EXHIBIT A

ENGINEER'S SCOPE OF WORK



Scope of Services Infiltration/Inflow Reduction Wastewater Flow Monitoring

Flow monitoring will be undertaken to establish wastewater flow during dry and wet weather conditions at key locations within the system. Data from the comprehensive flow monitoring will be used to evaluate the pipeline capacity at these key locations and prioritize areas of the system contributing to excessive infiltration/inflow. Using the existing sewer GIS, the following asset quantities were determined:

Mainline Gravity Sewer:	201,711 linear feet (38.2 miles)
Manholes and Mainline Cleanouts:	583

The following represents the project approach for the city-wide flow monitoring and infiltration/inflow assessment. Anticipated work tasks include:

TASK 100 MOBILIZATION

Mobilize project team and coordinate startup for each year of the program. Establish personnel assignments and responsibilities. Inventory equipment needs and order expendable supplies. Review all relevant existing materials, previous reports, etc. developed for or by the City of Hutchins concerning this project, including, but not limited to, the following:

- 1. Previous studies of the collection system
- 2. Utilize approved asset numbering system

To Be Provided by City:

- Coordinate access for placement of equipment and personnel
- Electronic sanitary sewer system maps and manhole numbering system
- As-built drawings, sewer key maps, street plans, electronic aerial photographs if available and if requested

Deliverables:

1. Inclusion in final report of findings from this work task

TASK 200 -TEMPORARY FLOW AND RAINFALL MONITORING

To perform I/I analysis and establish the existing baseline capacity being used during dry and wet weather at key locations within the collection system, it will be necessary to obtain flow monitoring information during both dry and wet weather. Under ideal conditions, multiple events are recorded to establish the volume of extraneous water that enters the collection system. From this collected data, the inflow response for each storm event is determined. Information obtained during the monitoring period will be used to determine the following for each metering site:

• Average daily flow-dry weather



- Peak flow-dry weather
- Average daily flow-wet weather
- Peak flow-wet weather
- Total I/I volume

The primary meter site selections are determined based on the collection system geometry. It is estimated that six (6) flow meters (refer to attached Study Area map) that record flow depth and velocity will be used to

obtain the necessary hydraulic information for subsequent analysis. By undertaking temporary flow monitoring, the existing hydraulic conditions can be determined. Each flow meter uses cellular telemetry to send collected data to the Pipeline Analysis server.

Flow monitoring would be undertaken for forty-five (45) consecutive days. The target start date should correspond to the historically highest probability of rainfall, which occurs in May, to optimize the probability of obtaining multiple storm events for analysis. The optimum period to flow monitor in Hutchins for 45 days would be the period April 15 – May 31, 2025.

Continuously recording rainfall gauges are used to accurately measure rainfall intensity and duration throughout the monitoring period over the service areas. Analysis of the flow meter data for each rain event will establish the percentage of rainfall that entered the wastewater collection system.

Month	Hutchins			
	Rainfall			
Jan	2.00			
Feb	2.50			
Mar	2.90			
Apr	3.20			
May	4.20			
Jun	3.20			
Jul	1.60			
Aug	1.80			
Sep	2.50			
Oct	3.70			
Nov	2.90			
Dec	2.60			
Total	33.10			

Three (3) rainfall gauges will be installed during the flow monitoring period to correlate wastewater flows with rainfall intensity and duration. The rain gauges call into the Pipeline Analysis server daily, and the data analyst reviews operational and maintenance parameters.

METER INSTALLATION, CALIBRATION AND DATA COLLECTION

Understanding the hydraulics of each proposed metering location will ensure that the site selection is appropriate and that the recorded data is accurate. Where flow hydraulics are poor due to abrupt changes in flow direction, large deposits of silt, restrictions, etc. a proposed meter location may be changed upstream or downstream to ensure proper hydraulic conditions to obtain accurate flow data.

The temporary flow meters proposed will utilize area/velocity technology. Both the Manning and continuity equations may be compared during analysis. Each flow meter will be calibrated in a hydraulic flume located at Pipeline Analysis's office. In addition, a field calibration check will be performed following installation and periodically throughout the monitoring period. Calibration of each meter is a simple procedure consisting of independently verifying depth of flow and recorded velocity. The flow sensors will be secured to a steel mounting band that fits securely in the pipeline. The data logger for each site will be installed in the top of each manhole and the meter will be activated at user defined sampling intervals, typically 15 minutes. Telemetry to each site will be established by wireless data link and confirmed by data transmission to the project computer server. Routine maintenance and service will be undertaken to confirm normal operation. Software is used to review each meter's status and sensor health. Crews will be dispatched to replace any malfunctioning equipment. Written logs of each site visit will be maintained and will be used to record date and time of visit, meter velocity and depth reading, corresponding independent velocity and depth reading, maintenance items such as battery voltage, etc.



