

DESIGN SERVICES FOR EAST WASTEWATER TREATMENT PLANT UPGRADE ENGINEERING

AMENDMENT NO. 1 SCOPE OF WORK

The following describes the ENGINEER'S modified scope of work to be conducted under this Amendment No. 1:

Replace Sections 1, 2, and 3 in their entirety with the following sections:

1. ENGINEERING SERVICES

1.1. Project Understanding

East Wastewater Treatment Plant

The OWNER's 7.9 mgd West Wastewater Treatment Plant (West WWTP), treats a majority of the flow from the City of Margate using a rotating biological contactor (RBC) secondary treatment process. The remaining wastewater flow from the OWNER is treated by the East Wastewater Treatment Plant (East WWTP). Influent flow to the East WWTP passes through one drum screen and then into two parallel aeration basins equipped with surface aerators. Mixed liquor from the aeration basins flows by gravity to one secondary clarifier that was recently upgraded. Waste activated sludge from the secondary clarifier is pumped to one aerobic digester at the East WWTP for stabilization. Digester residuals are pumped to the West WWTP for dewatering. The OWNER desires to increase the treatment capacity of the 2.2-mgd East WWTP to 6 mgd by installing an integrated fixed film system (IFAS) within the existing aeration basin tankage. The current OWNER-ENGINEER agreement dated March 20, 2018 calls for expansion of the East WWTP to 4 mgd. The West WWTP will provide backup treatment to the East WWTP if needed.

To implement the IFAS process, the approach to engineering is as follows:

1. Three manufacturers have been determined to be qualified to supply the IFAS system. The ENGINEER will prepare bid documents based around the design information supplied by one of these suppliers, Kruger, Inc. for the AnoxKaldnes K5 IFAS (Kruger) process, media, and equipment. Where practical, the bid documents will accommodate the approach used by the two alternative manufacturers.
2. The ENGINEER shall establish and specify IFAS supplier treatment performance, I&C integration approach, material and equipment quality requirements in a procurement specification in the bid documents.
3. The ENGINEER will design and specify IFAS support systems.
4. The construction contractor (Contractor) will be competitively selected to build the Project. The Contractor's bid will include one of the three qualified IFAS system suppliers to design and provide equipment for a complete, integrated IFAS system. The process design prior to construction procurement will be the responsibility of

Kruger, and after procurement the responsibility of the IFAS supplier engaged by the selected Contractor.

The IFAS system drawings (process, media and equipment), aeration system (blowers, diffusers, controls, pipeline and appurtenances), IFAS system including pertinent instrumentation and controls, and detail requirements for ancillary electrical work for these systems will be finalized by the IFAS supplier during the construction phase and IFAS system documents will be sealed by a licensed professional engineer in Florida employed by or under contract with the IFAS system supplier. The ENGINEER will review the IFAS supplier's submittals for conformance with the bid documents.

5. The OWNER plans to increase the treatment capacity of the East WWTP to achieve an annual average daily flow (AADF) capacity of 6 mgd and an annual peak hourly flow (PHF) capacity of 12 mgd. The final design capacities will be determined by the reliable treatment capacities enabled by the IFAS systems installed in the two existing aeration basins and the hydraulic conveyance capability of East WWTP facilities.

Water Treatment Plant

The OWNER's existing water treatment plant (WTP) shares the same site as the East WWTP. The current WTP concentrator tank that provides polishing of supernatant from the existing lime sludge lagoon needs to be relocated due to expansion of the East WWTP. A new WTP lime sludge lagoon supernatant polishing tank system will be sized for WTP flows and sludge production associated with a future treated water capacity of 14 mgd.

1.2. Project Management

- 1.2.1. Provide concise monthly progress reports that summarize:
 - 1.2.1.1. Schedule status.
 - 1.2.1.2. Budget status.
 - 1.2.1.3. Project issues current and potential.
 - 1.2.1.4. Identify the means to address current or potential issues.

1.3. IFAS Process Design General Scope

- 1.3.1. The ENGINEER's coordination with the IFAS suppliers during the design phase will define and tailor the supplier's treatment process to meet the City's needs. In addition, coordination is required to determine the support system requirements for the IFAS system.
 - 1.3.1.1. Activities conducted for definition and tailoring of the IFAS treatment process will include: collaboration with the IFAS suppliers on the City's treatment goals and needs (flow ranges, water quality, permit limits), coordinating the IFAS suppliers approach to integrate into the City's existing treatment process, and relaying and reaching consensus on minimum treatment and performance criteria (maximum oxygen uptake rates, maximum fill percentage for media, etc.) that will be specified.
 - 1.3.1.2. Activities conducted for determination of support system requirements will include: identification of needed drum screen performance,

optimization on location and number of divider walls, determination of aeration blower equipment size, type, and number of units, assessment of impacts on solids production and determining interconnect between the East and West plant digesters.

