

**STANDARD AGREEMENT FOR PROFESSIONAL SERVICES**

**THIS AGREEMENT** made between the City of Aurora, whose address is 44 E. Downer Place, Aurora, Illinois 60507 hereinafter called the **CLIENT** and Crawford, Murphy & Tilly, Inc., Consulting Engineers, 2750 West Washington Street, Springfield, Illinois 62702, hereinafter called the **ENGINEER**.

**WITNESSETH**, that whereas the **CLIENT** desires the following described professional engineering, land surveying or architectural services:

Continuation of a planned and organized system-wide watermain flushing program through the implementation of watermain flushing operations for a portion of the City of Aurora (Area 2 and three sub areas of Area 3, Zone 3C, 3D and 3F) based on flushing sequences developed previously.

The engineering services for the implementation of watermain flushing operations for Area 2 and three sub areas of Area 3 is described in the attached Exhibit A – Scope of Services. The limits of the above-mentioned areas, Area 2 and three sub areas of Area 3 are shown in the attached Exhibit B.

**NOW THEREFORE**, the **ENGINEER** agrees to provide the above described services and the **CLIENT** agrees to compensate the **ENGINEER** for these services in the manner checked below:

- On a time and expense basis in accordance with the attached Exhibit C - Schedule of Hourly Charges which is subject to change at the beginning of each calendar year. Reimbursable direct expenses will be invoiced at cost. Professional or Subconsultant services performed by another firm will be invoiced at cost plus ten percent. Note that no Professional or Subconsultant services are anticipated to be furnished to the **ENGINEER** by another firm on this project.
- At the lump sum amount of \$\_\_\_\_\_.

**IT IS MUTUALLY AGREED THAT**, payment for services rendered shall be made monthly in accordance with invoices rendered by the **ENGINEER**.

**IT IS FURTHER MUTUALLY AGREED:**

That the compensation for services for the implementation of watermain flushing operations for Area 2 and Zones 3C, 3D & 3F of Area 3 shall not exceed \$343,900 per the attached Exhibits D, D-1, and D-2 without further authorization from the **CLIENT**.

The **CLIENT** and the **ENGINEER** each binds himself, his partners, successors, executors, administrators and assignees to each other party hereto in respect to all the covenants and agreements herein and, except as above, neither the **CLIENT** nor the **ENGINEER** shall assign, sublet or transfer any part of his interest in this **AGREEMENT** without the written consent of the other party hereto. This **AGREEMENT**, and its construction, validity and performance, shall be governed and construed in accordance with the laws of the State of Illinois. This **AGREEMENT** is subject to the General Conditions attached hereto.

**IN WITNESS WHEREOF**, the parties hereto have affixed their hands and seals this \_\_\_\_\_ day of \_\_\_\_\_, 2018.

**CLIENT:**

CITY OF AURORA

(Client Name)

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Name and Title)

**ENGINEER:**

CRAWFORD, MURPHY & TILLY, INC.

  
(Signature)

Raed Armouti, Director of Water Resources  
(Name and Title)

**CMT Job No.** \_\_\_\_\_

**STANDARD GENERAL CONDITIONS**  
**Crawford, Murphy & Tilly, Inc.**

1. Standard of Care

In performing its professional services hereunder, the **ENGINEER** will use that degree of care and skill ordinarily exercised, under similar circumstances, by members of its profession practicing in the same or similar locality. No other warranty, express or implied, is made or intended by the **ENGINEER'S** undertaking herein or its performance of services hereunder.

2. Reuse of Document

All Reports, Drawings, Specifications, other documents, and electronic media prepared or furnished by **ENGINEER** pursuant to this Agreement are instruments of service in respect to the Project and shall be the property of the **CLIENT**. **ENGINEER** shall retain the right of reuse of said documents and electronic media by and at the discretion of the **ENGINEER** whether or not the Project is completed. Reproducible copies of **ENGINEER'S** documents and electronic media of the Project and **ENGINEER's** documents shall be delivered to the **CLIENT**; however, Project and **ENGINEER's** documents and electronic media are not intended or represented to be suitable for reuse by the **CLIENT** or others on additions or extensions of the Project, or on any other project.

