



# NAPA SANITATION DISTRICT

GHD - TASK ORDER No. 53

INFLOW AND INFILTRATION (I&I) REDUCTION PROGRAM (CIP 13705)

Date: \_\_\_\_\_

Issued under Professional Services Agreement dated \_\_\_\_\_.

To: GHD

## Project Description:

Pre-construction and post-construction flow monitoring, nighttime field reconnaissance, CCTV inspection, and flow monitoring report.

## Description of Scope of Services to be performed by Consultant under this Task Order:

See Attachment 'A' – Scope of Services

**Description of Services to be Provided by District:** See Attachment 'A' – Basic Scope of Services

**Deliverables:** See Attachment 'A' – Basic Scope of Services

**Consultant Project Manager:** Matt Winkelman, PE

**Consultant Quality Control Manager:** Ted Whiton, PE

**Schedule to Perform Services:** See Attachment 'A' – Project Schedule

**Time & Materials Not-to-Exceed Cost Limit:** \$196,363

See Attachment 'B' – Project Fee Estimating Sheet

## APPROVALS:

GHD

By: \_\_\_\_\_  
Authorized Representative

\_\_\_\_\_  
Date

NAPA SANITATION DISTRICT

By: \_\_\_\_\_  
Purchasing Agent

\_\_\_\_\_  
Date

NSD Account No.: CIP 13705



## ATTACHMENT "A"

November 7, 2016

### **2016-17 Inflow and Infiltration (I&I) Reduction Program**

This scope of services is for wet weather assessment of the District's sanitary sewer collection system during the 2016-17 wet weather season. Tasks include flow monitoring, nighttime infiltration and inflow (I&I) reconnaissance, closed circuit television (CCTV) inspection, and preparation of corresponding reports that present the findings of the field work effort. The proposal is based on information received from the District for the number of flow meters needed for assessment of pre- or post-construction assessment of I&I reduction efforts within the District's collection system and preferred locations within the collection system for nighttime I&I reconnaissance and CCTV inspection.

### **Project Understanding and Approach**

Flow monitoring, nighttime reconnaissance, and CCTV inspection is proposed to occur between December 2016 and March 2017, depending on weather conditions, and after early season rains have saturated the ground. GHD has subcontracted with V&A Consulting Engineers (V&A) for the flow monitoring and nighttime reconnaissance field work and reporting effort. V&A has completed flow monitoring and I&I analysis for the District's collection system since preparation of the District's current CSMP in 2005. GHD has subcontracted with Professional Pipe Services (Pro Pipe) for the CCTV inspection and reporting effort.

The District has selected 17 flow monitoring locations that focus on data collection for pre- or post-construction data for various I&I reduction efforts (i.e., rehabilitation projects such as pipe lining or bursting or manhole repairs). The District has also selected targeted areas for nighttime reconnaissance and CCTV inspection that focus on identifying sources of I&I within the collection system.

### **Field Work**

V&A will prepare for flow monitoring visiting the proposed flow monitoring sites and confirming preferred and alternative flow monitoring locations, as appropriate. Field work will include the installation, calibration, and removal of 17 flow meters and 2 rain gauges for a period of one month, with an option for extending the flow monitoring period to 1.5 or 2 months at the District's direction. Following the field work, V&A will evaluate the flow monitoring data and prepare a report.

V&A will conduct nighttime reconnaissance in various locations within the collection system, including Basin IJ where findings will be used to focus Pro Pipe's CCTV inspection effort for that basin.

Pro Pipe will conduct CCTV inspection within Basin IJ using NASSCO coding for pipeline and manhole reporting. Pro Pipe will use Digital Pipeline Scanning utilizing the IBAK Panorama 3D Optoscanner (pipeline and manhole digital scanning) to focus on sewer main and manhole defects that contribute infiltration into the collection system.

### **Reporting**

V&A will prepare and submit draft reports to GHD for the flow monitoring and nighttime reconnaissance efforts. Preliminary flow monitoring results will be provided within four weeks after the flow meters are removed. Pro Pipe will prepare and submit CCTV reports and GIS data for the CCTV inspection efforts. GHD will review and provide comments to V&A and Pro Pipe for the reports. Once revised, the draft reports will be resubmitted to GHD for incorporation into a summary report prepared by GHD, which will be submitted to the District. GHD and V&A will attend a review meeting after submittal of GHD's draft report. The purpose of the meeting is to discuss the reports' results and findings. Final reports will be prepared following receipt of the District's comments.



