



CITY OF NOVI CITY COUNCIL
MARCH 23, 2020

SUBJECT: Approval for OHM Advisors scope of engineering services for the preparation of a Water System Master Plan and associated documents needed for compliance with America's Water Infrastructure Act of 2018, in the amount of \$83,800.

SUBMITTING DEPARTMENT: Department of Public Works, Engineering Division

EXPENDITURE REQUIRED	\$ 83,800.00
AMOUNT BUDGETED	\$ 91,842.00
APPROPRIATION REQUIRED	\$ 0
LINE ITEM NUMBER	592-592.00-816.053

BACKGROUND INFORMATION: The America's Water Infrastructure Act (AWIA) of 2018 requires communities to prepare a Risk and Resilience Assessment (RRA) and an Emergency Response Plan (ERP) by the end of 2020. The Act requires a community serving a population greater than 3,300 persons to assess the risks to, and resilience of, their drinking water system. These documents are directly related to the Water System Master plan, which is also due to be updated. Therefore, staff decided to complete the documents simultaneously in order to coordinate all State and Federal reporting for the Novi water distribution system.

The Water System Master Plan will incorporate the components of a Water Reliability Study, a General Plan, and an Asset Management Plan which are required by the Michigan Department of Environment, Great Lakes and Energy (EGLE). OHM Advisors has been retained to prepare and update these items, as they have considerable experience with development and updates of the Novi system. In summary, the following deliverables will be prepared:

1. Risk and Resilience Assessment
2. Emergency Response Plan
3. Water System Master Plan, including:
 - Water Reliability Study
 - General Plan

– Asset Management Plan

In addition to the above documents, staff elected for consulting engineer OHM Advisors to develop a new hydraulic model for the City's water system. The current 2008 model is now obsolete and cannot provide the data and analysis needed for daily operations and future planning. The new model will allow staff to more accurately predict system pressures and flow rate, as well as the impact of development and system maintenance, or increases in demand from firefighting.

The development of the Master Plan and AWIA requirements involves a detailed review of the City's water system network, providing a good opportunity to use this information in the development of a new hydraulic model. This updated model will allow staff to understand existing conditions and prepare for the typical 5-year and 20-year planning periods.

OHM's proposal is enclosed and includes a detailed description of the tasks involved, as well as the fees and schedule for the work.

RECOMMENDED ACTION: Approval for OHM Advisors scope of engineering services for the preparation of a Water System Master plan and associated documents needed for compliance with America's Water Infrastructure act of 2018, in the amount of \$83,800.



February 21, 2020

Jeff Herczeg
Director of Public Works
City of Novi
26300 Lee BeGole Drive
Novi, MI 48375

Regarding: **Water Master Plan and AWIA Compliance**
Proposal for Engineering Services

Dear Mr. Herczeg,

OHM Advisors (OHM) is pleased to provide this proposal for professional engineering services for the preparation of a Water System Master Plan and the documents needed for compliance with America's Water Infrastructure Act of 2018 (AWIA) for the City of Novi (Novi). The Water System Master Plan will incorporate the components of a Water Reliability Study, General Plan, and Asset Management Plan. There are many elements common to these documents. Completing these together will result in a more efficient inventory and robust Capital Improvement Plan (CIP). The Water Master Plan will address the requirements of the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Safe Water Drinking Act (Act 399). Under AWIA, the City is required to prepare a Risk and Resilience Assessment (RRA) and Emergency Response Plan (ERP).

Based on several discussions with City staff, it is understood that the City wants to comply with the regulatory requirements and update its hydraulic model. The hydraulic model will be used to efficiently address anticipated development and Act 399 permits within its service area. This plan will ultimately be used by the City to address high-priority asset needs that are critical to the City's infrastructure performance, hydraulic capacity, and planning for future capital and operating expenditures.

PROJECT UNDERSTANDING

The Master Plan will address several EGLE required items. The Water Reliability Study focuses on planning for current and future water system demands. It addresses items listed under Part 12, Reliability, R 325.11203 and R 325.11204 of Act 399. The General Plan includes the hydraulic analysis of the system and addresses Part 16, R 325.11604 through R 325.11606. The Asset Management Plan (AMP) addresses new requirements under Part 16, R 325.11606. An AMP includes condition assessment, failure risk analysis, and revenue structure to look at life-cycle costs of system operation, maintenance, and repair or replacement.