3. Termination

This Agreement may be terminated by either party upon seven days prior written notice. In the event of termination, the **ENGINEER** shall be compensated by the client for all services performed up to and including the termination date, including reimbursable expenses.

4. Parties to the Agreement

The services to be performed by the **ENGINEER** under this Agreement are intended solely for the benefit of the **CLIENT**. Nothing contained herein shall confer any rights upon or create any duties on the part of the **ENGINEER** toward any person or persons not a party to this Agreement including, but not limited to any contractor, subcontractor, supplier, or the agents, officers, employees, insurers, or sureties of any of them.

5. Construction and Safety

This project will be completed with **CLIENT** staff working alongside **ENGINEER** staff. The **ENGINEER** shall be responsible for the safety of their own personnel working on the job site. The **CLIENT** shall be responsible for the safety of their own personnel working on the job site.

6. Payment

**CLIENT** shall be invoiced once each month for work performed during the preceding period. **CLIENT** agrees to approve and pay such invoices in the manner provided by the Local Government Prompt Payment Act, 50 ILCS 505/1 et. seq. **CLIENT** further agrees to pay interest on all amounts approved and not paid at the interest rate permitted under the Local Government Prompt Payment Act.

7. Risk Allocation

Inherent to the completion of this project, **ENGINEER** staff will be required to operate **CLIENT** owned valves and fire hydrants. **ENGINEER** staff will be provided training by **CLIENT** staff at the beginning of the project on the proper operation of valves and fire hydrants. Subject to the condition of the existing valves and fire hydrants, such proper operation of the existing valves and fire hydrants may result in damage and consequential damages for which the **ENGINEER** cannot be held responsible.

# **CITY OF AURORA 2018 FLUSHING PROGRAM – AREA 2 AND ZONES 3C, 3D & 3F OF AREA 3 FLUSHING**

## **EXHIBIT A - SCOPE OF SERVICES January 26, 2018**

### **Background**

In 2012, the city of Aurora embarked upon the development of a planned and organized system-wide multi-year watermain flushing program as part of routine water distribution system maintenance. Flushing distribution system watermains is considered a standard and recommended practice by the American Water Works Association (AWWA).

Watermain flushing can be performed either by means of conventional flushing or unidirectional flushing. In order to effectively flush the watermain, a target velocity of 5 feet per second is desired. Conventional flushing which consists of sequentially opening fire hydrants can sometimes achieve the target velocities. In locations where the target velocity cannot be achieved, unidirectional flushing is required. Unidirectional flushing is a systematic method of closing watermain valves and opening hydrants to direct water one-way at high velocities through targeted segments of pipe. Unidirectional flushing induces high water velocities which effectively removes deposits and cleans the pipe. The benefits of flushing include removal of rust and sediment, improved chlorine residual, and reduction in taste and odor; all of which can help provide high quality water to city of Aurora residents.

The city's water distribution system consists of over 740 miles of pipe. The extents of the flushing areas for the entire water distribution system have been determined as shown in Exhibit B. Flushing areas have been determined based on: dividing the city into 6 areas with similar total lengths of watermain; the location of water transmission main endpoints (locations that potable water from the Water Treatment Plant enters the distribution system) and a summary of water quality issue locations for ten years previous to 2012.

The watermain flushing program began in 2012 with the design of Area 1 flushing sequences. In 2013, Area 1 was flushed and the design of the flushing sequences for Area 2 was completed. In 2014, Area 2 was flushed and the design of flushing sequences for Areas 3 and 4 were completed. In 2015, remainder of Area 3 and Area 4 were flushed and the design of flushing sequences for Areas 5 and 6 was completed. In 2016, Areas 5 & 6 were flushed. In addition, the hydraulic analysis and design of flushing sequences were updated for Areas 1 through 6 to incorporate field changes, modifications to the flushing program parameters learned through the previous 4 years of field work, and new watermains constructed or replaced since the program began. With the completion of flushing in Areas 5 & 6, flushing of the entire water distribution system was completed. In the summer of 2017, the City embarked upon its second round of watermain flushing, beginning with Area 1. With this project, the City will embark on its second round of watermain flushing for Area 2 and three sub-areas of Area 3 namely, Zones 3C, 3D and 3F.

