STANDARD AGREEMENT FOR PROFESSIONAL SERVICES

THIS AGREEMENT made between the City of Aurora, a home rule Illinois municipal corporation, 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:

Professional engineering services for the 2024 Hydraulic Model Update described in the attached **Exhibit A** – Scope of Services.

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 B** - 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 engineering services for the 2024 Hydraulic Model Update shall not exceed $200,000, per the attached **Exhibit C** 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 _____, 2024.

CLIENT:	**ENGINEER:**
CITY OF AURORA	**CRAWFORD, MURPHY & TILLY, INC.**
(Client Name)	
	Chris P. Dagiantis
(Signature)	(Signature)
	Chris Dagiantis, Water Resources – Group Manager
(Name and Title)	(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. Insurance

ENGINEER shall indemnify and save harmless CITY, its officers and employees, from suits, actions or claims of any character brought because of any injuries or damages received or sustained by any person, persons, or property resulting from any negligent act, error or omission on the part of ENGINEER.

During the term of this AGREEMENT, ENGINEER shall provide the following types of insurance with no less than the following specified amounts.

a. Comprehensive general liability – combined single limit amount of $1,000,000 per incident, $2,000,000 general aggregate limit.
b. Auto Liability – combined single limit amount of $1,000,000 per incident on any vehicle driven by an R.I. while engaged in any activity within the scope of this AGREEMENT.
c. Professional Liability - $5,000,000;
d. Worker's Compensation – Statutory Limit; the policy shall include a "Waiver of Subrogation" clause;
e. "Umbrella Coverage" - $5,000,000.

ENGINEER shall furnish to CITY satisfactory proof of coverage of the above insurance requirements by a reliable company or companies, before commencing any work. Such proof shall consist of a current certificate executed by the insurance company(s) and shall be filed with CITY. Said certificate shall name the city of Aurora as additional, non-contributory insured and contain a clause which requires that no change shall be made to the coverage and there shall be no cancellation or lapse of such coverage unless CITY receives written notification from the insurance company providing coverage at least thirty (30)-days in advance of said cancellation or change in coverage.

City of Aurora

2024 Hydraulic Model Update

Exhibit A - SCOPE OF SERVICES

Background

Crawford, Murphy & Tilly, Inc. (CMT) developed the original city of Aurora (City) water distribution system hydraulic model in 1996. Previous hydraulic model updates were completed by CMT in 2005 and 2016. The hydraulic model has been used for several water service evaluations over the past 7 years. Since 2005 water usage has decreased. The Water Production Division has been compiling water usage data annually. In 2006, the City enacted a water conservation ordinance which resulted in an observed decrease of ~20 gallons per person per day in the Maximum Day Demand. In the most recent drought year, 2012, the Average Day Demand was 17.39 MGD and the Maximum Day Demand was 27.28 MGD, both lower than water usage in 2005. According to the US Census Bureau, population in the City has decreased from 197,899 in 2010 to 180,542 in 2020, representing a population decrease of almost 9% in 10 years. The 2022 US Census Bureau estimated population is 177,866.

When the model was updated in 2016, model demands were revised based on the water usage from 2011 through 2015 which included an Average Day Demand of 16.4 MGD (11.5 MGD in Normal Pressure System (NPS) and 4.9 MGD in High Pressure System (HPS)) and a Maximum Day Demand of 27.2 MGD (19.1 MGD in Normal Pressure System and 8.1 MGD in High Pressure System).

Since 2016, development in the City has continued at a steady pace, including Meadowridge, Chelsea Manor, Gramercy Square, Lincoln Prairie, and Fox Valley Mall residential developments. From 2016 to 2023 the total water supplied from the Water Treatment Plant has decreased by approximately 3 percent. For the same time period the amount of water supplied to the Normal Pressure System has decreased by approximately 8 percent; and the amount of water supplied to the High Pressure System has increased by approximately 12 percent.

Given the above, as well as the possibility of changes in water usage due to a more prevalent remote workforce since the pandemic, the demand distribution in the 2016 hydraulic model is not representative of the water usage occurring in the system and therefore, the hydraulic model needs to be updated. This is especially important as the hydraulic model continues to be utilized for water service evaluations for new residential, commercial and industrial developments.

Project Tasks

For the 2024 Hydraulic Model Update, both the steady state and extended period simulation scenarios in the hydraulic model will be updated. Therefore, the following tasks are anticipated for the project:

1. Project Kick-off Meeting – A meeting will be held with CMT and City staff to review scope, schedule and budget as well as discuss information to be collected from the City for the project.