The Reliability Study focuses on planning items including population and water demands for three separate planning periods (existing, 5-year, and 20-year). Average day, maximum day and peak hour water demand must be calculated for the three planning periods. In addition, fire protection needs must be identified. The Reliability Study also documents the capacity of the existing water source, pumping capacity, and storage and compares that capacity to the existing and future needs of the system.

The General Plan includes the hydraulic analysis of the system as well as the CIP. The hydraulic analysis must include creation of pressure contour maps for the various water demand conditions for the three planning periods. Available fire protection must also be provided. In addition, a comprehensive map of the system showing service



boundaries, location of water system components, water main size, material, age and the location of hydrants and valves must be shown. The final component of the General Plan is the CIP. The CIP must identify necessary system improvements for the 5-year and 20-year planning periods.

An AMP addresses the following components:

- ▶ Details of the system used to maintain *inventory* of assets
- ▶ Description of the methodology to assess *criticality* considering likelihood and consequence of failure
- ▶ Statement of *level of service* goals
- ▶ A 5-year and 20-year *capital improvements plan* (can be same as General Plan CIP)
- ▶ Summary of the *revenue structure* and rate methodology to provide sufficient resources to implement the AMP.

There are several voluntary consensus standards and resources for Risk and Resilience planning available through the EPA, Department of Homeland Security, and professional organizations. OHM proposes to use EPA's Voluntary Self Assessment Tool (VSAT) which is based on AWWA's J100-10 Risk and Resilience Management of Water and Wastewater Systems and AWWA's Water Sector Cybersecurity Risk Management Tool. AWIA requires community water systems to coordinate with the local emergency planning committee and agencies. OHM will facilitate interactions between the City and other state, regional, or local agencies.

The RRA must address the following:

- ▶ The risk to the system from malevolent acts and natural hazards;
- ▶ The resilience of the pipes and constructed conveyances, physical barriers, source water, water collection and intake, pretreatment, treatment, storage and distribution facilities, electronic, computer, or other automated systems (including the security of such systems) which are utilized by the system;
- ▶ The monitoring practices of the system;
- ▶ The financial infrastructure of the system;
- ▶ The use, storage, or handling of various chemicals by the system; and
- ▶ The operation and maintenance of the system.

An ERP describes strategies, resources, plans, and procedures utilities can use to prepare for and respond to an incident, natural or man-made, that threatens life, property, or the environment. Incidents can range from small main breaks or localized flooding to large scale hurricanes, earthquakes or system contamination, among other examples. The ERP should include:

- ▶ Strategies and resources to improve the resilience of the system, including the physical security and cybersecurity of the system
- ▶ Plans and procedures that can be implemented, and identification of equipment that can be utilized, in the event of a malevolent act or natural hazard that threatens the ability of the community water system to deliver safe drinking water
- ▶ Actions, procedures, and equipment which can obviate or significantly lessen the impact of a malevolent act or natural hazard on the public health and the safety and supply of drinking water
- ▶ Strategies that can be used to aid in the detection of malevolent acts or natural hazards that threaten the security or resilience of the system

The City receives its supply water through metered connections with Great Lakes Water Authority (GLWA). The physical components of the City's water supply are understood to generally include five (5) GLWA meter vaults, two (2) booster stations (West Park and Island Lake), one (1) 1.5 million gallon ground water storage tank with control vault (associated with West Park pump station), nine (9) pressure-reducing valves, 6-inch to 36-inch distribution piping, and network architecture in support of SCADA monitoring. This study shall address each of these assets.



SCOPE OF SERVICES

The objective of OHM Advisors proposed scope of services is to prepare a plan with the aforementioned requirements as it relates to the City's water system. The following scope of services is proposed for the City's consideration:

Task 1: Project Initiation and Data Review

Under this task, OHM will initiate the project and obtain necessary information to proceed with the analysis. Specific work efforts include:

- ▶ Organize and attend a kick-off meeting with City staff to review project goals, objectives, and project schedule.
- ▶ Obtain necessary updated planning information to perform population projections and water demand calculations.
- ▶ Obtain desired fire protection rates and zoning information (if needed).
- ▶ Obtain and review updated water system GIS information.
- ▶ Review current status of the water system data and identify required information to be updated.
- ▶ Review AWIA requirements, designate key City staff contacts and involvement (Information Technology, Finance, Operations, Administration, DPW) based on expertise and establish a specific timetable for AWIA related tasks.