Each continuously recording rainfall gauge will be installed and calibrated to ensure proper operation and recording. Rainfall gauges are of the tipping bucket type with wireless telemetry and accurately record rainfall to 0.01 inches. Rainfall gauges will be set to 5-minute sampling intervals. Maintenance logs will be prepared for each site visit and will show as a minimum the date, time, operational check, verification of recordings, and other applicable maintenance items such as battery voltage, etc.

INFILTRATION/INFLOW PRIORITIZATION PLAN FINAL REPORT

During and following completion of the flow and rainfall monitoring, Pipeline Analysis will analyze the gathered data and develop tabular and graphical summaries. Comparisons with any historical flow meter data will be reviewed. The impact of silt and debris will also be evaluated. Information obtained during the monitoring period will be used to determine the following for each site:

- Dry Weather Average Daily Flow A typical dry weather week, not impacted by rainfall, will be established. Velocity data will be compared to debris levels to analyze the scouring velocity necessary to prevent deposition in the lines. Discrete flows from each monitored sub-basin will be calculated.
- 2. Dry Weather Peak Flow Peak flows during dry weather will be determined from the recorded data.
- 3. Wet Weather Average Daily Flow Wet weather flows for each rainfall event will be analyzed to determine the percentage of rainfall that enters the collection system (also known as the leakiness factor). Comparing the storm event flow with the dry weather flows will establish the Rainfall Derived Infiltration/Inflow (RDII). This value will vary for each storm's duration and intensity. The discrete RDII for each sub-basin will be determined and will allow the ranking (prioritization) of each sub-basin by severity of RDII.
- 4. Wet Weather Peak Flow Peak flow rates during wet weather are critical to the capacity analysis. Peaking ratios (Peak flow rate to average dry weather flow) will be compared for dry and wet weather.
- Total I/I volume The area under each storm event curve will be evaluated to establish the volume of rainfall induced infiltration/inflow. These values can then be normalized to establish the volume of RDII per inch of rainfall. Projections can then be made to determine the impact of RDII during a normal year.
- 6. A comparison of the collected data with the treatment plant flow records will be completed and results summarized in the final report.

Prepare and submit flow monitoring final report. The report will include the following sections:

- Executive Summary
- Description of tasks undertaken including methodologies
- Rainfall data
- Dry/Wet weather flows
- Conclusions and Recommendations
- All flow data, photographs, site sheets, GIS files and report narrative will be provided electronically.



Up to three (3) hard copies of final report will be provided, if requested.

Project Schedule

The ENGINEER services shall be performed in a timely manner consistent with sound professional practices. ENGINEER will complete the work according to the project schedule:

Task	Description		2025			
		Apr	May	Jun	Jul	
100	Mobilization/Demobilization					
200	Review, Site Inspections and Installation					
	a. Flow & Rain Gauge Meter Site Inspections					
	b. Flow Meter Installation/calibration					
	c. Rain Gauge Installation					
300	Temporary Flow and Rainfall Monitoring					
	a.Temporary Flow Monitoring - 6 sites x 45 days					
	b. Temporary Rain Monitoring - 3 sites x 45 days					
400	Flow Data Analysis					
500	Admin., Project Mgt, Final Report					



Fee Schedule

Partial fee payments will be applied for at monthly intervals, based upon statements which reflect the percentage of work completed for the various items listed under Scope of Services. These statements shall be prepared by the ENGINEER and must be verified and approved by the City of Hutchins. The total fee for professional services presented in the scope of services shall not exceed \$78,555.00 without written approval of the City of Hutchins.

Task	Description	Estimated	Unit	Total		
		Quantity	Price			
100	Mobilization/Demobilization	L.S.	L.S.	\$3,600.00		
200	Review, Site Inspections and Installation					
	a. Flow & Rain Gauge Meter Site Inspections	L.S.	L.S.	\$4,690.00		
	b. Flow Meter Installation/calibration	6	\$1,470.00	\$8,820.00		
	c. Rain Gauge Installation	3	\$500.00	\$1,500.00		
300	Temporary Flow and Rainfall Monitoring					
	a.Temporary Flow Monitoring - 6 sites x 45 days	270	\$ 165.00	\$44,550.00		
	b. Temporary Rain Monitoring - 3 sites x 45 days	135	\$ 27.00	\$3,645.00		
400	Flow Data Analysis	L.S.	L.S.	\$4,880.00		
500	Admin., Project Mgt, Final Report	L.S.	L.S.	\$6,870.00		
	Total Not To Exceed					