1.3.2. The ENGINEER'S detailed design scope will consist of the following activities:

- 1.3.2.1. Review the designs proposed by the IFAS system suppliers for conformance with the technical specifications.
- 1.3.2.2. Development of construction staging constraints for installation and startup of the IFAS system.
- 1.3.2.3. Design of reconfiguration of influent piping to allow for sufficient straight length up and downstream of a new magnetic flow meter, plus relocation of the power and signal wiring.
- 1.3.2.4. Design of the replacement of the overhead mixed liquor line, assumed to allow the reuse of the existing concrete piers.
- 1.3.2.5. Design of an outdoor concrete slab for the new aeration blowers. To provide sound attenuation, the blowers are assumed to be in individual enclosures.
- 1.3.2.6. Design of air piping from the blowers to the IFAS supplier's air delivery system, consisting of medium bubble diffusers set on the basin floor.
- 1.3.2.7. Design of demolition drawings to show removal of existing surface aerators and electrical supply.
- 1.3.2.8. Design of two new influent perforated plate screens with 3 mm openings to be installed in parallel to handle higher flows and improve screening performance suitable for the IFAS aeration technology. A bypass line will be installed to divert flows around the screening process during extreme high flow conditions. Structural modifications will be required to install the screens. The screenings will be discharged into a dumpster at grade provided by the Owner. Addition of screening washing and compacting processes would require a modification to this scope based on agreed upon improvements. The OWNER has determined that odor control facilities are not to be provided.
- 1.3.2.9. The instrumentation and control system for the IFAS and plant-wide systems will be described in a control specification to be prepared by the ENGINEER that establishes (1) the control concept for integration of the IFAS system and other new facilities into the treatment plant, (2) instrumental and control equipment quality, and (3) instrumental and control submittal requirements. The Final Design of the instrumentation and control system for the IFAS system and interrelated process equipment and processes shall be prepared by the IFAS supplier or Contractor during the construction phase of the Project as part of the shop drawing submittal and review process.
- 1.3.2.10. Interconnects with the OWNER's data highway, SCADA, or other control system will be the responsibility of the Contractor. The ENGINEER is responsible for design of the instrumentation and control system for managing influent flow to the East WWTP aeration basins and the West WWTP, and the transfer of sludge to the West WWTP aerobic digesters. The instrumentation and control specification will be coordinated and compatible with the OWNER's overall plans for a future SCADA system upgrade at the East WWTP.

- 1.3.2.11. Design of electric power supply for the blower system, new screens, new clarifier, and any new aeration system pumps from a new larger and redundant power feeder from the existing main power distribution switchgear at the East WWTP main electrical room to a new motor control center to be located in an air conditioned electrical room in the new laboratory/electrical building adjacent to the existing RAS/WAS Pump Building.
- 1.3.2.12. The design criteria for power distribution will improve the reliability of existing critical process, based on using the EPA Class 1 reliability guidelines, which consists of configuring power distribution to process equipment in two parallel branches, with common circuit breakers that facilitate the disconnection and shutdown of electric power to one half of the process equipment during periodic inspections, maintenance and/or repairs, while the other half of process equipment is maintained with continuous power source. Improvements to the electrical system at the aeration basins and RAS pump station will comply with OSHA safety guidelines that facilitate the shutdown of electric power to electrical equipment, during maintenance or repairs.
- 1.3.2.13. Specify any needed improvements to the existing RAS, WAS, and sludge transfer pumps to meet the additional flow requirements. The OWNER will install pressure gages upstream and downstream of each pump to provide pressure readings necessary to make design decisions on pump improvement measures. Discharge flow meters will be added each of the RAS, WAS, and transfer pump systems. Replacement pumps, improvements to the existing building or piping systems would require a modification to this scope based on agreed upon improvements.
- 1.3.2.14. Estimate sludge production rates based on IFAS vendor design criteria for the influent design flows defined by this Amendment. This data will be used to verify the capacity of the existing East WWTP aerobic digester and the combined capacity of the East WWTP and West WWTP aerobic digesters. The project scope is based on the combined capacity of the East WWTP and West WWTP aerobic digesters being sufficient to handle the combined sludge production from the East WWTP and West WWTP.
- 1.3.2.15. Design a new reinforced concrete secondary clarifier with the same interior diameter as the existing clarifier. The two clarifiers will operate in parallel. Mixed liquor suspended solids (MLSS) will be introduced to the new clarifier, and sludge will be removed from the new clarifier using the same approach and equipment suppliers as those used in the existing East WWTP secondary clarifier. A new standalone splitter box will be designed to distribute MLSS flow from the aeration basins to each of the two secondary clarifiers.
- 1.3.2.16. Land survey and geotechnical explorations will be performed for the new clarifier and splitter box. A geotechnical report will be prepared to provide foundation design and soil improvement recommendations.
- 1.3.2.17. Conduct structural assessments of the existing aeration basins and aerobic digester and specify recommended improvements and protective coatings for the structures to enhance the structural integrity and longevity of the structures for the intended use as defined by this

project. The assessments will be made on mutually agreed upon dates with the OWNER within 60 days of the Notice-to Proceed.