## **Project Tasks**

Project tasks for the flushing of Area 2 and Zones 3C, 3D & 3F of Area 3 will include the following:

### *1. Project Start-up*

At the start of the flushing portion of the project, a kick-off meeting will be held with city staff to coordinate the field effort. The kick-off meeting will be attended by the proposed flushing crew so that flushing protocol/procedures can be reviewed by everyone at the same time. Project start-up activities will also include the development of a flushing schedule and the generation of checklists for field use.

It is anticipated that the city will provide equipment required for the flushing including diffusers, hydrant wrenches, valve keys, hydrant flow meter, pressure gauges, hoses, signs, lab kits and traffic control. The equipment to be used will be coordinated at the kick-off meeting.

It is anticipated that the city will prepare public notification information including a brochure that would be mailed to residents in Area 2 and Zones 3C, 3D & 3F of Area 3 as well as setting up a website. The content for the public notification information will be provided by CMT for publishing and delivery by the city.

Prior to unidirectional flushing in each area, it is anticipated the City will locate each valve to be operated as part of the unidirectional flushing sequence using a GPS locator. The valve locations and numbers will be provided to CMT as GIS data for use on CMT's mobile devices.

### *2. Unidirectional Flushing*

Within each subarea, there are sections of watermain noted for conventional flushing and sections noted for unidirectional flushing. The unidirectional flushing will be performed first in each subarea.

The unidirectional flushing will be performed with a crew of 6 people (2 valve operating crews each with 2 people, 1 person on the flushing hydrant, and 1 supervisor with 1 of the valve operators also covering the residual pressure monitoring hydrant). Of the 6 unidirectional flushing crew members, it has been assumed that all 6 will be CMT staff members. It has been assumed that 2 of the 6 crew members provided by CMT will be entry level engineers, one with at least 2 years of flushing experience. The remaining 4 positions would be either technical assistants or summer intern positions.

Based on production rates achieved with unidirectional flushing completed in previous four years, it has been assumed that 7,500 ft. of watermain can be unidirectionally flushed each day. The production rates for the unidirectional flushing will be evaluated periodically throughout the project.

### *3. Conventional Flushing*

After the unidirectional flushing is completed in each subarea, conventional flushing will be performed. Conventional flushing will be performed with crew members from the

unidirectional flushing crew broken down into two crews – one with 2 CMT crew members and one with 4 CMT crew members.

It is anticipated that the 2 person crew will be flushing in a separate area from the 4 person crew, so both can be operating hydrants without adversely impacting the system.

It has been assumed that a 2 person crew will be able to conventionally flush 21 hydrants per day and a 4 person crew will be able to conventionally flush 42 hydrants per day. The production rates for the conventional flushing will be evaluated periodically throughout the project.

#### *4. Office Engineering*

As unidirectional and conventional flushing proceeds in the field, CMT will provide office support (as needed) to address field issues including closed valves, drainage problems, low pressure or inadequate flow. In addition, CMT will provide daily updates to the city for updating the flushing hotline.

#### *5. Coordination Meetings*

It has been assumed that coordination meetings (no more than once per month) will be required throughout the project.

#### *6. Miscellaneous Effort*

Update Flushing Sequences:

It is anticipated that the City will provide CMT with the engineering plans for the new water main replacements in Area 2 and Zones 3C, 3D & 3F of Area 3. CMT will update the Unidirectional flushing and Conventional flushing sequences accordingly.

