



August 24, 2018

City of Daytona Beach
P.O. Box 2451
Daytona Beach, Florida 32115

Attention: Nichole Lloyd
Project Manager - Utilities

Subject: Contract 1307-1022
Work Authorization No. 29
Bethune Point Wastewater Collection System – Inflow and Infiltration Study

Dear Nichole:

Attached for your consideration are the proposed scope, schedule, and budget as defined in Exhibits A and B, attached herewith, for providing an Inflow and Infiltration Study of the Bethune Point Wastewater Collection System.

This proposal is a firm offer to provide the services detailed in the attached scope of services for a not-to-exceed fee of \$119,033.30, based on a breakdown provided in Exhibit B attached to this proposal, and the offer is effective for 90 days.

This proposal may be accepted through the issuance of a City purchase order to Carollo Engineers, Inc., 200 East Robinson Street, Suite 1400, Orlando, FL 32801 contract No. 1307-1022 work authorization No. 29.

If you have any questions, please feel free to contact us.

Sincerely,

CAROLLO ENGINEERS, Inc.

A handwritten signature in blue ink, appearing to read "M. Scott Richards".

Scott Richards, P.E.
Associate
srichards@carollo.com
407-377-4312

EXHIBIT A

CITY OF DAYTONA BEACH (CITY)
CITY CONTRACT NO.: 1307-1022
Work Authorization No. 29

BETHUNE POINT WASTEWATER COLLECTION SYSTEM INFLOW AND INFILTRATION STUDY

August 24, 2018

SCOPE OF SERVICES

GENERAL

The City of Daytona Beach (CITY) owns and operates a wastewater collection and treatment system consisting of gravity sewers, pump stations, and force mains, which collect and transfer wastewater flows generated within its service area for treatment at two water reclamation facilities (WRFs): the Bethune Point WRF with a capacity of 13 mgd and the Westside Regional WRF with a capacity of 15 mgd. The collection system consists of approximately 110 miles of force main, 280 miles of sanitary sewer gravity main, 6,100 manholes, and 140 wastewater lift stations. The CITY wastewater system serves approximately 90 square miles with a population of approximately 71,300.

As part of the permit requirement for the Bethune Point WRF, the CITY needs to conduct to an Inflow and Infiltration (I&I) Study, related to the Bethune Point WRF collection system. This study will evaluate the I&I within the Bethune Point WRF service area in order to establish Capital Improvement Plan (CIP) recommendations for projects to decrease I&I in the collection system.

The following describes the Scope of Services for the project, which includes data gathering, hydraulic model analysis, data analysis, and project deliverables including CIP recommendations.

The scope of services for Carollo Engineers Inc. (ENGINEER) will include the following tasks. Certain assumptions have been made in preparing this Scope of Services. To the extent possible, they are stated herein, and are reflected in the attached project budget.

TASK 1: PROJECT AND QUALITY MANAGEMENT

Task 1 includes all aspects of project and quality management to provide effective delivery of the PROJECT. Specific items included in Task 1 are detailed in the subtasks described below.

1.1: Project Management and Communications

Carollo will provide overall project management and communication between its staff and the CITY. Carollo will track and manage the budget, project tasks, and schedule.

1.2: Project Management and Work Plan

The CONSULTANT will prepare a Project Management and Work Plan and distribute it to project personnel including CITY staff and the CONSULTANT's staff. The Project Management and Work Plan will include the project description and objectives, project personnel contact information, scope of work, detailed project delivery schedule, communication protocol, and quality

management plan. The schedule will be created and maintained in MS Project. Each task identified in the scope of work will be included in the project schedule, along with milestone dates. The Project Management and Work Plan will be provided in electronic pdf format for use by CITY and the CONSULTANT'S project personnel.

1.3: Project Kickoff and Progress Meetings

The CONSULTANT will facilitate a project Kickoff Meeting to review the Project Management and Work Plan, including the project tasks, schedule, lines of communication, and quality management procedures. The Kickoff Meeting will be a working meeting to discuss project needs, data collection, and other items necessary to efficiently begin the project.

The CONSULTANT will conduct three (3) progress meetings throughout the project to inform CITY staff on the project's progress, issues, findings, and recommendations. The agenda, meeting materials, meeting minutes, and action/decision logs for each meeting will be prepared by the CONSULTANT and distributed to all project stakeholders.

1.4: Monthly Progress Reports

The CONSULTANT will provide monthly progress reports that identify what work has been performed during the month and an itemized listing of work that will be anticipated in the upcoming month. These reports will be delivered as part of the monthly progress payment request.

The project schedule will be updated monthly and delivered as part of the monthly progress reports. The CONSULTANT will maintain a Decision Log and an Action Log that will be updated and delivered as part of each monthly progress report.

1.5: Quality Control and Quality Assurance

The CONSULTANT'S project manager shall coordinate quality control and quality assurance review of the project data analysis and deliverables.

TASK 1 DELIVERABLES

- Project Management and Work Plan (electronic pdf)
- Meeting sign-in sheet and agenda (hard copies to be provided at meetings)
- Meeting minutes (electronic pdf)
- Monthly progress reports and Action/Decision Logs (electronic pdf)
- Monthly schedule updates (electronic pdf)

TASK 2: DATA GATHERING

Task 2 involves gathering of data necessary for execution of the project. Specific items included in Task 2 are detailed in the subtasks described below.

2.1: Data Gathering

The CONSULTANT will collect and review previous data and reports relating to the CITY'S collection system. The following data may be requested, and other additional data may be requested as available and as needed.

- Wastewater service area maps

- Record drawings
- Wastewater collection system hydraulic model
- Current population data
- Existing lift station flow data
- I&I data and records
- Rainfall data collected within the service areas
- Existing CCTV video records and logs
- Smoke testing records
- Pipeline and manhole lining records
- Previous root removal records
- Collection system and lift station maintenance and work order records
- Documented sanitary sewer overflow (SSO) records
- WRF influent flow data for past 10 years
- Water and wastewater chloride and conductivity data

Note that much of this data is assumed to be already collected and available based on the Wastewater Master Plan efforts.

2.2: Review Infiltration and Inflow Reports and Data

The CONSULTANT will review previous data and reports from the CITY specific to infiltration and inflow, where available. This may include evaluation for infiltration of groundwater high in chlorides, such as available water quality data, CCTV records, history of pipe and manhole lining projects, etc.

The CONSULTANT will evaluate historical water and wastewater flow and quality data to determine typical baseline conditions such as the average, minimum, and maximum ratio of conductivity and chloride in water versus wastewater. Calculations will be completed to estimate the volume and mass of dissolved solids and chloride entering the system from the water supply versus water use and infiltration.

This may also include review of WRF influent flow records, smoke testing records, history of collection system repairs and improvements, etc. The CONSULTANT will also review pump runtime data available from SCADA and meet with CITY staff to discuss historical inflow events to determine the most problematic areas for analysis within the collection system area.

TASK 3: INFILTRATION TESTING AND RECOMMENDATIONS

3.1: Test Plan and Field Testing

Based on the review of previous available data, the CONSULTANT will determine data gaps and best potential locations for additional data collection to aid in the infiltration portion of the I&I Study. The CONSULTANT will develop a test plan to monitor for conductivity and/or chloride in the collection system based on lift station service areas (sewer basins) and/or sub-basins. The test plan also will outline required SCADA data such flow and pump runtime. For key lift station basin areas that do not have flow meters, additional flow and pressure data may be collected in order to estimate flow. This effort is being completed under the Wastewater Master Plan project. The estimated flows will be used for the infiltration analysis.

The test plan will include water quality sampling at lift stations in the Bethune Point service area.

The CITY will complete the field test sampling and laboratory analyses as outlined in the field test plan provided by the CONSULTANT. The CONSULTANT will not accompany the CITY to conduct field testing or assist in water quality analyses. Grab samples will be tested for chloride and/or conductivity by the CITY or a contract laboratory at the CITY's expense.

The length of the field tests will depend on staff availability to collect samples and on the variability in results, i.e., if a large variation in results is seen, additional samples may be requested. It is estimated that field testing will last approximately one month.

3.2: Evaluate Infiltration Data

The CONSULTANT will analyze data collected during the field test. Pressure data from the field pressure loggers and pump run times will be used to estimate pumped flows based on the lift station pump curves. Results of the field test will be evaluated, and recommendations will be made for future testing to further locate and quantify sources of infiltration.

The CONSULTANT will estimate the amount of chloride entering the collection system for each lift station service area defined for the project. Mass balance calculations will be completed to quantify and map the location of chlorides based on the field testing grab samples, SCADA data, and estimated lift station flows based on runtime and pressure data.

3.3: Infiltration Corrective Action Plan

The CONSULTANT will develop a corrective action plan with strategies and goals to decrease chloride concentrations in the collection system as described below.

3.3.1: Determine Chloride Reduction Potential

The CONSULTANT will estimate the amount of chloride reduction that may be possible by making infiltration repairs in the sewer basins evaluated during this study. Based on the typical I&I reduction typically seen (based on values cited in available literature), an estimate of the possible chloride reduction in the Bethune Point WRF service area will be determined. This step will allow the project team to reasonably estimate the amount of chloride reduction that may be possible in key sewer basins based on the best available data. This task will also involve evaluation of historical reuse water quality trends and how a decrease in chloride may benefit the reuse system.

3.3.2: Cost Estimates

The CONSULTANT will develop budget-level cost estimates for infiltration repairs such as pipeline lining, sealing manholes, etc. The CONSULTANT will utilize the results of previous investigations or repairs by the CITY to assist in cost estimates. Costs will be based on estimated cost per linear foot for pipe replacement, lining, sealing manholes, etc. Costs for smoke testing, televising of mains, and/or other on-going collection system evaluation techniques that may be recommended in the corrective action plan will also be estimated on a budget-level basis.

3.3.3: Strategies and Incremental Goals

The CONSULTANT will develop a corrective action plan that identifies overarching strategies and goals for the CITY to decrease chloride concentrations in the Bethune Point WRF collection system. The strategies will be developed based on the estimated cost, timing, and effort that will

be required on the part of the CITY to implement the plan. The action plan will provide prioritized planning and implementation projects that can be used in reduction efforts. In addition to recommended further evaluations, the strategies may include continued televising of mains, water quality testing, other evaluation techniques to identify pipe breaks or leaking joints in selected sewer basins, sealing manholes, rebuilding or coating lift station wetwells, and/or pipe replacement or lining programs. The plan will include suggested renewal (repair, rehabilitation, and/or replacement) projects with associated budget for a 10-year planning period.

TASK 3 DELIVERABLES

- Field Test Plan (electronic pdf)
- Corrective Action Plan (electronic pdf)

TASK 4: INFLOW TESTING AND RECOMMENDATIONS

4.1: Test Plan and Field Testing

Inflow testing will be completed based on two sources. The first source will utilize available SCADA data to estimate flows based on pump runtime and forcemain pressure. The second source includes field flow monitoring data in the gravity system. Flow monitoring is being completed separately as part of the Wastewater Master Plan.

The CONSULTANT will work with a subconsultant to conduct flow monitoring in the collection system. The flow monitoring and the equipment budget is included separately as part of the current Wastewater Master Plan. Data collection efforts will be completed as part of the Wastewater Master Plan. However, data analysis specific to I&I will be completed as part of this task. Note the actual number of locations installed within the Bethune WRF service area will be determined within the Wastewater Master Plan efforts.

The CONSULTANT will evaluate the flow data provided by the subconsultant during the flow monitoring test specific to I&I. The length of the flow monitoring period is scheduled for one month period, but may require revision depending on the extent of rainfall during the test period. It is critical to capture at least one significant rain event to allow comparison of flow during dry and wet times to evaluate the impact of inflow. It is estimated that flow monitoring will last approximately one month, depending on rainfall events.

The CONSULTANT will review historical WRF flows, rainfall, and master lift station flows, gravity flows and lift station pump runtimes to develop an overall understanding of how rain events affect WRF flows. Hydrographs of historical rainfall and WRF influent flows will be developed to determine typical peaking factors at the WRF based on rainfall event quantity, duration, and intensity.

The CONSULTANT will utilize the test plan from the Master Plan to monitor available data sources within the Bethune WRF service area and applicable to the I&I study area.

4.2: Evaluate Inflow Data

The CONSULTANT will analyze the data collected during the inflow field testing. Data obtained from the Master Plan will be utilized and evaluated specific to the Bethune WRF study area.

Pumped flow, gravity flow and run time data will be used to develop hydrographs showing the estimated amount of flow as a function of time for selected areas. The hydrographs will include recorded rainfall throughout the test duration to identify any substantial increases in flow or run time due to rain events. This analysis will help identify the sewer basins that are most heavily impacted by inflow.

4.3: Inflow Corrective Action Plan

The CONSULTANT will develop a corrective action plan with goals and strategies to decrease contribution from inflow into the collection system as described below.

4.3.1: Determine Inflow Reduction Potential

The CONSULTANT will estimate the amount of flow reduction that may be possible by making inflow repairs. Based on typical literature values, a broad estimate of the percent flow reduction possible will be determined. This step will allow the project team to estimate the amount of flow reduction that may be possible in the sewer basins analyzed during flow monitoring.

4.3.2: Cost Estimates

The CONSULTANT will develop budget-level cost estimates for inflow repairs that may allow the CITY to reduce the wastewater flow peaks to the master lift stations and WRF. The CONSULTANT will utilize the results of previous investigations by the CITY to complete the cost estimates. Costs will be based on estimated cost per linear foot for pipe replacement, sealing manholes, etc.

4.3.3: Strategies and Incremental Goals

The corrective action plan will develop overarching strategies and goals for the CITY to decrease inflow into the portion of the collection system evaluated during this study. The strategies will be developed based on the estimated cost, timing, and effort that will be required on the part of the CITY to implement the plan. The action plan will provide prioritized planning and implementation projects that can be used to continue the CITY's inflow reduction efforts. The strategies may include additional studies or investigations such as additional flow monitoring, sealing manholes, rebuilding lift stations, and/or pipe replacement or lining programs. The plan will also include a suggested renewal (repair, rehabilitation, and/or replacement) projects with associated budget over a 10-year planning period.

TASK 4 DELIVERABLES

- Field Test Plan (electronic pdf)
- Corrective Action Plan (electronic pdf)

TASK 5: FLOW MONITORING AND CONDITION ASSESSMENT DATA ANALYSIS

5.1: Condition Assessment Data Analysis

The CONSULTANT will utilize current system inspection and maintenance data (CCTV, repair history, smoke testing) for evaluation, with the purpose to assist in establishing a capital improvement plan. Existing data, as provided by the CITY in a database, will be reviewed and

linked to a GIS based database where possible. Note that physical field inspection of the system is not included in this task. Where CCTV is available, the CONSULTANT will link existing condition assessment and scoring data from a CITY provided database for processing. Limited review of CCTV video is included for purposes of establishing a baseline criteria for scoring methodology implemented by the CITY.

Utilizing previous lift station service area data collected, the CONSULTANT will prepare a summary of recommended upgrades to reduce inflow and recommend future studies. The results of this task will be to identify areas of the collection system that, if I&I-reducing measures are achieved, will result in reduced flow at the WRF during peak events.

TASK 6: I&I STUDY REPORT WITH CAPITAL IMPROVEMENT PLAN

5.1: Report with CIP

The CONSULTANT will prepare a report that summarizes the results of the study. The I&I Study Report will summarize historical data and previous repairs, the field testing plans, testing results and analyses, I&I reduction evaluations, and the capital improvement plan.

The Draft I&I Study Report will be issued to the CITY for review. The CONSULTANT will attend a meeting to discuss comments. Upon receipt of CITY comments, the document will be revised and the Final I&I Study Report will be issued.

CITY RESPONSIBILITIES

Because of the nature of this project, certain assumptions apply to this Scope of Services. To the extent possible, these assumptions are stated within this document and are reflected in the budget. If the project task requirements are different from the assumptions presented in this Scope of Services, or if the CITY desires additional services, the resultant change in scope will serve as a basis for amending this project assignment or initiating the development of a new project assignment as agreed to by both the CITY and CONSULTANT. The following assumptions and CITY responsibilities apply to this project:

- The CONSULTANT shall be entitled to rely upon the accuracy of the data and information supplied by the CITY without independent review or evaluation.
- The CITY shall attend all workshops and review meetings to maintain the progress of the project according to the schedule.
- The CITY will provide the CONSULTANT with access to treatment facility and collection system sites for data gathering and data validation.
- The CITY will assist with field testing as necessary, including accompanying the CONSULTANT on site visits.
- The CITY will provide all required information within the period established in the schedule contained in this Scope of Services. The schedule is based on timely receipt of data from the CITY. The CITY shall review Draft deliverables and provide comments to the CONSULTANT within a two-week period.

- The CONSULTANT has no control over the cost of labor, materials, equipment or services furnished by others, over the incoming wastewater quality and/or quantity, or over the way the CITY's plant(s) and/or associated processes are operated and/or maintained. Data projections and estimates are based on the CONSULTANT's opinion based on experience and judgment. The CONSULTANT cannot and does not guarantee that actual costs and/or quantities realized will not vary from the data projections and estimates prepared by the CONSULTANT and the CONSULTANT will not be liable to and/or indemnify the CITY and/or any third party related to any inconsistencies between the CONSULTANT's data projections and estimates and actual costs and/or quantities realized by the CITY and/or any third party in the future.
- The services to be performed by the CONSULTANT are intended solely for the benefit of the CITY. No person or entity not a signatory to this Scope of Work shall be entitled to rely on the CONSULTANT's performance of its services hereunder, and no right to assert a claim against the CONSULTANT by assignment of indemnity rights or otherwise shall accrue to a third party as a result of this Scope of Work or the performance of the CONSULTANT's services hereunder.

SCHEDULE

The services described above are anticipated to be completed in accordance with the following summary. Unless noted otherwise, time durations listed below are weeks measured from the date upon which the CONSULTANT received the notice to proceed for the work.

Task	Weeks After NTP
1 – Project and Quality Management	20
2 – Data Gathering	4
3 – Infiltration Testing	14
4 – Inflow Testing	10
5 – Flow Monitoring and Condition Assessment	16
6 – I&I Study Report with CIP	20

It has been assumed that the CITY will complete all reviews within two weeks of receiving the submittals. It is expected that all services in this scope of services will be completed within 20 weeks of receiving a notice to proceed.

PROJECT FEE

Compensation for the services described above shall be delivered for the amount of \$119,033.30. The basis for this is a not-to-exceed amount as provided in the attached **Exhibit B**.