## ATTACHMENT "A"

### Basic Scope of Services

The professional engineering services for the Project are provided below.

#### Task 1 – Project Management and Coordination

GHD will coordinate with the District during the project, including: budget and schedule tracking; project and contract oversight; and general coordination/communication. A formal kickoff meeting, work plan, and formal progress meetings are not included in this scope of services. Communication with the District, V&A, and Pro Pipe is intended to be informal and follow the need for coordination of wet weather field activities.

*Deliverables: Monthly progress reports*

#### Task 2 – Wet Weather Field Activities

##### *Task 2.1 Flow Monitoring and Report*

##### Project Preparation and Site Reconnaissance

V&A will review existing sanitary sewer plans and documentation in preparation for flow monitoring. V&A will visit the proposed sites in order to verify suitability of manholes and/or alternative manholes for installation of flow meters. V&A will consult with the District in the event that alternative manholes are required for flow monitoring. V&A will document the following information: location map with address, pipe size, manhole identification number, flow channel condition, site schematics, and photographs. V&A will recommend the appropriate metering technology for the flow characteristics and hydraulic conditions observed during the site reconnaissance visits.

The site reconnaissance visit will document rain gauge placement areas, details and measures taken to eliminate undesirable influences of surrounding topography, vegetation, structures, etc.

##### Install/Calibrate/Remove Flow Meters and Rain Gauges

A V&A crew with a field truck and the necessary confined space, simple traffic control, and flow monitoring equipment will install, calibrate, and remove the flow meters and rain gauges. For this project, 17 flow meters and 2 rain gauges will be installed for a period of one month. The flow monitoring period may be extended to 1.5 or 2 months at the direction of the District (See Optional Tasks O.1 and O.2).

V&A will verify data integrity and that the meters are operational and clear of debris. V&A will be responsible for installation, calibration, and removal of the equipment for this project. Maintenance and meter malfunction will be documented and reported as soon as it is observed. V&A will be prepared to extend the duration of the flow monitoring period as requested by the District.

This scope of services assumes only simple traffic control set-ups (truck mounted light board and cones) will be required for this project. If complex traffic control set-ups requiring a traffic control contractor are deemed necessary, the costs for the traffic control contractor will be in addition to the state costs for the flow monitoring. This scope of services also assumes that the District or other jurisdictional permits (i.e., encroachment, traffic control plans, etc.) will be paid for by the District. Costs incurred by V&A for permits will be in addition to the stated costs in Attachment "B". V&A will coordinate with the City of Napa as required for appropriate field work.

##### Flow Monitoring and I&I Analysis Study Final Report

V&A will download and reduce the data in 15-minute intervals into Excel spreadsheets for data analysis and report preparation. Preliminary flow monitoring results will be submitted within four weeks after the flow meters are removed. One Draft version and one Final version of the report will be prepared. The summary report will include the following information:



## ATTACHMENT "A"

- A summary of the flow monitoring equipment used;
- Location maps with address, pipe size, manhole identifier number, flow channel condition, site schematics and photographs;
- Flow monitoring data with tabular outputs of depth, velocity and flow rate and hydrographs of depth, velocity and flow rates for each flow meter; and
- I&I Analysis: Average dry weather flows curves will be determined and rain dependent infiltration and inflow (RDI&I) response will be isolated during wet weather rainfall events. I&I analysis will include developing synthetic I&I hydrographs for each flow monitoring site and applying the synthetic hydrographs to a 10-year, 24-hour design storm. Pre and post-construction data will be compared to determine the effectiveness of the District's I&I rehabilitation projects that have been completed since 2011.

GHD will conduct a preliminary review the draft report and will provide the draft report with redline comments to the District. The report with redline comments will be discussed at the review meeting (Task 2.4) and used for finalization of V&A's report, and then incorporated into the Summary Report included in Task 3.

*Deliverables: Draft and Final Flow Monitoring and I&I Analysis Report – Three (3) hard copies and an electronic format (pdf) submittal*

### *Task 2.2 Nighttime Field Reconnaissance*

To better characterize the potential I&I sources in subareas within the collection system, V&A will conduct nighttime field reconnaissance within subareas with known or suspected high levels of I&I. A second benefit of the field reconnaissance is the potential of visual identification of I&I sources within the collection system.