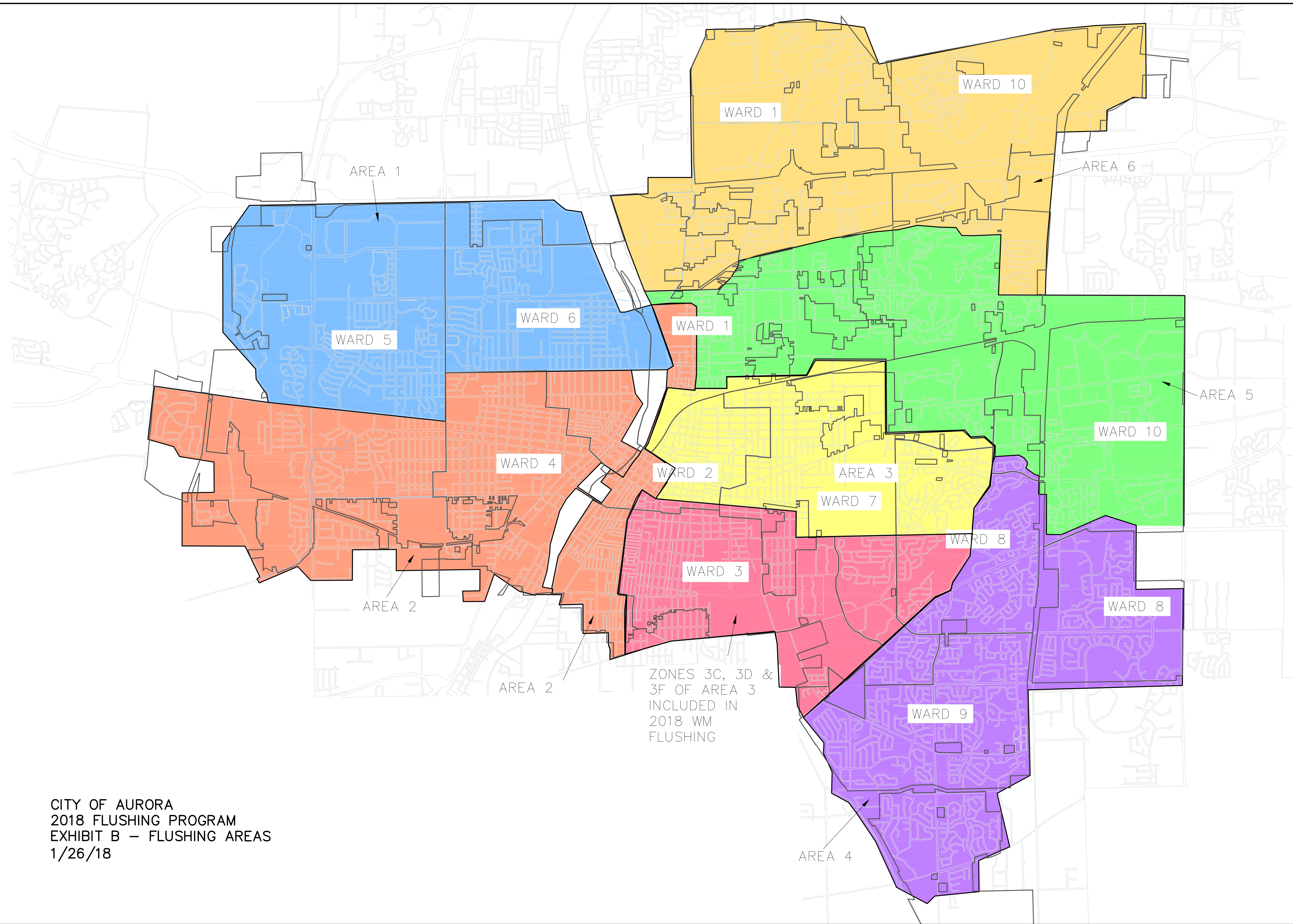
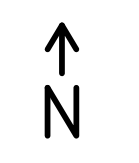
GIS Assistance:

CMT will provide training and assistance as and when needed for the collection of field data using iPads that will be provided by CMT.

### **Schedule**

Flushing is planned to begin the second week in May and will continue through the second week of August, resulting in approximately 62 working days taking into account holidays and a couple of rain/heat days.