- 1.3.2.18. Design a stand-alone laboratory/electrical building with cast in-place beam and column design with CMU block infill, or precast panel walls to provide laboratory space for basic wastewater treatment plant process measurements, and a separate electrical room with air-conditioned space for VFDs for each of the existing RAS pumps and space to install the proposed IFAS blower's speed controllers (VFDs). The building's west wall will be located at least 10 ft. east of the existing RAS/WAS Pump Building. The building will be air conditioned, and have separate access doors for the laboratory and electrical spaces. Hot and cold water and an emergency eyewash and shower unit will be provided in the laboratory space. The laboratory and electrical room will be air conditioned. The OWNER will provide furnishings for the building including providing any counter space, desks, chairs, sinks, refrigerators, other furnishings, and laboratory equipment.
- 1.3.2.19. Incorporate the West WWTP Coagulant Feed System design drawings and specifications delivered by the ENGINEER to the OWNER in February 2018 into the bid documents for this design. The construction contract schedule shall require that the West WWTP Coagulant Feed System be fully operational prior to the Contractor commencing any construction activity at the East WWTP that reduces the treatment capacity of the East WWTP.
- 1.3.2.20. Design one Lagoon Supernatant Polishing Tank to provide additional separation of lime sludge particles present in the supernatant of the lime sludge lagoon. A clarifier/thickener lagoon supernatant polishing technology is the basis for the initial scope. A WTP supernatant polishing alternative evaluation will be conducted under Section 1.5 to select, with the OWNER, the recommended supernatant polishing technology. If a different alternative is selected then this scope of work will be updated and compensation adjusted. The Lagoon Supernatant Polishing Tank will be located in the open space in the southeast area of the WTP site and will not permanently interfere with operation of the existing lime sludge lagoon. The Lagoon Supernatant Polishing Tank diameter and sidewater depth will be sized based on criteria developed with and agreed to by the OWNER. The Lagoon Supernatant Polishing Tank sizing will also consider future use as a lime sludge thickener.
- 1.3.2.21. Design new sludge pumping systems to (1) deliver lime lagoon supernatant to the Lagoon Supernatant Polishing Tank, and (2) pump overflow from the Lagoon Supernatant Polishing Tank to the head of the WTP. Pumping systems will be designed using an n+1 redundancy criteria. Pumps supporting the Lagoon Supernatant Polishing Tank will be located adjacent to the Lagoon Supernatant Polishing Tank on outdoor concrete pads with a roof.
- 1.3.2.22. Design a WTP Lagoon Supernatant Polishing Tank instrumentation and control system that is coordinated and compatible with the OWNER's overall plans for a future SCADA system upgrade at the water treatment plant. A new SCADA PLC panel would be located at the existing electrical room and it will be interconnected with existing SCADA network using fiber optic cables.

- 1.3.2.23. Design of electric power supply for the WTP Lagoon Supernatant Polishing Tank from a new redundant power feeder from the existing East WWTP main switchgear to a motor control center in the existing East WWTP electric room.
 - 1.3.2.24. Design of area lighting and building security systems.
 - 1.3.2.25. Provide the structural design for the Lagoon Supernatant Polishing Tank as a circular cast-in-place, concrete structure with the tank surface open to the atmosphere.
 - 1.3.2.26. Provide a site design including site grading, roads, yard piping, underground utilities, site grading, landscaping, and stormwater mitigation measures in accordance with permit requirements.
 - 1.3.2.27. Land survey and geotechnical explorations will be performed for the new lagoon supernatant polishing system. A geotechnical report will be prepared to provide foundation design and soil improvement recommendations.
 - 1.3.2.28. Design a new drainage dumping station to be located east of the East WWTP aeration basins. The existing dumping station needs to be relocated due to the location of the new secondary clarifier for the East WWTP.
- 1.4. The following information and activities will be provided by the OWNER within two weeks of the Project Notice-to-Proceed for this Amendment unless noted otherwise:
- 1.4.1. Operation data specific to the East WWTP for the most recent 24-month period, and monthly DMRs for the most recent 24 months.
 - 1.4.2. Any construction-related documents in the vicinity of the Project such as specifications, as-built drawings, and record drawings.
 - 1.4.3. RAS, WAS, and transfer pump information including nameplate data and pump curves to support pump capacity analysis.
 - 1.4.4. Install pressure gages upstream and downstream of existing RAS, WAS, and Transfer pumps to provide pressure readings necessary to make design decisions on pump improvement measures.
 - 1.4.5. Existing structural, utility, geotechnical, and site condition information including GIS mapping and data.
 - 1.4.6. Hydraulic modeling results on influent wastewater flow ranges to the East WWTP and West WWTP and the recommended approaches for the OWNER to direct flow to each of the respective wastewater treatment plants to meet OWNER-defined requirements. The influent flow modeling results will be used to develop wastewater design criteria and control concepts for the East WWTP.
 - 1.4.7. Daily existing WTP operating data including internal process requirements and any data summaries for the most recent 24-month period that enables determination of average day, consecutive three-month average, peak month, and peak day lime sludge production.
 - 1.4.8. Collect and test WTP process stream samples identified by the ENGINEER.
 - 1.4.9. Dewater and clean the East WWTP aeration basins and aerobic digester to support structural evaluations by the ENGINEER. The assessments will be made

on mutually agreed upon dates with OWNER within 60 days of the Notice-to Proceed.