2. Data Collection – The following information will be obtained from the City:
   An electronic copy of the City's current GIS map including watermain locations, hydrants, valves right of way lines, street names, parcel lines, watermain material, watermain installation year, zoning, elevation points and contours, and comprehensive land use plan boundaries. A list of locations and record drawings of watermains not updated in the City's GIS map to be provided.
   - Water billing information for 2021, 2022, 2023 (3 years) including customer address, customer type (residential, commercial, etc.) and water usage in excel or database format. For each year, provide annual usage as well as usage in highest billing period in each year.
   - Historical average day and maximum day water usage information since 2015, broken down by pressure zone (if available).
   - Water System Operation – operational information for pumps and tank levels during average day demand, maximum day demand and peak hour demand conditions.
   - Pump curves for all the pumps at Fox Valley East, Main Pump station and High Service pumps to reflect improvements that were completed.
   - SCADA data for 2023 Maximum Day and 2023 Average Day including tank levels and pump flow in 15 minutes increments.
   - SCADA data for a 5 day period of high demand from 2023 including tank levels and pump flow in 15 minute increments.

3. Review/Update historical water demands – CMT will review historical system wide demands that the City has been annually updating. CMT will work with the City to collect data required to separate the usage into Normal Pressure System and High Pressure System demands and update diurnal demand curves based on an average day and a high demand summer day in 2023.

4. Update Hydraulic Model – Updating the hydraulic model will consist of the following tasks:
   - Incorporate watermain modifications since 2016 – This includes the addition of new watermain as well as watermain replacements. The City's Water GIS Map will be compared to the current water model to determine the watermain modification locations. Some watermain modifications since 2016 may have already been included in the current water model based on record drawings with updates performed each year for the watermain flushing program. If there are watermain modifications in the current water model that are not in the GIS Map, CMT will provide markups to the City. Locations of watermain modifications in the GIS Map that are not in the water model will be noted and incorporated in the updated hydraulic model. The City has provided a list of Open Plans dated 2006 to 2023. It is assumed that the model is updated with watermain changes until 2016 and any new watermains with operating permits since 2017 would need to be updated. A total of 120 hours has been assumed to perform this task and it has been agreed upon that a separate task number will be created to track effort for incorporating watermain modifications in the model.
   - Update Roughness Coefficients – Watermain roughness coefficients will be updated for the model pipes based on age of watermain and time that has elapse since the last update. In areas where pipe condition is known to be poor, pipe roughness will be adjusted accordingly.
   - Update Elevations - Import topographic elevations from the latest County GIS map using the Trex Elevation Extractor tool in WaterGEMS.

- Update fire flow requirements – Update fire flow requirements (flow and residual pressure) in the model for junction nodes based on parcel zoning contained in GIS map.
- Update Model Demands - CMT will automatically import water billing data from the GIS map into WaterGEMS using the software's LoadBuilder tool. It is our understanding that the City's GIS mapping contains property information (location ID number) and this same property information is contained in water billing data so that the water billing data (annual usage and peak month usage) can be imported into the GIS map. Once the water billing data is in the GIS map, demands can be applied to the junction nodes using the LoadBuilder tool in WaterGEMS. A ratio between water billing usage and Average Day Demand will be utilized in the model based on historical water usage information obtained from the City. A ratio between maximum water billing usage and Maximum Day Demand will be utilized in the model based on the historical water usage information obtained from the City by pressure zone.

5. Calibrate Steady State Model - Once the steady state model is updated, it will be calibrated. We will perform calibration similar to the calibration performed in 2016 using pressure measurement throughout the system. First, the model would be calibrated over a two to three hour period by taking static pressure measurements at 20 minute intervals at approximately 40 fire hydrants throughout the City. The model would also be calibrated by performing 6 - 8 flow tests throughout the City representing various main sizes and installation years. Pipe roughness coefficients within the model will then be adjusted to recreate the conditions observed during the flow tests. It has been assumed that two CMT staff members and two City staff members will collect the pressure measurements at locations identified by CMT. During the calibration period, source information data at the time of the testing (source flows and pressures, tank levels, and pump status) will be recorded by City staff and provided to CMT for input into the model. Once the field calibration measurements have been obtained, they will be input into the model. Operating conditions, such as demand, pump operation, and tank levels will be input into the model. Field-measured pressures will be compared to model-computed pressures to determine if the accuracy of the model is within AWWA guidelines (2 psi for static pressure measurements and within 5 psi for flow tests).

