

**CITY OF HALLANDALE BEACH
2009 AGREEMENT**

**HAZEN AND SAWYER, PC
WORK AUTHORIZATION No. 29**

SANITARY SEWER EVALUATION SURVEY – PHASE 2

In accordance with Article 12 of the AGREEMENT between City of Hallandale Beach, Florida and Hazen and Sawyer, P.C. for TRANSPORTATION PLANNING AND ENGINEERING, TRAFFIC STUDIES, UTILITIES, ROADWAYS, GEOTECHNICAL CONSULTING AND TESTING SERVICES, the following scope of services is provided as requested by the City. Compensation shall be on a maximum amount not-to-exceed basis for salary costs and reimbursables as set forth in the original agreement.

BACKGROUND

The City of Hallandale Beach (CITY) has performed studies and rehabilitation work over many years to reduce infiltration and inflow (I-I) throughout its wastewater collection system. In December of 2011, Hazen and Sawyer, PC (CONSULTANT) completed a Phase 1 Sanitary Sewer Evaluation Survey (SSES) to assess the magnitude of I-I system-wide, and to prioritize pump station collection areas (basins) for subsequent detailed investigation and rehabilitation. The CITY's recent I-I reduction efforts have been focused on the basin prioritization presented in the 2011 Phase 1 SSES, and have emphasized in particular the inspection and rehabilitation of laterals.

In a recent meeting with CONSULTANT, the CITY expressed the following primary objectives concerning the I-I reduction program:

- Evaluate and document the flow reductions achieved through completed work.
- Investigate the next set of I-I reduction priorities so that rehabilitation plans for these areas can be developed and implemented on a near-term basis.
- Accelerate the overall investigation and rehabilitation program so that the benefits of I-I reduction can be more quickly realized.

Pursuant to the CITY's request, CONSULTANT is proposing a modified implementation plan designed to support and promote the CITY's expressed objectives. This proposed implementation plan preserves much of the CITY's current methodology, but is intended to accelerate implementation of the program, strengthen the organization and management of data, and more definitively document and quantify the I-I reductions achieved.

SCOPE OF SERVICES

The proposed scope of services presented herein is based on the following recommendations for the investigation and rehabilitation program.

- Continue to follow the prioritization developed in 2011 Phase 1 SSES.

- Complete investigation of multiple basins before prioritizing and assigning repairs. This should help ensure that the CITY focuses program funding on the higher-priority, more cost-effective repairs.
- Assign larger numbers of repairs in each work authorization. This should provide incentives to the contractor to allocate more resources to the program and reduce the duration of disruption to residents in a given area.
- Develop a simple electronic database to store inspection results for repair prioritization, cost estimating, program reporting, and future queries for reinspection and/or repair. The database should be designed to allow future integration with GIS.
- Defer the performance of smoke testing until after visual inspection and repairs to manholes, mains, and laterals have been completed for a given area. Lateral repairs will help address many types of inflow sources that are identified through smoke testing, and also allow the identification of common smoke testing defects involving missing cleanout caps and damaged cleanout risers. The need for smoke testing can subsequently be evaluated using wet weather flow data analysis.
- Maintain the focus on laterals initially, since flow monitoring results indicate that laterals are an important priority for the CITY at this time. Store manhole and mainline inspection results in the electronic database for future attention. If lateral work is needed in unlined mains, such recommendations should be stored in the electronic database using a “hold for other repairs” designation so that lateral work can be scheduled and performed following mainline repair work.
- Following the completion of rehabilitation in a particular basin (after a suitable time to allow the collection of flow data reflecting a variety of groundwater, tide, and wet weather conditions), conduct a pre-repair and post-repair flow comparison to assess the actual I-I reductions achieved and gauge the cost-effectiveness of the approach employed. The CITY’s SCADA system provides a low-cost tool to conduct this type of before/after flow evaluation, and the 2011 Phase 1 SSES can provide the “before” data.

A detailed scope of services for this proposed project is provided below and includes the following tasks.

- Task 1. Post-Rehabilitation Basin-Level Flow Monitoring Data Analysis
- Task 2. Database Development
- Task 3. Closed-Circuit Television Inspection - Review and Recommendations (Mains)
- Task 4. Closed-Circuit Television Inspection - Review and Recommendations (Laterals)
- Task 5. Database Population and Maintenance
- Task 6. Database Queries and Reports
- Task 7. Office Engineering and Management
- Task 8. Additional Optional Services

Each task is described in sequence below.

