OHM Advancing Communities®

Technical Proposal for

SANITARY SEWER COLLECTION SYSTEM COMPREHENSIVE PLAN

City of Ann Arbor | RFP No. 24-40

Proposal Due Date
THURSDAY, JULY 11, 2024, 3PM

ENGINEERING

OHM Advisors®

July 11, 2024

City of Ann Arbor
c/o Customer Service
301 East Huron Street
Ann Arbor, MI 48104

Re: Sanitary Sewer Collection System Comprehensive Plan

Dear Mr. Baughman,

The City is under development pressure that is straining the sanitary sewer system. The City is currently in the process of updating the Comprehensive Land Use Plan that is expected to reflect additional densification and growth. Given the magnitude of the growth planned, several sections of the sanitary sewer system will likely be overloaded. As a result, the City desires a Sanitary Sewer Collection System Comprehensive Plan (SSCSCP) to serve as a road map for capital improvements to manage flows from future growth.

The City has been proactive in managing and planning upgrades to the sanitary sewer system in the past, resulting in a high level of service from the system. The City has removed inflow and infiltration, developed a design level of service, and laid out plans for managing the system that have been effective for the past ten years. This plan will update the sewer collection system model and develop a comprehensive plan so that capital improvements can be developed to serve this growth while continuing to provide the high level of service that the City and its residents expect. Key objectives of the SSCSCP include:

- Update and recalibrate the model using recent flow metering data to develop updated design peak wet weather flows that reflect current conditions.
- Develop a wastewater master plan for handling projected future flows from anticipated growth.
- Prepare cost estimates and a phasing plan for recommended improvements to help inform the City's capital improvement and financial planning.
- Identify appropriate public engagement for each improvement project recommended.
- Perform a policy and financial evaluation to help the City develop policies and funding strategies to support the recommended infrastructure improvements.

We have developed a project approach that is customized to the specific needs of developing the SSCSCP. We know what it takes to develop sanitary sewer system improvements and capital cost estimates in the City's system because we have extensive experience investigating similar issues. We just completed similar analyses within the City for the University of Michigan Housing and the Arbor South developments. We also performed the previous studies on the City's footing drain program and the Sanitary Sewer Improvements & Preliminary Engineering project, so we are very familiar with the City's system. The same team members that successfully delivered those projects will be leading this project.

We have accomplished a lot together with the City on their sanitary sewer system during the past decade, and we hope to continue to serve the City on this SSCSCP project.

Sincerely,
OHM Advisors

Robert Czachorski, PE
Principal in Charge

t 734.466.4548 **e** robert.czachorski@ohm-advisors.com
Contract Office 34000 Plymouth Road, Livonia, MI 48150
www.**OHM-**Advisors.com

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PAGE LOCATOR

WE ARE THE COMMUNITY ADVANCEMENT FIRM.

SECTION A: PROFESSIONAL QUALIFICATIONS

Who We Are

OHM ADVISORS

OHM Advisors is a team of over 700 people from different backgrounds working in 19 cities across Michigan, Ohio, Indiana, Kentucky, and Tennessee. We strive to use our combined expertise and talents to continually advance the communities we serve. Our work spans client communities across the public and private sectors—including municipalities, state and federal agencies, Fortune 100 companies, developers, schools, universities, and more.

As a growing firm with full-service capabilities under one roof, we are listed on ENR's list of Top 500 Design Firms and recognized for our contributions to our industry. But it's not awards or personal gain that drives us. It is a passion for making a difference through innovative, people focused problem solving, design and ideas that drive whole communities forward—today, and well into the future.

Firm Growth

OHM Advisors was established in 1962 and has been growing steadily ever since. As a multidisciplinary organization, we provide a variety of services to our clients with a passion to be Advancing Communities for many years to come.

Firm Ownership

OHM Advisors is a privately held corporation, governed by a seven-member Board of Directors and has 53 employee shareholders.

Full Legal Name	**Orchard, Hiltz & McCliment, Inc.**
Telephone	734.522.6711
Web	ohm-advisors.com
Contract Address	34000 Plymouth Road Livonia, MI 48150
Federal Employer Id No.	38-1691323
Type of Entity	Corporation - Michigan
Age of Firm	1962 (61 Years)
Authorized Negotiator	Robert Czachorski, PE
Project Manager & Point of Contact	Mackenzie Chamberlain, EIT
Telephone	734.466.4455
Email	mackenzie.chamberlain@ohm-advisors.com
Addenda Received	No. 01 (06/24/24)

Project Focus: Wastewater & Asset Management

Our talented wastewater and industrial wastewater professionals work with communities and private industry clients alike to design high-performance facilities, create strategic long-range infrastructure management plans, provide treatment and optimization solutions, and everything in between.

And whether the project is municipal or industrial, our experts design solutions built on the three pillars of sustainability—economic, environmental and social values—because sustainable solutions create thriving and vibrant businesses and communities.

Managing your community's water assets is critical to preserving their lifespan and providing for present and future customers. Our team partners with your community to help you determine when your assets should be repaired or replaced and associated project costs. We'll help craft a plan specific to your community that proceeds through thoughtful, researched steps, optimizes your current spending, and engages community leaders in important funding discussions to achieve infrastructure improvement goals.

Our Services

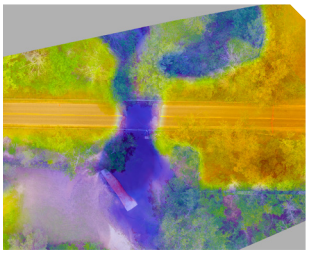
AREAS OF EXPERTISE

Architecture

- Complete Architectural Design Services
- Site & Facility Evaluation
- Facility Master Planning
- Space Planning & Programming
- Interior Design
- Sustainable Design

Construction Engineering

- Construction Design
- Construction Engineering & Observation
- Project Administration & Closeout



GIS & Innovative Technologies

- Mobile GIS
- Software Solutions
- System Analysis
- System Design & Implementation
- Innovative Technologies

Landscape Architecture & Urban Design

- Public Park Space & Master Plans
- Streetscapes
- Trails & Greenways
- Green Infrastructure
- Branding, Wayfinding & Signage
- Visualization & Graphics
- Site Design

Mechanical, Electrical & Plumbing Engineering

- Heating, Ventilation & Air Conditioning
- Plumbing
- Lighting & Controls
- Power Distribution
- Safety & Security

Municipal Engineering

- Community Engineering
- Infrastructure Assessment & Planning
- Funding Assistance
- Design & Implementation

Planning

- Public Engagement & Facilitation
- Economic Development Planning
- City & Regional Planning
- Land Development, Zoning & Entitlements
- Transportation Planning
- Codes & Standards

Surveying

- Road Design Surveys
- ALTA/NSPS Land Title Surveys
- Boundary Surveys
- Topographical Surveys
- Hydrographical Surveys
- Right-of-way Surveys
- As-built Surveys
- Stock Pile Volumetric Surveys
- Construction Layout

Transportation

- Traffic Engineering
- Transportation Planning
- Roadway & Highway Design
- Bridge Engineering & Diverse Structures
- Multimodal Transportation Engineering

Water

- Stormwater Management
- Drinking Water
- Wastewater
- Asset Management
- Ecological Services

Your Project Team

ORGANIZATION CHART WITH STAFF LOCATION

CITY OF ANN ARBOR

Robert Czachorski,PE (Livonia)
Authorized Negotiator & Principal

Cresson Slotten,PE (Livonia)
QA/QC Engineer

Mackenzie Chamberlain, EIT (Livonia)
Project Manager, Point of Contact

MODELING & ENGINEERING

Karlin Danielsen, PhD (Livonia)
Hydraulic Modeling Engineer

Erica Morgan (Auburn Hills)
AMM & Peak Flow Development Engineer

Chris Elenbaas, PE (Livonia)
Design Engineer & Cost Estimating

Albert Ruiz, PE (Ann Arbor)
Large Diameter and Trenchless Design Engineer & Cost Estimating

AMP & FINANCIALS

Murat Ulasir, PhD, PE (Livonia)
Asset Management Specialist & Financials

Andrew Burnham (Tampa, FL)
Financial & Policy Expert

Carol Malesky (Cleveland, OH)
Financial & Policy Expert

James Bearman (Ann Arbor)
Financial & Policy Expert

OHM Advisors
Stantec

Our Partners & Sub-Consultants

STRONG RELATIONSHIPS = SUCCESSFUL PROJECTS

From time to time OHM Advisors may need to employ the use of subconsultants on a project to provide a service that OHM Advisors cannot. OHM Advisors maintains relationships with many highly respected subconsultants in the State. We believe in selecting the right partner for a particular project or task. Subconsultants are hired with a documented scope of work, including a fee and schedule for the work. OHM Advisors can provide copies of any agreements to the City.

NAME	ADDRESS	CONTACT	PRIMARY SERVICES
STANTEC CONSULTING SERVICES	1168 Oak Valley Drive, Suite 100 Ann Arbor, MI 48108	James Bearman, PE james.bearman@ stantec.com	Financial Services

Stantec's Management Technology and Consulting Group (MTC), a group of over 75 individuals, performs similar analysis in Michigan and across the United States as requested by the City of Ann Arbor's RFP pertaining to the review and development of capital charge recovery and the development of appropriate and defensible fees new customers and developers should pay to connect to the utility system, such that growth pays for growth. In addition, Stantec routinely develops financial plans integrating master plans and CIP programs, including potential rate effects for municipal utilities throughout the United States. Additionally, Stantec's MTC is able to draw on Stantec's strong engineering resources, 30,000+ employees, when needed, to support its studies.

Team Support

OUR CAPACITY

OHM Advisors is committed to providing the City of Ann Arbor the best possible team for this contract. Both depth of experience and availability were carefully considered when building our team, ensuring the right staff. OHM Advisors attests to the fact that the key personnel provided within this proposal have adequate availability to provide the services as outlined in this document. In addition to the key staff that will support the project directly, we have over 700 professionals firm-wide to provide as-needed support to our clients.

Firm-Wide Capacity

35 Architects & Interior Designers
24 CADD Technicians
173 Civil Engineers
173 Construction Inspectors & Managers
12 MEP Engineers
10 GIS Specialists
20 Planners
46 Surveyors
25 Landscape Architects
65 Transportation, Structural & Geotechnical Engineers
53 Water Resources Engineers
95 Administrative & IT Professionals

Michigan Capacity

13 Architects & Interior Designers
16 CADD Technicians
104 Civil Engineers
151 Construction Inspectors & Managers
11 MEP Engineers
06 GIS Specialists
07 Planners
25 Surveyors
06 Landscape Architects
48 Transportation, Structural & Geotechnical Engineers
48 Water Resources Engineers
66 Administrative & IT Professionals

Mackenzie Chamberlain, EIT

PROJECT MANAGER & POINT OF CONTACT

Education
- Bachelor of Science in Environmental Engineering, Michigan State University, 2016

Professional Registration(s)
Engineer in Training (EIT) - 2016

Experience
With OHM since 2016
1 year prior experience

Background

Mackenzie Chamberlain is a Project Manager in the Environmental and Water Resources Group at OHM Advisors. Her experience includes water systems modeling, collection systems modeling, data analysis, condition assessment, and field investigation. She also has experience working with GIS, AutoCAD, and water system and collection system modeling software applications. Mackenzie takes pride in her thoroughness and diligence as she works to provide the client with effective and optimal solutions.