1.5. Preliminary Design (30%)

1.5.1. Basic Engineering Information.

- 1.5.1.1. Undertake a one-day site visit by the ENGINEER to be concluded with a meeting with OWNER'S key personnel.
- 1.5.1.2. Conduct a structural assessment of the existing aeration basins for suitability to accept the new treatment processes.
- 1.5.1.3. Prepare technical specifications (Divisions 1 through 17) in the CSI 17 division format. Front-end documents including the invitation to bid, construction contract, general conditions, and supplemental conditions, shall be prepared by the OWNER.

1.5.2. WTP Supernatant Polishing Alternative Evaluation

- 1.5.2.1. Identify WTP process stream solids and hardness samples to be taken and tested by the OWNER to provide information inputs to developing the WTP lagoon supernatant polishing system design criteria.
- 1.5.2.2. Up to three treatment alternatives will be considered in the evaluation. The following are alternatives that may be considered for evaluation: (1) clarifier/thickener, (2) package inclined plate settling treatment unit, (3) stand-alone clarifier, and (4) enlarging and segmenting the existing lagoon to enable supernatant polishing.
- 1.5.2.3. Alternatives will be developed that include process descriptions and schematic layouts.
- 1.5.2.4. Alternatives will be evaluated using cost criteria (capital, O&M and life-cycle costs), and non-cost factors developed with the OWNER.
- 1.5.2.5. A draft alternatives technical memorandum summarizing the evaluations work will be submitted to Margate for review within 30 days of notice to proceed on Amendment No. 1. A workshop meeting will be held with the OWNER to review and select the preferred alternative to be designed. Development of a final technical memorandum is not anticipated.

1.5.3. Preliminary Design Technical Memorandum (PDTM) - Expanded. The purpose of the PDTM is to (1) gain OWNER approval of the project elements and confirm the design concept to be followed in the subsequent design efforts, and (2) form the technical information for permit applications. The PDTM consists of:

- 1.5.3.1. Narrative description of the recommended facilities including a IFAS system for a desired AADF capacity of 6 mgd, and a WTP lime sludge lagoon supernatant polishing tank.
- 1.5.3.2. Design criteria by discipline (site civil, structural, process mechanical, instrumentation and control, and electrical).
- 1.5.3.3. Identification of codes and guidelines governing the design.
- 1.5.3.4. Preliminary drawings consisting of:
 - Process flow diagrams.
 - Plan view showing major equipment locations.
 - A control narrative will be developed for (1) the East WWTP, (2) the WTP lagoon supernatant polishing system, and (3) IFAS system including detailed design requirements and specification

for the IFAS control system to be prepared and submitted by the Contractor during the shop drawing submittal and review process.

- Electrical single line drawings including a new switchboard and power distribution system to the aeration blowers.
- Design of lighting improvements for the aeration basins and lighting for blower equipment area, new secondary clarifier, laboratory/electrical building, and WTP Lagoon Supernatant Polishing Tank.
- A section view of the new screens and screen channel.
- Aeration system and mechanical process drawings related to the IFAS system and aeration system will be provided by Kruger.
- Schematic drawing depicting the piping and pumping system between the East and West plant digesters.
- The preliminary level of drawing and engineering development will vary by discipline.

- 1.5.3.5. Establish IFAS system design criteria; treatment performance requirements; testing, equipment, and materials quality requirements; and IFAS supplier remediation requirements if performance is not demonstrated during a test period. The IFAS system procurement specification will define these requirements.
- 1.5.3.6. Establish bid requirements for the IFAS supplier including experience with facilities of similar size and larger, references, and documentation of meeting performance and quality requirements, a performance guarantee, and technical submittal requirements.
- 1.5.3.7. Prepare an outline of anticipated technical specifications, see listing of anticipated shop drawings that will correspond to the specifications.
- 1.5.3.8. Prepare a preliminary opinion of probable capital cost.
- 1.5.3.9. Prepare a preliminary construction schedule.
- 1.5.3.10. Submit the draft PDTM to the OWNER for OWNER review. (Five copies including half-size drawings with a CD containing drawings in PDF format and a narrative in MS Word format).
- 1.5.3.11. The OWNER shall provide review comments within fifteen calendar days from receipt of the documents. Review OWNER comments with the OWNER in a meeting and incorporate comments into the subsequent Intermediate Design.
- 1.5.3.12. Update the PDTM for submittal to permitting agencies.

1.6. Intermediate Design (60%)

- 1.6.3. Prepare and submit Intermediate Design drawings (60 percent) and specifications for OWNER review consisting of:

- 1.6.3.1. Drawings and specifications. The level of engineering development represented by drawing detail and specifications will vary by discipline. The following are the anticipated drawings:
 - Overall site plan showing grading and new site features.
 - Structural design drawings showing locations and sizes of the new equipment.
 - East WWTP and WTP lagoon polishing tank process flow diagrams.

- Process flow diagram for the IFAS system based on information provided by Kruger.
 - Plan views of the new system showing major and ancillary equipment locations and piping layouts.
 - Mechanical process section views of the new mechanical equipment and piping layouts.
 - Interconnection to the existing and planned SCADA PLC network.
 - P&IDs for the East WWTP new screens and new secondary clarifier liquid and solids streams.
 - P&IDs for the WTP Lagoon Supernatant Polishing Tank liquid and solids streams.
 - Electrical single line drawings for the East WWTP.
 - Electrical single line diagram including new secondary clarifier, new laboratory/electrical building, and new WTP Lagoon Supernatant Polishing Tank.
 - Electrical site plan. For the IFAS system a new outdoor switchboard at the edge of the blower pad for the IFAS system is to be provided.
 - Electrical ductbank and pull box schedules.
 - Electrical equipment locations.
 - Five half-size drawings and specifications with a CD containing drawings in PDF format and specifications in MS Word format).
- 1.6.3.2. IFAS system design criteria; treatment performance requirements; and testing, equipment and materials quality requirements; and IFAS supplier remediation requirements if performance is not demonstrated during a test period. The IFAS system procurement specification will define these requirements.
- 1.6.3.3. Bid requirements for the IFAS supplier including experience with facilities of similar size and larger, references, and documentation of meeting performance and quality requirements, and a performance guarantee.
- 1.6.3.4. Updated opinion of probable capital cost.
- 1.6.3.5. Updated construction schedule.
- 1.6.3.6. The OWNER will provide review comments within seven calendar days from receipt of the documents.
- 1.6.3.7. Review OWNER comments with the OWNER in a one-half day meeting and incorporate comments into the subsequent Final Design.

1.7. Final Design (100%)

- 1.7.1. Prepare and submit the draft Final Design drawings and specifications for OWNER review.
- 1.7.1.1. The following are the anticipated drawings:
- Overall site plan showing new site features.
 - Site grading and drainage plans.
 - Architectural elevation, plan, section and detail drawings
 - Structural plan, section, and detail drawings for the new laboratory/electrical building.
 - East WWTP and WTP lagoon polishing tank process flow diagrams.

- Process flow diagram for the IFAS system based on information provided by Kruger.
 - Aeration basin structural design drawings showing locations and sizes of the new screens and screen channel, blower pads, interior basins walls. The IFAS system support design and drawings will be provided by Kruger.
 - Structural plan, section, and detail drawings for the new East WWTP Secondary clarifiers and WTP Lagoon Supernatant Polishing Tank.
 - P&IDs for the East WWTP new screens and new secondary clarifier liquid and solids streams.
 - P&IDs for the WTP Lagoon Supernatant Polishing Tank liquid and solids streams.
 - Plan view of the new screens and screen channels.
 - West Plant Yard piping drawing for the interconnection between the East and West plant digesters.
 - HVAC plan, section, and detail drawings for the laboratory/electrical building.
 - Electrical single line drawings for the East WWTP including the existing power source at the East plant main electrical room and new outdoor switchboard that will be used as a power source for new aeration blowers and located near the edge of the blower pad. The IFAS system supplier will design and provide power connections from the new outdoor switchboard to the IFAS system process, including ancillary outdoor electrical equipment (transformer and panelboard) required to provide control power and lighting to the new aeration system equipment, and aeration basins.
 - Electrical single line diagrams that include the new secondary clarifier, new laboratory/electrical building, and new WTP Lagoon Supernatant Polishing Tank.
 - Electrical site plan. For the IFAS system a new outdoor switchboard at the edge of the blower pad for the IFAS system is to be provided.
 - Ductbank and pull box schedules.
- 1.7.1.2 Electrical and control specifications with general requirements and design criteria. For the IFAS system, the IFAS supplier is responsible to design, provide, and deliver complete power distribution, general purpose electrical outlets, lighting, control, and instrumentation for the new IFAS system and related improvements.
- 1.7.1.3 Technical specifications.
- 1.7.2 Updated opinion of probable capital cost.
- 1.7.3 Updated construction schedule.
- 1.7.4 The OWNER shall provide review comments within fifteen calendar days from receipt of the documents.
- 1.7.5 Prepare and submit to the OWNER Final Design (100%) drawings and specifications for construction documents (Five half-size drawings and specifications with a CD containing drawings in PDF and AutoCAD format and Specifications in PDF format).