Task 1 – Post-Rehabilitation Basin-Level Flow Monitoring Data Analysis and Reporting

Subtasks by CONSULTANT

- Develop a wastewater flow database for each selected pump station using date-and-time-stamped pump start and stop data along with wet well fill volumes.
- Analyze wastewater flow data considering selected wet weather events and periods of tidal influence, as well as the so-called “night flow” time period between 1:00 AM and 5:00 AM when actual wastewater flow is minimal and the majority of flow is infiltration.
- Provide a brief memorandum to illustrate the findings of the before/after flow evaluation.

Subtasks by CITY

- Confirm current pump operating levels for each pump station wet well (depth below finished floor for pump “off” float and pump “on” float).
- Provide date-and-time-stamped pump start and stop data, in electronic form, for a period to be defined by CONSULTANT. Raw (not summarized) data are needed to permit observation of changes in flow over the 24-hour daily cycle and the development of hydrographs showing flow changes at hourly or sub-hourly intervals.

Task 2 – Database Development

Subtasks by CONSULTANT

- Develop a Microsoft Access database to record and organize key infrastructure attributes, inspection findings, and repair recommendations. The database will be used to store inspection and rehabilitation data for repair prioritization, cost estimating, program reporting, and future queries for reinspection and/or repair. The database will be designed to allow future integration with GIS.
- It is anticipated that the database will contain up to 20 attributes (e.g., material, depth, structural condition, estimated infiltration rate, etc.) for each gravity sewer infrastructure element (manhole, main, lateral).
- Design up to 10 standard queries/reports based on consultation with the CITY. Examples of some anticipated queries/reports include the following:
 - **Rehabilitation recommendations prioritized using cost-effectiveness.** A listing of recommended rehabilitation work prioritized based on cost-effectiveness. Rehabilitation of a collection system main line, manhole or service line is typically termed “cost-effective” when the cost of repair to remove a given amount of infiltration or inflow is less than the cost of continuing to transport, treat, and dispose of that same amount of flow over a specified number of years. Prioritization can be based on the “payback period” of the repair (the number of years to recover the repair cost).
 - **Rehabilitation recommendations prioritized using other metrics.** A listing of recommended rehabilitation work prioritized based on other factors apart from cost-

effectiveness such as structural condition, public nuisance, health hazards, system hydraulics, and operation and maintenance demand. Such factors may become the determining factor as to whether a given repair is assigned a higher priority for rehabilitation.

- **Rehabilitation priorities organized by drainage area and repair category.** As with the above-mentioned reports, these reports can be used to develop contractor task assignments. Repair type, location, and estimated cost can be summarized and presented.
- **Completed rehabilitation organized by fiscal year, contractor, repair category, estimated infiltration reduction, and drainage area.** These reports can be used to document the specific work completed during a given time period along with associated costs and estimated benefits in infiltration reduction.
- **Gravity system components recommended for reinspection.** These reports can be used to develop reinspection assignments based on the date last inspected and the condition rating developed during that previous inspection. Reinspection of lines given a condition rating of “good” can be deferred for a period of perhaps 8 to 10 years, whereas those rated “fair” or “deteriorated” could be placed on a reinspection cycle at a lesser time interval such as 3 to 5 years.

Subtasks by CITY

- Meet with CONSULTANT to discuss needs, develop attribute lists, and provide direction on standard queries and reports.

Task 3 – Closed-Circuit Television Inspection - Review and Recommendations (Mains)

Subtasks by CONSULTANT

- Analyze videotapes provided by a specialty sewer inspection contractor or by CITY forces.
- Record and document the nature and location of pipe conditions that may require intervention by the CITY, including offset or separated joints, protruding or damaged service connections, roots or solids accumulations, cracked or broken pipe, and any other defects that may permit groundwater infiltration or compromise structural or operational integrity. Develop infiltration estimates, repair recommendations, and estimated costs as warranted.
- Identify “suspect” laterals to be inspected at a later time using specialized equipment.

Subtasks by CITY

- None.

Task 4 – Closed-Circuit Television Inspection - Review and Recommendations (Laterals)

Subtasks by CONSULTANT

- Analyze videotapes provided by a specialty sewer inspection contractor or by CITY forces.
- Record and document the nature and location of pipe conditions that may require intervention by the CITY, including offset or separated joints, protruding or damaged service connections, roots or solids accumulations, cracked or broken pipe, and any other defects that may permit

groundwater infiltration or compromise structural or operational integrity. Develop infiltration estimates, repair recommendations, and estimated costs as warranted.