Select Relevant Experience

Sanitary Sewer Improvements & Preliminary Engineering Project, Ann Arbor, Michigan
Project Engineer; Mackenzie was extensively involved in the Sanitary Sewer Improvements and Preliminary Engineering project for the City of Ann Arbor. This project involved flow metering, field investigation, data analysis, condition assessment, system modeling, and preliminary engineering to resolve sanitary sewer capacity issues throughout the City. Mackenzie was a part of the field investigation crew and responsible for compiling and analyzing the collected field data as well as the flow metering data. She conducted a condition assessment of the sanitary sewer pipes throughout the City and created GIS maps to display the findings. She was responsible for writing the reports regarding the field investigation discoveries and the flow metering data analysis. Additionally, she assisted in preparing a presentation and other correspondence to the residents of the City. She also contributed to the modeling and preliminary engineering efforts to resolve the sanitary sewer capacity issues.

June 25, 2021 Storm Event Analysis, Ann Arbor, Michigan
Project Engineer; for the June Storm Event Analysis project for the City of Ann Arbor. A large rain event in June of 2021 resulted in extensive flooding and basement backups in the Pittsfield Village neighborhood within the City. This project involved analyzing the storm and sanitary sewer systems to determine the cause of the flooding and basement backups in this area and to provide recommendations on what could be done to prevent these occurrences in the future. Mackenzie analyzed available flow meter and rain gauge data to better understand the extent and intensity of rainfall throughout the City. She also performed sanitary sewer hydraulic modeling to simulate conditions observed during the rain event. Additionally, she assisted with public engagement efforts, which involved presenting at public meetings, conducting an online survey, and conducting resident interviews. She then developed a technical memorandum for the City detailing the analyses performed as well as the findings and recommendations.

Pittsfield Village Sanitary Sewer and Stormwater Evaluation Survey, Ann Arbor, Michigan
Project Engineer; for the Pittsfield Village Sanitary Sewer and Stormwater Evaluation Survey for the City of Ann Arbor. Recommendations from the June 25, 2021 Storm Event Analysis project included performing a sanitary sewer and stormwater evaluation survey within the Pittsfield Village neighborhood to identify sources of inflow and infiltration into the sanitary sewer system. This study involved performing physical condition assessments of the sanitary sewer and stormwater manholes within the impacted neighborhood as well as reviewing the City's sanitary sewer and stormwater pipe inspection data to assess their condition. Smoke testing was also performed within this neighborhood to identify sources of inflow and infiltration into the sanitary sewer system. The contribution of inflow and infiltration from each of these

Select Relevant Experience Continued

sources were tabulated in a water budget, and the condition assessment results and recommended rehabilitation efforts for these assets were documented in a technical memorandum.

Pittsfield Village Curb Drain Study, Ann Arbor, Michigan
Project Engineer; for the Pittsfield Village Curb Drain Study for the City of Ann Arbor. Recommendations from the June 25, 2021 Storm Event Analysis project included performing a curb drain study within the Pittsfield Village neighborhood to identify locations where curb drain could be installed to facilitate footing drain disconnections. Mackenzie reviewed the City's existing public stormwater system layout to identify those neighborhood properties without an adjacent curb drain or stormwater pipe. She then developed a map of the proposed curb drain layout such that all neighborhood properties would have direct access to a curb drain or stormwater pipe. She also estimated the amount of flow to be discharged to each stretch of curb drain in order to provide a recommendation of curb drain sizing. She then developed a technical memorandum f or the City detailing the analyses performed as well as the proposed curb drain layout.

Pittsfield Village Improvements Project, Ann Arbor, Michigan
Project Engineer; for the Pittsfield Village Improvements Project for the City of Ann Arbor. This project includes design of water main, sanitary sewer, stormwater, and roadway improvements within the Pittsfield Village neighborhood. Mackenzie is managing the sanitary sewer and stormwater improvement efforts, which include analysis of condition assessment data as well as hydraulic modeling to develop and confirm the recommended improvements. Proposed improvements from previous studies will also be reviewed for inclusion in the final design and bidding documents.

Sanitary Sewer Analysis for Proposed University of Michigan Residence Hall, Ann Arbor, Michigan
Project Engineer; for a Sanitary Sewer Analysis for a Proposed University of Michigan Residence Hall within the City of Ann Arbor. This project involved performing sanitary sewer modeling to determine whether the City's existing sanitary sewer infrastructure would be able to accommodate the projected additional flow from a new University residence hall during a design storm event. The modeling results suggested that the existing downstream sewers would not have the capacity to convey the additional flow, so recommended sanitary sewer system improvements and associated cost estimates were developed for consideration by the City and University. Mackenzie also assisted with development of an Alternatives Matrix to help the City and University select the improvement option that would meet both the City's and University's flow and schedule needs. Mackenzie is also working on a similar sanitary sewer and water system impact analysis for the proposed Arbor South Development that will be located near State and Eisenhower.

Miller/Spring/Chapin Sanitary Sewer Analysis, Ann Arbor, Michigan
Project Engineer; for the Sanitary Sewer Analysis of the Miller/Spring/Chapin area of the City of Ann Arbor. This project involved review of historical sanitary sewer flow metering and pipe inspection data in the area near the Miller/Chapin/Spring intersection on the west side of downtown Ann Arbor in order to obtain a better understanding of pipe capacities and connectivity. Sanitary sewer hydraulic modeling was also performed to identify potential opportunities for pipe consolidation in this area's complex sanitary sewer configuration. The City of Ann Arbor was programmed to perform road rehabilitation on Miller Avenue in 2024 and wanted to determine whether sanitary sewer system improvements were needed in this area.

Austin Avenue Sanitary Sewer Analysis, Ann Arbor, Michigan
Project Engineer; for the Austin Avenue Sanitary Sewer Analysis for the City of Ann Arbor. The City received numerous reports of basement backups over the years from multiple homeowners residing in a particular neighborhood. Mackenzie interviewed residents within the neighborhood to better understand their experiences. She also reviewed the flow metering data from the flow meters near this area for evidence of surcharging. She performed sanitary sewer hydraulic modeling to compare the flow metering and observational data to the modeling results in order to identify the potential cause of the basement backups and develop recommendations for improvement. She then developed a technical memorandum for the City detailing the analyses performed as well as the findings and recommendations.

Robert Czachorski, PE

AUTHORIZED NEGOTIATOR & PRINCIPAL

Education
- Master of Science in Hydraulics in Civil Engineering, University of Michigan, 1996
- Bachelor of Science in Civil Engineering, University of Michigan, 1994

Professional Registration(s)
Professional Engineer
- MI, 1998, #43827
- OH, 2009, #73798

Experience
With OHM since 2004
10 years prior experience

AMM Info
Maintains the AMM Learning Library and founded the AMM Users Group. Link below:

Background

Robert Czachorski has 30 years of experience in consulting with a focus on water resources and a deep expertise in sewer collection systems. Robert is the firm's Practice Leader for Collection Systems and is a nationally recognized expert in wet weather sewer issues. His focus has been on bringing new technologies to water resource systems. His key accomplishments include:

- **Extensive Collection Systems Experience**: Performed studies and designs for an extremely broad array of clients and projects, including some of the largest and most complicated sewer collection systems in the Country.
- **The Antecedent Moisture Model (AMM)**: Developed a hydrologic model for antecedent moisture impacts on sewer systems. The model has been applied to hundreds of catchments and has optimized wet weather upgrades for dozens of systems.
- **AMM Learning Library and Users Group**: Formed the AMM Learning Library and Users Group after putting the model in the public domain in 2020. The Learning Library contains papers, spreadsheets, videos, and guides for how to use the AMM.
- **H2Ometrics Data Analytics Platform**: Developed cloud-based water and sewer data analytics platform that manages flow and rain data from dozens of systems, comprising thousands of data feeds and billions of data points.

Robert has performed studies for nearly 100 municipal utility systems. He has helped these communities gain a better understanding of their systems, improve system performance, and optimize capital upgrades. He is one of the firm's top Principals and Project Managers. He is the Principal-in-Charge of some of the firm's largest accounts, including Ann Arbor, Oakland County Water Resources Commissioner, Macomb County Public Works, Delta Township, and the City of Los Angeles, CA.

As a Project Manager, Robert routinely delivers successful projects to our clients with high levels of quality and client satisfaction. He accomplishes this through a unique combination of strong technical capabilities, excellent communication skills, and team building that includes the client, consultants, and public.

Select Relevant Experience

Sanitary Sewer Analysis for Proposed University of Michigan Residence Hall, Ann Arbor, Michigan

Principal; for a Sanitary Sewer Analysis for a Proposed University of Michigan Residence Hall within the City of Ann Arbor. This project involved performing sanitary sewer modeling to determine whether the City's existing sanitary sewer infrastructure would be able to accommodate the projected additional flow from a new University residence hall during a design storm event. The modeling results suggested that the existing downstream sewers would not have the capacity to convey the additional flow, so recommended sanitary sewer system improvements and associated cost estimates were developed for consideration by the City and University.

Select Relevant Experience Continued

Sanitary Sewer Improvements & Preliminary Engineering Project, Ann Arbor, Michigan
Project Manager; Sanitary Sewer Wet Weather Evaluation Project (SSWWEP), performed by OHM Advisors between 2013 and 2016, provided the basis for the City's long-term planning and improvements for the sanitary sewer system. Robert was the Project Manager for the Sanitary Sewer Improvements & Preliminary Engineering (SSIPE) project, which involved performing flow metering, sewer investigations, modeling and preliminary engineering for improvements to several interceptor sewers in the city. The study focused on six interceptor areas that were identified in the SSWWEP. The SSIPE project involved development of preliminary engineering designs and cost estimates for the six interceptor areas.

Sanitary Sewer Wet Weather Evaluation Project, Ann Arbor, Michigan
Project Manager; Project manager and lead technical public engagement engineer for the City's evaluation of their sanitary collection system. The City of Ann Arbor performed approximately 2,700 footing drains disconnections (FDDs) from their sanitary sewer system between 2001 and 2012. The City retained OHM to perform an evaluation of the effectiveness of the FDD program and develop alternatives for improving the sanitary system. OHM's approach included flow metering, FDD effectiveness evaluation, hydrologic modeling, hydraulic modeling, capacity assessment, alternative evaluation and an extensive public engagement program.

