

Services Authorization No. 18-019-07, Modification No. 1

for

Research Agreement dated May 1, 2018

All of the term and conditions of the Research Agreement between the parties dated May 1, 2018 are hereby incorporated by reference.

Project Name	Hodge Street Water Treatment Facility Process Operations Assessment
Scope of Services	See attached Exhibit "A"
Duration (in days)	Modification 1 to Original scope of services notice to proceed October 3, 2022 ending June 2, 2024, expands scope and extends the duration (11 months) projected for completion by April 30, 2025. This authorization shall be in full force and effect until all services identified in Exhibit "A" are complete.
Compensation (Original): Compensation (Additional):	\$114,500 \$67,144 (Revised Contract Total = \$181,644)
Special Contract Conditions (if any)	N/A
Budget Source/Availability	42011. 660536012.5331010 (Water Plant Operations/Treatment)

IN WITNESS WHEREOF, the parties hereto have executed this authorization on this ___ day of _____, 2024.

ATTEST: Stacy M. Butterfield

POLK COUNTY, a political subdivision
the State of Florida

By: _____
Deputy Clerk

By: _____
~~Rick Wilson~~, Chairman - W.C. BRASWELL
Board of County Commissioners

Date signed: _____

Review as to form and legal sufficiency


County Attorney's Office ~~Date~~

ATTEST:

UNIVERSITY OF CENTRAL FLORIDA,
by and on behalf of its Board of Trustees

By: 
Name: Iwanska Wozada
Its: 2/19/24

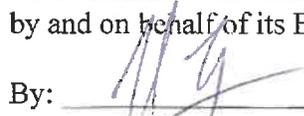
By: 
Name: Joel Kenndy
Its: Associate Director
Date Signed: 2/19/24

Exhibit A
Scope of Services
Services Authorization No. 18-019-07, Modification No. 1
East Regional Utility Service Area (ERUSA)
Hodge Street Water Treatment Facility Process Operations Assessment

The University of Central Florida's Department of Civil, Environmental and Construction Engineering (UCF) entered into a Research Agreement (AGREEMENT) with Polk County, Florida (COUNTY) on May 1, 2018. Pursuant to this Agreement, the County previously requested UCF to perform granular activated carbon (GAC) process performance studies, and has now requested UCF amend the Study (Original Project) to further investigate the Hodge Street Water Production Facility (WPF) processes to include the Hodge Street ground storage tank, Waverly well, and inter-connected distribution system disinfectant and disinfection by-products (Amended Project), as further detailed in this Services Authorization 18-019-03, Modification No. 1.

AMENDMENT MOTIVATION: MODIFICATION No. 1

The COUNTY provides potable water to East Regional Service Area customers through the Waverly Public Water System (PWS No. 653-5707). The Waverly distribution system is supplied by the Lake Wales Bus Maintenance Barn (a.k.a., Waverly) and the Hodge Street Water Production Facilities (WPFs). The Waverly WPF has a permitted capacity of 2.16 MGD through the Florida Department of Environmental Protection (FDEP).

The Hodge Street WPF currently serves as the primary source of supply for meeting water demands in the system and has an FDEP permitted capacity of 2.16 MGD; however, the Waverly WPF is connected to the same system and provides system redundancy for fire flow, spikes in customer demands, and backup of the system's primary WPF when the Hodge Street WPF is off-line for maintenance or repairs.

The COUNTY has requested that UCF perform additional investigations the COUNTY's Hodge Street and Waverly WPF treatment processes. The purpose of the Amended research is to further evaluate:

- a) The efficacy and stability of the Hodge Street WPF granular activated carbon (GAC) microbiological process via assessment of adenosine triphosphate and genetic speciation.
- b) The Hodge Street GAC effectiveness in removing total organic carbon (DBP precursor matter);
- c) The Waverly well disinfection by-product (DBP) formation, with focus on regulated parameters total trihalomethanes (TTHMs) and haloacetic acids (HAA₅) within the distribution system;
- d) The impact of recirculation rate and operation of the Hodge Street ground storage tank and (GST) and its tray aeration process on distribution system DBP water quality and formation by season [quarterly]; and,
- e) The impact of environmental conditions (sun/shade/hot/cold) on chlorine residual and DBPs at LRAA and other sample sites.