Nighttime field reconnaissance will be conducted during low-flow hours, which is typically between the hours of 1:00 am and 4:30 am, when I&I flow is most evident ("clear-water" flow). This scope includes seven (7) nighttime work shifts for field reconnaissance during the flow monitoring period. GHD and V&A will consider the location of prior nighttime field reconnaissance efforts and feedback from the District prior to mobilizing for the work. Areas targeted for nighttime field reconnaissance include: Browns Valley – Area 2 from the 2016 Dry Weather Flow Monitoring project; Nipak grouting project area in Basin H; and Basin IJ.

Note: The effectiveness of the field reconnaissance is limited in what it may discover, such that the source of I&I may not be traceable from the field visits and the work may be dependent on investigations taking place during storm events, which are unpredictable. Evidence of I&I will be documented and, wherever possible, quantified. Depending on the characteristics and conditions unique to the basins being investigated, investigation measures may include general and/or detailed reconnaissance, and/or basin isolation by meter relocation or temporary meter usage.

GHD will conduct a preliminary review the I&I reconnaissance report and will provide the draft report with redline comments to the District. The report with redline comments will be discussed at the review meeting (Task 2.4) and used for finalization of V&A's report, and then incorporated into the Summary Report included in Task 3.

*Deliverables: Draft and Final I&I Reconnaissance Report – Three (3) hard copies and an electronic format (pdf) submittal*

### *Task 2.3 Nighttime CCTV Inspection*

GHD has contracted with Professional Pipe Services (Pro Pipe) for pipeline and manhole digital scanning (Panoramo) for Basin IJ.



## ATTACHMENT "A"

Panorama CCTV for Basin IJ will focus on identifying pipeline and manhole defects and any associated sources of infiltration. Manholes will also be GPS located during the field work. This scope includes approximately two (2) nighttime work shifts, which is anticipated to cover 6,300 LF of non-PVC sewer main and 19 manholes (approximately 30% of the basin).

Based on preliminary review of the District's GIS data for this basin, the quantity of 6-inch pipe to be inspected is similar to the quantity of 8-inch and larger pipe. The portion of this basin to be inspected will be based, in part, on V&A's nighttime reconnaissance findings.

Pro Pipe will post-process field observations and provide NASSCO standard PACP and Manhole Assessment Certification Program (MACP) defect codes. Field observations and defect codes will be also integrated into the District's GIS geodatabase.

GHD will conduct a preliminary review the CCTV report and GIS geodatabase and will provide the draft report with redline comments to the District. The report with redline comments will be discussed at the review meeting (Task 2.4) and used for finalization of Pro Pipe's report, and then incorporated into the Summary Report included in Task 3.

*Deliverables: Draft and Final CCTV Report – Three (3) hard copies and electronic format (pdf and GIS) submittal*

### **Task 2.4 Review Meeting**

GHD and V&A will attend a review meeting at the District to discuss the draft reports, including likely conclusions that will be used for the Summary Report to be prepared under Task 3.

*Deliverables: Meeting agenda and notes*

### **Task 3 – Summary Report**

Following review of the V&A and Pro Pipe deliverables in Task 2, GHD will incorporate those deliverables into a summary report. The primary purpose of the summary report is to bring the V&A and Pro Pipe deliverables into one document and highlight recommendations that will provide guidance for the District's I&I Reduction Program and associated collection system projects. GHD will submit the draft report for District review, and finalize the report following receipt of District comments.

*Deliverables: Draft and Final 2016-17 I&I Reduction Program Summary Report – Three (3) hard copies and an electronic format (pdf) submittal*

### **Optional Tasks**

#### **Task O.1 Additional 0.5 Month Flow Monitoring (1.0 month → 1.5 months)**

At the direction of the District, which would likely follow a review and discussion of weather conditions affecting the flow monitoring effort, the flow monitoring time period would be extended for an additional half month. The intent for extending the flow monitoring time period is to capture additional data from storm events. Analysis and reporting per Task 2.1 would also apply to this optional task.

#### **Task O.2 Additional 0.5 Month Flow Monitoring (1.5 month → 2.0 months)**

Similar to Task O.1, at the direction of the District, which would likely follow a review and discussion of weather conditions affecting the flow monitoring effort, the flow monitoring time period would be extended for an additional half month. The intent for extending the flow monitoring time period is to capture additional data from storm events. Analysis and reporting per Task 2.1 would also apply to this optional task.



## ATTACHMENT "A"

### *Task O.3 Additional Flow Meters*

At the direction of the District, additional flow meters will be installed within the collection system. This optional task includes two (2) flow meters for a period of one month. Analysis and reporting per Task 2.1 would also apply to this optional task.