June 25, 2021 Storm Event Analysis, Ann Arbor, Michigan
Principal in Charge; for the June Storm Event Analysis project for the City of Ann Arbor. A large rain event in June of 2021 resulted in extensive flooding and basement backups in the Pittsfield Village neighborhood within the City. This project involved analyzing the storm and sanitary sewer systems to determine the cause of the flooding and basement backups in this area and to provide recommendations on what could be done to prevent these occurrences in the future.

Great Lakes Water Authority, CSO Long-Term Corrective Action Plan, Detroit, Michigan
Project Manager for OHM as the civil engineering lead on a team for the development of the CSO Long Term Control Plan (LTCP) for this regional wastewater system serving over 3,000,000 people in the City of Detroit and surrounding suburbs. Robert led the design standards and level of service development, alternatives evaluation, and conceptual engineering. The Antecedent Moisture Model was used for validating the hydrologic model. The final plan focused on system optimization and water quality, resulting in a $200 million program, which was substantially less expensive than prior recommendations focused on grey infrastructure that would have been unaffordable for the residents of the City of Detroit.

Oakland County Water Resources Commissioner, Evergreen-Farmington System Metering, Billing System, and Long-Term Corrective Action Plan, Oakland County, Michigan
Robert has performed many projects for this regional sewer system of over 300,000 people and 15 communities. He led the development of a meter-based billing system using 200 flow meters. OHM still processes this flow data today. Robert was the Program Manager for development of the Long-Term Corrective Action Plan, which encompassed $200 million in capital upgrades, including tunnels, relief sewers, storage facilities and conveyance improvements. These have been implemented and successfully control SSOs. The Antecedent Moisture Model was the basis of the system evaluation and sizing. Robert led the project and consultant team, the project scope and schedule, the program strategies, the technical tasks, and coordinating with the 15 communities and the MDEQ.

Citywide Sewer Study (2022), Dearborn, Michigan
QA/QC Officer; for this citywide hydrologic and hydraulic evaluation of the sanitary, combined, and storm sewers and development of recommendations to successfully mitigate street and basement flooding. Project tasks include developing hydrologic and hydraulic models for six project areas, flow metering and data analysis, model calibration, evaluating existing system performance, completing a root cause analysis to flooding issues and development of solutions. These tasks culminate in the delivery of a final set of feasible 5-year and 30-year solutions. This set of solutions will serve as a roadmap for the City to mitigate flooding into the future.

Cresson Slotten, PE

QA/QC ENGINEER

Education
- Bachelor of Science in Civil Engineering, University of Michigan, 1986

Professional Registration(s)
Professional Engineer
- MI, 1993, #38784

Experience
With OHM since 2021
34 years prior experience

Background

As a member of OHM Advisors' Municipal Services Group, Cresson Slotten is utilizing his substantial and diverse experience gained from a 33+ year career with the City of Ann Arbor, Michigan in their engineering, systems planning and public works groups, including seven years as the City's Systems Planning Unit Manager, on a variety of civil and municipal projects for multiple OHM Advisors clients. His significant background in private development reviews and construction oversight, as well as capital improvement project design, bidding and project management is beneficial on both private and publicly funded infrastructure projects for various communities.

Cresson's experience in strategic and technical infrastructure planning, including master planning, capital improvements planning/programming and infrastructure asset management across municipal utilities, transportation and solid waste systems will assist communities and agencies with both their short-term and longer-view strategies and visions.

Some of the local communities and agencies that Cresson has worked with over the years, as well as now with OHM Advisors, include: the City of Ann Arbor; Washtenaw County Water Resources Commissioner's Office and Department of Public Works; Ann Arbor DDA; University of Michigan; Michigan Department of Transportation; SEMCOG; Washtenaw Area Transportation Study (WATS); Ann Arbor Area Transportation Authority (AAATA); Washtenaw Regional Resource Management Authority (WRRMA); Pittsfield Charter Township, Ann Arbor Charter Township, Scio Township, and Superior Charter Township.

Select Relevant Experience

Pittsfield Village Improvements, Ann Arbor, Michigan
QA/QC Manager; for the development of a comprehensive plan that encompasses previously recommended utility and roadway improvements within the Pittsfield Village neighborhood. OHM Advisors is performing the field data collection as well as the detailed design and preparation of bidding documents for construction of the recommended improvements.

Ann Street Water Main & Resurfacing Design, Ann Arbor, Michigan
Co-Project Manager; Engineering design for water main replacements, stormwater management improvements and road resurfacing for Ann Street in downtown Ann Arbor. The design includes new intersection bump outs for pedestrian safety, stormwater infiltration for stormwater quantity and quality benefits, and maintenance of traffic for this downtown area during construction.

Clark Road Pump Station Replacement, Superior Township, Michigan
Project Manager; Replace an existing pre-manufactured "can" station installed in 1969 with a new relocated pump station building and wet well, including over 700 feet of new 12-inch and 18-inch gravity sanitary sewer utilizing trenchless installation.

Streetlight Replacement and Painting (2021), Ann Arbor, Michigan
Project Engineer; Assisting with design development for preparation of contract documents for the replacement of light poles and fixtures in the downtown and along major roadways

Select Relevant Experience Continued

throughout the City. This project is a recurring light pole CIP to implement findings from the City's asset management system, which was previously created with OHM Advisors under a separate project.

Solid Waste Department Work Plan and RFP Development Assistance, Ann Arbor, Michigan
Project Manager; The City, with OHM Advisors' assistance, and discussions with its recycling collections contractor Recycle Ann Arbor (RAA), developed and implemented adjustments to the collection of recyclable materials from most multi-family sites in the city. OHM also assisted the City in developing a Request for Proposal for their Commercial Solid Waste Collections Franchise prior to the expiration of their existing franchise contract. The RFP incorporated the City's Zero Waste Goals to the greatest extent possible and included extensive and detailed requirements for proposers for their proposals.

2023 Miscellaneous Utility Projects Design, Ann Arbor, Michigan
Project Manager; Engineering design for water main replacement and road resurfacing for four local streets - Carmel Street, Easy Street, Provincial Drive, and Glendaloch Road, including determination of horizontal alignment and construction methodology for the water main replacements, road cross-sectional requirements, and storm system needs. The design also included replacement of a nearby sanitary sewer on Arlington Boulevard, and abandonment of an old crosslot sanitary sewer on North Seventh Street that required the relocation of a single remaining service lead from the sewer to be abandoned to the sanitary sewer in the roadway.

Miller/Spring/Chapin Sanitary Sewer Analysis, Ann Arbor, Michigan
Project Manager; Review of historical sanitary sewer flow metering and pipe inspection data in the area near the Miller/Chapin/Spring intersection on the west side of downtown Ann Arbor in order to obtain a better understanding of pipe capacities and connectivity and performance of sanitary sewer hydraulic modeling to identify potential opportunities for pipe consolidation in this area's complex sanitary sewer configuration. The City of Ann Arbor is programmed to perform a road rehabilitation on Miller Avenue in 2024 and needed to determine if any work on the sanitary sewer system should be coordinated with that work.

Solid Waste Resources Management Plan, City of Ann Arbor, Michigan *
Project Manager for the development of the City's plan, including scoping of the project, procurement and selection of consultant team and City lead throughout the public engagement and plan development process. This effort, which had over sixty participants on its advisory committee, resulted in the plan that optimizes resources, mitigates financial and operational risk, and improves customer service.

Sanitary Sewer Wet Weather Evaluation Project, City of Ann Arbor, Michigan *
Member of the project management team providing guidance on the project; provided background and insight on the City's sanitary collection system; participated in, and assisted with the community engagement efforts; and, provided review and QA/QC of project materials and deliverables. This project, which OHM Advisors performed for the City, evaluated the effectiveness of the City's 11-year long Footing Drain Disconnection (FDD) Program to reduce wet weather impacts in the sanitary system through flow metering, FDD effectiveness evaluation, hydrologic modeling, hydraulic modeling, capacity assessment, alternative evaluation, and an extensive public engagement program.

Capital Improvements Plan/Program Lead, City of Ann Arbor, Michigan *
Developed, guided, and managed the City's collaborative, prioritized and data-based approach to capital improvement planning. Working with thirteen Asset Category Teams consisting of planning, engineering and operational staff and some key outside stakeholders, and utilizing GIS-based asset inventories and condition data along with a prioritization model tool, assembled and formed the City's 6+ year Capital Improvements Plan (CIP), every other year, and adjusting the plan in the intervening year. This included adoption of the CIP by the Planning Commission and utilization of the CIP in the creation of the recommended 2-year Capital Projects Budget for City Council approval.

Indicates work completed prior to joining OHM Advisors.

Karlin Danielsen, PhD

HYDRAULIC MODELING ENGINEER

Education
- Ph.D., Environmental Engineering, University of Michigan, Ann Arbor, MI, 2004
- Master of Science in Geology/Environmental Geochemistry, Ohio State University, Columbus, OH, 1995

Experience
With OHM since 2016
11 years prior experience

Affiliations
Co-chair of the MWEA Contaminants of Concern Committee

Publications with OHM Advisors
- 2024 "Evaluation of fluorescence spectroscopy to quantify real-time E. coli concentrations in a combined sewer overflow impaired watershed" submitted for publication to Science of the Total Environment
- 2022 "A Case Study on Proactive PFAS Source Tracking" Opflow, Vol 48, (10), 18-22
- 2018 "Data Tools Improve Nutrient Monitoring" Opflow, Vol. 44 (8), 16- 16-16-19

Background

Karlin is a Technical Specialist leading OHM Advisors' water quality services. Her work focuses on the interface between the built environment and the natural world, and she is especially interested in supporting communities to navigate complex decision making by utilizing innovative technologies to automate water quality measurements, meeting the challenges presented by emerging contaminants and utilizing models as decision support tools.

- **Hydraulic and Hydrodynamic Modeling Experience**: Karlin's modeling experience includes multiple sanitary capacity studies that support communities to navigate development pressures. These studies provided critical information that allowed communities and development teams to come to agreement on cost sharing for infrastructure improvements. Karlin has also built an integrated stormwater model that utilizes both surface drainage and the connected stormwater drainage conduits and developed preliminary plans to reduce the number of outfall locations where contaminated stormwater would need to be monitored or treated.
- **Real-time water quality monitorin**g: Karlin built a real-time water quality monitoring program that coupled tools capable of continuous real-time monitoring with Internet communication and online data analytics platforms and models. The team has technical expertise, access to unique field sensors and in-depth field experience and is pushing the envelope in this area by exploring rapidly evolving monitoring tools, evaluating their potential and limitations, and developing strategic implementations. The tools document the influence of rain events as they happen, track water quality issues to the source and create spatial maps that visually communicate water quality. Karlin and her team's work empowers communities to prioritize infrastructure upgrades and focus on those that return the highest water quality improvements for their investment.
- **Emerging Contaminants***:* Karlin develops technical approaches to support communities as they work to meet emerging Per and -polyfluoroalkyl substances (PFAS) requirements. Karlin co-chairs the Michigan Water Environment Association's (MWEA) Contaminants of Concern Committee and tracks the rapidly evolving state and federal regulatory PFAS landscape. She also has extensive experience with water contaminant analysis including laboratory and analytical method selection, sampling protocols and data validation. Together with her clients, she has developed innovative approaches to source tracking by combining flow analysis, mapping tools, patent review and site historical information to zero in on the most probable contaminant sources.