- 1.8 Permitting. The following permit applications will be prepared and revised as needed for approval:
- 1.8.1 Florida Department of Environmental Protection (FDEP) - "Form 2A Application for a Domestic Wastewater Facility Permit" that is required due to a modification or change in capacity at the East WWTP.
 - 1.8.2 FDEP - "Notification of Completion of Construction for Wastewater Facilities or Activities." Completion of the services defined in Section 1.9 Engineering Services During Construction are necessary for the ENGINEER to perform this activity.
 - 1.8.3 FDEP - "Notification of Availability of Record Drawings and Final Operation and Maintenance Manuals." Completion of the services defined in Section 1.9 Engineering Services During Construction are necessary for the ENGINEER to perform this activity. Coordination with the Contractor on its work to obtain a City of Margate Building Permit will be handled by the OWNER.
 - 1.8.4 A stormwater permit is anticipated. It is understood that no existing drainage permits exist for the existing facility therefore the following activities will be conducted.
 - 1.8.4.1 Research existing conditions, conduct a pre-application meeting with regulatory agencies, perform drainage calculations, and size retention areas and other stormwater management systems that may be required.
 - 1.8.4.2 Prepare permit application packages with supporting backup documentation for submittal to the Florida Department of Environmental Protection (FDEP) and the Broward County Environmental Protection and Growth Management Department.
 - 1.8.4.3 Coordinate and revise permit submittals as necessary with regulatory agencies.
- 1.9 Bidding Services. The following bidding services will be provided for one bid process:
- 1.9.1 Coordination with the OWNER'S purchasing department.
 - 1.9.2 Submittal of final bid documents in PDF format to the OWNER for reproduction and distribution.
 - 1.9.3 Review of the bid advertisement prepared by the OWNER.
 - 1.9.4 Prepare responses to bidder questions.
 - 1.9.5 Prepare up to two addendum documents.
 - 1.9.6 Support the OWNER's purchasing agent for review of bid packages and preparation of a comparison of bids to determine the lowest three qualified bidders.
 - 1.9.7 Prepare a recommendation of award letter.
 - 1.9.8 Prepare conformed Contract Documents.

1.10 Engineering Services During Construction

Engineering Services During Construction by the ENGINEER (ESDS) are to support the OWNER'S Project Manager. The OWNER'S Project Manager will be responsible for the day-to-day contract administration. The following are the ESDS to be provided by the ENGINEER:

- 1.10.1 Construction administration will be the responsibility of the OWNER as represented by the OWNER'S Project Manager. The ENGINEER shall support the OWNER'S Project Manager by attending monthly construction progress meetings. Eleven monthly progress meetings are included in the scope. The ENGINEER will lead the meetings and prepare minutes of the meetings.
- 1.10.2 Respond to technical aspects of Contractor Requests for Information (RFIs) as forwarded by the OWNER'S Project Manager. All other tasks associated with RFIs are the responsibility of the OWNER. The ENGINEER shall respond to an RFI within 10 calendar days of receipt of the RFI.
- 1.10.3 Review and comment on technical aspects of Contractor submittals as forwarded by the OWNER'S Project Manager:
 - 1.10.3.1 Provide responses to a submittal within 21 calendar days from receipt of the submittal and within 14 calendar days from receipt of a resubmittal.
 - 1.10.3.2 This scope of work assumes review of an estimated 150 submittals/resubmittals totaling 626 hours of review and processing time.
- 1.10.4 Prepare technical aspects of change orders as requested by the OWNER'S Project Manager. Review technical aspects of a Contractor initiated change including providing a response to the OWNER'S Project Manager on the acceptability of a claim.
- 1.10.5 Support the OWNER'S Project Manager during site inspection as requested by the OWNER'S Project Manager. The ENGINEER shall be on site intermittently during the entire construction period through turnover of the facilities to the OWNER for an estimated period of 45 weeks. ENGINEER'S presence on site is based on an average of one day a week prior to the start of readiness testing and startup/performance testing. If the OWNER requests the ENGINEER to be on site more than one day a week, then additional time shall be paid for at the established hourly rates and expenses paid at actual cost. The following site inspection activities may be performed by the ENGINEER:
 - 1.10.5.1 Provide inspection of IFAS media, screens, divider walls, drum screen, blowers, piping, diffusers, actuators, I&C, and electrical system equipment installation.
 - 1.10.5.2 Address Contractor's compliance with the Contract Documents.
- 1.10.6 The ENGINEER shall not be responsible for: (1) construction means, methods, techniques, sequences, procedures, or safety precautions and programs in connection with construction of the Project; (2) the failure of the Contractor or, any subcontractor, vendor, or other Project participant, not under contract to the ENGINEER to fulfill contractual responsibilities to the OWNER or to comply with federal, state, or local laws, regulations, and codes; or (3) procuring permits, certificates, and licenses required for any construction.
- 1.10.7 Prepare an overall system O&M manual that consists of:
 - 1.10.7.1 Design criteria.
 - 1.10.7.2 Description of process and treatment goals.
 - 1.10.7.3 Equipment lists (new equipment).

