36/A36M. Unless otherwise specified, the impellers shall be of bolted construction, and shall be connected to the agitator shaft with a hook key for maximum security. A keyway shall be provided to allow for vertical adjustment of impeller.
 - c. The maximum stress in any impeller component shall not exceed 11,000 psi under maximum operating loads.
 - d. The shaft-impeller system design shall be such that its operating speed shall not exceed 50 percent of its first lateral critical speed. The use of stabilizing rings or fins will not influence this limitation. The shaft shall be safe for operation when the liquid level passes through the impeller while the mixer is running.

2.04 REACTOR DRAFT TUBE

- A. Materials of construction: Steel ASTM A36/ A36M with Type 316 stainless steel anchor bolts.
- B. See Section 05 50 00, Metal Fabrications for fabrication requirements.
- C. Reactor draft tube to combine 6 inches sludge recycle flow with polishing plant flow and uniformly mix these flows with polymer dose.
- D. Draft tube to include polymer distribution ring for uniform polymer mixing.

- E. Manufacturer to provide W3 flushing system to prevent settling of solids in the reactor zone.
 - 1. W3 flushing system to operate at a pressure of 60 psi and a flow of 180 gpm, as needed at low flow conditions only.
 - 2. Spray system to be Type 304 stainless steel pipe manifold with spray holes.
- F. Manufacturer to design and provide vortex baffles within reactor draft tube.
- G. Anchoring and supports to be designed by the manufacturer but must be in conformance with Section 05 50 00, Metal Fabrications. Number and size as recommended by system supplier.

2.05 SETTLING TANK EQUIPMENT

- A. Sludge Scraper:
 - 1. Equipment Tag Numbers: 533M.
 - 2. General:
 - a. Suitable for installation in 32-foot diameter by 22-foot sidewall water depth (SWD) clarifier having a floor slope of 4.8 degrees.
 - b. Center pier supported, center drive type.
 - c. Furnished complete, including drive motor, gearing, center column, and other necessary parts, including anchor bolts.
 - d. Direction of Mechanism Rotation: Clockwise.
 - 3. Performance Requirements:
 - a. Collect and convey settled sludge to center solids hopper.
 - 4. Design Requirements:
 - a. Gears, Bearings Chains and Sprockets: Above clarifier water surface.
 - b. Drive Mechanism: Easy removal of internal gears, balls, and strip liners without walkway bridge removal.
 - c. Mechanism Construction: Welded, except at locations requiring periodic field adjustment and as approved.
 - 1) Welded Joints: Seal welded in shop.
 - 2) Welding: Conform to AWS D1.1/D1.1M requirements.
 - 3) Incorporate impacts of seal welding on structural design of mechanism, if any, into design.
 - d. Stresses: Maximum 90 percent of material yield strength at Ultimate Torque load in members.
 - e. Maximum Slenderness Ratio: 200 for compression member and 240 for tension member.
 - f. Design Running Torque: 3072 foot-pounds minimum.
 - g. Rotational Speed: Between 0.06 and 0.08 rpm.

- h. Capable of withstanding, without failure or permanent deformation of any part, Ultimate Torque rating as defined herein.
 - i. Each sludge scraper assembly shall consist of a drive unit, main gear and bearing, gear hub, main gear pinion assembly, input speed reducer, drive control, center shaft, rake arms, and discharge cone scraper.
5. Sludge Scraper Assembly:
- a. Center shaft: steel ASTM A36/A36M, attached to rake arms and discharge cone.
 - b. The total load of the scraper assembly shall be supported from the walkway spanning the top of the settler tank as shown in Drawings.
 - c. Drive Unit:
 - 1) Single shaft type, rated for the ultimate torque rating, not less than 2.0 times design running torque.
 - 2) Electric Drive Motor: In accordance with Section 26 20 00, Low-Voltage AC Induction Motors and Induction Motor Data Sheet located in Supplements following End of Section.
 - d. Main Gear: Hardened forged alloy steel.
 - e. Bearings and Races: Grease lubricated and protected by suitable seals to prevent contamination from external sources or the main gear oil bath.
 - f. Main Gear Pinion Housing: Welded steel construction and completely weatherproof.
 - g. Gear Hub: Fabricated from steel plate and fastened with bolts designed to accommodate the drive design torque.
 - h. Gear Teeth: Minimum AGMA 5 quality and hardened to a minimum 250 BNH.
 - i. Drive Control:
 - 1) Two limit switches that are adjusted to sound an alarm at 100 percent of the maximum expected continuous operating torque and stop the drive motor at 125 percent of the maximum expected continuous operating torque.
 - 2) Sludge scraper shall output a dry contact for HIGH TORQUE and HIGH HIGH TORQUE. The HIGH TORQUE contact shall close upon impending overload. This shall be used by the operator as an alarm condition. The HIGH HIGH TORQUE contact shall be used as a shutdown feature for the associated sludge scraper. Both signals for each sludge scraper shall be routed to Panel 530CP.
 - j. Rake Arms: Fabricated of steel and designed to move solids to the discharge cone.

- k. Discharge Cone Scraper: Fabricated of steel and attached directly to the center shaft.
- l. All fasteners shall be Type 316 stainless steel.
- m. All ferrous metals shall arrive factory primed, see Section 09 96 35, Chemical Resistant Coatings, for chemical resistant coatings to be performed by others.
- n. Strength and Rigidity: Confirm that at Ultimate Torque no member will be stressed to a level beyond maximums allowed by current AISC Specifications.
- o. Do not use rake arms to place grout/ concrete, but may be used to provide final screeding of grout/concrete topping after manual placement of the grout/concrete. Manufacturer shall coordinate with Contractor regarding limitations in use of rake arms for final screeding of grout/concrete topping.
- 6. Motor: In accordance with Section 26 20 00, Low-Voltage AC Induction Motors and the induction motor data sheet supplements to this section.
- 7. Adjustable Frequency Drive (AFD): In accordance with Section 26 29 23, Low-Voltage Adjustable Frequency Drive Systems and as specified herein.
- 8. Dissimilar metals:
 - a. Isolate dissimilar metals or connectors to prevent direct contact and electrical conductivity.
 - 1) Use 1/8-inch-thick continuous neoprene gasket to insulate aluminum grating, checker plate, and handrail post bases from access walkway support bridge and other components.
 - 2) Use insulating washer to be placed under bolted connections between dissimilar metals.
- 9. Shop fabricate and assemble mechanism components in largest sections practicable and permitted by transportation carrier regulations.
- 10. Welded Construction:
 - a. Mechanism component interfaces that are not field bolted connections shall be seal welded in shop.
 - b. Welding: As specified in Section 05 05 23, Welding.

B. Tube Settler Modules:

- 1. Type: Hexagonal inclined at 60 degrees from the horizontal.
- 2. Material: ABS or PVC.
- 3. Module height: 2 feet.
- 4. Lamella Tube Supports: Material: Carbon Steel.
- 5. Tube Settler modules supports to be designed and provided by the system supplier.

C. Collection Troughs:

1. Number: 6.
2. Type: Rectangular troughs with V-notch weirs.
3. Size: 1 foot 6 inches by 2 foot 0 inches by 23 feet 6 inches.
4. Material: FRP.
5. Connections and Fasteners: Type 316 stainless steel anchor bolts.

D. Sludge Sampling System:

1. Manufacturer shall include a sludge sampling system with 12 schedule 80 PVC sample lines including schedule 80 PVC ball valve at elevations as recommended by the system supplier.
2. Sample sink materials of construction: Type 304 stainless steel.
3. All drain piping from sample sink basin shall be provided by the contractor. Manufacturer to coordinate with contractor on size of drain piping required.

E. Scum Removal Mechanism:

1. The system supplier shall provide a 12 inches diameter carbon steel, electrically actuated scum removal mechanism.
2. For electric actuator sizing requirements see Section 40 27 02, Process Valves and Operators.
3. Electric Actuator Supplier: Harold Beck and Sons, Inc.

2.06 SLUDGE BLOWDOWN/ RECIRCULATION SYSTEM EQUIPMENT

A. Sludge Blowdown/Recirculation Pumps:

1. Equipment Tag Numbers:
 - a. 534P1.
 - b. 534P2.
 - c. 535P1.
 - d. 535P2.
2. See Specification Section 44 42 56.13, Progressing Cavity Pumps, for pump requirements.

B. Valves: For valve requirements see Specification Section 40 27 02, Process Valves and Operators. Valves to be provided by Contractor.

2.07 OPERATING BRIDGE AND WALKWAYS

- A. Framing: In accordance with Section 05 50 00, Metal Fabrications.
- B. Grating: In accordance with Section 05 53 00, Metal Gratings.
- C. Railing: In accordance with Section 05 52 16, Aluminum Railings.

2.08 INSTRUMENTATION AND CONTROLS

- A. General:
 - 1. All instrumentation, control and electrical components and associated work provided under this section shall comply with the requirements of Section 40 99 90, Package Control Systems.
 - 2. The DENSADeg® manufacturer shall be responsible for the proper sizing, programming and operation of the associated control equipment to adequately protect and control the equipment specified in this section.
 - 3. The control panel shall include one Ethernet-ready PLC CPU.
- B. Functional Requirements:
 - 1. The system will be designed for operations of all controlled equipment from the DENSADeg® control panel with the exception of the Rapid Mix Drive as described below.
 - a. Local Operation: The Rapid Mix Drive will have a local HAND/AUTO hand switch and a local speed potentiometer located close to it to allow the operator to manually control the drive while visually observing it.
 - 2. Manual and/or Automatic operation shall be provided by DENSADeg® control panel (530CP). Automatic operation shall include the following functions.
 - a. Provide CONTROL POWER ON indicating light, ON/OFF hand switch, ALARM SILENCE pushbutton, and ALARM indicating light. Locate these devices on panel front.
 - b. Provide Allen-Bradley PanelView Plus Operator Interface Unit (OIU).
 - c. Auto mode, which includes startup and shutdown sequences and steady-state automatic operation.
 - 1) Include interlocks as appropriate for safe operation and for equipment protection.
 - 2) Influent process flowrate shall be obtained by an Ethernet interface between the DENSADeg® PLC and the plant PMCS (PMCS).