Select Relevant Experience

Sanitary Sewer Analysis for Proposed University of Michigan Residence Hall, Ann Arbor, Michigan

Project Engineer; for a Sanitary Sewer Analysis for a Proposed University of Michigan Residence Hall within the City of Ann Arbor. This project involved performing sanitary sewer modeling to determine whether the City's existing sanitary sewer infrastructure would be able to accommodate the projected additional flow from a new University residence hall during a design storm event. The modeling results suggested that the existing downstream sewers would not have the capacity to convey the additional flow, so recommended sanitary sewer system improvements and associated cost estimates were developed for consideration by the City and University.

Select Relevant Experience Continued

Evaluation of Real-time Bacteria Monitoring Tools, Great Lakes Water Authority, Michigan
As Technical Specialist, tested technology that would help prioritize the location of infrastructure improvements and evaluate programmatic advances over time. Selected submersible fluorometers that measured the optical indicator parameter Tryptophan-like fluorescence (TLF) and evaluated this parameter's ability to predict *E. coli* concentrations continuously and in real-time. Quantified *E. coli* loading from five Combined Sewer Overflows (CSOs) discharging to the Rouge River and compared traditional *E. coli* measurements to sonde predictions. Collected data during three storm events to compare the performance of this technology across seasons and storm magnitudes.

Arbor South Utility Impact Analysis, Ann Arbor Michigan
The Arbor South development includes a proposed multi-story building complex and hotel. As a project engineer, performed a sanitary sewer capacity analysis for multiple potential routing options. Determined that the sanitary system had capacity to convey flows locally along one of the routes and recommended improvements to the second potential route where capacity was limited. Identified major trunklines that are already overcapacity downgradient and quantified the magnitude of additional stress placed on those interceptors due to the Arbor South development.

Client Confidential, Stormwater Management Project
Project Engineer responsible for creating an integrated stormwater model that utilized both the surface drainage and the connected stormwater drainage conduits on a 240-acre industrial property contaminated with legacy PFAS. Developed watershed delineation maps to identify the areas that were tributary to each stormwater outfall. Utilized the model to predict outfall volumes and flow timing depending on the size of precipitation events. With the long-term goal of retaining stormwater on site, developed preliminary plans to reduce the number of outfall locations where PFAS would need to be monitored or treated.

Water System Feasibility Analysis, Village of Pellston, Michigan
The Village of Pellston has private wells contaminated by PFAS. As Technical Lead, evaluated the option of using Point of Entry (POE) Granular Activated Carbon filtration units for PFAS removal. Lead conversations with state regulators to determine the conditions where POE systems would be considered an acceptable alternative, identified an appropriate GAC filtration system, and developed cost estimates to scale this solution to all the homes with contaminated water.

PFAS Evaluation and Source Tracking for Three Wastewater Treatment Plants, Oakland County, Michigan
Technical lead for PFAS source tracking for the Commerce Township Wastewater Treatment Plant, the Clinton River Water Resource Recovery Facility, and the Walled Lake-Novi Wastewater Treatment Plant. Developed a strategy to characterize PFAS in the collection system branches receiving flow from potential PFAS sources. Sampled at flow meter locations or lift stations to isolate sewer branches with the highest loading. Created detailed maps of priority sub-sewer sheds to identify sites with the highest likelihood of being PFAS sources for follow-up investigation. Tracked PFAS within the facility to determine the ultimate loading to the environment via effluent and land application of biosolids.

PFAS Contingency Planning, Oakland County Water Resources Commissioner, Oakland County, Michigan
Technical lead for contingency planning to protect water supply wells in three townships from PFAS contamination. Mapped the locations of wells and the 10-year time of travel wellhead protection zones relative to potential and known sources. Ranked the risk from sources, recommended monitoring wells where appropriate, developed a well sampling strategy, and proposed technologies for emergency response efforts.

University of Michigan School for Environment and Sustainability, Ann Arbor, Michigan
Technical lead for a project that evaluated Tryptophan-like fluorescence and Optical Brighteners (combined with other well-established parameters) to track *E. coli* loading in a continuous real-time deployment. The project evaluated the performance of submersible sondes in three sub-watersheds of the Clinton River; one highly urbanized sub-watershed, one dominated by rural land use and one with a mix of rural and urban land use patterns and compared the effectiveness of optical parameters in tracking *E. coli* loading in the three land use settings.

Erica Morgan

AMM & PEAK FLOW DEVELOPMENT ENGINEER

Education
- Bachelor of Science in Civil Engineering, Michigan Technological University, 2011

Experience
With OHM since 2013
3 years prior experience

Professional Affiliations
- In-Coming Vice President for the Michigan Water Environment Association Board of Directors (2024)

Presentations
- OHM AMM Case Studies, AMM Users Conference, May 2022
- AMM – Frequency Analysis & Case Studies, MWEA Annual Conference, June 2023

Background

Erica has thirteen years of experience in Civil Engineering, including three in municipal engineering with the City of Novi, Michigan and ten in consulting with a primary focus on hydrologic and hydraulic analysis of sewer, storm, and combined systems. Below are some of Erica's key technical qualifications:

- **Technical Expertise**: Extensive collection system experience on some of largest systems in the Midwest: Great Lakes Water Authority, Oakland County Water Resources Commissioner, Ann Arbor, Ypsilanti Community Utility Authority, City of Dearborn.
- **OHM's Lead Antecedent Moisture Modeler**: Technical specialist in developing, calibrating, and validating antecedent moisture models more than a dozen projects and 50+ catchments over the past ten years.

Select Relevant Experience

Evergreen-Farmington Sanitary Drain (EFSD) As-Needed Services & Clinton-Oakland Sewage Disposal System (COSDS) As-Needed Services, Oakland County, MI

Assistant Project Manager; Performs quarterly mass flow balance. Performs dye test period break analyses, wet weather flow editing, inflow and infiltration analyses, as-needed billing system analyses.

- Paint Creek Branch Modeling: Modeler for developing hydrologic Antecedent Moisture Models for design peak flows for hydraulic model update along the Paint Creek Branch Interceptor in the COSDS and evaluating existing system performance.

YCUA Meter Based Billing System, Ypsilanti, Michigan

Assistant Project Manager; Performed quarterly mass flow balance of Ypsilanti Community Utilities Authority (YCUA) flows. Performs dye test period break analyses, wet weather flow editing, inflow and infiltration analyses, and presentation of quarterly billing results.

- Wastewater Treatment Plant Evaluation (2020): Technical specialist in developing hydrologic Antecedent Moisture Model for design peak flows and analyzing retention basin storage needs at the treatment plant.

Great Lakes Water Authority, CSO Long-Term Corrective Action Plan, Detroit, Michigan

Technical Specialist; in developing hydrologic Antecedent Moisture Model for design peak flows and analyzing results in a pilot study to validate alternative modeling platform. Modeler; for regional hydrologic and hydraulic evaluation of the combined sewers and development of recommended plan to control CSOs along the Rouge River.

Citywide Sewer Study (2022), Dearborn, Michigan

Modeler; for this citywide hydrologic and hydraulic evaluation of the sanitary, combined, and storm sewers and development of recommendations to successfully mitigate street and basement flooding. Project tasks include developing hydrologic and hydraulic models for six project areas, flow metering and data analysis, model calibration, evaluating existing system performance, completing a root cause analysis to flooding issues and development of solutions.

Select Relevant Experience Continued

These tasks culminate in the delivery of a final set of feasible 5-year and 30-year solutions. This set of solutions will serve as a roadmap for the City to mitigate flooding into the future.

Sanitary Sewer Improvements, St. Louis, Michigan
Technical specialist in developing hydrologic Antecedent Moisture Model for design peak flows, verifying sizing in hydraulic PCSWMM model, and analyzing retention basin storage needs at the WWTP.

Capacity Evaluation of the Carrier Creek and River Ridge Sanitary Sewer Service Area & As-Needed, Delta Township, Michigan
Technical specialist in developing hydrologic Antecedent Moisture Model for design peak flows at multiple locations, development of a SWMM model to identify capacities in the sanitary sewer system.

Stormwater, Asset Management, and Wastewater (SAW) Projects Various Communities, Michigan
The SAW Projects covered multiple tasks depending on the system and community, the main functions were too, inventory the stormwater or wastewater collection systems and perform condition assessment on inventoried infrastructure, conduct metering and hydrologic/hydraulic modeling and update GIS layers based on inventoried and condition assessment.

- Stormwater Asset Management, Hydraulic Modeling, and Stormwater Rate Study for City of Auburn Hills
- Stormwater Asset Management and Hydraulic Modeling for City of Baraga
- Stormwater Asset Management and Stormwater Rate Study for City of Battle Creek
- Wastewater Asset Management and Hydraulic Modeling for City of Chesaning
- Stormwater and Wastewater Asset Management and Stormwater Rate Study for City of Fenton
- Stormwater Asset Management and Hydraulic Modeling for City of Hancock
- Wastewater Asset Management for Orion Township
- Wastewater Asset Management and Hydrologic/Hydraulic Modeling for City of Owosso
- Stormwater Asset Management and Stormwater Rate Study for City of Rochester Hills
- Wastewater Asset Management and Hydrologic/Hydraulic Modeling for the City of Southfield
- Stormwater and Wastewater Asset Management for City of Standish
- Stormwater Asset Management and Stormwater Rate Study for Traverse City

Wastewater Master Plan, Midland, Michigan
Project Engineer responsible in developing hydrologic Antecedent Moisture Model for design peak flow and comparing to observed sanitary sewer overflow event.

Brookfield Abandonment Study, Massillon, Ohio
Project Engineer responsible for analyzing peak flow data in sanitary sewers, evaluating sanitary sewer capacity, and making recommendation for sanitary sewer abandonment.

GLWA Stand-Up Assistance, Detroit, Michigan
Project Engineer; responsible for aiding the development of the Great lakes Water stand-up program plan, monitor and track progress, develop and monitor program management stakeholder engagement, support the teams formed to stand up the Authority, provided additional duties as needed and provided technical support.

Sanitary Sewer Wet Weather Evaluation Project, Ann Arbor, Michigan
Engineer; Reviewed flow meter and rain gauge data for quality control. Performed antecedent moisture hydrologic modeling to evaluate the inflow and infiltration removal after a footing drain disconnection program. Performed regression analysis on results to ensure statistical significance. Aided in presentation of results to citizens.