- 1.10.7.4 Standard operating procedures for startup, shutdown (normal and emergency), and normal operation.
- 1.10.7.5 Preventive maintenance steps.
- 1.10.7.6 Append IFAS, blower, and screen equipment supplier-provided O&M manuals.
- 1.10.8 Provide assistance to the OWNER'S Project Manager during commissioning and startup, including electrical and controls, as requested by the OWNER'S Project Manager. Services will include:
 - 1.10.8.1 Review and comment on the Contractor's draft startup and commissioning plan including a training plan for OWNER'S staff.
 - 1.10.8.2 Review Contractor's maintenance of plant operation plan.
 - 1.10.8.3 Be present on site during the IFAS system treatment readiness and performance testing periods. We have assumed that this startup will occur over a two week period and that staffing will consist of: split onsite time between the senior process lead and project engineer, and six days for electrical/I&C engineer.
 - 1.10.8.4 Advise the OWNER on acceptability of the IFAS system performance.
- 1.10.9 Provide assistance to the OWNER'S Project Manager on record drawing preparation as requested by the OWNER'S Project Manager consisting of review of record drawings prepared by the Contractor for completeness and compliance with the Contract Documents and communicate any record drawing deficiencies to the OWNER'S Project Manager for Contractor correction. A total of 115 hours are allocated for record drawing preparation.

2 TIME OF PERFORMANCE

- 2.1 Preliminary Design Technical Memorandum (30%) submittal to OWNER: 60 calendar days from Amendment No. 1 Notice to Proceed (NTP).
- 2.2 Intermediate Design (60%): 120 calendar days from Amendment No. 1 Notice to Proceed (NTP).
- 2.3 Final Design draft submittal (100%) to OWNER: 210 calendar days from NTP.
- 2.4 Bidding Services: According to OWNER'S schedule.
- 2.5 Construction Management Services: According to OWNER'S schedule, but for budgeting purpose estimated to be 12 months.

3 PAYMENT

- 3.1 Compensation for the design, permitting, and bidding services for the additional scope of work associated with this Amendment No. 1.: OWNER agrees to pay the ENGINEER an amount not to exceed \$728,453 for the additional services. The total compensation for design, permitting, and bidding services under this Agreement is \$1,007,981. Payments will be made monthly on a lump sum basis.

- 3.2 Compensation for engineering services during construction for the additional scope of work associated with this Amendment No. 1.: OWNER agrees to pay the ENGINEER based on actual time spent and invoiced monthly per the unit rates provided in the attached price worksheet, with a budgeted amount of \$299,803. The total compensation for engineering services during construction for this Agreement is \$491,898.
- 3.3 The original Agreement (Section 3.5) contained a budget allowance amount of \$25,000. That allowance is no longer needed and is not included in this Amendment No. 1.