- 3) Various AUTO mode parameters shall be adjusted from:
 - a) OIU on the front of DENSADEG's® control panel, and also;
 - b) Computer screens which are part of the PMCS. Data information exchange shall be via an Ethernet interface between the DENSADEG® PLC and the plant PMCS.
 - c) Create a FAIL alarm for each controlled device; i.e., if a device is commanded to run from the DENSADEG® panel, but is not confirmed ON within a preset time, create the FAIL alarm.
- d. When a pump is called to run, the control system shall automatically open its associated motor operator discharge valve. The valve will automatically close with the pump is stopped.
- e. Provide the ability to operate both Sludge Blowdown Pumps at the same time for maintenance flushing.

C. Control Panel (530CP):

1. The panel shall contain all electrical components and control devices for control of the DENSADEG® train.
 - a. Panel shall be NEMA 4X 316 stainless steel and shall be freestanding.
 - b. Panel shall be located in the DENSADEG® platform. Prior to fabricating panel, confirm panel dimensions so that panel fits in available space.
 - c. Power supply to panel will be one 120V ac, single-phase, 60-Hz circuit.

D. Panel Mounted Controls and Indications:

1. Provide an Operator Interface Unit (OIU) mounted on panel front.
 - a. OIU shall allow operator to adjust all parameters related to automatic operation, including speed of adjustable speed drives.
 - b. OIU shall display all equipment status and alarm conditions related to automatic operation. As a minimum, the OIU shall display the following:
 - 1) Rapid Mix Drive under PLC control.
 - 2) Rapid Mix Drive ON status.
 - 3) Rapid Mix Drive FAIL alarm.
 - 4) Rapid Mix Drive actual drive speed.
 - 5) Reactor Drive under PLC control.
 - 6) Reactor Drive ON status.
 - 7) Reactor Drive FAIL alarm.
 - 8) Reactor Drive actual drive speed.

- 9) Scraper Drive under PLC control.
- 10) Scraper Drive ON status.
- 11) Scraper Drive FAIL alarm.
- 12) Scraper Drive HIGH TORQUE alarm.
- 13) Scraper Drive HIGH HIGH TORQUE alarm.
- 14) Scraper Drive actual drive speed.
- 15) Sludge Recirculation pump under PLC control, each pump.
- 16) Sludge Recirculation pump ON status, each pump.
- 17) Sludge Recirculation pump AFD FAIL alarm, each pump.
- 18) Sludge Recirculation pump HIGH DISCHARGE pressure alarm, each pump.
- 19) Sludge Recirculation pump LOW DISCHARGE pressure alarm, each pump.
- 20) Sludge Recirculation pump actual drive speed, each pump.
- 21) Sludge Blowdown pump under PLC control, each pump.
- 22) Sludge Blowdown pump ON status, each pump.
- 23) Sludge Blowdown pump AFD FAIL alarm, each pump.
- 24) Sludge Blowdown pump HIGH DISCHARGE pressure alarm, each pump.
- 25) Sludge Blowdown pump LOW DISCHARGE pressure alarm, each pump.
- 26) Sludge Blowdown pump actual drive speed, each pump.
- 27) PLC FAIL alarm.
- 28) PLC RUN mode status.

E. Programmable Logic Controller and Applications Software:

1. Provide all PLC and OIU applications software to meet the functional requirements described above and also to support a safely operating system.
2. PLC Manufacturer and Product: Provide a PLC system, complete, to meet the functional requirements. Unit shall include I/O modules, racks, CPU, power supply, and ancillaries. Provide at least one spare port reserved connection to a laptop computer.
 - a. Unit shall be Allen-Bradley CompactLogix Series.
3. OIU Manufacturer and Product: Provide an OIU to meet the functional requirements. Unit shall include combination touch screen and keypad, and shall provide color graphics. Unit shall be Allen-Bradley Panel View Plus Operator Terminal.
4. Configure PLC to provide a data table suitable for export with the plant control system via an Ethernet port. As a minimum, data table shall provide the following information for each variable: Tag name, description, memory location, scaling, and alarm set point.

5. Data table shall facilitate transfer of the following information:
 - a. All information displayed on the OIU shall be exported to the plant PMCS system. (See Paragraph Panel Mounted Controls and Indications.)
 - b. Data table shall receive raw water flow data which shall be used to control the high rate clarification process.
 - c. Data table shall receive set point values to adjust various parameters associated with the clarification auto mode. (Values will be entered by operator at computer screens part of the plant PMCS to adjust high rate clarification parameters.)
6. Provide all I/O modules as required to support the high rate clarification process. As a minimum, provide all I/O shown on the Process and Instrumentation Contract Drawings.

F. Field Instrumentation: Provide field instrumentation of a quality that meets the requirements of components specified in Section 40 91 00, Instrumentation and Control Components.

2.09 ADJUSTABLE FREQUENCY DRIVES

- A. Equipment Tag Numbers:
 1. 531AFD (Rapid Mix Drive).
 2. 532AFD (Reactor Drive).
 3. 533AFD (Scraper Drive).
- B. Provide engineered adjustable frequency drive systems in accordance with the requirements of Section 26 29 23, Low Voltage Adjustable Frequency Drive System.
- C. NEMA 1 ventilated (gasket and filter) enclosure; wall mounted. The AFDs will be mounted in an indoor, conditioned space.
- D. Power Supply: 480 volts, 3-phase.
- E. Features:
 1. Constant torque drive.
 2. Rectifier: 6-pulse inverter with 5 percent input reactor.
 3. Output dV/dt filter; motor branch circuit lead lengths are over 600 feet; see Drawings.
 4. Arrange for top entry of power and control conduits.
 5. Controls and interlocks as indicated herein and in Drawings.
 6. Provide auxiliary discrete and analog input modules to accommodate the I/O.

F. Operator Controls and Indicators:

1. AFD HMI.
2. AFD/OFF/REMOTE (530CP) control selection (keyed selector switch). Selector switch is normally left in REMOTE position. AFD and OFF positions are available for maintenance operations.
3. START/STOP control when selector switch is in AFD position.
4. POWER ON and RUN indication.
5. SPEED indication.
6. Motor OVERTEMP alarm indication.
7. Drive FAULT alarm indication.
8. HIGH TORQUE shutdown indication (Scraper Drive only).

G. External Interfaces:

1. Remote RUN input contact closure.
2. Drive RUNNING output contact.
3. Drive IN REMOTE output contact.
4. Drive FAULT output contact.
5. Analog SPEED input.
6. Analog SPEED output.
7. HIGH TORQUE shutdown input contact closure (Scraper Drive only).
8. HIGH TORQUE shutdown output contact.

H. Functional Requirements:

1. Complete automatic and manual operation of the Driven Equipment.
Provide the following functions:
 - a. When the AFD-OFF-REMOTE selector is in OFF, the drive is not to run regardless of any other run command.
 - b. When the AFD-OFF-REMOTE selector is in AFD, the drive is controlled by the START/STOP selections on the drive.
 - c. When the AFD-OFF-REMOTE selector is in REMOTE, control is transferred to local control panel 530CP.
 - d. When an equipment failure or alarm condition occurs, the drive system shuts down the equipment, illuminates a pilot light, and issues a trouble alarm to local control panel 530CP.
 - e. Energize motor space heater when AFD is off; de-energize when AFD is running.

2.10 ACCESSORIES

- A. Lifting Lugs: Provide suitably attached for equipment assemblies and components weighting over 100 pounds.
- B. Equipment Identification Plates: Provide 16-gauge stainless steel identification plate securely mounted on each separate equipment component and control panel in a readily visible location. Plate shall bear 1/4-inch high engraved block type black enamel filled equipment identification number and letters indicated in this Specification and as shown.
- C. Anchor Bolts: Type 316 stainless steel, sized by equipment manufacturer with 1/2-inch diameter, and as specified in Section 05 50 00, Metal Fabrications. Post installed anchor types are acceptable. It is the system suppliers' responsibility to ensure anchor edge distance and embedment fits within the concrete geometry.

2.11 SHOP/FACTORY FINISHING

- A. Shop prime ferrous metal in accordance with and as specified in Section 09 96 35, Chemical Resistant Coatings, for submerged surfaces and for non-submerged surfaces.
- B. Exposed metal surfaces of motors, gear reducers, assemblies, shall be factory prepared and primed and field finish coated in accordance with Section 09 96 35, Chemical Resistant Coating.
- C. Surfaces inaccessible subsequent to erection, shall be prepared, primed, and finish coated prior to erection.
- D. Shop-applied and field applied coatings shall be by same manufacturer to ensure compatibility.

2.12 SOURCE QUALITY CONTROL

- A. Factory Inspections: Inspect equipment and control panels for required construction, electrical connection, and intended function.
- B. Factory Tests and Adjustments:
 - 1. Test equipment and control panels actually furnished.
 - 2. Provide written certification of tests to Engineer prior to shipping equipment.
 - 3. Test for proper alignment, quiet operation, proper connection, pumping capacity, and satisfactory performance.
 - 4. Motor Test: See Section 26 20 00, Low Voltage AC Induction Motors.

2.13 COORDINATION WITH PLANT PROCESS INSTRUMENTATION AND CONTROL SYSTEM (PICS)

- A. Equipment provider shall perform the following:
1. Provide an I/O interface list detailing point name, equipment tag identifier, I/O address, signal type, scaling, engineering units, alarm set points, and high/low status descriptive nomenclature.
 2. Program the DENSADEG® PLC with all control system logic, sequencing, and algorithms.
 3. Provide I/O checkout for all DENSADEG® PLC I/O.
 4. Assist Engineer in plant PMCS graphic I/O checkout.
 5. Provide complete startup services to verify DENSADEG® PLC program algorithms including Operational Readiness Tests (ORTs) and Performance Acceptance Tests (PATs) as specified in Section 40 90 00, Instrumentation and Control for Process Systems.
 6. Verify communications by passing data between DENSADEG® PLC and plant PMCS software.
 7. Review and approve control strategies developed by the Engineer and related to the DENSADEG® process, including real-time control of polymer feed.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in strict accordance with manufacturer's installation instructions and recommendations.
- B. Furnish oil and grease required for initial operation. Furnish grades of oil and grease in accordance with manufacturer's recommendations.
- C. Install all equipment, components, piping and appurtenances true to alignment and rigidly supported.
- D. Configure and program the adjustable frequency drives' operational and protection setpoints and software.