Royal Oak Sanitary and Combined Sewer Study, Royal Oak, Michigan
Engineer; Reviewed flow meter and rain gauge data for quality control. Performed antecedent moisture hydrologic modeling to evaluate future peak flow throughout combined sewer system for incorporation into hydraulic model.

Chris Elenbaas, PE

DESIGN ENGINEER & COST ESTIMATING

Education
- Bachelor of Science in Civil & Environmental Engineering, University of Michigan, 2005

Professional Registration(s)
Professional Engineer
- MI, 2009, #6201056730

Experience
With OHM since 2022
18 years prior experience

Background

Chris Elenbaas serves as a Senior Project Manager and has over 19 years of broad experience within municipal engineering, including master planning, engineering analysis, asset management, condition assessment, detailed design, and construction administration. His primary focus has been on municipal water supply including storage tanks, pump stations, distribution mains, and large-diameter transmission mains. Beyond water infrastructure, he has served as a design engineer for wastewater gravity mains, force mains, lift stations, pedestrian pathways, roadways, streetscapes, and recreational facilities. In addition to his consulting experience, he has over four years working within a public works environment and is accustomed to field and emergency response efforts. Successfully managing municipal assets is his primary goal and his work has involved numerous examples of making data-driven design decisions to help communities meet their service goals for residents.

Select Relevant Experience

U of M Housing Master Planning, Ann Arbor, Michigan

Municipal Engineer; The University of Michigan is in the process of constructing two student resident halls in the City of Ann Arbor. OHM Advisors provided a sanitary sewer capacity study and evaluated eight potential sanitary routing alternatives to accommodate the flow anticipated from the residence halls. Cost estimates were developed for each alternative and one route was recommended based on construction feasibility and the ability to meet the schedule constraints.

DWSD As-Needed Engineering; Task 1 & Task 6 Water Main Replacement, Detroit, Michigan

QA/QC Engineer; The Task 1 water main project consists of more than 6 miles of water main replacement mainly within local neighborhoods in the city. A majority of the work is funded by a Michigan Drinking Water State Revolving Fund (DWSRF) loan. The current Task 6 water main replacement design project is similar in that it consists of replacement or rehabilitation of approximately 6 miles of water main in the Dexter-Linwood, Davison, and Buffalo-Charles neighborhoods of the city. This task is also funded through DWSRF with bidding in spring 2024. OHM Advisors prepared construction drawings, specifications, opinion of probable costs at various stages of design, and preparation of documentation and clearances needed to satisfy DWRSF requirements.

US-12 Wastewater Improvements; Pittsfield Township, Michigan*

Project Manager; and lead technical engineer for a multi-phase sanitary interceptor improvement project for Pittsfield Charter Township. The design for Phase 1 included over 16,000 feet of new 36-inch interceptor sewer, with depths reaching up to 40 feet. Notably, this phase included the first open-cut application of fiberglass reinforced pipe (FRP/GRP) within the State of Michigan to address concerns of hydrogen sulfide corrosion. Phase 1 construction cost was over $27 million with subsequent planned phases totaling over $35 million.

Select Relevant Experience Continued

Huron West Park Sanitary Sewer Replacement Phase 2 & 3, Ann Arbor, Michigan
Construction Project Manager; for installation of 4,200 feet of new 21-inch sanitary interceptor sewer through the City of Ann Arbor. Also served as design manager for the project at a previous firm. The project involved extensive Public Engagement and obtaining 40 rear yard easements for construction. Supervised the surveying of over 800 trees, and selected alignment and construction methods that minimized impacts on critical natural areas and adjacent homeowners. The dewatering design incorporated elements to reduce impacts on the existing 1,4 dioxane contamination plume along the sewer route.

The Downs PUD Consultation (Northville Downs Site Redevelopment), Northville, Michigan
Utility Infrastructure Expert; for comprehensive consultation to the City in technical matters for a proposed PUD redevelopment of the former Northville Downs Harness Racing site, proposed as The Downs PUD. This mixed-use development contains various types of residential uses, retail, and greenspace improvements, as well as associated CIPs at the perimeter. Services provided included site plan review, traffic analysis, review of development agreement, survey, engineering plan review, and more.

Farmington Hills Temporary Pump Station, Farmington Hills, Michigan
Project Manager; OHM led the efforts to design a temporary water pump station that reversed normal flow patterns and allowed the City of Farmington Hills to supply water from one of their alternate feeds during the rehabilitation of a 48-inch and 54-inch transmission main. Services included emergency design, hydraulic analysis, permit and startup assistance for a 3,200 gpm temporary water booster station. Challenges included pump availability, permitting requirements, cold weather installation and surge management.

2023 Miscellaneous Utility Projects Design, Ann Arbor, Michigan
Assistant Project Manager; Engineering design for water main replacement and road resurfacing for four local streets - Carmel Street, Easy Street, Provincial Drive, and Glendaloch Road, including determination of horizontal alignment and construction methodology for the water main replacements, road cross-sectional requirements, and storm system needs. The design also included replacement of a nearby sanitary sewer on Arlington Boulevard, and abandonment of an old crosslot sanitary sewer on North Seventh Street that required the relocation of a single remaining service lead from the sewer to be abandoned to the sanitary sewer in the roadway.

5 Mile & Ridge Road Water Main Extension, Northville, Michigan
Project Manager; Developed design documents for the construction of 8,800 feet of new 16-inch HDPE water main. The new water main will primarily be installed by horizontal directional drill (HDD) to minimize environmental impacts to sensitive wetlands and a major stream crossing along the proposed route. Included extensive stakeholder coordination including a CSX Railroad crossing, high pressure gas main crossing, stream crossing and extensive wetlands.

7 Mile Road Water Tower & Vault Modifications, Northville, Michigan
Construction Project Manager; for the construction phase engineering efforts for a new 500,000-gallon elevated storage tank and of two new control vaults in Northville Township. The project required detailed coordination with the Great Lakes Water Authority and extensive water system work within constricted sites demanding unique easement conditions. The project construction cost was over $6 million, and startup was completed in the spring of 2024.

Equalization Basin Expansion, Western Townships Utilities Authority, Canton, Michigan*
Project Engineer; on the Owner's Advisor team for the progressive design build of a 3 MG expansion of existing wastewater equalization basins at WTUA's Lower Rouge Pump Station. Included the construction of a new partially buried wire-wound prestressed concrete tank and modifications to the existing pump station and project site. The Guaranteed Maximum Price of the contract was over $12.3 million.

Completed prior to joining OHM Advisors.

Albert Ruiz, PE

LARGE DIAMETER AND TRENCHLESS DESIGN ENGINEER & COST ESTIMATING

Education
- BS, Civil Engineering, Arizona State University, Tempe, Arizona, 2005

Professional Registration(s)
Professional Engineer
- #50754, AZ
- #79393, CA

Experience
19 Years experience

Professional Affiliation(s)
- Member, American Society of Civil Engineers
- Member, Society of Mining Engineers
- Member, Underground Construction Association
- Member, North American Society for Trenchless Technology

Background

Albert is a trenchless construction expert with nineteen years of experience in trenchless design, design of tunnel excavations, ground support systems, and structural liners for shafts and tunnels, and construction management experience. He has design and construction experience in all trenchless methodologies, notably HDD, microtunneling, auger boring, and pipe jacking. He has led design teams responsible for shaft, tunnel, and trenchless projects and coordinated with different engineering disciplines and project stakeholders. He has created finite element models for design of tunnels, cut and cover structures, and shafts. His expertise has extended to several published papers regarding tunneling and underground construction. He has general civil and structural design experience as well, including the structural design of bridge abutments, retaining walls, and concrete and steel frame structures. He has performed site investigations and structural inspections, has experience in infrastructure rehabilitation projects, and has experience in generating quantity take-offs, cost estimates, and construction schedules. His experience in general civil design includes design of water and sewer mains, site grading and drainage, and hydrological analysis. Albert also has construction management experience in both a resident engineer and contract administration role, with experience reviewing and approving contract change orders, reviewing and approving contractor progress payments, and reviewing and approving contractor submittals.

Select Relevant Experience

TRENCHLESS TECHNOLOGY

Fourth Street 84-Inch Sewer Interceptor, San Jose, California
Lead Tunnel Engineer responsible for leading trenchless design team and coordinating with other design disciplines and with contractor as part of design-build team. Prepared trenchless drawings, calculations, and specifications. Project consists of two miles of 84-inch diameter RCP sewer pipe, including a low cover crossing of US Highway 101 using microtunneling and a low overhead open cut installation underneath a Highway 880 overpass.

TransCanada Sanitary Trunk Sewer, Calgary, Alberta
Lead Tunnel Engineer responsible for leading trenchless design team and coordinating with other design disciplines and project stakeholders. Project consists of 7 kilometers of 1.5-meter gravity sanitary trunk pipeline constructed using a combination of microtunneling, guided auger boring, and open cut construction. Analyzed alignment options and trenchless methodologies, and prepared Preliminary Design Report, and performed detailed design.

North Las Vegas Hollywood System, Las Vegas, Nevada
As Lead Trenchless Engineer developed plans, specifications, and geotechnical instrumentation and monitoring plan for 84-inch diameter pipe jack crossing of Interstate I-15 in North Las Vegas, Nevada to install a gravity storm sewer.

Miami Dade County WASD, Miami Area N Transmission Main, Miami, Florida
Lead Trenchless Engineer. Led a trenchless design team and coordinated with other design disciplines, project stakeholders, and permitting agencies. Project consisted of approximately of a 750-foot crossing of a state highway and CSX railway tracks for a 48-inch diameter water pressure main within a 72-inch steel casing constructed using microtunnelling. Prepared design plans, specifications, and calculations.

Stantec

Select Relevant Experience Continued

Toledo Waterways Initiative; Downtown Storage Basin, Toledo, Ohio
Trenchless Engineer. Project consists of a 16-million-gallon combined sewer overflow storage basin along Water Street, near the Maumee River, with 1,000 feet of 108-inch diameter reinforced concrete pipe connection to the existing CSO pump station. Pipe installed by pipe jacking approximately 40 feet to 50 feet below the existing grade in stiff to very stiff cohesive till materials below the groundwater table. As a Project Engineer prepared plan and specifications and reviewed tunnel design calculations.

San Francisco PUC, Kansas Marin Street Sewer Improvements Project, San Francisco, California
Trenchless Engineer. Designed 900-ft -long 96-inch-diameter microtunnel crossing to 30% design level as Owner's Engineer for tendering of design build contract. Project included two complex shaft junction structures to connect to existing sewers and microtunneling through complex ground with mixed face conditions.

TUNNELS & SHAFTS

Narraganset Bay Commission, Pawtucket Storage/ Conveyance Tunnel and Pump Station
Project Technical Lead. This project includes design and construction of a deep rock storage conveyance tunnel as well as design and construction of new interceptors, regulator modifications, and other system improvements intended to convey flow from the outfalls of the Blackstone River to the Pawtucket Tunnel. The project is designed to be a 30-foot-diameter, 13,000-foot-long rock tunnel constructed with a precast segmental lining approximately 175 feet below surface. Responsible for design and coordination of the technical components of this Design-Build project during construction.