A. RESEARCH SCOPE

PHASE 100 – PROJECT MANAGEMENT COMPONENT

Task 101 – Project Management and Communication

Coordination of UCF research activities with the COUNTY will occur during the STUDY. This task consists of those needs required for project management for the STUDY to include scheduling and coordinating activities with the COUNTY and others (if required). Process-related data gathering activities will require COUNTY and UCF technical personnel to discuss schedule for planning purposes. UCF quality assurance and control methods will be continued to be implemented in STUDY.

Task 102 – Site Visits and Progress Conference Calls

This work authorization will allow UCF to continue to perform site visits at the Hodge Street WPF for at least nine (9) additional site visits. In addition, the every-other-month conference calls will continue to be held between COUNTY and UCF to discuss STUDY progress and schedule needs.

PHASE 200 – AMENDED RESEARCH COMPONENT

Task 201: Background Process Data Collection (Completed Task: Not included in Modification)

Note: This task has been completed and is not included in Modification No. 1 to SA No. 18-019-07.

Task 202: Process Evaluation (Modification No. 1 Activities)

Hodge Street GAC Process. UCF will continue to evaluate the Hodge Street WPF's GAC process (adsorption system) and disinfection unit operations. COUNTY will assist UCF in the collection of aqueous (process water streams) or solid (granular carbon media) process-related samples. Sample location access will vary depending on whether it is aqueous (e.g., raw supply; process stream; point-of-entry) or solid (activated carbon). UCF will continue to communicate with COUNTY operations personnel UCF's data needs so that the appropriate means for gaining access to the appropriate sample location can be established. The activated-carbon process will be continued to further evaluate process operation performance. This will include process-control water quality evaluations (mass transfer parameter time-series comparisons), water quality, microbiological activity, and other adsorption conditions.

Site-specific details are highlighted in **Figure 1** and will be clarified prior to any sampling activities being performed in support of STUDY, and **Figure 2 (a)** provides documentation that the installed equipment has not been modified since the initial start-up, and **Figure 2 (b)** presents the process plan and section diagram that have also remained unchanged since the initial (original) authorization was awarded. There are two types of samples that will continue to be collected in this GAC subtask: **Subtask 202 (a)** water quality samples; and **Subtask 202 (b)** solid GAC samples directly from the bed for (i) physical and (ii) microbiological means.

- a) **Water Quality Sample Collection Events.** Water quality samples will continue to be collected in a routine fashion at locations entering the vessel and exiting each vessel (in and out). Process operation (flow, time) monitoring information will be collected as well as monitored water quality depending on location. One parameter of focus will remain total organic carbon (TOC) removal effectiveness, as this chemical is considered a DBP precursor to monitor.

b) Solid Activated Carbon Analysis Collection Events.

- (i) **Continued carbon sampling.** Approximately 100g of carbon will continue to be collected at each sample accessible sampling port (50%, and 75% bed depth). For solid media sample collection purposes, coordination is required with the COUNTY who will be required to remove the vessel side port covers (at 50% and 75% GAC vessel locations) bed access hatch at the top of vessel bed. It is planned to obtain the carbon media samples necessary for the analysis in this component of the research via access to stainless-steel bed sampling locations (access points to vessel indicated in Figure 3a; will be reinserted/reinstalled back to the GAC vessels by the COUNTY Figure 3b provides an idea of how the top port will be accessed if required for the STUDY).