3.02 FIELD FINISHING

- A. Finish coat ferrous metal in accordance with and as specified in Section 09 96 35, Chemical Resistant Coatings.

- B. Shop primed mechanism shall be prepared for field finish coating by brush-off blasting in accordance with SSPC SP 7. Exposed metal following brush-off blasting shall be primed using same material as was factory applied prior to finish coating.
- C. Equipment manufacturer shall supply paint for field touch-up of surfaces as required in accordance with Section 09 96 35, Chemical Resistant Coatings.

3.03 FIELD QUALITY CONTROL

- A. In accordance with Section 01 91 14, Equipment Testing and Facility Startup.
- B. Settling Tank Equipment:
 - 1. Prior to placement of settling tank equipment into service, check effluent weir setting by filling settling tank with water to elevation shown on Drawings. Adjust as recommended by Engineer.
 - 2. Weirs: Level to within plus or minus 1/8 inch of the design elevation shown.
- C. Functional Tests:
 - 1. Conduct on each piece of equipment assisted by manufacturer's representative, as follows:
 - a. Alignment: Prior to facility startup, test complete assemblies for correct rotation, proper alignment and connection, quiet operation, excessive vibration, and satisfactory specified performance.
 - b. Contractor and System Supplier shall certify that the process equipment, instrumentation, and electrical components are properly installed and ready for the Performance Test. Do not start performance test until the above criteria are met.
 - 2. Perform under approved operating conditions.
 - 3. Test for a continuous 5-day period without malfunction. During the 5-day period test at flow rates ranging between 1.8 and 18 mgd. Flow rate/rates to be selected by Engineer.
 - 4. Perform with the Engineer present.
 - 5. Meet the performance requirements specified earlier in this section.
 - 6. Adjust, align, or modify units and retest if necessary.
 - 7. Demonstrate required interface with the plant computer control system.

D. Performance Test:

1. The above performance of the process supplied shall be determined from one 7-day Process Performance Test Period. Each Process Performance Test Period shall be a daily average resulting from samples collected for each day for 7 days. Each day's samples shall be taken on an hourly basis for 8 consecutive hours, and should also be monitored on a continuous basis and shall be individually analyzed in accordance with EPA procedures. All sampling and analytical support will be the responsibility of the system supplier and the contractor. The Process Performance Test Period shall commence within 2 weeks after functional testing is completed. The results of the performance test will be evaluated on an average daily basis.
2. The performance test should be performed at the following flows for the corresponding number of days:
 - a. Min Flow: 1.8 MGD (2 days of performance testing).
 - b. Permitted Flow: 6.6 MGD (2 days of performance testing).
 - c. Design Flow: 8.0 MGD (3 days of performance testing).
 - 1) System supplier to demonstrate capability to hydraulically pass 18.0 MGD through the unit (8 hours of performance testing).
3. The following are the specific responsibilities of SUEZ, the Contractor, and the Owner with respect to the Process Performance Test and Process Guarantee:
 - a. The System Supplier, contractor and owner shall be responsible for operating the DENSADeg during the DENSADeg Performance Test Period. Chemical feed systems for the DENSADeg will be operated by the Contractor.
4. Performance Testing will include the following:
 - a. Collection of influent and effluent data as dictated by the performance guarantee.
 - b. Monitoring of chemical usage.
 - c. Analysis of samples by a third party laboratory, fees for laboratory analysis to be coordinated and paid for by the Contractor. Lab selected by Contractor must be approved by Owner.
 - 1) Lab must provide sample results within 24 hours of sample delivery, expedited lab fees and coordination of lab results to be the responsibility of the contractor.
 - d. Detailed record keeping of the performance during test period to determine if the performance guarantee has been satisfied.
 - 1) These records will be turned over to the owner after performance guarantee has been satisfied and will include all daily log sheets, operator notes, sample inspections, and instrument charts produced in the plant operation.

- e. If, during the Process Performance Test, it appears that the Process Guarantee is not being met, SUEZ will have the right to have the Plant operated at such conditions as it may deem necessary for purposes of determining the nature or cause of the failure of the plant to meet such guarantee.
 - 1) Provided such operating conditions are in accordance with good engineering practice and the Contractor's and Owner's safety rules enforced at the plant site.
 - 2) The system supplier will have the right to make adjustments as it deems necessary in order to meet such guarantee and the right to make at Suez's own expense, such modifications to the DENSADEG equipment as it deems necessary or advisable.
 - 3) It is understood and agreed that any mechanical corrective work necessary to the DENSADEG system to cause the Plant to meet the Performance Guarantee will be performed by SUEZ, the Owner, or their respective contractors at times mutually agreed upon by SUEZ, the Contractor, and the Owner.
- f. The Owner will promptly notify Suez when each guarantee under the Performance Guarantee has been met and, if necessary, of the failure of the plant to meet any such guarantee, specifying the respect in which such guarantee has not been met.
- g. SUEZ will not be responsible for nonfulfillment of guarantees due to deficiencies in the plant with respect to engineering design, materials, equipment (other than equipment supplied by SUEZ), workmanship, or services, including but not limited to:
 - 1) Defective materials or deficient performance of equipment utilized in the Plant's auxiliary parts, unless supplied by Suez.
 - 2) Noncompliance with the Process Design Basis for said Plant and/or noncompliance with operating instructions.
 - 3) Defective conditions or performance of any materials, equipment (other than equipment supplied by Suez) or work supplied by or contracted for by anyone other than Suez.
 - 4) Failure of the Contractor and Owner to furnish adequate utilities, such as, but not limited to, electricity, air, water, etc. as well as an adequate operating force.
 - 5) Mechanical failure of any of the equipment or component parts thereof, due to ordinary wear and tear.
 - 6) Failure of Contractor to perform any of the responsibilities and obligations assumed by it in accordance with the provisions hereof.

3.04 MANUFACTURERS' SERVICES

A. Manufacturer's Representative:

1. Provided by DENSADeg® Manufacturer as part of purchased items:
 - a. Mixers Manufacturer: Present at Site or classroom designated by Owner, for minimum person-days listed below, travel time excluded:
 - 1) 2 person-day to cover the following activities:
Installation inspection, supervision of functional and performance test, completion of Manufacturer's Certification of Proper Installation, facility startup, and classroom or Site training of Owner's personnel.

B. DENSADeg® Manufacturer's Representative:

1. Provided by DENSADeg® Manufacturer as part of Owner-purchased items.
2. Present at Site or classroom designated by Owner, for minimum person-days listed below, travel time excluded:
 - a. 2 person-days for installation assistance and inspection.
 - b. 12 person-days for supervision of functional and performance testing and facility startup.
 - c. 1 person-days for classroom or Site training of Owner's personnel.
 - 1) Prior to training, submit training outline for review by Owner.
 - 2) Training shall include the PLC, operation, diagnostics, recovery after power outage, minor programming (forcing bits) overview of program architecture, review of database table for export to plant PMCS system, etc.
 - d. Travel time listed above to be performed in 3 trips or less by system supplier representative.
3. Contractor shall coordinate schedule of services with DENSADeg® Manufacturer and inform DENSADeg® Manufacturer a minimum of 3 weeks before Manufacturer's representative is requested to be on Site.

C. See Sections 01 43 33, Manufacturers' Field Services, and Section 01 91 14, Equipment Testing and Facility Startup.

3.05 SUPPLEMENTS

A. The supplements listed below, following “End of Section,” are a part of this Specification.

1. Data Sheets: Motors.
2. Vendor Supplied Instrument List.
3. Vendor Input/Output List.
4. High Rate Clarification System Proposal.

END OF SECTION

INDUCTION MOTOR DATA SHEET

Equipment Name: Rapid Mix Drive

Equipment Tag Number(s): 531M

Type: Squirrel-cage induction meeting requirements of NEMA MG 1

Manufacturer: For multiple units of the same type of equipment, furnish motors and accessories of a single manufacturer.

Hazardous Location: ☐ Furnish motors for hazardous (classified) locations that conform to UL 674 and have an applied UL listing mark.

Motor Horsepower: 5.0

Guaranteed Minimum Efficiency at Full Load: _____ percent

Voltage: 460

Guaranteed Minimum Power Factor at Full Load: _____ percent

Phase: 3

Service Factor (@ rated max. amb. temp.): ☐ 1.0 ☒ 1.15

Frequency: 60 Hz

Enclosure Type: TEFC

Synchronous Speed: 900 rpm

☐ Multispeed, Two-Speed: _____ / _____ rpm

☒ Thermal Protection: Thermostats

Winding: ☐ One ☐ Two

☒ Space Heater

Mounting Type: ☐ Horizontal ☒ Vertical

☐ ☐ Vertical Shaft: ☐ Solid ☐ Hollow

☐ ☐ Vertical Thrust Capacity (lb): Up _____ Down _____

☒ Adjustable Speed Drive: See Section 26 29 23, Low-Voltage Adjustable Frequency Drive Systems.

Operating Speed Range: _____ to _____ % of Rated Speed

☐ Variable Torque

☒ Constant Torque

Additional Motor Requirements: ☒ See Section 26 20 00, Low-Voltage AC Induction Motors.