CITY OF AURORA  
2018 FLUSHING PROGRAM  
EXHIBIT B – FLUSHING AREAS  
1/26/18

ZONES 3C, 3D &  
3F OF AREA 3  
INCLUDED IN  
2018 WM  
FLUSHING



**EXHIBIT C  
CITY OF AURORA  
RESIDENT INSPECTION AND ENGINEERING SERVICES**

<b>CLASS NO.</b>	<b>CLASSIFICATION</b>	<b>2017 AVG DIRECT LABOR RATE</b>	<b>BILLING RATE MULTIPLIER @ 2.90</b>	<b>2018 BILLING RATE *</b>
10	<b>Principal</b> (IDOT cap at \$70)	\$70.00	\$203.00	\$205.44
20	<b>Senior Project Engineer/Manager</b>	\$64.96	\$188.40	\$190.66
30	<b>Project Engineer/Manager</b>	\$52.10	\$151.09	\$152.90
40	<b>Senior Engineer</b> (licensed professional engineer)	\$40.58	\$117.67	\$119.08
41	<b>Senior Architect</b>	\$38.59	\$111.93	\$113.27
42	<b>Senior Technical Manager</b>	\$49.74	\$144.23	\$145.96
43	<b>Senior Planner</b> (aviation planning, environ.	\$36.22	\$105.04	\$106.30
44	<b>GIS Specialist</b>	\$28.59	\$82.91	\$83.90
50	<b>Engineer</b> (graduate engineer)	\$30.56	\$88.63	\$89.69
51	<b>Architect</b>	\$31.39	\$91.03	\$92.12
60	<b>Planner</b> (aviation planning, environ.	\$24.31	\$70.48	\$71.33
65	<b>Technical Manager</b>	\$24.42	\$70.81	\$71.66
70	<b>Registered Land Surveyor</b>	\$44.08	\$127.82	\$129.35
80	<b>Senior Technician</b> (exp survey tech, CAD tech,	\$35.65	\$103.39	\$104.63
90	<b>Technician II</b> (survey instrument man, CAD	\$27.75	\$80.49	\$81.46
100	<b>Technical I</b> (junior-level rodman, inspector,	\$20.85	\$60.45	\$61.18
110	<b>Clerical/Word Processor</b>	\$23.56	\$68.33	\$69.15

\*Using an escalation rate of 1.2% based on the CCI increase from November 2016 to November 2017.

Computation of billing rate multiplier:

Direct labor factor	1.0000
Audited overhead rate	1.641
Subtotal	2.6409
Profit factor	1.10
Total	2.90

*Overhead and rate calculation is based on AASHTO guidelines for all US DOT's nationwide.*

**CITY OF AURORA**  
**2018 WATERMAIN FLUSHING PROGRAM - Area 2 and Zones 3C, 3D and 3F Flushing**

Exhibit D - Professional Services Cost Estimate Summary  
26-Jan-18

<b>Exhibit</b>	<b>Description</b>	<b>Manhours</b>	<b>Amount</b>
D-1	Area 2 + Zone 3C + Zone 3D + Zone 3F- Flushing Costs	4,175	\$343,900



CITY OF AURORA

2018 Watermain Flushing Program - Area 2 and Zones 3C, 3D and 3F Flushing

Exhibit D-1 - Professional Services Cost Estimate

26-Jan-18

**Assumptions:**

Unidirectional Flushing - Assume 6 CMT crew members with 2 Engineers and 4 Interns  
 Conventional Flushing - Assume 6 CMT crew members working on conventional flushing with 2 crews.  
 Technical Assistance - Assume CMT to provide daily office technical assistance

**Conventional Flushing Crew:**

-->assume unidirectional crew splits into two crews, a 2-person crew and a 4-person crew, for conventional flushing

Crew Size	2	
Technical Assistant (\$/hr.)	\$61.18	
Engineer (\$/hr.)	\$89.69	
2017 Crew Cost (\$/hour)	\$150.87	
Number of Hydrants per day	21	Based on a 2 person crew flushing between 20 - 25 hydrants per day in 2015 Watermain Flushing Program

Crew Size	4	
Technical Assistant (\$/hr)	\$61.18	
Technical Assistant (\$/hr)	\$61.18	
Technical Assistant (\$/hr.)	\$61.18	
Engineer (\$/hr.)	\$89.69	
2018 Crew Cost (\$/hour)	\$273.23	
Number of Hydrants per day	42	Based on a 4 person crew flushing between 40 - 50 hydrants per day in 2015 Watermain Flushing Program

