



PROPOSAL FOR SEWER SYSTEM FLOW MONITORING
Barton Meadows, East Vincent, PA
REVISED: September 30, 2022

CKS Engineers
 4259 W. Swamp Rd, Suite 410
 Doylestown, PA 18902
 Attn: Patrick DiGangi, P.E.

I. PURPOSE

The firm of CKS Engineers (herein called “Client”) has requested from Flow Assessment Services, LLC (herein called “Subconsultant”) a proposal for specialized services in the Barton Meadows neighborhood of the Township of East Vincent, PA. This document represents Subconsultant’s proposal to perform the requested services and includes the following:

1. A listing of the services to be provided;
2. A detailed description of the scope of services to be provided;
3. A list of Client responsibilities;
4. A list of mutual agreements between the two parties;
5. An estimated time of performance of the requested services; and
6. A fee schedule for the requested services.

II. SCOPE OF PROFESSIONAL SERVICES TO BE PROVIDED

The specific services to be performed by the Subconsultant shall include the following:

- A. The study area consists of select portions of the East Vincent sanitary sewer system. The system will be investigated for the purpose of quantifying wastewater flow.
- B. The Scope of Specialized Services shall include the following items and estimated work quantities.

Item #	Description of Tasks	Estimated Quantity
1	Flow Meter Installation	4 Meters
2	Flow Meter Operation, Maintenance, & Rental (4 Meters x 8 Weeks = 32 Meter Weeks)	32 Meter Weeks
3	Flow Data Reduction & Presentation (4 Meters x 8 Weeks = 32 Data Weeks)	32 Data Weeks
4 OPTION	Rainfall Gauge Installation & Monitoring (1 Gauges x 8 Weeks = 8 Gauge Weeks)	8 Gauge Weeks

- C. Continuous flow monitoring will be performed to obtain information necessary to accurately analyze the monitoring tributary areas for infiltration during high groundwater periods and for rainfall related inflow during wet weather periods. Continuous metering will be conducted for the designated time period as directed by the Client.

The flow monitoring will be accomplished by one of the following methods:

1. The use of continuous monitoring devices incorporating a velocity sensor combined with a depth sensor, or
 2. Palmer Bowlus flumes, in conjunction with continuous depth recording.
- D. Flow monitoring data reduction and review will be performed on all data obtained each flow monitoring location. The data obtained will be reduced, evaluated, and presented in report form. One (1) copy of the completed report will be submitted to the Client. This will include, for each location, tabular reports based on 15-minute time increments.

The tabular report will be provided and will include:

A summary of daily flow information for a selected time period. The summary presents, for each day, the minimum flow rate, peak flow rate, total daily flow, total rain, peak hourly rain, and peak 15-minute rainfall, if applicable. The summary also includes the total flow volume, average daily flow, and total rainfall quantity, if applicable, for the selected time period.

Detailed flow reports of the flow rate data in 15-minute time increments will also be prepared and submitted. The detailed report will include depth of flow, velocity of flow, incremental flow rate, cumulative flow rate and recorded rainfall. The report will also include the total daily flow volume and total daily rainfall quantity, if applicable.

In addition, flow hydrographs will be prepared for each flow monitoring location, which present a plot of the recorded flow rates for a selected time period. A bar graph of rainfall recorded during the selected time period is also plotted on the hydrograph, if applicable.

Further, periodically data will be posted to a password protected web site that will allow project personnel access to flow, rainfall and groundwater recorded data. Users then can prepare and review detailed flow reports, graphs and tables. Comparison between wet and dry periods as well as net flows per sub system calculations may also be performed. Online data export format capabilities included Excel, Access, and ASCII.

III. QUALITY CONTROL PROCEDURES

FIELD OPERATIONS – SITE SELECTION

Since the flow monitoring site can play a significant role in obtaining accurate flow monitoring data, site selection in the field will be given a high priority. The proposed monitoring site will be visited for the specific purpose of observing flow characteristics. Every effort will be made to identify a monitoring site that will provide accurate data while attempting to comply with the original location plan.

Observations such as surcharging or backing up of flows are less than ideal for monitoring and, if possible, will be avoided. Manholes having more than one line entering and irregular

flow/velocity patterns will be looked on as less than favorable. Outlet lines are also not recommended for monitoring due to nonuniform hydraulics.

FLOW METER SELECTION/INSTALLATION

Once a site has been identified the appropriate meter with any specific sensors will be installed. The installation will consist of installing tight fitting aluminum bands with both flow depth and velocity sensors mounted in such a way as not to obstruct flow or snag paper or other disposed items in the flow stream.