Special Features:

Inverter Duty Motor

INDUCTION MOTOR DATA SHEET	
Equipment Name: <u>Reactor Drive</u>	
Equipment Tag Number(s): <u>532M</u>	
Type: Squirrel-cage induction meeting requirements of NEMA MG 1	
Manufacturer: For multiple units of the same type of equipment, furnish motors and accessories of a single manufacturer.	
Hazardous Location: <input type="checkbox"/> Furnish motors for hazardous (classified) locations that conform to UL 674 and have an applied UL listing mark.	
Motor Horsepower: <u>15</u>	Guaranteed Minimum Efficiency at Full Load: _____ percent
Voltage: <u>460</u>	Guaranteed Minimum Power Factor at Full Load: _____ percent
Phase: <u>3</u>	Service Factor (@ rated max. amb. temp.): <input type="checkbox"/> 1.0 <input checked="" type="checkbox"/> 1.15
Frequency: <u>60 Hz</u>	Enclosure Type: <u>TEFC</u>
Synchronous Speed: _____ rpm	<input type="checkbox"/> Multispeed, Two-Speed: _____ / _____ rpm
<input checked="" type="checkbox"/> Thermal Protection: <u>Thermostats</u>	Winding: <input type="checkbox"/> One <input type="checkbox"/> Two
<input checked="" type="checkbox"/> Space Heater	Mounting Type: <input type="checkbox"/> Horizontal <input checked="" type="checkbox"/> Vertical
<input type="checkbox"/> <input type="checkbox"/> Vertical Shaft: <input type="checkbox"/> Solid <input type="checkbox"/> Hollow <input type="checkbox"/> <input type="checkbox"/> Vertical Thrust Capacity (lb): Up _____ Down _____ <input checked="" type="checkbox"/> Adjustable Speed Drive: See Section 26 29 23, Low-Voltage Adjustable Frequency Drive Systems. Operating Speed Range: _____ to _____ % of Rated Speed <input type="checkbox"/> Variable Torque <input checked="" type="checkbox"/> Constant Torque	
Additional Motor Requirements: <input checked="" type="checkbox"/> See Section 26 20 00, Low-Voltage AC Induction Motors.	
Special Features:	
<u>Inverter Duty Motor</u>	

INDUCTION MOTOR DATA SHEET

Equipment Name: Scraper Drive

Equipment Tag Number(s): 533M

Type: Squirrel-cage induction meeting requirements of NEMA MG 1

Manufacturer: For multiple units of the same type of equipment, furnish motors and accessories of a single manufacturer.

Hazardous Location: ☐ Furnish motors for hazardous (classified) locations that conform to UL 674 and have an applied UL listing mark.

Motor Horsepower: 0.75

Guaranteed Minimum Efficiency at Full Load: _____ percent

Voltage: 460

Guaranteed Minimum Power Factor at Full Load: _____ percent

Phase: 3

Service Factor (@ rated max. amb. temp.): ☐ 1.0 ☒ 1.15

Frequency: 60 Hz

Enclosure Type: TEFC

Synchronous Speed: _____ rpm

☐ Multispeed, Two-Speed: _____ / _____ rpm

☒ Thermal Protection: Thermostats

Winding: ☐ One ☐ Two

☒ Space Heater

Mounting Type: ☐ Horizontal ☒ Vertical

☐ ☐ Vertical Shaft: ☐ Solid ☐ Hollow

☐ ☐ Vertical Thrust Capacity (lb): Up _____ Down _____

☒ Adjustable Speed Drive: See Section 26 29 23, Low-Voltage Adjustable Frequency Drive Systems.

Operating Speed Range: _____ to _____ % of Rated Speed

☐ Variable Torque

☒ Constant Torque

Additional Motor Requirements: ☒ See Section 26 20 00, Low-Voltage AC Induction Motors.

Special Features:

Inverter Duty Motor

FKC CO., LTD.

2708 West 18th Street
Port Angeles, WA 98363



(360) 452-9472
FAX (360) 452-6880

June 7, 2017

Kristina Yanosek
CH2M
Atlanta, GA

RE: FKC Updated RST Proposal

Kristina,

Attached is FKC's updated thickening equipment proposal for (2) 275 GPM units for the Clayton County WWTP. Pricing is per the May 10, 2017 specification.

This proposal included (2) RST's, (2) flocculation tanks and (2) Control Panels as detailed below.

This proposal does not include sludge pumps or thickened WAS pumps.

Please note that 95% capture is based on TSS of the filtrate, not the TS.

Please contact me if you have any questions regarding this equipment proposal.

Sincerely,
FKC Co., Ltd.

Shane Harvey

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A. Proposed Equipment

1. Rotary Screen Thickener (RST)

		FOB WWTP
<u>Qty.</u>	<u>Description</u>	
2	Rotary Screen Thickener: Model RST-S775x3600L	US\$ 349,987
	Material:	WAS
	Capacity:	275 GPM
	Inlet consistency:	1.0% or higher
	Outlet consistency:	4.0% or higher
	Materials of construction:	SS-304 wetted parts, Base SS-304, Other CS
	Screens:	.045" dia. x 42% open area (stainless steel)
	Drive units:	SEW Eurodrive
	Motor:	3.0 HP, 1800 rpm, by SEW

A. Proposed Equipment

2. Flocculation Tank

<u>Qty.</u>	<u>Description</u>	Included
2	Flocculation Tank 175 gal with variable speed agitator	
	Drive:	SEW Eurodrive
	Motor:	2 HP, 1800 rpm, manufactured by SEW 480 VAC, 3 Ph, 60 Hz included
	Materials of construction:	SS-304 wetted parts

B. Miscellaneous

1. Delivery

The RST package will be delivered five (5) months after approved submittals.

2. Shipping Arrangements

The FKC Thickening equipment will be shipped from the Port Angeles, WA facility best way overland to the plant.

Offloading all equipment is at owner's expense.

3. Effective Period

This proposal shall remain valid until 11/15/17.

4. Payment Terms

30% with certified drawings

30% with shipment

30% with delivery

10% with performance or within 6 months of delivery if the equipment has yet to start-up due to the schedule of the customer, whichever occurs first.

Net 30 days

5. Installation

The rotary screen thickener system is shipped fully assembled and ready for installation.

Installation and erection assistance are not included in the price of the equipment and generally are not required. However, the service is available for our standard service rates (see the enclosed rate sheet).

6. Operator Training and Start Up

Manufacturer's services included per specification. (4) days total not including performance testing.

7. Utility Requirements

A. RST (S775 x 3600)

- Shower water 25 -29 GPM (each) at 30-40 psi

No booster pump required

8. Warranty

(2) Years per specification.

9. Performance Testing

Two 6-hour days included per specification.

10. Documentation Schedule

- A. Approval Drawings - within 3 weeks after receipt of purchase order
- B. Certified Drawings - within 2 weeks after return of approval drawings
- C. Operation and Maintenance Manuals - 14-16 weeks after receipt of order

11. Clarifications

- Laboratory testing of performance test samples included
- Polymer for startup/performance is not included.
- RST extended discharge chutes included per drawings
- No spare parts specified / included for RST.
- (2) PLC control panels included as specified
- Spare parts for Control Panel included.
- Polymer injection rings included.
- (2) Days of performance testing included total – not (4) days. FKC assumes that both units can be run simultaneously for performance testing.

12. Service Rates

The following are rates and terms for professional and technical services furnished by FKC:

Weekdays

\$800.00 - Per eight (8) hour day on weekdays plus, lodging, and rental car expenses.

\$150.00 - Per hour for all hours exceeding eight (8) hour workday on weekdays.

\$90.00 - Per hour for office engineering services and telephone consultations.

Saturdays, Sundays and Holidays

\$1,200.00 - Per eight (8) hour day plus lodging and rental car expenses.

\$225.00 - Per hour for all hours exceeding eight (8) hour workday.

Travel Time - Weekdays

\$75.00 - Per hour travel time. (Not to exceed \$600/day)

Travel Time – Weekends and US Holidays

\$120.00 - Per hour travel time (Not to exceed \$900.00/day)

The above rates are US\$.

Payment terms: Net 30 days.

Densadeg[®]

High-Rate Clarifier, Softener & Thickener



FIRM BID PROPOSAL

Project : W.B. Casey WRF

Engineer : CH2M

Proposal No : PROP-17-01-45124

Date : July 7, 2017

Regional Business Manager

Chris Cone
SUEZ
8007 Discovery Drive
Richmond, VA 23229
PH: 804-756-7691
Chris.Cone@suez-na.com

Local Representative

Chris Keever
Cornerstone H2O, LLC
21 Eastbrook Bend, Suite 118
Peachtree City, GA 30269
PH: 770-742-3321
chris@cornerstoneh2o.com



treatment solutions | North America



8007 Discovery Drive, Richmond, VA 23229
P.O. Box 71390, Richmond, VA 23255-1390
Tel 804.756.7600 | Fax 804.756.7643

1. SCOPE PROPOSAL & CONTRACT

TO: All Bidding Contractors

DATE: July 7th, 2017
PROPOSAL NO. PROP-17-01-45124
FOR: W.B. Casey WRF

SUEZ Treatment Solutions Inc. (hereinafter referred to as "STSI") offers to furnish the following described materials and equipment ("Products") and/or services at the prices ("Purchase Price") stated herein and in accordance with the Conditions of Sale and other provisions contained or referenced herein. This Proposal shall remain in effect until **November 15, 2017** and shall expire at that time unless extended in writing by STSI. After such date, pricing is subject to the Producer Price Index and London Metal Exchange for stainless steel calculated from the original proposal/bid date. The Purchase Price is based upon only the Conditions of Sale and other provisions specifically contained or referenced herein. Purchaser's acceptance of this Purchase Price, whether by issuance of a purchase order or otherwise, or acceptance of delivery of the Products and/or services furnished hereunder, shall be considered acceptance by the Purchaser of all the Conditions of Sale and other provisions contained or referenced herein, notwithstanding any statement in Purchaser's acceptance or order to the contrary. STSI hereby objects to and rejects any proposal by Purchaser to modify, amend, limit, add to or delete any of the Conditions of Sale or other provisions contained or referenced herein unless expressly accepted in writing by STSI.

This Proposal and any resulting contract shall be referred to hereinafter as "this Contract".

Section 44 42 23.02 – High Rate Clarification System

STSI will furnish one (1) DensaDeg® system. This system will include the rapid mix, reactor system, clarifier system, scraper, recycle pumps, sludge blowdown pumps, valves, controls, and instruments as detailed in our scope of supply section.



1.1 SCOPE OF SUPPLY – BY STSI

RAPID MIXER SYSTEM

1. One (1) rapid mixer shall be provided. All wetted parts shall be 316SS. The motor shall be a 5-hp, TEFC, 230-460/60/3, inverter duty.

REACTOR SYSTEM

2. One (1) inner draft tube assembly shall be provided to promote proper recirculation and flocculation, is suspended within the walls. The draft tube and all other internal components, baffles, etc., shall be fabricated from carbon steel.
3. One (1) reactor turbine fabricated from carbon steel shall be provided to produce mixing, precipitation, and recirculation of solids drives the axial flow turbine. The motor shall be a 15.0-hp, TEFC, 230-460/60/3, inverter duty. The turbine consists of curved blades especially designed to result in a high-efficiency, low-shear pump.
4. One (1) carbon steel polymer distribution ring with 1-1/2" flange connection.
5. One (1) water spray manifold. Fabricated of 304SS with appropriately size holes and 2" flange connection.