Task 2: Asset Inventory and Condition Assessment

The City's horizontal asset inventory will be updated based on the GIS database. We propose to use existing GIS as the repository for the asset assessment. Under this task the City will also be asked to review and update (as needed) the inventory and assessment of vertical assets compiled during the 2017 AMP project.

The assessment portion of this task will utilize new, existing, and historic water system information in order to both approximate infrastructure condition (in lieu of actual field condition testing). For that end, we propose to complete the following work associated with Task 2:

- ▶ Review City-provided water main break data since the last AMP was completed. We assume the break data includes date of break and location.
- ▶ Perform analysis on the information in order to approximate water main condition on groups of infrastructure.
- ▶ Perform approximation on potential remaining useful life of water main infrastructure given the water mains' age, material of construction, break history, and maintenance history.
- ▶ Review any updates to the vertical asset inventory and condition assessment.

As part of this task, asset criticality calculations will be updated by identifying asset probability of failure (based on asset condition) as well as consequence of failure (based on qualitative or quantitative information, such as potential service disruption impacts). As part of this task, we also propose to obtain critical asset information from the City that will be incorporated into the risk assessment. This includes locations such as schools, City Hall, Police Station, Industry, the Downtown, *etc.* OHM will use a combination of GIS and spreadsheets (Microsoft Excel format) to perform the calculations and analysis.

Task 3: Planning and Demand Projections

Under this task, OHM will evaluate and analyze updated population and consumption data. OHM, with the assistance of City staff, will compile updated planning data that will be used in creation of water system demand projections. Under this task, OHM will assemble, evaluate, and analyze water demand and water system capacities to determine the sufficiency of the water system to meet existing and future needs. OHM will use existing data to determine the City's average day, maximum day and peak hour demands. Five (5) year and 20-year demands will be



scaled based upon population projections. Similar maximum day and peak hour peaking factors based on existing conditions will be utilized. It will also be necessary to analyze water billing records. This is needed in order to determine water loss within the system, to provide a breakdown of water use by different customer classes, and to identify the top water users in the system. We assume that billing record data will be available for these calculations.

Specific work efforts include:

- ▼ Compile and report all planning data as required by the provisions in Act 399. These items include the following:
 - a. Current, 5-year, and 20-year population based upon SEMCOG population projections and City input.
 - b. Number of service connections and annual usage totals for each customer class as determined by the public water supply.
- ▼ Compile and report all water production and consumption data (current, 5-year, and 20-year planning periods) as required by the provisions in Act 399. These items include the following:
 - a. Present and projected average daily demands.
 - b. Present and projected maximum daily demands.
 - c. Present and projected peak hourly demands.
 - d. Present and projected fire flow demands.
 - e. Basis for demand projections.
 - f. Monthly and annual water purchase.
- ▼ Determine if the system has adequate supply, transmission, pumpage, and storage capacity.
- ▼ Analyze non-revenue water

Task 4: Hydraulic Model Development

OHM proposes to create a new model from GIS using the existing water model in Innovyze's InfoWater software. OHM is in possession of a hydraulic model of the City's water system. Based on the level of effort to update this model and the GIS enhancement efforts that have occurred since its creation, OHM proposes to create a new model from the water system GIS. Previous model calibration, C-factors, and relevant operational data will be incorporated in the new model. Knowledge about pipe material and age available from mapping and discussions with the City will need to be added to meet General Plan requirements. An allowance of two days for a GIS technician to update the City's GIS to ensure proper network topology for incorporation into the modeling software is included in this task.

Updated existing average day water demand, operating criteria, and elevation data will be input into the water model to simulate pressures and available fire protection under current conditions. Storage tank operating ranges, demand distribution, and other operational criteria will be obtained from City. It is important that these operating set points be properly input into the water system model. The model will then be calibrated based on hydrant flow test data. OHM will provide suggested hydrants for testing and assist the City with the flow tests. Two days of field work for hydrant flow testing is included in this proposal. Updated water demand scenarios for average day, maximum day, and peak hour for existing, 5-year, and 20-year planning periods will be created in the hydraulic model under this task utilizing the data gathered during Task 3.