### **Project Schedule**

Engineering services will commence upon issuance of the Notice to Proceed for this scope of services, which is anticipated to occur following the District's November 2016 Board meeting. The Project will begin with project planning and site reconnaissance in December 2016. Timing for flow monitoring is weather-dependent, but anticipated to begin sometime between mid-December 2016 and January 2017. Flow monitoring will last for one to two months. Nighttime I&I reconnaissance and CCTV inspection are anticipated to occur following storm event(s) during the flow monitoring period.

One month following the conclusion of the flow monitoring, V&A and Pro Pipe will submit their draft reports for deliverable to GHD. GHD will review the reports and provide the draft report with redline comments to V&A and the District within two weeks, at which time the project team will convene for the review meeting. V&A and Pro Pipe final reports will be submitted by V&A and Pro Pipe three weeks following the review meeting. Then, GHD will prepare the Summary Report. The following provides an approximate schedule for the completion of the scope of services:

**Table 1 Tentative Project Schedule**

<u>Task</u>	<u>Completion Date</u>
a. Notice to Proceed	December 2016
b. Project Planning and Site Reconnaissance (Task 2.1)	December 2016
c. Conduct Flow Monitoring (Task 2.1)	December 2016 – February/March 2017 *
d. Conduct Nighttime Field Reconnaissance (Task 2.2)	January/February 2017 *
e. Conduct Nighttime CCTV Inspection (Task 2.3)	January/February 2017 *
f. Prepare Draft Reports (1 month) (Tasks 2.1, 2.2, and 2.3)	March/April 2017 *
g. GHD Review (2 weeks) (Tasks 2.1, 2.2, and 2.3)	April 2017 *
h. Review Meeting (Task 2.4)	May 2017 *
i. Prepare Summary Report (Task 3)	June 2017 *

\* Timing depends on weather conditions and whether or not the flow monitoring period was extended from 1.0 month to 1.5 or 2.0 months.



## ATTACHMENT "B"

### PROJECT FEE ESTIMATING SHEET

Project Name: 2016-17 I&I Reduction Program

Prepared by: M. Winkelman

Reviewed by: T. Whiton

Job Number: 11140048

Client: Napa Sanitation District

Date: November 7, 2016

		LABOR COSTS					FEE COMPUTATION			
	LABOR CATEGORY >  RATE >	Principal / QA/QC \$265 /Hr	Proj. Mgr. / Sr. Engr. \$205 /Hr	Project Engineer \$150 /Hr	Admin \$100 /Hr	TOTAL HOURS	*OTHER DIRECT COSTS	Sub-Consultant  V&A	Sub-Consultant  Pro Pipe	TOTAL FEE
Task 1 - Project Management and Coordination										
1.1 Coordination and Administration		1	8		2	11	\$66			\$2,171
Subtotal Task 1		1	8	0	2	11	\$66	\$0	\$0	\$2,171
Task 2 - Wet Weather Field Activities										
2.1 Flow Monitoring and Report		2	10	14		26	\$156	\$65,100		\$69,936
2.2 Nighttime Field Reconnaissance			3	3		6	\$36	\$38,588		\$39,689
2.3 Nighttime CCTV Inspection			3	5		8	\$48		\$29,759	\$31,172
2.4 Review Meeting		5	5			10	\$60			\$2,410
Subtotal Task 2		7	21	22	0	50	\$300	\$103,688	\$29,759	\$143,207
Task 3 - Summary Report										
3.1 Summary Report		3	16	24	2	45	\$270			\$8,145
Subtotal Task 3		3	16	24	2	45	\$270	\$0	\$0	\$8,145
PROJECT TOTALS		11	45	46	4	106	\$636	\$103,688	\$29,759	\$ 153,523
Optional Tasks										
O.1 Additional 0.5 Month Flow Monitoring (1.0 month --> 1.5 months)			1	1	1	3	\$18	\$17,955		\$18,428
O.2 Additional 0.5 Month Flow Monitoring (1.5 months --> 2.0 months)			1	1		2	\$12	\$17,955		\$18,322
O.3 Additional Flow Meters			2	2	1	5	\$30	\$5,250		\$6,090
Subtotal Optional Tasks		0	4	4	2	10	\$60	\$41,160	\$0	\$42,840
PROJECT TOTALS (With Optional Tasks)		11	49	50	6	116	\$ 696	\$ 144,848	\$ 29,759	\$ 196,363

\*OTHER DIRECT COSTS include telephone, mileage, printing, photocopies and other miscellaneous direct expenses.