6. Calibrate Extended Period Simulation (EPS) model – The EPS model was previously calibrated as part of the 2016 Hydraulic Model Update. The EPS Model will be recalibrated as part of this hydraulic model update. The extended period calibration will consist of the following tasks:
   - Create a minimum 24 hour calibration scenario and associated alternatives based on historical SCADA data from a period of high water usage from 2023. For the extended period selected, the City will need to provide source information for a 5 day period over 15 minute intervals to be input into the model to determine if actual tank levels compare favorably to computer calculated tank levels.
   - Troubleshoot the model to ensure that the model is accurately calibrated.
   - Compare and evaluate the model predicted versus actual water levels for the storage facilities to verify calibration.

7. Update and Run Steady State Modeling Scenarios – steady state simulation scenarios will be updated to reflect current water system operations and demands, as follows:
   - Steady State - Average Day Demand, Maximum Day Demand and Peak Hour modeling Scenarios will be updated. Current operations (pumps on and tank levels)

will be updated as well as demand ratios (average to maximum day demand and maximum day demand to peak hour demand).

- Steady State - Maximum Day Demand Including Near Future Developments
  An additional scenario for Maximum Day Demand will be created to include watermains from ongoing developments such as Lincoln Prairie Crossing South, Redwood, apartments by the Fox Valley Mall and upcoming developments including the casino, hotel, 50-acres east of the Premium Outlet mall entrance on Bilter Road, and the Route 59 Corridor.
- Once the scenarios have been updated, they will be run and the results will be compiled in tables and exhibits including pressure contours, fire flow contours and flow directions maps.

8. Update and Run Extended Period Modeling Scenarios – extended period simulation scenarios will be updated to reflect current water system operations and demands, as follows:
   - Extended Period Simulation - The EPS scenario in the model will be updated based on a typical 2023 summer day. Updated diurnal demands will be input into the model as well as current operations (pump on/off controls, etc.)
   - Once the scenarios have been updated, they will be run and the results will be compiled in tables and exhibits including pressure contours, fire flow contours, flow directions and water age contour maps.

9. Prepare report – The information compiled in the 2024 Hydraulic Model Update will be presented in report format. A draft report will be prepared and submitted to the City for review. CMT will then meet with the City staff to discuss comments on the draft report. Then CMT will incorporate comments and submit the final report to the City. The final report will include an electronic copy of the water model.

Note: that this model update does not include evaluation of the existing source, supply and treatment systems. It is anticipated that evaluation of the entire water system (including the distribution) would be completed separately as part of a Water Master Plan Update (similar to the previous 2005 Hydraulic Model Update and 2006 Water Master Plan Update).

Schedule

The schedule for the project is based on a start date of April 1, 2024. The intent is to submit the pre-final report by October 1, 2024 and submit the final report by November 15, 2024.

Engineering Effort

We estimate the level of effort for hydraulic model update at 1,124 man-hours at a cost of $200,000. Additional detail regarding the level of effort and cost is attached for your review.

EXHIBIT B - SCHEDULE OF HOURLY CHARGES
CITY OF AURORA
RESIDENT INSPECTION AND ENGINEERING SERVICES

CLASS NO.	CLASSIFICATION	2022 AVG DIRECT LABOR RATE	ESTIMATE 2023 AVG DIRECT LABOR RATE (2022 Rate x 7.0%)	2023 BILLING RATE Dir Labor x 2.99 Multiplier)	2024 BILLING RATE (2023 Rate x CCI Increase of 9.11%)
10	Principal (IDOT Cap is $78)	78.00	78.00	233.22	254.47
20	Project Engineer II	72.91	78.01	233.26	254.51
30	Project Engineer I (Traffic Engineer)	64.41	68.92	206.07	224.84
36	Project Structural Engineer I	58.44	62.53	186.97	204.00
40	Sr. Engineer I	43.10	46.12	137.89	150.45
42	Technical Manager II	62.31	66.67	199.35	217.51
44	GIS Specialist	38.31	40.99	122.57	133.73
47	Sr. Structural Engineer I	46.85	50.13	149.89	163.54
50	Engineer I	33.64	35.99	107.62	117.43
56	Structural Engineer I	34.79	37.23	111.30	121.44
60	Planner I	33.92	36.29	108.52	118.41
65	Technical Manager I	31.33	33.52	100.23	109.37
70	Land Surveyor	41.86	44.79	133.92	146.12
80	Sr. Technician I	42.60	45.58	136.29	148.71
81	Sr. Technician II	52.04	55.68	166.49	181.66
90	Technician II	39.90	42.69	127.65	139.28
100	Technician I	27.69	29.63	88.59	96.66
110	Administrative/Accounting Assistant	26.25	28.09	83.98	91.63

Computation of Billing Rate Multiplier:

Direct labor factor	1.0000
Audited overhead rate 2023	1.7226
Subtotal	2.7226
Profit factor	1.10
Total	2.99

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

CRAWFORD, MURPHY & TILLY, INC.