CLARIFIER/THICKENER SYSTEM

6. One (1) scraper mechanism shall consist of a torque tube with collector arms. A center scraper shall extend below the torque tube into the sludge hopper. The collector arms and center scraper shall be fabricated of carbon steel.
7. One (1) scraper drive - The drive shall be supplied with an integral variable speed. The motor shall be minimum 075-hp, TEFC, 230-460/60/3, severe duty. A torque overload device and visual torque indicator gauge shall be furnished with the drive.
8. One (1) LOT of tube settling modules - 2'-0" high settling tubes, including supports. The tubes shall be fabricated from ABS or polystyrene sheets and vacuum-formed to give a corrugated cross section.
9. One (1) LOT of tube setting supports. Support shall be fabricated from carbon steel. Mounting hardware included.
10. Six (6) effluent collection troughs, V-notch weir type, shall be sized and provided for effluent water collection above the tube settling modules. The troughs shall be fabricated from carbon steel. Mounting hardware included.
11. Four (4) Effluent baffles shall be sized and provided for mounting above the settling tubes. The baffles shall be fabricated from carbon steel. Mounting hardware included.
12. One (1) carbon steel scum removal pipe system with electric Beck Actuator and mounting hardware.
13. One (1) sampling system - taps, PVC valves, Sch 80 PVC piping, and 304SS sink. Cover by Others.

PUMPS

14. Two (2) sludge recirculation pumps – One (1) duty progressive cavity pump, plus one (1) spare shall be furnished to recycle preformed solids from the clarifier-thickener basin to the reactor inlet. The motor shall be a 20.0-hp, TEFC, 230-460/60/3, inverter duty.
15. Two (2) sludge blowdown Pumps – One (1) duty progressive cavity pump, plus one (1) spare shall be furnished to pump thickened solids from the clarifier-thickener basin to disposal. The motor shall be a 30.0-hp, TEFC, 230-460/60/3, inverter duty.
16. Pump Spares: (2) mechanical seals, (2) sets of gaskets and O-ring seals, (6) stators, (2) rotors, (2) coupling rods, (2) u-joint kits
17. Five (5) days of field service in (4) trips by the rapid mix manufacturer's representative for installation assistance and inspection, functional and performance testing, training, post-startup training

VALVES

18.	DESCRIPTION	TAG	QTY.	TYPE	SIZE	ACTUATOR
	Water spray ring, W3	532FV	1	Solenoid	2"	Electric, O/C
	Sample sink		12	Ball	1"	Manual

INSTRUMENTS

19.	DESCRIPTION	TAG	QTY.	TYPE	SIZE
	Pressure switches (low)	534PSL1/PE1A 534PSL2/PE2A 535PSL1/PE1A 535PSL2/PE2A	4	Diaphragm	-
	Pressure switches (high)	534PSL1/PE1A 534PSL2/PE2A 535PSL1/PE1A 535PSL2/PE2A	4	Diaphragm	-
	Pressure gauges	534PI1, 534PI2 535PI1, 535PI2	4	Bourdon tube	-
	Sludge recirculation flowmeter	534FE/FIT	1	Electromagnetic	6"

CONTROL PANEL

20. One (1) clarifier control panel. The control panel will include all logic and control functions, etc., required to operate the DensaDeg®. The control panel will be a NEMA 4X 316SS enclosure with 2 doors and 3 point latches, 74"H X 60"L X 12"D. The control panel will include an Allen-Bradley CompactLogix 5370 L2 PLC, Allen-Bradley PanelView +7 10" HMI, 24VDC instrument power supply, UPS with 15 minute battery backup, Ethernet switch with 4 copper ports and 2 fiber optic ports and fiber optic patch panel. The panel will require a 120VAC power supply provided by others. Panel will be located outdoors with a maximum ambient temperature of 100°F. The control panel

will also include a telephone modem for remote troubleshooting and programming by STSI. This capability will require an analog telephone line to be provided by Others

21. Five (5) VFDs installed in NEMA 12 enclosures. Includes circuit breaker disconnect, line reactor or isolation contactor/passive harmonic filter, DV/DT filter and control transformer for motor space heater as specified. These will be for: (1) rapid mix, (1) reactor, (1) scraper, and (2) sludge recirculation pumps. The VFDs will be installed in an electrical room provided by Others. All motors starters shall be provided by Others.
22. Spare control panel parts as specified

WALKWAYS

23. A 36"-wide (minimum) walkway and support bridge shall be fabricated of galvanized steel to span the rapid mix, reactor and clarifier thickener basins. Aluminum handrails (1-1/2"), grating and kickplates (4") are included. The platform shall expand at the rapid mixer, reactor and clarifier basins and support the mixer drives. Solid floor plating is provided over the clarifier section
24. Two (2) access hatches over the clarifier walkway area to allow visual inspection of collection troughs

SURFACE PREPARATION & PAINT

25. All fabricated carbon steel components shall receive a SP-6 or SP-10 shop blast and shop primer prior to shipment to the jobsite. All finish painting by Others.

STSI FIELD SERVICE

26. Up to fifteen (15) days in no more than three (3) trips of a STSI field service employee shall be supplied. This amount is typical for inspections, startup, and training. It is the contractor's responsibility use these days and trips at their discretion to accommodate their construction schedule. Any additional days required by the contractor or specifications are available for purchase under the conditions of field service in this proposal.

26.1 SCOPE OF SUPPLY - BY OTHERS

The following items, but not limited to, shall be provided By Others:

The following items are to be provided by Others (unless indicated otherwise above):

- All concrete basins & grout. Design and supply
- Installation of any kind and unloading & placement of equipment
- All required buildings, civil structures, and covers
- All anchor bolts and mounting hardware not specified herein
- Inlet, outlet, transfer, sludge recycle, sludge blowdown, and drain piping
- Flange gaskets and hardware
- All access stairs external to the DensaDeg unit
- Influent flow meters and flow control
- All chemical feed systems
- All pH, turbidimeters, and other instrumentation not specified herein
- Flushing system for sludge recycle and blowdown lines if required
- All basin drains and drain valves, mud valves, stem extension, floor boxes
- Supply and installation of all electrical power and control wiring and conduit to the equipment served plus interconnections between the STSI equipment as required, including wire, cable, junction boxes, fittings, conduit, cable trays, safety disconnect switches, circuit breakers, etc.
- Install and provide all motor control centers, motor starters, field wiring, wireways, supports and transformers
- All embedded pipe sleeves, valves, and elbows not specified herein
- All handling and disposal of waste materials/streams produced as part of the treatment process and/or construction process
- All finish paint and touch up finish painting of any steel components
- All taxes, tariffs, duties
- Recycle / sludge pump isolation and check valves
- Rapid mix potentiometer
- All field service not specified herein
- All other necessary equipment and services not otherwise listed as specifically supplied by STSI

3.3 NOTES AND CLARIFICATIONS

1. The equipment described in this proposal, where shipping tolerances require, will be shipped knocked -down for installation in the field by others. This proposal does not include any expense for unloading, storage, erection, unless otherwise specified herein.
2. The equipment to be furnished by STSI will include only those major equipment items normally manufactured or supplied by STSI as specifically listed in the scope of supply section of this proposal. Other items required to complete installation such as interconnecting wiring, conduit, pipe and fittings external to the major equipment components, will be done by others unless otherwise specified herein
3. All mechanical equipment (pumps, drives, etc.) shall be supplied with the Manufacturer's standard paint/finish unless otherwise specified herein.
4. The design and furnishing of all basins, concrete slabs and/or load-bearing structures is not by STSI.
5. PE stamp – Where a PE stamp is required STSI will provide a Virginia PE stamp for initial submittals. A Georgia PE stamp will be added for the final record submittal
6. Section 26 20 00 1.04-B.4 and 3.02-B. Exception. Motors are mounted on equipment. Certificate of Proper installation is not applicable
7. Section 40 27 02 1.02-A.1.h. Exception to anchorage and bracing drawings and cut sheets
8. Section 40 27 02 1.02-B.1. Exception to anchorage and bracing calculations
9. Section 44 42 23.02-1.03-C Design and detailing shall be performed by a qualified professional engineer not registered in Georgia. A GA PE stamp will be provided for the final record submittal.
10. Section 44 42 23.02-1.06-3 Raw phosphorus is 0-1.5 mg/L, not 1-30 mg/L.
11. Section 44 42 23.02-1.06-4.a. Available ferric sulfate dosage to be 50 mg/L and as 100% Fe₂(SO₄)₃, not as applied product. Average ferric sulfate dosage will be ≤40 mg/L Fe₂(SO₄)₃.
12. Section 44 42 23.02-1.07-A.10 Anchorage and bracing information will be provided for the walkway bridge to concrete foundation attachment points/anchor bolt and reactor draft tube anchor bolts only. Information required by 01 88 15 will be stamped by a VA PE.
13. Section 44 42 23.02-1.07-B.10 Calculation will be provided for the structural walkway only.
14. Section 44 42 23.02-2.05-C.4 Collection troughs are carbon steel, not FRP as specified
15. Section 44 42 23.02-2.05-E.2 Beck will provide their standard actuator to match what is currently at the plant. They call exception to the requirements of 40 27 02.
16. Section 44 42 23.02-2.10-A Lifting lugs will be provided for equipment weighing over 100 lbs for pumps, mixers, etc. Lifting lugs will not be provided for steel fabrications.
17. Section 44 42 23.02-2.12-B.1 Exception. It is not practical to factory test mixers & pumps with AFD controllers. This can be done at the site but not at the factory.
18. Section 44 42 56.13-1.05-A.1.i. Exception, no anchorage and bracing calculations will be provided
19. Section 44 42 56.13-1.06-A. Spares parts as noted in scope of supply
20. Section 44 42 56.13-1.07. See warranty in terms and conditions
21. Section 44 42 56.13-2.08. Exception. Factory testing for AFD's and pumps will be performed separately at each manufacturer's facility. They will not be factory tested together. Test reports will be certified by the manufacturer. Certification by a PE not included.
22. Section 44 42 56.13-3.01-F. An anchor bolt location drawing will be provided. No template furnished.
23. Section 44 42 56.13 534P1 & 534P2 & 535P1 & 535P2. Suction is standard flange opening and design does not have a steel tube around stator
24. Section 44 42 56.13. All bearings in reducers have oil splash lubrication

3.4 PROCESS GUARANTEE

SCOPE AND TIME LIMITATIONS: STSI guarantees the process results below until successful completion of the Performance Testing specified below, only if the Products are operated properly under conditions and at loads for which sold and handling water, liquid or material conforming to the analysis furnished STSI, or the samples submitted, or as described in the specifications or as stated below. In any event, successful completion of performance testing, whether performed with or without the participation of STSI, shall be sufficient evidence that the requirements under this guarantee have been met and shall release STSI from further obligations pursuant to this Process Performance Guarantee.