**Unidirectional Flushing:**

Crew Size	6	
Technical Assistant (\$/hr)	\$61.18	
Technical Assistant (\$/hr)	\$61.18	
Technical Assistant (\$/hr.)	\$61.18	
Technical Assistant (\$/hr.)	\$61.18	
Engineer (\$/hr.)	\$89.69	
Engineer (\$/hr.)	\$89.69	
2018 Crew Cost (\$/hour)	\$424.10	
Approximate feet per day	7,500	Based on average of 7,500 feet/day of UDF Flushing with a 6 member crew.
Assume operating a maximum of 30 valves per day (add crew days as necessary above footage calculation)		

**Flushing Technical Assistance**

2018 Senior Engineer (\$/hour)	\$119.08
2018 GIS Specialist (\$/hour)	\$83.90

Technical Assistance - assume 6 hours per day

Field Paperwork - assume 5 hours per week

Coordination Meetings - assume 4 hours per week

Project Management Time - 5 hours per week (2018 Hourly Rate = \$190.66/hour)

	2A	2B	2C	2D	2E	2F	2G	2H	2I	2J	2K	3C	3D	3F	TOTAL
<b>Conventional Flushing</b>															
Length of watermain (feet)	35,528	92,851	45,925	31,732	83,413	19,373	1,673	57,471	76,237	39,199	73,953	97,165	134,184	43,545	832,249
Length of watermain (miles)	6.73	17.59	8.70	6.01	15.80	3.67	0.32	10.88	14.44	7.42	14.01	18.40	25.41	8.25	158
<b>--&gt; Conventional Flushing (2 CMT person crew)</b>															
# of Hydrants	21	45	30	25	45	20	0	50	63	26	45	65	50	65	550
Estimated flushing time (crew hours)	8	18	12	10	18	8	0	20	24	10	18	25	20	25	216
Estimated flushing time (crew days)*	1.5	2.5	1.5	1.5	2.5	1.0	0.0	2.5	3.5	1.5	2.5	3.5	3.0	3.5	31
Estimated Crew Labor Cost	\$1,810.44	\$3,017.40	\$1,810.44	\$1,810.44	\$3,017.40	\$1,206.96	\$0.00	\$3,017.40	\$4,224.36	\$1,810.44	\$3,017.40	\$4,224.36	\$3,620.88	\$4,224.36	\$36,812.28
<b>--&gt;Conventional Flushing (4 CMT person crew)</b>															
# of Hydrants	38	100	63	39	96	20	3	92	126	48	91	126	103	128	1073
Estimated flushing time (crew hours)	8	20	12	8	19	4	1	18	24	10	18	24	20	25	211
Estimated flushing time (crew days)*	1.5	2.5	1.5	1.5	2.5	1.0	0.5	2.5	3.5	1.5	2.5	3.5	3.0	3.5	31.0
Estimated Crew Labor Cost	\$3,278.76	\$5,464.60	\$3,278.76	\$3,278.76	\$5,464.60	\$2,185.84	\$1,092.92	\$5,464.60	\$7,650.44	\$3,278.76	\$5,464.60	\$7,650.44	\$6,557.52	\$7,650.44	\$67,761.04
<b>Unidirectional Flushing (6 CMT person crew)</b>															
Length of watermain (feet)	18,610	21,648	11,412	10,641	16,114	9,686	15,048	8,735	21,274	20,666	13,667	24,508	28,623	30,116	250,748
Length of watermain (miles)	3.52	4.10	2.16	2.02	3.05	1.83	2.85	1.65	4.03	3.91	2.59	4.64	5.42	5.70	47
Number of Sequences	15	12	5	7	10	3	3	4	9	6	7	11	11	13	114
Number of Valves to Operate	102	88	26	45	73	7	14	15	14	86	56	73	64	86	749
Average Length of Watermain per Sequence (feet)	1,241	1,804	2,282	1,520	1,611	3,229	5,016	2,184	2,364	2,296	2,278	3,501	2,602	2,317	34,245
Average # of Valves per Sequence	7	7	5	6	7	2	5	4	2	10	9	10	6	7	87
# of valves per mile of watermain	29	21	12	22	24	4	5	9	3	22	22	16	12	19	216
Estimated flushing time (crew hours)	20	24	13	12	18	11	17	10	23	23	15	27	31	33	277
Estimated flushing time (crew days)*	3.5	3.5	2.0	2.0	2.5	1.5	2.5	1.5	3.0	3.0	2.0	3.5	4.0	4.5	39.0
Estimated Crew Labor Cost	\$11,874.80	\$11,874.80	\$6,785.60	\$6,785.60	\$8,482.00	\$5,089.20	\$8,482.00	\$5,089.20	\$10,178.40	\$10,178.40	\$6,785.60	\$11,874.80	\$13,571.20	\$15,267.60	\$132,319.20
<b>Office Engineering</b>															
Technical Assistance time (hours)	30	36	21	21	30	15	17	24	39	27	27	42	42	48	419
Estimated Labor Cost	\$3,572.40	\$4,286.88	\$2,500.68	\$2,500.68	\$3,572.40	\$1,786.20	\$1,964.82	\$2,857.92	\$4,644.12	\$3,215.16	\$3,215.16	\$5,001.36	\$5,001.36	\$5,715.84	\$49,834.98
<b>Total</b>															
Length of watermain (feet)															1,082,997
Length of watermain (miles)															205
<b>Miscellaneous Effort</b>															
Update flushing maps (hours)															60
Update flushing maps (cost)															\$7,144.80
Facility Contact List (hours)															24
Facility Contact List (cost)															\$2,152.56
Project Start-up/Close-Out (hours)															100
Project Start-up/Close-Out Costs															\$15,487.00
GIS Assistance (hours)															24
GIS Assistance Costs															\$2,013.60
Field Paperwork (hours)															70.0
Field Paperwork Cost															\$6,278.30
Coordination Meetings (hours)															56.0
Coordination Meetings Cost															\$10,676.96
Project Management (hours)															70.0
Project Management Cost															\$13,346.20
<b>Total Labor Hours</b>	270	324	189	189	270	135	153	216	351	243	243	378	378	432	4175
<b>Total Cost</b>	\$20,536.40	\$24,643.68	\$14,375.48	\$14,375.48	\$20,536.40	\$10,268.20	\$11,539.74	\$16,429.12	\$26,697.32	\$18,482.76	\$18,482.76	\$28,750.96	\$28,750.96	\$32,858.24	\$343,826.92