As part of the General Plan requirements, maps displaying the water service district boundaries will be provided along with a map displaying water main size, material, and age. Hydrants and valves and other water system components are also required to be mapped.



Specific work efforts include the following:

- ▶ Updated hydraulic water model.
- ▶ Update of water demand scenarios for average day, maximum day, and peak hour for existing, 5-year, and 20-year planning periods in the model.
- ▶ Input of operational settings.
- ▶ Identification of hydrants to be flow tested and assistance with testing.
- ▶ Model calibration.
- ▶ Creation of General Plan map.

Task 5: Hydraulic Analysis

Once the model has been updated and calibrated, it will be used to determine anticipated system pressures during average day, maximum day, and peak hour for existing conditions. Available fire protection during a maximum day demand period will also be shown. Deficiencies in pressure or areas of fire protection concern will be identified for existing conditions. The model will also be run to assess system pressure and available fire protection for the 5-year and 20-year planning periods.

OHM will meet with City staff after areas of concern from the existing conditions model are identified. Proposed water system improvements to fix existing pressure concerns (either too low or too high) and to improve desired fire protection will be initially based on existing conditions. Once the hydraulic driven improvements are identified and agreed to with the City, the model will be updated to include those improvements and the 5-year and 20-year future water demand scenarios will be modeled. If other hydraulic driven improvements are needed based on these future scenarios, they will be noted and presented. Once all hydraulic driven system improvements have been identified and incorporated in the water model, the pressure maps and fire protection maps will be updated for the existing, 5-year, and 20-year future projections, as required.

Specific work efforts include the following:

- ▶ Perform model analyses for average day, maximum day, and peak hour demand scenarios for existing, 5-year, and 20-year planning periods.
- ▶ Perform fire protection model analyzes for existing, 5-year, and 20-year planning periods.
- ▶ Identification of capital improvements needed to address pressure or fire protection concerns for the three planning periods.
- ▶ Creation of pressure and fire protection maps summarizing the model results.

Task 6: Level of Service and Revenue Structure

We propose to assist the City with updating of level of service goals. The level of service helps define the way that staff and water system stakeholders (residents, board, *etc.*) want the utility to perform over the long term. As part of this effort, we propose to identify an approach for the development of level of service goals (including service criteria, performance indicator, and targeted level of service) and stakeholder involvement. This work will be completed in collaboration with City staff.

Development of a revenue structure is required by the Rule. This proposal assumes that the City will use results from recent financial analysis to perform this assessment. Therefore, only minimal effort is proposed as part of this task, which relates to assisting City finance staff (or their designee) with questions and, perform revisions on the proposed, prioritized CIP as per City request.

Task 7: Capital Improvement Plan

We will update the 2017 Capital Improvement Plan (CIP) based on the recommendations from the AMP and hydraulic analysis and incorporate planned road projects. Water system CIP projects will consider hydraulic issues



identified during Task 7, our condition analysis findings, and City-directed desired projects for 5-year and 20-year planning horizons. A map showing proposed projects will be created and cost opinions will be developed.

Task 8: Development of Water Master Plan Report

As part of this task, a Water Master Plan Report will be generated for submission to EGLE, including the findings, results, and conclusions from the above outlined tasks.

Task 9: Risk and Resilience Assessment

Under this task, OHM will complete the RRA through a series of workshops and online tools. We propose to use EPA's VSAT to quantify the system's risk of and resilience to malevolent acts or natural hazards. AWWA's Water Sector Cybersecurity Risk Management Tool was designed to support utilities in developing their cybersecurity risk management strategy while also facilitating compliance with the cybersecurity provisions in AWIA. This tool will be completed by the City with assistance from OHM.