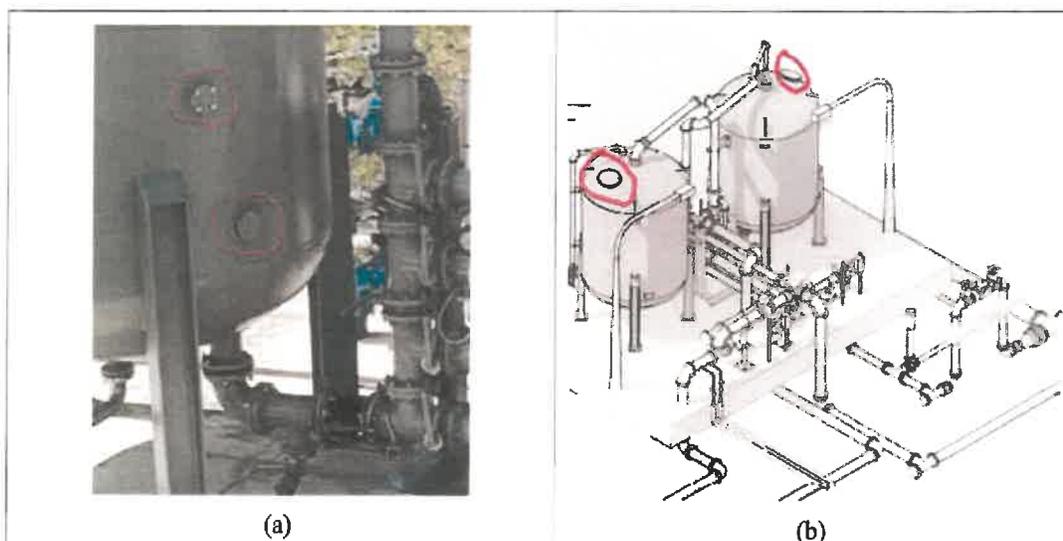


Figure 3. GAC Sample Port Detail (a) Schematic of Side-Entry Media Sample locations, and (b) Vessel Top Access Port Access Location.

- (ii) **Microbiological testing.** As noted in this section, for solid media sample collection purposes, coordination is required with the COUNTY who will be required to remove the vessel side port covers (at 50% and 75% GAC vessel locations). It is planned to obtain the carbon media samples necessary for the analysis in this component of the research via access to stainless-steel bed sampling locations. For this component, GAC media samples collected in Task 202(b)(i) will be processed for total microbial community analysis (metagenomics). DNA will be extracted from samples and sequenced using biomarkers for bacteria, archaea, and fungi. DNA primers will target specific genetic regions using the Illumina MiSeq platform. The QIIME2 pipeline will be used to demultiplex and filter sequencing data and perform phylogenetic and basic statistical analyses.

Task 203: Waverly Well DBP Formation Evaluation

The Waverly well will be evaluated for DBP formation, with focus on regulated parameters TTHM and HAA5 within the distribution system. Testing will be conducted by to develop time-based DBP formation curves; two sets of curves at two different calendar dates will be developed (planned for Summer and then again Fall of 2024). Bulk water samples will be collected, using appropriate sample containers, having no chlorine or other disinfectant (raw water) as the samples used in the evaluation should not (will not) have been in contact with any chemical (in particular chlorine) at time of collection. Appropriate aliquots will be doses and monitored for chlorine demand prior to chlorine dosing for TTHM and HAA5 analysis.

After stripping of raw water sulfide, chlorine residual of zero will also be verified. KHA will provide an estimate to UCF of the amount of demand in the water, based on DOC and hydrogen sulfide levels (if known); UCF will verify success of dosage and adjust as required.

Initial testing of bulk water will be conducted and is anticipated to include the following parameters: calcium, magnesium, sodium, chloride, sulfate, iron, bromide, total dissolved solids, UV-254, color (true), pH, and dissolved organic carbon (DOC). Should sulfide be present, it will be stripped from the bulk water samples prior to DBP formation potential (FP) analyses.

Chlorine demand prior to chlorine dosing procedures used to determine TTHM and haloacetic acid FP water quality will be performed. Chlorine will be added to bulk sample aliquots to achieve the desired chlorine residuals in accordance to *Standard Methods* to allow that residual of at least 0.2 mg/L (and less than 1.0 mg/L) to be detected after 24 hours. If sulfide is present, then the bulk samples will be aerated for an extended time to remove sulfide as noted previously herein. Once an acceptable dosage is determined, bulk aliquots will be dosed without pH adjustment (in duplicate); enough sample bottles (amber, sealed) will be used so that chlorine residual, TTHM and HAA5 analysis can be performed after incubation at 30°C to represent distribution system conditions. For TTHMs, incubation is planned to extend for 24, 48 and 96 hours; however, HAA5 dosed samples will be incubated for 96 hours only. TTHM and HAA5 samples will then be quenched with the appropriate agent and analyzed for TTHM and HAA5 at prescribed holding times. Chlorine residual will be measured at the time of each quenching event.

Quality assurance plans and associated control charts will be developed for water quality parameters (where applicable). Precision and/or accuracy will be reported for specific parameters as needed.