DESIGN, BID, PERMIT SERVICES

East WWTP Expansion to 6 mgd

Task	Project Lead	Project Manager	Project Engineer	Senior Technical Specialist - Process	Engineer - Mechanical Process	CAD Designer - Mechanical Process	Senior Engineer - Structural/ Architectural	Engineer- Structural/ Architectural	CAD Designer - Structural/ Architectural	Senior Engineer Civil	Engineer- Civil	CAD Designer - Civil	Senior Electrical I&C Engineer	Engineer- Electrical	CAD Designer - Electrical	Admin. Support	Task Totals
Preliminary Design (30%)	\$ 237.00	\$ 237.00	\$ 145.02	\$ 227.00	\$ 142.00	\$ 95.00	\$ 196.00	\$ 142.00	\$ 95.00	\$ 196.00	\$ 142.00	\$ 95.00	\$ 196.00	\$ 142.00	\$ 85.00	\$ 74.00	
Hours	8	88	96	200	80	32	96	64	20	12	30	24	6	2	8	8	774
Labor Cost	\$ 1,896	\$ 20,856	\$ 13,922	\$ 45,400	\$ 11,360	\$ 3,040	\$ 18,816	\$ 9,088	\$ 1,900	\$ 2,352	\$ 4,260	\$ 2,280	\$ 1,176	\$ 284	\$ 680	\$ 592	\$ 137,902
Intermediate Design (60%)																	
Hours	4	72	80	128	64	56	80	40	32	8	30	32	4	6	12	4	652
Labor Cost	\$ 948	\$ 17,064	\$ 11,601	\$ 29,056	\$ 9,088	\$ 5,320	\$ 15,680	\$ 5,680	\$ 3,040	\$ 1,568	\$ 4,260	\$ 3,040	\$ 784	\$ 852	\$ 1,020	\$ 296	\$ 109,297
Final Design (100%)																	
Hours	4	72	80	104	64	80	80	80	64	8	30	32	4	6	16	4	728
Labor Cost	\$ 948	\$ 17,064	\$ 11,601	\$ 23,608	\$ 9,088	\$ 7,600	\$ 15,680	\$ 11,360	\$ 6,080	\$ 1,568	\$ 4,260	\$ 3,040	\$ 784	\$ 852	\$ 1,360	\$ 296	\$ 115,189
Permitting																	
Hours	2	16	32	8	0	0	0	0	0	2	80	12	0	0	0	4	156
Labor Cost	\$ 474	\$ 3,792	\$ 4,641	\$ 1,816	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 392	\$ 11,360	\$ 1,140	\$ -	\$ -	\$ -	\$ 296	\$ 23,911
Bidding Services																	
Hours	0	12	32	4	0	0	0	0	0	2	0	0	2	0	0	8	60
Labor Cost	\$ -	\$ 2,844	\$ 4,641	\$ 908	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 392	\$ -	\$ -	\$ 392	\$ -	\$ -	\$ 592	\$ 9,769
Design Totals																	
Hours	18	260	320	444	208	168	256	184	116	32	170	100	16	14	36	28	2370
Labor Cost	\$ 4,266	\$ 61,620	\$ 46,406	\$ 100,788	\$ 29,536	\$ 15,960	\$ 50,176	\$ 26,128	\$ 11,020	\$ 6,272	\$ 24,140	\$ 9,500	\$ 3,136	\$ 1,988	\$ 3,060	\$ 2,072	\$ 396,068
Labor subtotal	\$ 396,068																
Expenses	\$ 22,199																
Design, Bid, Permit Services Total Cost	\$ 418,267																
WTP Supernatant Polishing Tank																	
Task	Project Lead	Project Manager	Project Engineer	Senior Technical Specialist - Process	Engineer - Mechanical Process	CAD Designer - Mechanical Process	Senior Engineer - Structural/ Architectural	Engineer- Structural/ Architectural	CAD Designer - Structural/ Architectural	Senior Engineer Civil	Engineer- Civil	CAD Designer - Civil	Senior Electrical I&C Engineer	Engineer- Electrical	CAD Designer - Electrical	Admin. Support	Task Totals
	\$ 237.00	\$ 237.00	\$ 145.02	\$ 227.00	\$ 142.00	\$ 95.00	\$ 196.00	\$ 142.00	\$ 95.00	\$ 196.00	\$ 142.00	\$ 95.00	\$ 196.00	\$ 142.00	\$ 85.00	\$ 74.00	
Preliminary Design (30%)																	
Hours	16	56	72	120	80	16	40	16	8	4	40	8	16	12	16	4	524
Labor Cost	\$ 3,792	\$ 13,272	\$ 10,441	\$ 27,240	\$ 11,360	\$ 1,520	\$ 7,840	\$ 2,272	\$ 760	\$ 784	\$ 5,680	\$ 760	\$ 3,136	\$ 1,704	\$ 1,360	\$ 296	\$ 92,217
Intermediate Design (60%)																	
Hours	2	40	72	96	40	42	64	24	16	4	24	16	12	24	24	2	502
Labor Cost	\$ 474	\$ 9,480	\$ 10,441	\$ 21,792	\$ 5,680	\$ 3,990	\$ 12,544	\$ 3,408	\$ 1,520	\$ 784	\$ 3,408	\$ 1,520	\$ 2,352	\$ 3,408	\$ 2,040	\$ 148	\$ 82,989
Final Design (100%)																	
Hours	4	40	72	96	64	80	48	40	40	2	24	16	16	32	32	2	608
Labor Cost	\$ 948	\$ 9,480	\$ 10,441	\$ 21,792	\$ 9,088	\$ 7,600	\$ 9,408	\$ 5,680	\$ 3,800	\$ 392	\$ 3,408	\$ 1,520	\$ 3,136	\$ 4,544	\$ 2,720	\$ 148	\$ 94,105
Permitting																	
Hours	2	8	24	8	0	0	0	0	0	2	20	0	0	0	0	2	66
Labor Cost	\$ 474	\$ 1,896	\$ 3,480	\$ 1,816	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 392	\$ 2,840	\$ -	\$ -	\$ -	\$ -	\$ 148	\$ 11,046
Bidding Services																	
Hours	0	4	24	4	0	0	8	0	0	2	0	0	2	0	0	4	48
Labor Cost	\$ -	\$ 948	\$ 3,480	\$ 908	\$ -	\$ -	\$ 1,568	\$ -	\$ -	\$ 392	\$ -	\$ -	\$ 392	\$ -	\$ -	\$ 296	\$ 7,984
Design Totals																	
Hours	24	148	264	324	184	138	160	80	64	14	108	40	46	68	72	14	1748
Labor Cost	\$ 5,688	\$ 35,076	\$ 38,285	\$ 73,548	\$ 26,128	\$ 13,110	\$ 31,360	\$ 11,360	\$ 6,080	\$ 2,744	\$ 15,336	\$ 3,800	\$ 9,016	\$ 9,656	\$ 6,120	\$ 1,036	\$ 288,343
Labor subtotal	\$ 288,343																
Expenses	\$ 21,843																