INITIAL & SUBSEQUENT FLOW VERIFICATION

During the installation process, the meter will be operated in such a way as to instantaneously obtain and display both depth and velocity readings. Manual depth measurements will be obtained and compared to meter readings; any differences will be corrected to within 0.10 inches. Using a hand-held velocity meter, readings will be obtained and compared to the metered velocity readings and adjustments to the installed equipment will be made until a reasonable match is obtained. During each maintenance visit, the following will be performed and noted on site log sheets:

- Actual depth of flow
- Metered depth of flow
- Actual flow velocity
- Metered flow velocity
- Flow pattern will be graphed for the previous period
- Scatter plots of both depth & velocity will be reviewed
- Any adjustments (if necessary) will be noted
- Battery voltage logged and if necessary, batteries will be replaced

DATA QUALITY REVIEW

Staff operating at our headquarters will review the flow data as it is received for completeness (missing data). A more detailed review will take place at a later date when the actual field logs arrive. Flow data files will then be combined with rainfall data and graphs will be prepared to begin a more detailed review of all depth, velocity and flow data. Abnormalities such as unexplainable depth spikes or drop outs as well as inconsistent velocity trends will be noted. Additional comparison graphs will be prepared that will use both actual depth and velocity data as well as predicted data. Scatter plots will also be produced to better understand specific characteristics of the site as well as help identify isolated incorrect measurements. Adjustments or corrections, if any, will be performed and documented.

IV. CLIENT RESPONSIBILITIES

The Client shall provide the following at no additional cost to the Subconsultant:

- A. Furnish copies of the necessary plot maps of all sewers to be studied. The sewer lines and manholes should be clearly marked and labeled with a numbered reference system.
- B. Make any revisions to the sewer maps in the study area based on correction data collected during the fieldwork.

- C. Make arrangements to provide traffic control as required by local public safety authorities.
- D. Make arrangements to provide access to and exposure for entry those manholes within the study area which are buried, covered or otherwise not readily accessible.
- E. Provide free and legal access to all sites of work.
- F. Assure the prompt clearance of major blockages or obstructions in the sewer system, if any, should such clearance be required for performance of the work.
- G. Provide the shutdown of certain pump stations, upon prior request, should it become necessary for the satisfactory performance of the work.
- H. In the absence of any of the assurances indicated above, give Subconsultant release from responsibility for the performance of the affected portions of the work under this Agreement.

V. MUTUAL AGREEMENTS

- A. Subconsultant shall not be held liable to the Client if delayed or prevented from performing the work as specified herein through any cause beyond the control of Subconsultant and not caused by his own fault or negligence, including acts of God, or the public enemy, weather conditions; acts of government, including changes in state and/or federal requirements governing sewer system evaluation surveys after the effective date of this contract; fires, floods, epidemics, strikes, jurisdictional disputes, lockouts, and freight embargoes. Subconsultant shall advise the Client, in writing, of any such delays.
- B. Subconsultant is an equal opportunity employer.
- C. Subconsultant agrees to carry (1) Comprehensive Public Liability, Property Damage, Personal Injury and Independent Contractors – not less than \$1,000,000 per accident, \$2,000,000 aggregate. (2) Automobile Liability, Bodily Injury, Property Damage – not less than \$500,000 per person \$1,000,000 per occurrence. (3) Workman’s Compensation Insurance statutory limits covering any liability of the Consultant during the course of the services performed and as described herein.
- D. The provisions of the Agreement may be revised upon written notice by either party, and the written acceptance of the revisions by both parties to this Agreement.
- E. Subconsultant shall not assign, sublet, or transfer his interest in this Agreement without the written consent of the Client.

VI. TIME OF PERFORMANCE

Subconsultant anticipates initiating fieldwork no later than TBD with all such fieldwork to be completed TBD. All data will be provided to the Client within thirty (30) days of completion of each field task.

This proposal is valid until March 1, 2023.

VII. FEES

Item #	Description of Tasks	Estimated Quantity	Unit Cost	Total Unit Cost
1	Flow Meter Installation	4 Meters	\$850.00	\$3,400.00
2	Flow Meter Operation, Maintenance, & Rental (4 Meters x 8 Weeks = 32 Meter Weeks)	32 Meter Weeks	\$550.00	\$17,600.00
3	Flow Data Reduction & Presentation (4 Meters x 8 Weeks = 32 Data Weeks)	32 Data Weeks	\$125.00	\$4,000.00
Total of Above:				\$25,000.00
4 OPTION	Rainfall Gauge Installation & Monitoring (Lump Sum for up to 8 Weeks)	Lump Sum	\$75.00 per Week after 12 Week Lump Sum	\$800.00

Extensions to the program will be billed at unit rates above.

VIII. METHOD OF PAYMENT

The Method of Payment for Professional Services outlined above shall be in the form of progress invoices to be submitted to the Client for the items above as the fieldwork is actually completed. Such invoices are due and payable within fourteen (14) days after the Client has been paid by the Owner.

Regards,
Flow Assessment Services, LLC



Lucas Chapman
Mid-Atlantic Regional Manager

If the above is acceptable, kindly execute both copies, retain one for your records and return the other to our office.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed in Their behalf respectively by their proper officers or officials thereunto duly authorized by their respective governing bodies on this the _____ day _____ 20____.

(CKS Engineers)

By: _____

Print Name: _____

Title: _____



By: _____

Print Name: _____

Title: _____