Task 204: Hodge Street GST Recirculation and DBP Formation

Current operations of the 0.1-million-gallon (MG) Hodge Street GST is typically cycled on and off 12 hours in a recirculation mode thru the tray aerator. COUNTY operations believe that cycling through the tray aerator helps control TTHM formation (HAA5 are non-volatile and not impacted by this operation). In this task, the GST will be operated under the following conditions to evaluate recirculation operations on TTHM formation:

- Scenario 1: 24 hours “on” (continuous recirculation),
- Scenario 2: 12 hours “on/off” in 1-hour increments,
- Scenario 3: 6 hours “on/off” in 2-hour increments.

At the end of each scenario operation, samples entering and exiting the GST will be collected and quenched for TTHM analysis so that comparisons in the recirculation operations can be assessed. This evaluation shall be conducted during a summer (July 2024 or August 2024) and winter (January 2024 or December 2024) timeframe for seasonal comparison purposes.

Quality assurance plans and associated control charts will be developed for water quality parameters (where applicable). Precision and/or accuracy will be reported for specific parameters as needed.

Task 205: LRAA Sample Site Environmental Conditions

The COUNTY’s Waverly distribution system is monitored at dedicated sample sites where most taps are exposed to the environment. COUNTY operating professionals suspect that the exposure of the PVC cylindrical posts that are concreted around a metal sample tap to external environmental conditions may impact water quality conditions (such as temperature). For example, the POE sample tap at Hodge Street is exposed and the configuration is such that the tap is also a component of a pipe that returns to the plant for on-line quality monitoring. The exposure to the sun could impact the temperature of the connections impacting quality. To evaluate this potential condition, simple experimentation will be implemented to determine if external heat sources can alter the quality conditions by sampling the tap over time.

Samples of water will be collected at the Hodge Street POE and the four corresponding DBP distribution system monitoring locations in specific time and flow conditions where temperature is monitored in 1 minute increments over a 15 minute interval. Sampling will be performed at the locations during the warmest period of the day on clear summer days (July/August), and again during cooler environmental times (Jan/Feb). Additional actions will be taken should preliminary valuations at each of the sites show temperature variation; a temperature gradient is 1 to 2 degree difference can be significant with respect to TTHM formation; hence, if viable, samples will be collected for TTHM analysis in a regimented format.

Quality assurance plans and associated control charts will be developed for water quality parameters (where applicable). Precision and/or accuracy will be reported for specific parameters as needed.

Task 206 (Formerly Task 203 in Original Authorization): Data Compilation and Analysis

UCF will compile the analytical results and data observations gained in the evaluation phase of the STUDY and perform data analysis on the collected information, considering existing COUNTY or other entity historical data and information in this Task. The analysis will focus on the following: total organic carbon and sulfide removal effectiveness of the process; the condition of the activated carbon that comprises the GAC beds and their microbiologically state (active; not-active, etc.). and an evaluation of the replacement timeline and schedule for the carbon replacement (if any preliminary estimates or planning estimates have been provided by others). Additionally, the GST recirculation results will be assessed after compilation, as well as the DBP formation impact of the Waverly well on the distribution system. The impact of environmental conditions on the LRAA sampling sites will be included in the analysis. Quality assurance plans and associated control charts will be developed for water quality parameters (where applicable). Precision and accuracy will be reported for specific parameters as needed.

PHASE 300 – REPORTING SERVICES

Task 301: Reporting Component

UCF will prepare an electronic version of a DRAFT REPORT and deliver to the COUNTY for their review. The COUNTY will provide to UCF one set of combined comments of COUNTY-compiled draft review comments on the DRAFT REPORT within 10 business days of receipt.

UCF will prepare and deliver to COUNTY a FINAL REPORT, considering COUNTY review comments of the DRAFT REPORT and report format quality requirements. A minimum of one hard copy and one electronic copy will be provided to the COUNTY at completion of the research.

At the end the STUDY, UCF will provide a copy of a technical proceeding based on the COUNTY approved report and prepared as part of an operations-based technical conference, such as the Florida Section American Water Works Association (FSAWWA) Fall 2024 Conference for purpose of public dissemination and outreach where COUNTY operations and engineering staff will also be in attendance. The information will be presented to at least one of the conferences and, if possible, the three noted conference as schedule allows.

B. SCHEDULE

The Modification (AMENDMENT No. 1) is anticipated to require approximately 11 months per the schedule shown in Table 1, Schedule by Month, beginning with the Original Contract SA19-019-07 to be extended by Modification No. 1 (Amendment) from June 2024 to April 30, 2025. UCF will proceed with the Modified services identified herein immediately upon receipt of an executed copy of this Authorization and a formal Notice-to-Proceed from the County. This authorization shall be in full force and effect until the UCF completes the services as described herein and any subsequent modifications hereto.

