

September 11, 2018



Sam Adams, P.E.
Utilities Manager
City of Camas
360-817-7003 direct
sadams@cityofcamas.us

Re: Temporary Sewer Flow Monitoring Proposal

Dear Sam,

We are pleased to have the opportunity to submit this letter proposal to conduct sewer flow monitoring. ADS is uniquely qualified to assist you with this flow monitoring project, given our forty-three years of experience performing similar projects throughout your area. Enclosed please find a detailed scope of work and pricing for your review.

Our proposal is valid for sixty (60) days and subject to the ADS standard terms and conditions for professional services which are attached for your review.

We look forward to working with you on this and other future projects. Thank you for the opportunity to propose on your requirements. If you have any questions regarding this proposal, please do not hesitate to call me at (858) 210-5387.

Sincerely,

Rob Larson
Business Development Manager
858-210-5387

Enclosure

Proposed Scope of Work

ADS Environmental Services (“ADS”) will provide temporary flow monitoring services to the City of Camas, WA (“Client”) to collect four (4) Months of flow data at four (4) locations, rain data at one (1) location, and perform RDI/I analysis. The work will be performed in three phases as set forth below:

Phase I – Mobilization

- 1) **Kick-off Meeting.** Phase I will begin with a kick-off meeting between representatives of the Client and ADS. The purpose of the kick-off meeting is to discuss project scope, establish lines of communication, set milestones, and set the project schedule (Kickoff meeting to be conducted via conference call).
- 2) **Site Locations.** ADS will work with the Client to identify/verify the location of monitor installations.
- 3) **Site Investigation.** Once the installation sites are provided to ADS, ADS field crew(s) will perform site investigations. ADS will utilize a standard 2-person field crew for fieldwork and comply with Federal standards for confined-space entry. The proposed flow monitoring location will be located, inspected, and verified for hydraulic suitability. ADS will also check for debris in the manhole that could impact data quality and coordinate any required cleaning efforts with the Client. ADS field crews will look for evidence and signs of erratic flow patterns. ADS will also investigate adjacent manholes in order to identify the best monitoring locations as applicable if needed.
- 4) **Site Reports.** Site reports will be generated upon completion of the site investigations. The site reports will include a sketch of the general location, physical characteristics and diameters of the proposed monitoring locations, manhole depths, flow measurements, and other comments pertinent to the location such as any special traffic or safety issues. Final site locations to be approved by the Client.
- 5) **Equipment.** ADS will utilize ADS® Model Triton+™ Wireless Flow Monitors during the course of this project. A typical monitor installation will include an ultrasonic depth sensor that will be mounted at the invert of the pipe, a redundant pressure depth sensor; and a Doppler velocity sensor also mounted at or near the invert. At some locations ADS may install an additional sensor to match certain hydraulic conditions or structure configuration with the appropriate Triton+ sensor(s). ADS will utilize ADS RainAlertIII wireless rain logger with TB6 tipping bucket for rain data collection.
- 6) **Monitor Activation.** Once installed, the monitor will be activated and set to take readings at 5-minute intervals, some locations such as downstream of a lift station(s) the logging rate will be set at 2-minute intervals. ADS Field crews will take manual depth readings with a ruler and velocity readings with a portable, instantaneous velocity meter in order to confirm the monitor is collecting accurate data based on the actual existing hydraulic conditions at each location.

Phase II – Flow Monitoring

- 1) **Flow Monitoring**. Once the monitors are installed and verified to be in working order, ADS will monitor the flows for a period of four (4) calendar months (“monitoring period”). This initial monitoring period can be extended based on mutual consent and written agreement of additional work and price for such additional work.
- 2) **Data Collection and Equipment Maintenance**. ADS will use a standard 2-person field crew for all maintenance/removal activities. ADS will collect flow data from each monitoring point remotely using telemetry on a daily schedule. Field crews will perform site maintenance and site confirmations as necessary. ADS is an ISO 9001 certified company and has proprietary internal quality procedures for all fieldwork. During the course of the project and as part of ADS’s quality control program, the field manager will also visit each location and reconfirm that the monitor is in proper working condition. This includes cleaning depth and velocity sensors, confirmations as needed, and checking an installation to make sure that the ring is secure in the pipe. The ADS data analyst will also review the data on a regular basis throughout the monitoring period.
- 3) **Demobilization**. Field crews will continue data collections and confirmations (as necessary) until the end of the monitoring period. Once authorized, crews will immediately begin removing the flow monitors and deliver final data to the data analyst.