NOTICE REQUIREMENT AND REMEDY: STSI shall, upon receipt of written notice within sixty (60) days of any breach of or failure under this guarantee, determine whether STSI is responsible for the Product's failure to fulfill this Process Performance Guarantee. If it is determined by STSI that STSI is responsible, STSI shall make every reasonable effort to correct the failure by adjusting or altering the Products or specific part of the Products to which the failure is attributable or by providing new or additional Products or parts of the Products at its expense.

INDEMNITY: If it is determined for any reason that STSI is not responsible for any breach of or failure under this guarantee, Owner shall pay STSI for all costs incurred by STSI in investigating and substantiating Product process conformance with this Process Performance Guarantee.

EXCLUSIONS: If any changes occur in load or composition of the material being treated, if the Products are not stored, installed, maintained and correctly operated in accordance with STSI written instructions and requirements, or if the Products are subjected to misuse, neglect, corrosion, or accident, this Process Performance Guarantee shall be null and void.

1. General

The proposed DensaDeg® clarifier shall meet the following "Stated Effluent Conditions" provided the following:

- a. The DensaDeg® Clarifier must be operated and maintained in accordance with all operating and maintenance instructions per the STSI O&M manual at all times.
- b. Raw water must be within the characteristics listed below in the 'Stated Influent Conditions'.
- c. All chemical feed equipment must be designed, maintained and calibrated to ensure proper delivery of the optimum chemical dosages.
- d. Ferric Sulfate and flocculants polymer (as approved by STSI) must be available for addition into or prior to the clarifier and added at optimum dosage levels determined by STSI.

STATED INFLUENT CONDITIONS	
Flow Condition (each unit)	1.8 – 8.0 MGD
pH	6.5 – 7.5
Alkalinity	50 to 100 mg/L (as CaCO ₃)
TSS	0 to 30 mg/L
Temperature	50 to 81 °F
Total Phosphorus	0 – 1.5 mg/L
Soluble Non-Orthophosphorus	≤0.1 mg/L

STATED EFFLUENT CONDITIONS	
TSS	≤ 10.0 mg/L
Total Phosphorus (TP)	≤ 0.3 mg/L

AVAILABLE CHEMICALS	
Ferric Sulfate (as 100% Fe ₂ (SO ₄) ₃)	≤ 50.0 mg/L
Polymer (Anionic emulsion)	≤ 1 mg/L

2. Performance Testing

The CONTRACTOR and OWNER, with Assistance from STSI, shall conduct a Performance Test during which the DensaDeg® clarifier shall be operated at various flow rates: (2) days at 1.8 MGD, (2) days at 6.6 MGD, and (3) days at 8.0 MGD. The Performance test shall be for seven (7) consecutive days. The performance of the clarifier shall be determined from the values for TSS and Total Phosphorous collected during the 7-day performance test as set out below. Equipment acceptance shall be based on the supplier's equipment meeting the minimum effluent criteria specified in the 'Stated Effluent Conditions.' Additionally, there is an 8-hour hydraulic capacity test; this test is not required to meet the 'Stated Effluent Conditions'; the requirement of this test is to hydraulically pass 18-MGD through the unit for 8-hours.

The schedule for the performance testing shall be coordinated with the CONTRACTOR and OWNER in order to effectively test the performance of the clarifier.

Sampling: Each day's samples shall consist of at least eight (8) grab samples for TSS and TP, each taken from the clarifier effluent flume. Each sample shall be collected at consistent intervals (i.e. every hour). Following sample collection, the samples shall be immediately analyzed by the CONTRACTOR. All samples for each day shall be individually analyzed for TSS and TP in accordance with EPA procedures. All sampling and analytical support will be the responsibility and the cost of the CONTRACTOR. The average of the eight (8) samples shall not exceed the 'Stated Effluent Conditions'.

The CONTRACTOR shall supply all chemicals, utilities and other services necessary for operation of the equipment during the test. During the performance test the SUPPLIER shall be able to adjust all chemicals to optimize operation.

If during the Performance Test any of the parameters listed in the 'Stated Influent Conditions' are not within the stated range the specific flow rate performance test may be stopped at STSI discretion. When the raw water is again within the 'Stated Influent Conditions' a new test at the same flow rate shall be restarted. The OWNER will compensate the CONTRACTOR who shall compensate the SUPPLIER for restarting the test based on a time and materials basis.

3. Trial Period

Immediately following the Performance Test and hydraulic capacity test, the OWNER or CONTRACTOR shall perform a 3 month Trial Period to demonstrate phosphorus removal at various influent loadings within the 'Stated Influent Conditions'. For each of the three months of the Trial Period, the monthly average phosphorus and TSS effluent concentrations shall not exceed the permit limit given in the 'Stated Effluent Conditions'.

Sampling: The monthly phosphorus average shall be computed by averaging daily samples. Each day's samples shall consist of at least four (4) grab samples for TP, each taken from the clarifier effluent flume. Each sample shall be collected at consistent intervals (i.e. every 2 hours). Following sample collection, the samples shall be immediately analyzed by the OWNER or CONTRACTOR. All samples for each day shall be individually analyzed for TP in accordance with EPA procedures. All sampling and analytical support will be the responsibility and the cost of the OWNER or CONTRACTOR. The monthly average of the all the samples over the 3-months shall not exceed the 'Stated Effluent Conditions'.

The OWNER or CONTRACTOR shall supply all chemicals, utilities and other services necessary for operation of the equipment during the Trial Period. During the Trial Period the SUPPLIER shall be able to adjust all chemicals to optimize operation.

Data Collection: During the Trial Period, the Owner will submit daily operational logs for the DensaDeg system as provided in the O&M manual or provide access to this data in the event of noncompliance of the system. This data shall include, but shall not be limited to, inlet/effluent turbidity, influent and effluent pH, flowrates, chemical doses, recycle rates, sludge blanket height, and sludge blowdown settings.

If during the Trial Test any of the parameters listed in the 'Stated Influent Conditions' are not within the stated range the effluent data for that data point shall be excluded from the average. The Trial Period shall not be extended for days the 'Stated Influent Conditions' are not met.

4. Testing Results and Process Guarantee

- a. If the test results for each flow rate of the Performance Test meet all the 'Stated Effluent Conditions,' the clarifier shall be considered to operate properly and shall pass the Performance Test.
- b. If any of the above conditions are not met, the SUPPLIER shall be afforded 90 days to modify the facilities and/or chemical feed systems and repeat the respective flow rate test.
- c. If the monthly average effluent phosphorus and TSS (of any of the three months in the Trial period) meets the values in the 'Stated Effluent Conditions," the clarifier shall be accepted by the OWNER

3.5 TERMS & CONDITIONS OF SALE

1. **ENTIRE AGREEMENT.** Seller's proposal (the "Proposal"), these Terms and Conditions of Sale, Seller's site specific Supplementary Conditions (if applicable), and any supplements which may be attached hereto, constitute the full and final expression of the contract (the "Contract") for the sale of equipment and parts, and any services set forth in the Proposal, and supersede the terms and conditions contained in any RFP or RFQ, specifications, quotations, purchase orders, correspondence, or other documents or communications, whether written or oral, between the parties. No change, amendment, or modification hereto, nor any statement, representation, or warranty not contained herein, shall be binding upon the parties unless made in writing and signed by an authorized representative of both parties. Prior dealings, usage of the trade, or a course of performance shall not be relevant to determine the meaning of this Contract.

2. **PAYMENT.** Payments shall be net 30 days in accordance with the milestone payment schedule set forth in the Proposal. The purchase price does not include any federal, state, provincial, or local sales, value-added, use or other taxes or any import fees or duties (collectively, "Taxes"). Taxes shall be listed separately, and Buyer shall be responsible for payment of all such Taxes to Seller. If Buyer fails to pay any amount under this Contract when due, Seller shall be entitled to interest at the highest legal rate on the unpaid balance, and Buyer shall promptly reimburse Seller for all attorney's fees and costs related to collection of past due amounts.

3. **DELIVERY.** Seller shall deliver the equipment to the delivery point stated in the Proposal. Delivery of equipment or parts into storage, including storage at Seller's facility, due to Buyer's request or refusal or inability to accept delivery (other than for non-conformance with this Contract by Seller), shall constitute delivery for all purposes under the Contract, and Buyer shall promptly reimburse Seller for all costs associated with such storage. Risk of loss or damage to the equipment, or any part thereof, shall pass to Buyer upon delivery.

4. **FORCE MAJEURE.** Seller shall not be liable for any delay in performance or failure to perform due to any cause beyond Seller's reasonable control including, fire, flood, any act of God, strike or other labor difficulty, any act or omission to act of any civil or military authority, change in laws, acts of war, any insurrection, riot, embargo, unavailability or delays in transportation or car shortages. The parties recognize that a time extension may not be the only remedy for a delay.

5. **CONFIDENTIAL INFORMATION.** All information, pricing, plans, drawings, tracings, specifications, programs, reports, models, mock-ups, designs, calculations, schedules, technical information, data, manuals, proposals, CADD documents and other materials, including those in electronic form ("Confidential Information") have been prepared and furnished by Seller for use solely with respect to the work under this Contract. Seller retains all common law, statutory, and other reserved rights in the Confidential Information, including all intellectual property rights. Neither Buyer, nor any other person or entity other than Seller, shall use the Confidential Information for future additions or alterations to this project or for other projects, or for any other purpose (except as expressly permitted below in this paragraph) without Seller's prior written consent. The Confidential Information furnished by Seller is proprietary to Seller, submitted in strict confidence, and shall not be reproduced, transmitted, disclosed, or used in any other manner without Seller's written consent. Seller grants Buyer a royalty-free, non-exclusive, and perpetual (unless there is a breach) license to use the Confidential Information furnished by Seller under this Contract solely for the installation, maintenance, and operation of the equipment that is the subject of this Contract.

6. **INSPECTION BY BUYER.** Buyer may inspect the equipment at the point of manufacture, provided that such inspection is arranged and conducted so as not to unreasonably interfere with Seller's or the manufacturer's operations. Notwithstanding anything in this Contract to the contrary, Buyer shall notify Seller of any obvious damage and/or shortage within five (5) days of delivery.

7. **SUBMITTALS.** Buyer will review and approve, or make any and all necessary comments to, Seller's drawings and submittals on the first submittal by Seller within ten (10) working days, and Buyer shall use its best efforts to require at most one re-submittal. Notwithstanding the foregoing, any additional modifications, additions, or deletions by Buyer, or any other party, of Seller's submitted information after the first submittal that requires additional submittals by Seller, if not due to Seller's fault, shall entitle Seller to equitable relief in cost and schedule.

8. **WARRANTY OF TITLE.** Seller warrants that, upon full and final payment, title to all equipment will pass to Buyer free and clear of all liens. If a lien waiver is requested, Seller will supply its standard lien waiver forms.

9. **WARRANTY.** The equipment shall materially conform to the description contained in the Proposal and be free from defects in material and workmanship for a period of one (1) year from the date the equipment is ready for or initially placed in operation or eighteen (18) months from the date the equipment is delivered, whichever occurs first. Upon Seller's receipt of written notice within thirty (30) days of discovery of any defect, and a determination by Seller that such defect is covered under this warranty, Seller shall, at its option, repair or replace the defective part or parts, f.o.b. factory. Seller's warranty does not cover normal wear and tear or failure or damage due to storage, installation, operation, or maintenance not in conformance with Seller's written instructions and requirements or due to accident, misuse, abuse, neglect, or corrosion or force majeure. In addition, Seller's warranty does not cover labor or labor costs for gaining access, removal, or installation, temporary power, or any other expenses that may be incurred with repair or replacement. Seller is not responsible for field touch-up painting of the equipment. Correction of non-conformities in the manner and for the period of time provided above shall constitute Seller's sole liability and Buyer's exclusive remedy for Seller's failure to meet its warranty obligations, whether Buyer's claims are based in contract, tort (including negligence or strict liability), or otherwise. Notwithstanding anything in this Contract to the contrary, the warranties herein are the exclusive warranties under this Contract, and in lieu of all other warranties of any kind, express or implied, including any implied warranty of merchantability or fitness for a particular purpose.

10. **BACKCHARGES.** Seller is not liable for any costs Buyer incurs for work, repairs, replacements, or changes to the equipment, without Seller's prior written consent, and any adverse consequences resulting from such unauthorized actions shall be Buyer's full responsibility.

11. **LIQUIDATED DAMAGES.** Liquidated damages shall not apply to this Contract, unless they are expressly accepted by Seller on the face of this Contract or in a separate, attached document entitled "Liquidated Damages."

12. **LIMITATION OF LIABILITY.** Neither party shall be liable to the other party for any special, indirect, incidental, consequential or punitive damages, including lost profits or loss of use, under, arising from or relating to this Contract. In no event shall Seller's aggregate liability to Buyer exceed the amount paid for the equipment and services on which such liability is based, regardless of when or how many claims are made. The above limitations apply whether such damages are based upon breach of contract, breach of warranty, tort, strict liability or otherwise.

13. **TERMINATION FOR CONVENIENCE.** If Buyer terminates this Contract or refuses to accept delivery of the equipment, Buyer shall be liable to Seller for all costs and other amounts incurred by Seller, including cancellation charges, administrative costs, and commissions to sales representatives for all work initiated or in process up to the time of cancellation or refusal to accept delivery.

14. **DEFAULT BY BUYER.** In the event of any default by Buyer (including where the project is suspended or delayed for more than 120 cumulative days), Seller shall give written notice of default to Buyer. Buyer shall remedy the default within thirty (30) days of receipt of such written notice, or, if such default cannot reasonably be remedied within such thirty (30) day period, Buyer shall promptly begin to remedy the default within the thirty (30) day period and thereafter diligently prosecute to conclusion all acts necessary to remedy the default. In the event of a Buyer default, Buyer shall pay Seller for all work initiated prior to termination/suspension, including all costs and other amounts related to the termination/suspension.

15. **DEFAULT BY SELLER.** In the event of any default by Seller, Buyer shall give written notice of default to Seller. Seller shall remedy the default within thirty (30) days of receipt of such written notice or, if such default cannot reasonably be remedied within such thirty (30) day period, Seller shall promptly begin to remedy the default within the thirty (30) day period and thereafter diligently prosecute to conclusion all acts necessary to remedy the default. Buyer shall have no right to terminate this Contract so long as Seller timely remedies such default.

16. **PATENT AND COPYRIGHT INFRINGEMENT.** Seller shall defend and have sole control over any action or proceeding brought against Buyer based on any claim that the equipment infringes any United States patent or copyright, provided the equipment is used in the manner specified and is not modified, altered, or combined with any other equipment without Seller's prior written permission. Buyer shall give prompt written notice to Seller of any such action or proceeding and will reasonably provide authority, information and assistance (at Buyer's expense) in the defense of same. If Buyer is enjoined from the operation or use of the equipment, Seller shall use commercially reasonable efforts to procure the right to operate or use the equipment. If Seller cannot so procure such right within a reasonable time, Seller shall promptly, at Seller's option and expense, (i) modify the equipment so as to avoid infringement of any such patent or copyright, (ii) replace the equipment with equipment that does not infringe or violate any such patent or copyright, or (iii) as a last resort, remove the equipment and refund a pro rata portion of the purchase price, based on the expected life span of the equipment. The above represents Seller's sole liability and Buyer's sole remedy in connection with an infringement for which Seller is responsible (and Seller is only responsible to the extent and under the circumstances described above in this paragraph 16).

17. **INDEMNITY.** To the extent and proportion of its negligence, Seller will indemnify and hold Buyer harmless for any damages, suits, or losses from tort claims asserted by third parties against Buyer, and paid by Buyer to such third parties based on a final court order, for death, bodily injury, or damage to tangible property (other than to the equipment itself) directly caused by Seller's negligence. Seller's indemnity obligation does not imply an obligation to defend any person or entity other than Seller. However, Seller has the right to defend the action and the Buyer to the extent Seller so requests. This indemnification provision does not apply to any settlement unless such settlement is approved in writing by Seller.

18. **GOVERNING LAW/JURISDICTION.** This Contract shall be governed by, interpreted, and enforced in accordance with the laws applicable in the state where the jobsite is located, without regard to any conflicts of law principles thereof. Any lawsuit must be brought in the federal or state courts having jurisdiction over the jobsite. The Parties irrevocably waive the right to request trial by jury.

19. **ASSIGNMENT/SUCCESSORSHIP.** Neither Seller nor Buyer may assign this Contract without the prior written consent of the other party, which consent shall not be unreasonably withheld or delayed. Any prohibited assignment shall be null and void. All provisions of this Contract are binding upon the parties, their employees, agents, heirs, successors and assigns.

20. **INSURANCE AND BONDING.** Upon Buyer's request, Seller will provide insurance certificates and/or bonds on the standard forms used by Seller's carrier/surety.

21. **RIGHTS OF THIRD PARTIES.** This Contract is solely for the benefit of the parties. Notwithstanding anything at law or in the Contract documents to the contrary, nothing in this Contract is intended to convey any rights, benefits, or obligations on any third parties.

22. **MISCELLANEOUS.** Both parties shall comply with all laws applicable to their performance under this Contract and on the instant project, including all laws related to anti-corruption, competition, and human rights. Unless otherwise provided, any notices to be given hereunder shall be given in writing at the address and to the representatives mentioned in the Contract documents and shall be deemed effectively given (i) upon personal delivery to the party to be notified, (ii) on confirmation of receipt by e-mail by the party to be notified, (iii) one business day after deposit with a reputable overnight courier, prepaid for overnight delivery and addressed as set forth herein, or (iv) three days after deposit with the U.S Post Office or Canadian Post, postage prepaid, registered or certified, with return receipt requested. If any term, condition or provision of this Contract shall at any time or to any extent be invalid or unenforceable, then the remainder of this Contract shall not be affected thereby, and the parties shall negotiate in good faith to render the offending provision(s) valid and enforceable. The failure of either party to insist upon or enforce strict performance by the other party of any provision of this Contract or to exercise any right under this Contract shall not be construed as a waiver or relinquishment to any extent of such party's right to assert or rely upon any such provision or right in that or any other instance. The Parties agree that the terms of this Contract were mutually negotiated and shall not be construed either in favor or against either of them by virtue of a Party's involvement in preparing or reviewing this Agreement. The provisions of this Agreement that by their nature are continuing shall continue in full force and effect and shall bind the Parties beyond any termination of this Agreement.

3.6 CONDITIONS OF FIELD SERVICE

If this Contract does not include Field Service or if Purchaser requires such service in addition to that included in this Contract, Purchaser may purchase from STSI such Field Service or technical advice during installation or start-up of the Products, in which case Purchaser agrees to pay STSI for Work Time, Travel Time and Standby Time based on (1) STSI's "per diem" rates in effect at the time the service is performed; (2) the expenses of each STSI employee so furnished; and (3) the terms and conditions under which such service is performed.

"PER DIEM" CHARGES FOR SERVICE

The following rates are currently in effect. They are subject to change by STSI and are based on the definitions below. These rates are for domestic service only. Rates for service outside the Continental United States will be quoted upon request.