SCHEDULE C - 2024 PROFESSIONAL SERVICES COST ESTIMATE

CLIENT CITY OF AURORA

PROJECT NAME 2024 Hydraulic Model Update

CMT JOB NO. TBD

Prep By	VPG
DATE	02/29/24

Apprvd	C. Dagiantis
DATE	02/29/24

TASK NO.	TASKS \ CLASSIFICATIONS	Principal	Project Engineer II	Project Engineer I	Project Structural Engineer I	Technical Manager II Envr Scientist III	GIS Specialist	Sr. Structural Eng I	Sr. Eng I	Sr. Technician I	Eng I	Technician II	Proj Admin Assist	MAN HOURS & LABOR SUMMARY	
	CURRENT YEAR 2024 CITY OF AURORA HOURLY RATES	$254	$255	$225	$204	$218	$134	$164	$150	$149	$117	$139	$92	TOTAL
1	Kick-off Meeting & Progress Meetings (assume 2)		12						18					30
2	Data Collection								8		8			16
3	Review/Update Historical Water Demands		4				4		16		40			64
4	Update Model													
5	- Incorporate WM modifications		8				24		64			24		120
6	- Update roughness coefficients								28		24			52
7	- Update elevations								8				`	8
8	- Update fire flow requirements						4		12					16
9	- Update model demands		4	20			20		40					84
10	Calibrate Steady State Model - Static and Flow Test Calibration		16	24					48		16	16		120
11	Calibrate EPS Model		20	40					60					120
12	Update and Run Steady State Modeling Scenarios - Existing & Near Future		4	24					36		24	20		108
13	Update and Run EPS Modeling Scenarios		4	36					60		24	20		144
14	Prepare Report		8	24					48		24	50	16	170
15	Project Management & QA/QC	12	60											72
	TOTAL MAN HOURS	12	140	168			52		446		160	130	16	1,124
	SUBTOTAL - BASE LABOR EFFORT	$3,054	$35,631	$37,773			$6,954		$67,101		$18,789	$18,106	$1,466	$188,874

	TASKS (CONTINUED)	TOTAL LABOR EFFORT	DIRECT EXPENSE & REIMBURSABLES											TOTAL FEE
			TRAVEL MILEAGE	MEALS & LODGING	PRINTING	EQUIP-MENT	MISC	SURVEY MTL	SUBS	SUBS ADMIN	OTHER EXP	OTHER EXP	TOTAL EXPENSE	
1	Kick-off Meeting & Progress Meetings (assume 2)	$5,762	$25										$25	$5,787
2	Data Collection	$2,143												$2,143
3	Review/Update Historical Water Demands	$8,657												$8,657
4	Update Model		$200										$200	$200
5	- Incorporate WM modifications	$18,217												$18,217
6	- Update roughness coefficients	$7,031												$7,031
7	- Update elevations	$1,204												$1,204
8	- Update fire flow requirements	$2,340												$2,340
9	- Update model demands	$14,207												$14,207
10	Calibrate Steady State Model - Static and Flow Test Calibration	$20,797	$100										$100	$20,897
11	Calibrate EPS Model	$23,111												$23,111
12	Update and Run Steady State Modeling Scenarios - Existing & Near Future	$17,434												$17,434
13	Update and Run EPS Modeling Scenarios	$23,743												$23,743
14	Prepare Report	$25,902			$500								$500	$26,402
15	Project Management & QA/QC	$18,324												$18,324
	TOTALS	$188,874	$325		$500								$825	$189,699
	TIME PERIOD OF PROJECT	2024	2025	2026	2027	TOTAL	EST % OF OT HRS INCLUDED ABOVE						MULTI-YEAR + OT	
	PERCENTAGE OF WORK TO BE PERFORMED BY YEAR	100%				100%	AVERAGE OVERTIME RATE PREMIUM					15%	MLTPLR & AMT	
	WEIGHTING FACTOR FOR 5% ANNUAL ADJUSTMENT	1.0000				1.0000	OT ADJUSTMENT FACTOR						1.0000	
	ESTIMATED CONTINGENCY												5%	$9,480
	ROUNDING													$821
	TOTAL FEE	MATH CROSS CHECK IS OK												$200,000