\*Rounded up to nearest half day (this accounts for time to move signs).

\*rounded up to \$343,900

CITY OF AURORA

2018 Watermain Flushing Program - Area 2 and Zones 3C, 3D & 3F of Area 3 Flushing

Exhibit D-2 - Summary of Unidirectional and Conventional Flushing Statistics

26-Jan-18

	2A	2B	2C	2D	2E	2F	2G	2H	2I	2J	2K	3C	3D	3F	TOTAL
<b>Conventional Flushing</b>															
# of Hydrants	59	145	93	64	141	40	3	142	189	74	136	191	153	193	1,623
Length of watermain (feet)	35,528	92,851	45,925	31,732	83,413	19,373	1,673	57,471	76,237	39,199	73,953	97,165	134,184	43,545	832,249
Length of watermain (miles)	6.73	17.59	8.70	6.01	15.80	3.67	0.32	10.88	14.44	7.42	14.01	18.40	25.41	10.26	160
<b>Unidirectional Flushing</b>															
Length of watermain (feet)	18,610	21,648	11,412	10,641	16,114	9,686	15,048	8,735	21,274	20,666	13,667	24,508	28,623	30,116	250,748
Length of watermain (miles)	3.52	4.10	2.16	2.02	3.05	1.83	2.85	1.65	4.03	3.91	2.59	4.64	5.42	5.70	47
Number of Sequences	15	12	5	7	10	3	3	4	9	9	6	7	11	13	114
Number of Valves to Operate	102	88	26	45	73	7	14	15	14	86	56	73	64	86	749
<b>TOTAL</b>															
Length of watermain (feet)	54,138	114,499	57,337	42,373	99,527	29,059	16,721	66,206	97,511	59,865	87,620	121,673	162,807	73,661	1,082,997
Length of watermain (miles)	10.25	21.69	10.86	8.03	18.85	5.50	3.17	12.54	18.47	11.34	16.59	23.04	30.83	13.95	205