CLASSIFICATION OF SERVICEMAN	STRAIGHT TIME RATE		
Standard Service	\$1,500	per	day

TIME DEFINITIONS

- a) Work Time shall include all hours that STSI service personnel are on Purchaser's job site, either working or ready for work, and shall be payable at the applicable specified rates.
- b) Travel Time shall include the time spent by STSI service personnel in traveling between their customary headquarters and Purchaser's job site and in returning (including travel occurring on Saturdays, Sundays and holidays) up to a maximum of eight (8) hours chargeable time for any given one way trip. Travel Time shall be paid for at the applicable Straight Time Rate and shall not be cumulative with Work Time in determining Overtime.
- c) Standby Time shall include all time (excluding Work Time) that STSI service personnel are available for work at Purchaser's job site, whether on the job site or not, up to a maximum of eight (8) hours per day, between the hours of 7:00 a.m. and 6:00 p.m., Sunday through Saturday, including holidays if availability has been requested by Purchaser. Standby Time shall be paid for at the applicable Straight Time Rate; however, Standby Time preceded and/or followed by Work Time is cumulative in determining Overtime.

RATE DEFINITIONS

- a) Straight Time Rate. This rate shall be paid for Work Time, Standby Time or Travel Time on a regular schedule of eight (8) hours per day, Monday through Friday.
- b) Time and One Half Rate. The rate of one and half (1 1/2) times the Straight Time Rate shall be paid for any Work Time or Standby Time in excess of eight (8) hours, but not exceeding sixteen (16) hours, per day, Monday through Friday, and for any Work Time or Standby Time on Saturdays, not to exceed sixteen (16) hours.
- c) Double Time Rate. The rate of twice the Straight Time rates shall be paid for time worked in excess of sixteen (16) hours per day, without a six (6) hour break, Monday through Saturday, and for all time worked on Sundays and holidays. Holidays shall be those observed in the locality where the work is to be performed.

CHARGES FOR EXPENSES

In addition to the "Per Diem" charges above, Purchaser shall pay STSI for all the traveling and living expenses and all other expenses of each STSI employee incidental to the work.

TERMS AND CONDITIONS

- 1) Notification. Purchaser shall give STSI at least two (2) weeks advance notice when ordering Field Service.
- 2) Terms of Payment. Purchaser shall pay STSI immediately upon receipt of invoices covering the time and expenses of STSI's employees furnished for such services. OVERDUE PAYMENTS NOT RECEIVED BY STSI WITHIN THIRTY (30) DAYS FROM DATE OF INVOICE SHALL BE SUBJECT TO FINANCE CHARGES AT THE RATE OF ONE AND ONE HALF PERCENT (1.5%) PER MONTH.
- 3) Time Sheets. STSI employees shall present Purchaser at the end of each week or at the completion of the job if less than one (1) week, appropriate documents on which shall be indicated the number of hours spent and the estimated expense incurred on this work. Purchaser shall sign these documents in the place indicated, thus signifying approval of the time spent and estimated expense incurred on this work.
- 4) Delays. If the work of a STSI employee is postponed or suspended by Purchaser, or is delayed or does not proceed with reasonable dispatch, due to no fault of STSI, STSI may withdraw such employee and return a serviceman to the job when needed and available; and any additional costs (including Travel Time and expenses) incurred by STSI because of this shall be an additional charge to Purchaser.
- 5) Limitation of Liability. STSI, in providing any Field Service hereunder, shall do so in an advisory capacity only and shall not be held responsible in any way for the acts, workmanship or omissions of the employees, contractors, sub-contractors or agents of Purchaser. STSI SHALL NOT BE LIABLE IN ANY EVENT FOR SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGE.

3.7 PRICING, PAYMENT & SCHEUDLE

BASE BID	PRICING
Scope of Supply - By STSI	\$1,049,765 - One million, forty nine thousand, seven hundred and sixty five dollars

Note: All pricing is exclusive of ALL taxes, tariffs and duties, including GST, PST and any other local taxes. Please be advised that pricing is based upon STSI's review of technical sections referenced in the email dated 6/5/17 ("Contract Documents") from Christina Yanosek to Mr. Chris Keever and in the email dated 6/8/17 from Leigh Jester. Additional specification compliance, including any requirement that STSI adhere to terms or conditions different from those noted in the STSI proposal may require a Change Order. In the event of a conflict between the conforming specifications and the STSI proposal, the STSI proposal shall govern.

FREIGHT TERMS	
FOB	Jobsite (Destination)

PAYMENT TERMS	
10%	Net Cash, Payable thirty (30) days from date of final submittal of drawings
80%	Net Cash, Payable upon delivery of all equipment
10%	Net Cash, Payable thirty (30) days following the 3-month Trial Period

SERVICE: Field Service included in this Contract shall be provided for a period up to **15** eight-hour man-days provided in not more than **3 trips** to check the completed installation by Purchaser, to place the Products into operation and to instruct Purchaser in their operation. Purchaser agrees to pay STSI for any additional service days and/or trips in accordance with STSI's standard service rates and conditions in effect at the time the service is performed.

SCHEDULE: Approval drawings and data shall be submitted approximately **8** weeks after agreement to all terms, as evidenced by STSI's receipt of this proposal, fully executed; or, in the event that Purchaser issues a Purchase Order, STSI's receipt of fully executed letter agreement. STSI estimates that shipment of the first units can begin **16 weeks** after STSI has received from Purchaser final approval of all submittal drawings and data.

PURCHASER'S ACCEPTANCE: BY ITS SIGNATURE BELOW OR ISSUANCE OF ANY PURCHASE ORDER OR OTHER DOCUMENT, NOTWITHSTANDING ANY STATEMENT OR PROVISION CONTAINED THEREIN TO THE CONTRARY, PURCHASER AGREES TO ALL THE CONDITIONS AND PROVISIONS OF THIS PROPOSAL AND CONTRACT. NO OFFER BY PURCHASER TO ALTER, AMEND, LIMIT OR DELETE ANY CONDITION OR PROVISION OF THIS PROPOSAL AND CONTRACT SHALL BE BINDING UPON STSI UNLESS EXPRESSLY ACCEPTED IN WRITING BY STSI.

PURCHASER'S ACCEPTANCE		SELLER
Company:		SUEZ Treatment Solutions Inc.
By (Name/Title):		
Signature:		
Date:		



North American Locations:

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Paramus, NJ 07652
USA
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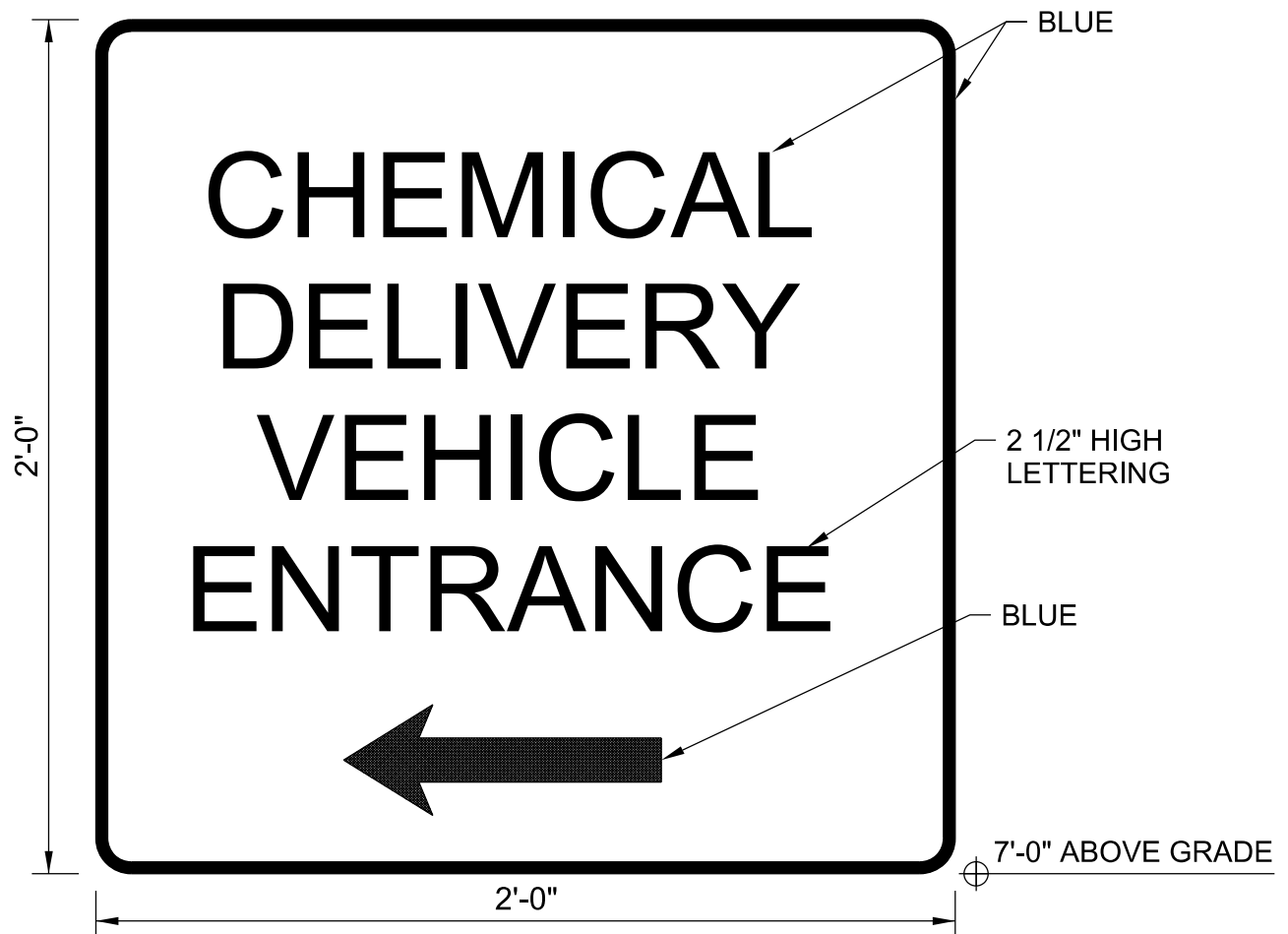
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CHEMICAL DELIVERY ENTRANCE SIGN

NTS

W.B. CASEY WATER RECLAMATION FACILITY
POLISHING PLANT AND
WAS THICKENING UPGRADES
CLAYTON COUNTY WATER AUTHORITY
CLAYTON COUNTY, GEORGIA

7/5/2017
ADDENDUM NO. 2

1014-004