Table 1. Schedule by Month

TASK	21 EXTEND START JUNE 2024	22	23 TM AUG. 2024	24	25	26 DRAFT NOV. 2024	27	28 FINAL JAN. 2025	29, 30 FEB & MARCH	31 FINAL APRIL 2025
Task 101. Project Management and Communication	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Task 102. Site Visits (✓) and Progress Conf. Calls (*)		✓ *	✓	✓ *	✓	✓ *	✓	✓ *	✓	*
Task 201: Background Process Data Collection	✓	✓								
Task 202: Process Evaluation			✓	✓	✓	✓	✓	✓	✓	
Task 203: Data Compilation and Analysis				✓		✓		✓		
Task 301: Reporting Component				✓		✓		✓		✓

C. DELIVERABLES

UCF will provide STUDY findings in a reasonable manner. **Table 2** presents an anticipated schedule of deliverable dates for the STUDY.

Table 2. Deliverables Schedule (Basis: 20 months)

DELIVERABLE ITEM	DUE DATE
a. Task 301. Initial TM (Tech Memo) for Review by County	End Month 23
b. Task 301. Draft Report for Review by County	End Month 26
c. Task 301. Final Report provided to County	End of Month 28
d. Task 301: Proceedings Document (Public Outreach) Options: FSAWWA; FRWA; FWRC.	End Month 30

D. COMPENSATION

The COUNTY will compensate UCF for Modification No. 1 services based on the lump sum fee paid in 11 monthly installments of \$6,104 totaling **\$67,144.**; the cost breakdown for the STUDY is presented in Table 3. The **Total cost** (Original \$114,500 + Amendment No. 1 \$67,144) will not exceed **\$181,644** without prior mutual agreement of UCF and the COUNTY. This is a UCF TYPE 1 funded project, based on an equal and incremental monthly invoice installment.

Table 3. UCF Research Cost for STUDY (Modification No. 1)

This research STUDY is a UCF Level 1 Project Budget Categorization.

Task	Modification No. 1 Task Description (See Scope for Details)	Cost (\$)
101	Project Management and Communications	\$1,950
102	Site Visits and Progress Conference Calls	\$4,900
201	Background Process Data Collection (Completed)	\$0
202	Process Evaluation	\$26,634
203	Waverly Well DBP Formation Evaluation	\$12,540
204	Hodge Street GST Recirculation and DBP Formation	\$10,820
205	LRAA Sample Site Environmental Conditions	\$6,375
206	Data Compilation and Analysis	\$2,450
301	Reporting Component	\$1,475
Modification No. 1		\$67,144

E. RESPONSIBILITIES

COUNTY will provide to UCF the following information and services.

- o One copy (electronic or paper format) of state of Florida FDEP or Polk County Health Department (PCHD) distribution system water quality parameter quarterly reports for LCR and D/DBP total trihalomethane and haloacetic acid quarterly reports for the distribution system including the LRAA.
- o Copies of data and information not associated with official FDEP or PCHD correspondence that is related to the WPF's operational history. UCF shall be allowed to make copies of the operator's daily log sheets (either by photograph or scan copy).

COUNTY will coordinate activities related to UCF's research involvement to determine site visit times and locations; the COUNTY will provide official representation at meetings where UCF is on-site; meetings with UCF will not occur without the presence COUNTY operations staff or designee unless previously agreed. COUNTY will provide access to the COUNTY facilities and appurtenances associated with research efforts. The COUNTY will provide personnel to assist and in support of the STUDY.

F. ADDITIONAL PROVISIONS

If the research tasks required are different from those items presented herein, or if the COUNTY desires additional research, the resultant changes in scope will serve as a basis for amending the research scope as agreed to by the COUNTY and UCF. Additionally, UCF shall be entitled to rely upon the accuracy of data and information collected and provided by the COUNTY and others without independent review or evaluation. UCF is not responsible for the means, methods, sequences, techniques, or procedures of the COUNTY. Administrative and contractual points of contact for the Specific Authorization presented herein are as stated in the section, "Notices of the Research Agreement" of the Master Agreement.

G. QUALITY ASSURANCE AND QUALITY CONTROL

The Modification will adhere to the QA/QC procedures originally identified in the Original Authorization and remain in full-effect for Modification No. 1.