Phase III – Data Editing and Reporting

- 1) **Data Analysis**. Upon completion of the monitoring period, a trained ADS Data Analyst will begin to finalize the data collected for each monitoring location. The data analyst will directly calculate flow using the continuity equation from recorded depth and average velocity data. Flow quantities as determined by the continuity equation will be plotted.
- 2) ***ADS will deliver a tech memo. Sliicer RDI/I Analysis.*** For each of the flow monitoring location, the analysis will characterize the average dry weather flow conditions and RDI/I calculations for all significant wet weather events, an assessment of hydraulic performance under such conditions. The results of dry weather and wet weather performance will be plotted on maps of the sewer sheds to make it easier to understand where RDI/I originates. The Sliicer.com section of the Report will include the following items:
 - **Dry Weather Analysis** – A characterization of the conditions observed during weekday and weekend periods of the flow monitoring period during dry weather periods, excluding periods of extended system recovery to previous rain events. Summarized as a time-series hydrograph of the average diurnal flow quantities for weekday and weekend dry weather periods.
 - **Dry Weather Flow Summary** – A table of the Average Dry Day Flow (ADDF) and an estimation of Base Infiltration (BI). Average dry weather diurnal patterns will be provided for each flow monitoring location during weekday and weekend portions of the monitoring period.
 - **Wet Weather Analysis** – A characterization of the conditions observed during specific wet weather events observed during the flow monitoring period, summarized as a time-series hydrograph comparing observed flow quantities to average diurnal flow quantities for corresponding weekday and weekend dry weather periods.
 - **Wet Weather Summary** – A characterization of the conditions observed during the maximum rain event of the monitoring period. This can be summarized as the maximum 30 minute average peaking factor observed during the flow monitoring period.
 - **Wet Weather Prioritization** – A column chart of the Rain Dependent Inflow/Infiltration (RDI/I) determined for each flow monitoring location for each wet weather event. Column chart provides a prioritized ranking based on net RDI/I (as %rain ingress if basin acreages are provided) or net RDI/I per linear foot of sewer per inch of rain when linear footage information is provided to ADS.
 - **Hydraulic Performance Evaluation** – A narrative interpretation of hydraulic performance recorded at each flow monitoring location as determined using a scattergraph of flow depth and velocity data. The scattergraph interpretation shall evaluate the ability of each flow monitoring

location to accommodate flow quantities observed during dry weather and wet weather conditions observed during the monitoring period.

- **Recommended SSES** prioritized plan based on flow data analysis.
- 3) **Data Delivery and Final Report.** ADS will prepare a Final Report to include electronic data of the flow data in tabular, hydrograph, scattergraph, and a RDI/I report in electronic format.

NOTE: ADS's Flow monitors are capable of providing very accurate and precise (repeatable) flow data. However, under some complex hydraulic conditions such as frequent backwater, surcharging, reverse flows, and complex bends in the flow path leading to and from the associated manhole in which the flow monitor is placed, the accuracy of the data is diminished. It is important that the Client understands that ADS's temp flow monitoring equipment is some of the best available in capturing flow data in complex hydraulic situations, but that accuracy may be compromised in locations immediately upstream of pump stations or other locations where the above listed hydraulic conditions can sometimes be persistent.

City of Camas's Responsibilities:

The City will perform the following functions in connection with this Project:

- 1) Access to the site of work with sufficient area for placement of personnel and equipment, including all right-of-way and ramps, if required. This includes, but is not limited to exposing manholes and clearing easements.
- 2) Pay all local licenses and permits fees, if required.
- 3) Assist in obtaining and complying with any special permits, if required.
- 4) If sewer line is dirty and full of debris, ensure that selected sites have been jet cleaned to minimize hydraulic deficiencies or select an alternate location.
- 5) Any known information concerning bypasses, overflows, base flows, critical surcharge areas, and maintenance habits.
- 6) Provide secure location(s) and access for ADS Rain Gauge(s)
- 7) City to provide GIS map data (shapefiles) of piping, manholes, flow monitoring points, rain gauge points, and basins (polygons) associated with each monitoring location intended for RDI/I analysis. Client to provide pipe footages and acreage for each basin (for use in normalization in RDI/I analyses). Note: The monitoring point ID will be the same as the basin ID in the Slicer analysis.

Proposed Pricing:

Item	Description	Cost
1	4 Temporary Flow Meters, 1 Rain Gauge x 4 Months of Monitoring	\$49,850.00
2	RDI/I Analysis and Tech Memo	
	Base Project Total (WA State Taxes Included in Price)	

*Pricing Assumptions: Mobilization of 20% of contract value is due within thirty days of contract effective date. Any applicable Federal, state, or local taxes are not included; No prevailing wages or W/MBE requirements; **Light traffic and standard traffic control requirements assumed (1 arrowboard, 2 signs, 18 traffic cones)**; No night work assumed; Payment terms net 30 days.