Subtasks by CITY

- None.

Task 5 – Database Population and Maintenance

Subtasks by CONSULTANT

- Populate the database with infrastructure attributes, inspection findings, estimated infiltration rates, and repair recommendations and cost estimates.
- Maintain an up-to-date database based on inspection documentation provided by the CITY. The database will remain the property of the CITY and CONSULTANT will provide updated electronic copies upon request.

Subtasks by CITY

- Provide inspection documentation for population of the database.

Task 6 – Database Queries and Reports

Subtasks by CONSULTANT

- Run and report standard database queries as requested by the CITY. Queries will be delivered electronically in PDF format, along with printed copies if so requested.

Subtasks by CITY

- Provide direction as to timing and nature of desired queries and reports.

Task 7 – Office Engineering and Management

Subtasks by CONSULTANT

- Coordinate office and field staffs. Act as liaison between the CITY and the inspection contractor(s). Manage and organize inspection documentation generated by CONSULTANT, contractor, and City personnel.
- Prepare and submit periodic status reports to the CITY. The reports shall provide a description of work performed, significant findings, issues requiring resolution, and contractor-provided scheduling information.
- Attend periodic meetings with CITY in association with the work performed under the previous tasks. It is anticipated that meetings will generally be held every one to two months to review the program status and work performed, discuss potential problem areas and issues requiring resolution, and establish schedules and action items for future work.

Subtasks by CITY

- Provide access throughout the project to engineering and operations staff for field visit accompaniment when required and interviews.

Task 8 – Additional Optional Services

Task 8 is intended to provide a means for the performance of additional related tasks on an as-needed basis, if requested and authorized by CITY.

SCHEDULE

CONSULTANT will submit a request for a meeting with the CITY concerning Task 2 within two weeks from receipt of a Notice to Proceed. CONSULTANT will submit Task 2 draft deliverables to the CITY within ninety days from receipt of all requested data, and will submit final deliverables to the CITY within thirty days from receipt of comments on the draft deliverable.

It is anticipated that the remaining tasks will be performed over a period of approximately twelve to eighteen months, depending on the availability and scheduling of the CITY's video inspection contractors and the extent of field investigation work authorized by the CITY. CONSULTANT's support of this effort will be conducted in accordance with the schedule decided upon by the CITY.

COMPENSATION

The task budgets requested for the work are summarized in the table below. Budgets for scope items with undefined quantities (Tasks 1, 3, 4, 5, and 6) are based on a unit cost to provide flexibility, clear accounting, and invoicing based on the number actually completed. The requested unit cost for each item is arrived at using labor rates pursuant to the Professional Services Agreement. Quantities for these investigation tasks are estimated and actual quantities will vary in accordance with the extent of work authorized by the CITY.

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Tasks	Unit	Unit Cost	Number of Units	Total Task Budget	Notes
Task 1. Post-Rehabilitation Basin-Level Flow Monitoring Data Analysis	Each basin	\$1,854	6	\$11,124	
Task 2. Database Development	Each database	\$30,456	1	\$30,456	
Task 3. Closed-Circuit Television Inspection - Review and Recommendations (Mains)	Linear foot	\$0.53	17,000	\$8,980	1
Task 4. Closed-Circuit Television Inspection - Review and Recommendations (Laterals)	Each lateral	\$96	567	\$54,188	1
Task 5. Database Population and Maintenance	Each element	\$42.00	1,700	\$71,401	2
Task 6. Database Queries and Reports	Each report	\$517.00	10	\$5,170	3
Task 7. Office Engineering and Management	Percentage			\$15,086	4
Task 8. Additional Optional Services	Allowance	\$25,000	1	\$25,000	5
TOTAL				\$221,405	

Notes:

1. Provides for review and recommendations of video produced by others (City personnel or City contractors).
2. An "element" is defined as a gravity system manhole, main, or lateral.
3. Queries and reports will be developed under Task 2.
4. Ten percent of Tasks 1, 3, 4, 5, and 6.
5. For as-needed tasks based on client authorization.

AUTHORIZATION - HAZEN AND SAWYER, P.C.


 Accepted: Patrick A. Davis, P.E.
 Vice President

9/10/13
 Date: