

# EXHIBIT A

## DESIGN SERVICES FOR EAST WASTEWATER TREATMENT PLANT UPGRADE ENGINEERING

**CITY OF MARGATE**  
**OWNER**

**AND**

**CAROLLO ENGINEERS, INC.**  
**ENGINEER**

This Task Order is issued by the OWNER and accepted by ENGINEER pursuant to the mutual promises, covenants, and conditions contained in the Agreement between the above named parties dated the \_\_\_\_ day of \_\_\_\_\_, 2018, in connection with:

Professional design, bidding, and construction services for an aeration system upgrade for the East Wastewater Treatment Plant (Project).

### 1. ENGINEER'S SERVICES

The following describes the ENGINEER'S scope of work for the Project:

#### 1.1. Project Understanding

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 City 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 4.0 mgd by installing an integrated fixed film system (IFAS) within the existing aeration basin tankage. The OWNER has determined that no new treatment units such as a second influent screen, new secondary clarifier, or additional aerobic digester will be included in the Project. 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 and plant-wide instrumentation and controls, and electrical work for these systems will be finalized by the IFAS supplier during the construction phase and 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.

## 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. 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 versus the project objectives outlined in TM-1 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 a new influent drum screen by Lakeside with 3 mm openings to handle higher flows to improve screening performance suitable for the IFAS technology.
- 1.3.2.9 The instrumentation and control system for the IFAS and plant-wide systems will be described in a control specification that establishes the overall control concept for integration of the IFAS system into the treatment plant, instrument and control equipment quality, and instrumental and control submittal requirements. The Final Design of the instrumentation and control system shall be prepared by the IFAS supplier or Contractor during the construction phase and reviewed during shop drawing submittals. Interconnects with the OWNER'S data highway, SCADA, or other control system will be the responsibility of the Contractor.
- 1.3.2.10 Design of electric power supply for the blower system and rotary drum screen from a new larger power feeder from the existing east main electrical room to a new outdoor electrical switchboard.
- 1.3.2.11 Design of new divider walls in the aeration basins to meet IFAS system requirements.
- 1.3.2.12 Review of curves for RAS, WAS and sludge transfer pumps provided by the OWNER to assess pump head and flow capacities under the new operating conditions. If needed, upgrades and/or new pumps, will be specified for the new operating conditions and associated electrical supply will be designed.
- 1.3.2.13 Estimate sludge production rates from data developed by the IFAS vendor in response to design requirements determined during

preliminary design. This data will be used to verify the capacity of the existing East plant aerobic digester as presented in TM-1. As the diversion of West plant flows is desired, this will most likely require increased digester capacity.

- 1.3.2.14 Design of an interconnect between the East and West plant digesters. It is assumed that this interconnect can be made at the West treatment plant using the East digester line currently discharging to the West treatment plant thickeners.

1.4 The following information will be provided by the OWNER upon the Project Notice-to-Proceed.

- 1.4.1 Operation data specific to the East WWTP for the most recent 24 months 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 Existing structural, utility, geotechnical, and site condition information including GIS mapping and data.

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 Review existing information on topography, site features, and underground utilities for sufficiency to support the design activities. A site survey and field locates of utilities will be provided as an optional task.
  - 1.5.1.3 Review existing geotechnical information provided by the OWNER for sufficiency to support the design activities. A geotechnical evaluation will be provided as an optional task.
  - 1.5.1.4 Conduct a structural assessment of the existing aeration basins for suitability to accept the new treatment processes.
  - 1.5.1.5 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 Preliminary Design Technical Memorandum (PDTM). 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:
  - 1.5.2.1 Narrative description of the recommended facilities.
  - 1.5.2.2 Design criteria by discipline (site civil, structural, process mechanical, instrumentation and control, and electrical).
  - 1.5.2.3 Identification of codes and guidelines governing the design.
  - 1.5.2.4 Preliminary drawings consisting of:

- 1.5.2.4.1 Overall site plan.
- 1.5.2.4.2 Process flow diagram.
- 1.5.2.4.3 Plan view showing major equipment locations.
- 1.5.2.4.4 A control narrative and specification will be developed including the instrumentation and control system detailed design requirements of the IFAS system supplier and Contractor to be prepared and submitted by the Contractor during the shop drawing submittal and review process.
- 1.5.2.4.5 Electrical single line drawing for the new switchboard and power distribution system to the aeration blowers.
- 1.5.2.4.6 Design of lighting improvements for the aeration basins and lighting requirements for blower equipment area.
- 1.5.2.4.7 A section view of the new screen and screen channel
- 1.5.2.4.8 Aeration system and mechanical process drawings related to the IFAS system and aeration system will be provided by Kruger.
- 1.5.2.4.9 Schematic drawing depicting the interconnect between the East and West plant digesters.
- 1.5.2.4.10 The preliminary level of drawing and engineering development will vary by discipline.
- 1.5.2.5 Establish 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.
- 1.5.2.6 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.
- 1.5.2.7 Prepare an outline of anticipated technical specifications, see listing of anticipated shop drawings that will correspond to the specifications.
- 1.5.2.8 Prepare a preliminary opinion of probable capital cost.
- 1.5.2.9 Prepare a preliminary construction schedule.
- 1.5.2.10 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).
- 1.5.2.11 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.
- 1.5.2.12 Update the PDTM for submittal to permitting agencies.

## 1.6 Final Design (100%)

- 1.6.1 Prepare and submit the draft Final Design drawings and specifications for OWNER review.
  - 1.6.1.1 The following are the anticipated drawings:
    - 1.6.1.1.1 Overall site plan showing new site features.
    - 1.6.1.1.2 Structural design drawings showing locations and sizes of the new screen and screen channel, blower pads, interior

basins walls. The IFAS system support design and drawings will be provided by Kruger.

- 1.6.1.1.3 Process flow diagram based on information provided by Kruger.
  - 1.6.1.1.4 Plan view of the new screen and screen channels.
  - 1.6.1.1.5 Section views of the new screen and screen channels.
  - 1.6.1.1.6 P&ID for the new screen.
  - 1.6.1.1.7 West Plant Yard piping drawing for the interconnect between the East and West plant digesters.
  - 1.6.1.1.8 Electrical single line drawing, including 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.
  - 1.6.1.1.9 Electrical site plan with new outdoor switchboard at the edge of the blower pad for the IFAS system Supplier to tap power source and connection points with IFAS system.
  - 1.6.1.1.10 Ductbank schedules and pull box schedule up to the new outdoor switchboard, at the edge of the blower pad, for the IFAS system to tap power source and connection points.
  - 1.6.1.1.11 Electrical and control specifications with general requirements and design criteria, for the IFAS system supplier to design, provide and deliver a complete power distribution, general purpose electrical outlets, lighting, controls and instrumentation for the new IFAS system and related improvements.
  - 1.6.1.2 Specifications: IFAS system supplier experience requirements and 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. (see listing of anticipated shop drawings that correlate to the specifications that will be prepared).
  - 1.6.2 Update opinion of probable capital cost.
  - 1.6.3 Update the construction schedule.
  - 1.6.4 The OWNER shall provide review comments within fifteen calendar days from receipt of the documents.
  - 1.6.5 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).
- 1.7 Permitting. The following permit applications will be prepared and revised as needed for approval:

- 1.7.1 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.
  - 1.7.2 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. .
  - 1.7.3 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.
  - 1.7.4 A stormwater permit is not anticipated and therefore is not included in the Agreement.
- 1.8 Bidding Services. The following bidding services will be provided for one bid process:
- 1.8.1 Coordination with the OWNER'S purchasing department.
  - 1.8.2 Submittal of final bid documents in PDF format to the OWNER for reproduction and distribution.
  - 1.8.3 Review of the bid advertisement prepared by the OWNER.
  - 1.8.4 Prepare responses to bidder questions.
  - 1.8.5 Prepare up to two addendum documents.
  - 1.8.6 Support the City's purchasing agent for review of bid packages and preparation of a comparison of bids to determine the lowest three qualified bidders.
  - 1.8.7 Prepare a recommendation of award letter.
  - 1.8.8 Prepare conformed Contract Documents.
- 1.9 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:
- 1.9.1 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.
  - 1.9.2 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.
  - 1.9.3 Review and comment on technical aspects of Contractor submittals as forwarded by the OWNER'S Project Manager:
    - 1.9.3.1 Provide responses to a submittal within 21 calendar days from receipt of the submittal and within 14 calendar days from receipt of a resubmittal.
    - 1.9.3.2 This scope of work assumes review of an estimated 44 submittals/resubmittals totaling 228 hours of review and processing time. The following submittals are anticipated:

**Shop Drawings**

Schedule of values

Schedule

IFAS general process

Positive Displacement Blowers

IFAS Media

IFAS Effluent Screens

In Basin Aeration Grid and Diffusers

Aeration Piping

Rotary Drum Screen

Screenings Washer/Compactor System

Epoxies

Epoxy Resin/Portland Cement Bonding Agent

Concrete Formwork

Concrete Reinforcement

Cast-in-Place Concrete

Concrete Finishes

Grouts

Structural Steel

Structural Aluminum

Mechanical Anchoring and Fastening to Concrete and Masonry

Pipe supports

Ductile Iron pipe

SS pipe (air)

Valves

Valve Operators

Control Systems: Panels, Enclosures, and Panel Components

Control Systems: Programmable Logic Controllers

Control Systems: Human Machine Interface Hardware (HMI)

Testing, Calibration, and Commissioning

Grounding and Bonding

Resistance Grounding Systems

Cables

Conduits

Boxes

Wiring Devices

Wire Connections

Cable Connections

Low Voltage Motors up to 500 Horsepower

Disconnect Switches



Motor Starters  
Low Voltage Motor Control Centers  
Panelboards  
Transfer Switches  
Field Electrical Acceptance Tests

- 1.9.4 Prepare technical aspects of change orders as requested by the RPR. Review technical aspects of a Contractor initiated change including providing a response to the OWNER'S Project Manager on the acceptability of a claim.
- 1.9.5 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:
  - 1.9.5.1 Provide inspection of IFAS media, screens, divider walls, drum screen, blowers, piping, diffusers, actuators, I&C, and electrical system equipment installation.
  - 1.9.5.2 Address Contractor's compliance with the Contract Documents.
- 1.9.6 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.
- 1.9.7 Prepare an overall system O&M manual that consists of:
  - 1.9.7.1.1 Design criteria.
  - 1.9.7.1.2 Description of process and treatment goals.
  - 1.9.7.1.3 Equipment lists (new equipment).
  - 1.9.7.1.4 Standard operating procedures for startup, shutdown (normal and emergency), and normal operation.
  - 1.9.7.1.5 Preventive maintenance steps.
  - 1.9.7.1.6 Append IFAS, blower, and screen equipment supplier-provided O&M manuals.
- 1.9.8 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:
  - 1.9.8.1 Review and comment on the Contractor's draft startup and commissioning plan including a training plan for OWNER'S staff.
  - 1.9.8.2 Review Contractor's maintenance of plant operation plan.
  - 1.9.8.3 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.
  - 1.9.8.4 Advise the OWNER on acceptability of the IFAS system performance.

- 1.9.9 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 42 hours are allocated for record drawing preparation.
- 1.9.10 Optional Reimbursable Services:
  - 1.9.10.1 Surveying or Utilities Locate Services: In the event a site survey or locate of underground utilities is required: \$10,000.
  - 1.9.10.2 Geotechnical Evaluation: In the event geotechnical information is needed: \$15,000.

## 2 TIME OF PERFORMANCE

- 2.3 Preliminary Design Technical Memorandum submittal to OWNER: 90 calendar days from Notice to Proceed (NTP).
- 2.4 Final Design submittal to OWNER: 180 calendar days from NTP.
- 2.5 Bidding Services: According to OWNER'S schedule.
- 2.6 Construction Management Services: According to OWNER'S schedule, but for budgeting purpose estimated to be 11 months.

## 3 PAYMENT

- 3.3 Compensation for the design, permitting and bidding services: OWNER agrees to pay the ENGINEER monthly on a lump sum basis a total amount not to exceed \$279,528.
- 3.4 Compensation for engineering services during construction: 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 \$192,095.
- 3.5 Compensation for optional reimbursable tasks will be based on Cost plus 10% markup. Total allowance budgeted amount of \$25,000.

## EFFECTIVE DATE

This agreement is effective as of the \_\_\_\_ day of \_\_\_\_, 2018.

IN WITNESS WHEREOF, duly authorized representatives of the OWNER and of the ENGINEER have executed this Agreement \_\_\_\_ evidencing its issuance by OWNER and acceptance by ENGINEER.

CAROLLO ENGINEERS, INC.

OWNER

Accepted this \_\_\_\_\_ day of \_\_\_\_\_, 2018

By: \_\_\_\_\_  
Elizabeth Fujikawa, PE – Vice President

By: \_\_\_\_\_  
Officer

By: \_\_\_\_\_  
Brandon Braley , PE – Vice President

By: \_\_\_\_\_  
Officer