Specific work efforts under this task include:

- ▶ Identify and pair critical assets with threats.
- ▶ Workshop with City Staff on Consequence, Threat Likelihood, Vulnerability using definitions from AWWA's J100 Standard.
- ▶ Workshop with City Staff to discuss countermeasures and recommend actions, procedures, and equipment which can prevent or significantly lessen the impact of a malevolent act or natural hazard.
- ▶ Workshop with City Staff review recommendations from Water Sector Cybersecurity Risk Management Tool.
- ▶ Facilitate interactions between the City and MiWARN (Water/Wastewater Agency Response Network), Local Emergency Planning Committees, the Michigan Intelligence Operations Center, and Oakland County's Homeland Security Division.
- ▶ Compile Final Report for internal City use and certify completion to EPA.

Task 10: Emergency Response Plan Assistance

The City has an existing FEMA-approved plans for all City operations addressing disaster preparedness and continuity of operations. OHM will provide support to City staff during development the required ERP components by providing guidance materials and attending two meetings with key staff. The ERP will describe the following:

- ▶ Strategies – Resilience strategies incorporate how you will assign roles and responsibilities, how you will work with response partners, and how you intend to communicate both internally and externally during an incident.
- ▶ Plans and Procedures – This will document plans, procedures, and equipment that can be used in the event of a malevolent act or natural hazard. Two types of emergency response plans and procedures should be considered as part of the ERP: Core and Incident-specific. The Core procedures can apply across a variety of incidents and address things like site access, cybersecurity, and power loss. Incident-specific procedures are specialized field ready plans to tailored to a particular type of incident like flooding at a facility or a tornado.
- ▶ Mitigation Actions – These actions will be based on the results of the RRA developed in Task 9.
- ▶ Detection Strategies – These strategies will aid in the detection of malevolent acts or natural hazards identified during the RRA.

The City will update their existing materials and OHM will certify completion to EPA.



ASSUMPTIONS AND CLARIFICATIONS

The above-listed scope of services was prepared with the following assumptions:

- ▼ The City will provide all necessary water system demand information and operating criteria necessary for model analysis. During model updates and calibration, connectivity will be assumed at all intersections unless other data is provided.
- ▼ The City will perform hydrant flow testing with assistance from OHM Advisors' field staff.

SCHEDULE

Assuming authorization by March 24, 2020, OHM proposes to submit the final Water Master Plan report deliverable to the City and the State by no later than August 1, 2020. OHM proposes to also submit the final RRA report to the City by August 1, 2020 and certify completion to the EPA by December 1, 2020. OHM will work with the City to make sure the ERP is completed to allow certification within 6 months of the certification of the RRA as required by AWIA.

This duration is based on timely responses from the City when information requests are verbally or formally submitted. As outlined in the Scope of Services, on-going involvement is needed from the City to maintain task progress and schedule.

FEE SCHEDULE

OHM Advisors proposed to provide the above-outlined professional engineering services for a total lump sum fee of eighty-three thousand eight hundred dollars (\$83,800), based on the task breakdown shown below:

Task 1 – Project Initiation and Data Review	\$	3,700
Task 2 – Horizontal Asset Inventory and Assessment	\$	2,200
Task 3 – Planning and Demand Projections	\$	6,700
Task 4 – Hydraulic Model Development	\$	23,000
Task 5 – Hydraulic Analysis	\$	10,900
Task 6 – Level of Service and Revenue Structure	\$	2,000
Task 7 – Capital Improvement Plan	\$	7,400
Task 8 – Development of Water Master Plan Report	\$	7,800
Task 9 – Risk and Resilience Assessment	\$	15,300
Task 10 – Emergency Response Plan Assistance	\$	4,800
Total	\$	83,800



SERVICES NOT INCLUDED

The following task are not included in this proposal but can be provided on a time-and-materials basis upon the request of the City.

- ▶ Additional field verification or assistance.
- ▶ Additional field data collection.
- ▶ Model trouble shooting due to data availability and/or connectivity issues.
- ▶ Additional GIS development or assistance.
- ▶ Other requested tasks, meetings, or efforts not outlined in the above scope of services.

OHM Advisors thanks you for the opportunity to provide professional engineering services to the City. If there are any questions, please contact us directly. Should you find our proposal acceptable, please sign the authorization page below and return a copy of this signed proposal to us for our file.

Sincerely,

OHM Advisors

Authorization to Proceed

Lindsey Kerkez, P.E.
Project Manager

Signature

Date

Timothy J. Juidici, P.E.
Principal-in-Charge

Printed Name

Title

cc: Ben Croy, City Engineer
File