South Coast Water District, Tunnel Stabilization and Sewer Pipeline Replacement Project, Laguna Beach, California*
Project Engineer overseeing and coordinating design efforts between different engineering teams. Completed design of two-mile-long sewer tunnel rehabilitation and new 20-foot diameter access shaft mined in alluvium and hard rock for $75M enlargement and rehabilitation project. Designed tunnel structural liner and shaft structural liner. Also assisted client with easement and permit acquisition and coordinated between all project stakeholders. Project challenges included the tunnel being located in an extremely environmentally sensitive area, difficult access to the tunnel, coordinating with the public, and keeping the 24-inch diameter, 1MGD sewer pipeline in service during construction.

South Coast Water District, Laguna Beach Sewer Interceptor Tunnel Rehabilitation, Laguna Beach, California*
Project Engineer. Performed tunnel inspection and stability assessment of two-mile long sewer tunnel. Created report of inspection findings and recommended repair and rehabilitation options. Also performed duties as a Construction Inspector for rehabilitation and repairs of a 700-foot long section of tunnel. Oversaw excavation, shotcrete and concrete installation. Created material movement studies and quantity take-offs for logistically and environmentally complex site involving construction beach landing crafts to resupply materials and remove spoil.

San Francisco Public Utility Commission, New Irvington Tunnel Project, Fremont, California*
Client: Inspector and Field Contract Administrator. Reviewed and approved of contract change orders and performed site inspections. Lead inspection team in a study of potential construction defects. Coordinated with Owner, Design Engineer, Construction Manager, and Contractor. The estimated $250 million four-year project will involve excavating the tunnel from up to 4 headings using pre-excavation grouting, drainage/dewatering and ground support techniques. It is anticipated that up to 7 major fault/shear zones will be encountered as well as hydrostatic heads of 350 ft and depths up to 700 ft. The portals will require extensive piping and valves to connect to the numerous existing supply pipelines for the Bay Area.

Indicates work completed prior to joining Stantec.

Murat Ulasir, PhD, PE

ASSET MANAGEMENT SPECIALIST / FINANCIALS

Education
- Masters in Smart Infrastructure Finance, University of Michigan, 2023
- Post-Doctoral research in Environmental and Water Resources Engineering, University of Michigan, 2002

Professional Registration(s)
Professional Engineer
- MI, 2003, #51291

Experience
With OHM since 2001
9 years prior experience

Background

As an Infrastructure Asset Planning Specialist, Murat Ulasir provides assistance to communities for developing long range infrastructure planning and investment strategies, which support a well-planned and maintained infrastructure network that is sustainable and enhances local community character and identity. He has experience with a wide variety of Infrastructure Asset Planning services including infrastructure modeling, master planning, and capital improvement planning, as well as developing asset management programs.

His infrastructure modeling expertise includes water resources modeling expertise (hydraulic and hydrologic models) and infrastructure condition and deterioration forecasting modeling, as well as modeling of impact of climatological factors related to a variety of infrastructure asset performance measures, including water main breaks, inflow and infiltration rates, water demand variations etc.

Murat has experience in advanced data analytics procedures (e.g., statistical modeling, artificial intelligence, neural networking, etc.) for identifying trends in the data. He has developed several business management dashboards for clients in order to summarize institutional information content as well as help clients use these platforms for effective management of their infrastructure assets. He has extensive experience with presenting technically complex concepts in public presentations utilizing a variety of media (GIS, 3-D visualization modeling, etc.) to facilitate understanding and meaningful collaboration.

His desire to provide his clients with the simplest answer to their complex challenges propelled Murat to develop processes and applications utilized by a broad range of client base. One such application is what is referred to as i-Track, a sanitary sewer Part 41 permit application that helps municipalities track their sanitary sewer Part 41 permits, as well as the impact of these permitted flows on overall system hydraulic capacity. It is a web-based application utilizing ArcGIS capabilities along with database management and sanitary sewer modeling capability. Murat has also developed a W.I.N. process by which water main improvement needs can be prioritized for infrastructure management purposes giving consideration to a wide variety of information, such as road condition, water main breaks, system age, material, hydraulic deficiencies, customer complaints, water quality deficiencies, etc.

Select Relevant Experience

Ann Arbor Sanitary Sewer Wet Weather Evaluation Project, Ann Arbor, Michigan
Asset Management Specialist for the City's evaluation of their sanitary collection system. The City of Ann Arbor performed approximately 2,700 footing drains disconnections (FDDs) from their sanitary sewer system between 2001 and 2012. The City retained OHM to perform an evaluation of the effectiveness of the FDD program and develop alternatives for improving the sanitary system. OHM's approach included flow metering, FDD effectiveness evaluation, hydrologic modeling, hydraulic modeling, capacity assessment, alternative evaluation, and an extensive public engagement program.

Select Relevant Experience Continued

West Park Storm Sewer Modeling & Forensic Review, Ann Arbor, Michigan
Asset Management Specialist for the re-design of existing swirl concentrator units to provide treatment to the first flush flow rate from the upstream watershed. The project included development of hydraulics and hydrology to serve as the basis for the design for reconfiguration of the existing in-line swirl concentrator devices within the storm sewer system. The basis of design for this project included some innovative approaches to evaluating the first flush flow rate from the tributary areas.

Livonia Sanitary Sewer Asset Management Plan, Livonia, Michigan
Modeler; Worked with the City to submit a Department of Environmental Quality (MDEQ) Stormwater, Asset Management and Wastewater (SAW) grant application. The end product resulting from the grant program was an asset management plan complete with a rate study, assessing the anticipated future system needs of the City compared to the current revenue. Metering and Wet Weather Modeling: Approximately 20 meters as well as three rain gages were used to collect flow information, which subsequently was converted into a representative hydraulic and hydrologic model of the collection system; capacity evaluation was performed as well based on MDEQ overflow threshold mandate. In the calibration process, was able to pinpoint an area of unusual hydraulic blockage, which turned out to be a twelve-foot light pole stuck in a manhole, causing significant backups.

Clinton-Oakland SDS As-Needed Services, Oakland County, Michigan
Project Manager for upgrades to the management and reporting system for this sewer disposal system serving 9 communities and over 250,000 people. The new system provides methodologies and tools for billing the local communities based on actual meters flows from nearly 60 flow meters in the system. Antecedent moisture models were developed to review meter flows for accuracy during wet weather periods.

Novi Sanitary Sewer Capacity Study, Novi, Michigan
Project Engineer for the development of the City of Novi sanitary collection system study and Capacity, Operation, Management and Maintenance (CMOM) program. Project included performing flow monitoring at seven local sites and collecting flow data from 6 regional flow meters to assess rainfall / flow relationships in the system. Data collected was used to perform an inflow and infiltration analysis and capacity assessment for the system. An antecedent moisture model was prepared to develop a frequency analysis for peak flows. Several tools were developed to simplify and automate the process of issuing sewer permits and reporting of information to the MDEQ, including a Part 41 sewer permit tracking system.

Evergreen-Farmington SDS As-Needed Services and Long-Term Corrective Action Plan, Oakland County, Michigan
Project Engineer responsible for development of a long-term plan to address sewer overflows from the County's EFSDS system, which collects sewage from 15 communities comprising over 300,000 people. The project scope included detailed field investigations, modeling, analysis, development of alternatives, and development of the Long-Term Corrective Action Plan. The project is being conducted in a phased approach and additional work is ongoing.

****Infrastructure Management and Planning****
City of Milan Asset Management & Master Plan, 2024
City of Owosso Asset Management Plan, 2024
City of Dexter Asset Management Plan, 2024
Southeast Michigan Council of Governments Regional Water/Sewer/Storm Asset Management Plan, 2022
Detroit Water and Sewerage Department – Water Main Ownership Reassignment Collaboration Assistance, 2020
City of Ann Arbor Sanitary and Storm Sewer Asset Management Planning Project, 2020

****Infrastructure Asset Management****
Great Lakes Water Authority, Capital Improvement Planning As-Needed Assistance – 2016
City of Livonia Sanitary Sewer Asset Management Program – 2015
City of Farmington Hills Water Mater Plan & Infrastructure Prioritization and Condition Forecasting– 2013

Andrew Burnham

FINANCIAL & POLICY EXPERT

Education
- Bachelors of Business Administration, Lake Superior State University, Sault Ste. Marie, Michigan, 2000

Experience
22 Years experience

Professional Affiliation(s)
- Rates and Charges Committee, American Water Works Association
- Financial Accounting & Management Controls Committee, American Water Works Association
- Member, Florida Section, Government Finance Officers Association
- Member, Utility Resource Management Committee, The National Association of Clean Water Agencies
- Management Committee, Water Environment Federation
- Trustee of the Management & Leadership Division, American Water Works Association

Publications
- Lessons Learned - Integrating AMP Findings into a Sustainable Financial Plan. Asset Management Seminar. Michigan, 2019. Water Works Association

Background

Andrew brings 24 years of experience in addressing cost recovery and financial planning issues with investor-owned utilities as well as municipal utilities. He directs all of the group's projects and he will lead the Stantec team in providing the requested analysis. He has been involved in many studies involving both system wide capital charge development as well as area specific capital charges within a municipality. Andy is very familiar with the City of Ann Arbor's utility systems as he led the City's last rate study, explaining the recommended modifications to stakeholders and City staff and administrators. Andy will also lead the Stantec team in reviewing the 2015 Black & Veatch's report and its further applicability as the City addresses their Sanitary Sewer Master Plan implementation.

Select Relevant Experience

Ann Arbor Stormwater Rate and Service Assessment, Ann Arbor, Michigan
Project Manager. Andy evaluated the quality of service offered in this thorough evaluation of stormwater rates and service levels. He examined many regions and identified different choices, along with their associated costs and rate consequences. In addition, Andy organized a sequence of participatory work sessions with representatives from different customer groups in the community to determine the order of importance for the identified improvements in service quality.

Water Rate Study & User Charges Ann Arbor, Michigan
Project Manager. Andy conducted an extensive cost of service analysis, which involved assessing various revenue projections, rate modifications, and capital finance methods in collaboration with stakeholders, considering different assumptions. For the study, we examined the data provided by the City, analyzed customer usage patterns on a monthly, daily, and hourly basis, reviewed previous studies, and considered the objectives. Our goal was to identify suitable customer categories, determine the methods for calculating service costs, and establish rate structures that would meet the annual revenue targets, align with the cost of service, encourage conservation, and improve affordability. Significantly, our analysis of the existing data resulted in the development of a tiered rate system based on costs and the establishment of a new categorization for multifamily rates.

DWSD, Rate Study and Financial Feasibility Services Detroit, Michigan
Project Director. The DWSD offers water distribution, sanitary sewage, and stormwater collection services to about 700,000 inhabitants inside the City of Detroit. In 2013, a Federal judge granted the Detroit Water and Sewerage Department (DWSD) a level of administrative autonomy separate from the City. In 2016, the water, wastewater, and stormwater regional system assets constructed by DWSD and providing services to 126 municipalities in seven southeast Michigan counties were split between DWSD and the Great Lakes Water Authority (GLWA). The GLWA leases regional water and sewer infrastructure, as well as water and wastewater treatment facilities. The bifurcation agreement between DWSD and GLWA

Stantec

Select Relevant Experience Continued

stipulates a yearly lease payment of $50 million for a duration of 40 years. This payment is intended to fund the replacement and restoration of DWSD's deteriorating water and sewer infrastructure. The ownership of regional assets is retained by DWSD, along with the responsibility for maintaining and replacing its local infrastructure. Andy, in his role as Project Director, provided guidance in analyzing a lifeline rate to improve affordability, as well as assessing a fairer method of calculating sewage rates that took into account outdoor water usage.

Kalamazoo Regional Water System, Water Rate Study and System Capacity Buy-In Fee Development, Kalamazoo Michigan

Project Director. Andy oversaw the process of determining the financial requirements of the water system and the distribution of expenses amongst the City's wholesale and resale customers. We engaged in numerous meetings and made several presentations to both the City and the Utility Policy Committee, outlining our recommendations. Furthermore, he spearheaded the creation of a novel fee, known as the System Capacity Buy-In Fee, which consumers must pay when connecting to the City and Connected Communities systems.

James City Service Authority, Rate Study, James City, Virginia

Project Manager for an extensive rate study conducted for the Authority. He spearheaded the implementation of rate structure revisions that guaranteed the Authority's rates adhered to established industry standards and accurately allocated system costs, all while accomplishing its policy goals of fiscal stability, affordability, and conservation. Due to decreasing demands, the Authority was worried about its capacity to cover some of the fixed expenses of the system. As a result, we created a two-part pricing structure that includes a fixed monthly charge for being ready to provide service, as well as increasing rates for conserving water in different usage blocks. We also assessed the Authority's system and local facilities fees to verify that they recouped the initial expenses of the infrastructure's capacity used to accommodate future connections.

Toho Water Authority, Utility Rate Study & CIAC , Kissimmee, Florida

Project Director. Andy guided the Stantec team in conducting a rate study and financial planning for TOHO Water, but also oversaw the creation of system connection charges for new customers. This included collecting a CIAC from new customers when they connect to the system and ensuring that the appropriate entity that initially developed the system is credited accordingly.

Brunswick-Glynn County Joint Water and Sewer Commission Financial Management Plans, Glynn County, Georgia

Project Manager. Andy formulated a yearly ten-year financial management strategy for the water and sewer systems in the two districts. He created reports to assess the feasibility of loans and bonds, determined the updated capital tap fees for water and sewer services in each district, calculated charges for both public and private fire protection, established a consistent rate structure for water conservation in both service districts, and compiled a comprehensive rate manual that provided a detailed explanation of the purpose, intent, and structure of all rates, fees, and charges.

NYC DEP, Sustainable Rate Structure Analysis, New York, NY

Project Director. Andy offered guidance and instructions to the team regarding i) conducting a thorough comparative analysis of rate structures in other cities, ii) modeling DEP's water, sewer, and stormwater revenue requirements over a 20-year timeframe, iii) devising and assessing sustainable rate structure options for DEP, iv) formulating potential implementation strategies, and v) presenting a customer impact analysis and affordability demonstration. The rate structure options considered include implementing a fixed charge for water and sewer service, introducing a stormwater fee based on impervious service to cover the cost of stormwater management by DEP, implementing system development fees, and assessing low-income rate structures to ensure customer affordability.

James Bearman

FINANCIAL & POLICY EXPERT

Education
- Bachelor of Science in Accounting, Magna Cum Laude, Lake Superior State University, Sault Ste. Marie, Michigan, 1977

Experience
46 Years experience

Professional Affiliation(s)
- Former Vice Chairman, Rates and Strategic Issues Committee, American Gas Association
- Member, Michigan Chapter, American Water Works Association
- Former Chairman, Rate Committee, Michigan Electric & Gas Association

Publications
- Lessons Learned: Integrating AMP Findings into a Sustainable Financial Plan. Michigan Water Environment Federation and Michigan Section of the American Water Works Association's Asset Management Seminar, 2019.

Development
- APWA Great Lakes Expo May 2024 Considerations in Developing a Water Affordability Program

Background

James has over 45 years of providing cost recovery and financial planning support for investor-owned utilities and municipal utility systems. Since joining Stantec in 2013, he has led almost all Stantec financial planning and fee studies performed in Michigan. He has provided expert witness testimony to both the MPSC and FERC on financial and regulatory matters. He is located in Stantec's Ann Arbor office and will provide the local contact for the City on this project. He is currently leading Stantec's project team with the City and OHM in determining the financial impacts of the potential DOS recycling facility.

Select Relevant Experience

Water Rate Study and System Capacity Buy-in Fee, Kalamazoo, Michigan

Project Manager. Jim led Stantec's project team to develop recommended water rate increases for the City's retail and wholesale customers, beginning 1-1-24. This required appropriate cost allocation analysis and compliance with the requirements of the Water Service Agreement with the City's wholesale water customers. In addition, Stantec developed a new charge for new customers connecting to the system, beginning in 2024, entitled the System Capacity Buy-In Fee to be charged in addition to the City's existing Connection Fee. This analysis required multiple presentations to City staff, and the Utility Policy Committee (UPC) supporting our recommendation and gaining their support for such a fee.

Wastewater Rate Study, Jackson, Michigan

Project Manager. Jim served as Project Manager allocating the City's wastewater system costs among user customers, including surrounding townships and a prison. He led the development of the revenue sufficiency needs for the City's Wastewater Enterprise Fund. He also led discussions between the Customer group and the City as to what portion of those costs each major customer should bear, including the City's customers and associated user fees. He assisted in the development of a connection fee calculation for new customers to the system.

Water and Sewer Rate Analysis, Alpena Township, Michigan

Project Manager. Jim served as Project Manager to assist the Township in developing a revenue sufficiency analysis related to the City of Alpena's water and sewer enterprise funds and the appropriate cost allocation of the City's revenue requirements between Alpena Township and the City of Alpena's retail customers. He led the analysis at the request of the Township and their Legal team as a result of litigation involving the Township and the City of Alpena over appropriate water and sewer rates paid by the Township. Lastly, he participated in multiple discussions and presentations to Township staff, Township's Legal team, and the 26th Circuit Court of Alpena County, MI.

Stantec

Select Relevant Experience Continued

Integration of a Master Plan into a Financial Plan & Development of Various Connection Fees for New Customers, Farmington Hills, Michigan
Project Manager. Jim oversaw the Stantec team's creation of many financial scenarios for the integration of an OHM-developed master plan for the city's water and sewer systems, including the possible costs associated with connecting new users to the system. In the end, the City decided against carrying out the Master Plan because of the impact on current ratepayers.

Water and Wastewater Rate Analysis, Pere Marquette Township, Michigan
Technical Advisor. Jim served as Technical Advisor in negotiating wholesale water supply rates with the Township's provider. After lengthy negotiations, the parties agreed to a rate structure which reduced the Township's purchased water costs and provided incentive for the attachment of a major user to the Township's system. Once purchased water costs were finalized, expected revenues reflecting the new customer addition, operating, debt, and capital costs were developed for the Township. This allowed the Township to examine the future sustainability of their operations.

Water and Sewer Rate Study, Manistee, Michigan
QA/QC Advisor. Jim served as a QA/QC advisor for a comprehensive water and sewer cost-of-service rate study for the City (which had no record of having ever conducted a formal rate study). A comprehensive cost-of-service analysis was carried out to ascertain the appropriate distribution of expenses among the following parties: 1) the water and sewer systems; and 2) the users of each system situated both inside and outside the City. This analysis ultimately represented the application of the utility basis of ratemaking for these users. He also contributed to the creation of the updated connection fees for new users. Different consumer groups received multiple presentations.

Water, Sewer and Stormwater Asset Management Plan Evaluation and Revenue Sufficiency Analysis, Imlay City, Michigan
Project Manager. Jim served as Project Manager for the development of multi–year financial plans for the City's water, sewer, and stormwater utilities. Using projected asset management plan expenses, this research created sustainable financial plans for each utility and suggested appropriate rate and fee increases. He oversaw the prediction of anticipated income from the major client of the business, which contributes significantly to its revenue. Through several meetings, he conveyed the findings and our recommendations to the City Council and staff.

Water and Wastewater Rate Study, Cost Allocation, and Rate Design, Battle Creek, Michigan
Project Manager. Jim oversaw the creation of the revenue sufficiency study, cost distribution to retail and wholesale clients, and rate design for the City's retail and wholesale clients for water and wastewater. Jim also introduced additional connection costs for customers as well.

Water and Wastewater Rate Study, Midland, Michigan
Project Manager. Jim served as Project Manager and oversaw the creation of revenue needs, cost allocation, pricing, capital charges, and other fees for the retail and wholesale clients of the City, which included two sizable industrial clients.

Carol Malesky

FINANCIAL & POLICY EXPERT

Education
- MS, Agricultural and Resource Economics, Colorado State University, Fort Collins, Colorado, 1995
- BS, Applied Economics and Business Management, Cornell University, Ithaca, New York, 1992

Experience
27 Years experience

Professional Affiliation(s)
- Member, American Water Works Association
- Member, Water Environment Federation

Publications
- Roth, F., and C. Malesky. Albuquerque Uses Customer Outreach to Gain Deeper Insights into Infrastructure Needs, Conservation and Rate Increases. Water Finance & Management, 2017.
- Streiner, C., and J. Loomis. Estimating the Benefits of Urban Stream Restoration Using the Hedonic Pricing Method. Rivers, 1996, pp. 267-278.
- McCrory, B., C. Malesky and B.Shaw. From a Passive to an Active Stakeholder Engagement Culture. Journal AWWA, 2019, pp. 68-69.

Background

Carol brings over 27 years of experience in working with municipal clients on financial planning and capital cost recovery charges, both from a system wide perspective and the perspective of specific area charges within a municipality. She will provide technical direction to the project team and support the establishment and evaluation of the financial policies on this project. She will also utilize her extensive experience to lead the review of the 2015 Black & Veatch Capital Cost Recovery Charge Report.

Select Relevant Experience

Toho Water Authority, Rate Consulting and Program Management Services, Kissimmee, Florida

Financial Services Manager. Carol has managed a wide range of financial consulting services for Toho. Among these services is revenue sufficiency analysis support for Toho in proactively managing the long-term rate revenue consequences of its operating expenditures and capital improvement program funding. She oversaw the group that created policy modifications and system development fees to fairly recover growth-related expenses from new clients, including CIAC fees that should be reimbursed to original payers. In order to improve equity and affordability, Carol also reviewed Toho's customer support program choices and assisted with measuring key performance indicators for affordability. She has been involved in the preparation of financial modeling tools for Toho over the past few years in order to assess the viability of merging the water and wastewater systems of another utility, which is presently undergoing the implementation phase.

Sewer Rate Study & WIFIA Loan Application , Lancaster, Pennsylvania

Project Manager. Carol managed the long-term financial analysis and baseline financial capability assessment (FCA) for the City's combined sewer overflow (CSO) consent order requirements. The three-month investigation includes financial implications for the wholesale sewer authorities of the City. In addition, Carol oversaw the group that created the pro forma part of the City's successful WIFIA loan application.

Mahoning Valley Sanitary District - Meander Water, Financial Planning & Rate Study, Niles, Ohio

Project Manager. Carol managed the District's long-term financial planning and rate study. The District is distinct in that it supplies McDonald Village, the Ohio cities of Youngstown and Niles, as well as the Village of McDonald with wholesale water. Achieving the District's financial policy targets, such as days cash on hand, debt service coverage ratios, and the percentage of capital improvement programs funded by cash as opposed to debt, was the main goal of the analysis.

Sewer Affordability Assessment, Ann Arbor, Michigan

QA/QC. Carol provided technical assistance to our staff during the assessment of affordability programs for wastewater customers.

Stantec

Select Relevant Experience Continued

Rate Study & System Development Fees , Cedar Rapids. Iowa
Carol developed a methodical procedure for upgrading computer models utilized in the financial plans and cost-of-service rate studies used by the City's sanitary sewer, water pollution control, and water utilities for long-term planning and rate setting. furthermore, she helped with the system development fee calculation for every utility.

Wastewater Rate Study & Investment Fees, Boulder, Colorado
Carol contributed to an extensive analysis on plant investment fees that linked new construction fees to the city's rate structure approaches. directed the updating of the rate models for wastewater cost-of-service. supplied the water budget rate model with quality control.

Pinery Water and Wastewater District, Rate Study & Tap Fees, Colorado
Carol assisted with reimbursement agreements and a pre-paid tap mindset with future developments in addition to completing cost-of-service rate assessments and evaluations of water and wastewater tap fees for the District. Among the recent tasks was overseeing a 2017 update study on tap fees and rate structures.

User Charge Analysis & System Development Fees, Town of Platteville, Colorado
Carol developed user charge models for the town's water and sewer utilities. The town intended to finish a number of major projects, such as a wastewater treatment plant, and anticipated substantial expansion. Additionally, the models for figuring out new customers' system investment fees were finished.

Metropolitan Sewer District of Greater Cincinnati, Rate & Fee Analyses , Greater Cincinnati, Ohio
Carol has worked with MSDGC on a number of rate and fee studies, such as an equity buy-in approach-based connection fee study, an analysis of a major industrial user's capacity standby charge that served as the foundation for MSDGC's contract negotiations, and system valuation based on replacement costs of current assets. She examined industrial surcharges to determine the effects of a general rate increase, examined different rates for a customer outside the District, and helped create a new service agreement. Additionally, Carol offered financial advice services for high intensity commercial rates, other miscellaneous costs, and septic hauler charges.

Cost-of-Service Rate Study, Mobile, Alabama
Project Manager. Carol managed a comprehensive cost-of-service study focused on wholesale customer rates. The Mobile Area Water and Sewer System (MAWSS) received quality control and direction from her in creating a long-term financial planning framework in response to gap analysis results. She supported the team in workshops with members of the Finance Committee and MAWSS employees, which enabled clear and concise reporting, timely Board input into budgeting, long-term financial planning, and cost allocations between water and wastewater. To monitor the efficacy of the framework, key performance indicators are used, such as the percentage decrease in O&M from previous years, monthly revenues versus anticipated revenues, and actual capital and expenditures versus budget. For the MAWSS Master Plan, Carol is still in charge of the financial options analysis.

Facility Plan and Rate Study, Rio Rancho, New Mexico
Lead Financial Analyst. Carol completed wastewater and water reuse system development fee analyses, financial planning, and rate studies for the City of Rio Ranch. She evaluated alternative rate structures to simplify and improve equity of the City's user rates. This effort was integral to the Facility Master Plan prepared by Stantec.

157th Avenue Water Reclamation Facility Expansion Master Plan, Goodyear, Arizona
CIP Planning Lead. Carol is responsible for collaborating with our engineering team by using FAMS (Stantec's capital planning tool) for alternatives analysis while evaluating the full impact of options on funding sources and ultimately, ratepayers. The City of Goodyear's (City's) 157th Avenue Water Reclamation Facility (GWRF) provides wastewater treatment for a substantial proportion of the City's population. The Stantec-Hazen GWRF Master Plan will address aging infrastructure, service area population and industry growth, future regulatory requirements, and changing drivers related to direct potable reuse.

SECTION B: PAST INVOLVEMENT WITH SIMILAR PROJECTS

B.1 Recent Work for the City of Ann Arbor

B.2 Other Similar Work


RAIL ROAD CROSSING
STOP ON RED SIGNAL

U of M Housing Master Planning

ANN ARBOR, MICHIGAN

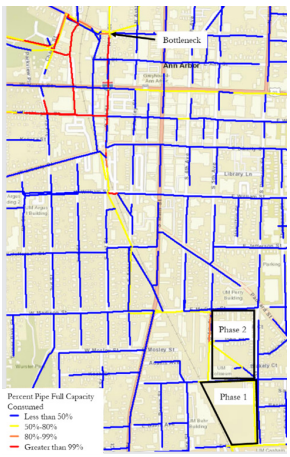
The University of Michigan is working with its Architect, Robert A.M. Stern Architects, on the design of two new dormitories near the intersection of South Fifth Avenue and Hill Street in the City of Ann Arbor. The dormitories are planned to be constructed in two phases and are expected to contribute an additional peak sanitary flow of 2.37 cubic feet per second (after removal of the existing buildings) to the 30-inch interceptor that extends north along First Street in Ann Arbor. OHM Advisors performed hydraulic modeling that projected the additional flows would cause an increase in the sanitary hydraulic grade line (HGL) of up to 1.62 feet during a design storm event. The increased HGL causes capacity issues in perpendicular sanitary sewers that drain into the First Street Interceptor. These sewers are shallow and currently over capacity during a design storm event, so a rise in the HGL further increases the risk of basement backups in buildings with sanitary connections to these sewers.

OHM Advisors performed hydraulic modeling to identify eight potential sanitary sewer routing alternatives that would relieve surcharging in the sewers along First Street. Each alternative was evaluated based on a series of critical factors that would influence successful delivery of the project. Records of historic contamination in soils and groundwater were identified near some of the proposed sewer route alternatives and introduced the risk of regulatory delays and additional cost. A shallow groundwater table along Chapin Street, one of the potential sanitary sewer route alternatives, was identified and could require extensive dewatering volumes that would need to be containerized, tested, and potentially treated prior to discharge. Several of the alternatives had to be combined with sewer lining along north First Street since routes that bypassed the initial bottleneck moved flow downgradient to a second bottleneck near Depot Street. Potential routes were also evaluated based on the need to update easements where existing sewers were located. In addition, the selected alternative needed to be scalable to accommodate not only the dormitories' flows, but also the City's master plan flows. Finally, projects were evaluated based on their relative costs and the likelihood of completion in time to allow the first phase of the dormitories to connect to the sanitary system by the fall of 2026.

OHM Advisors contracted with TetraTech to perform a review of existing environmental soil and groundwater contamination to inform route selection. When the potential routes were narrowed down to just two, MTC was contracted to collect soil borings and analyze cuttings for geotechnical information and environmental contamination to further inform route selection.

After extensive modeling and evaluation of the potential routes, their costs, and constructability and contamination concerns, the Deep First and Washington Parallel Sewer was recommended based on the ability to meet the schedule requirements while simultaneously optimizing the remaining factors considered.

The City requires financial contributions from developers if projected flows from new construction exceed existing pipe capacity and require sanitary improvements to accommodate the added flow. OHM Advisors provided flow data and cost breakdowns to the University and City to assist with their negotiation of an equitable cost share to implement the recommended project.



COMPLETION
Design
09.2023 - 07.2024

CLIENT INFORMATION
Robert A.M. Stern Architects, LLP

Kurt Glauber,
Associate

One Park Avenue
New York, New York 10016

212.967.5100

COST
Design
$153,000

SERVICES PROVIDED
Wastewater Engineering
Municipal Engineering

STAFF INVOLVED
Robert Czachorski
Mackenzie Chamberlain
Chris Elenbaas
Karlin Danielsen

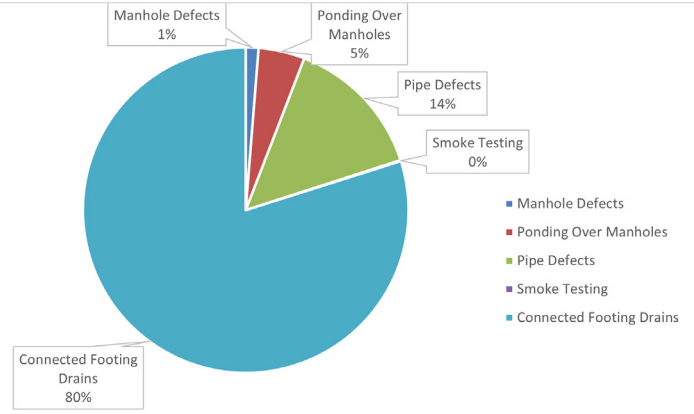
June Storm Event Analysis & SSES Study

ANN ARBOR, MICHIGAN

A large rain event occurred on the evening of June 25, 2021 into the early morning hours of June 26, 2021 resulting in numerous reports of flooding and basement backups throughout Southeast Michigan, including portions of the City of Ann Arbor. The rain was so significant that states of disaster were declared at the local, state, and federal levels. OHM was retained by the City to perform an engineering analysis to better understand the cause of the basement backups and flooding, and to provide recommendations on what could be done to minimize the potential for similar occurrences in the future.

The Pittsfield Village neighborhood was one of the most impacted areas within the City of Ann Arbor. As part of this project, OHM conducted an interview and field visit with the Pittsfield Village staff to better understand their experiences during the rain event. A public engagement meeting was then held with the residents of the project area to introduce them to the project and project team as well as to learn more about their experiences during the rain event. OHM also conducted a resident survey within the project area to further learn about homeowners' experiences.

OHM analyzed the data from the local sanitary sewer flow meters and rain gauges that were in place during the storm. The rain data was used to determine the magnitude of the storm event as well as to understand the spatial variability of rainfall throughout the City. The flow and rain data were used to update the storm water and sanitary sewer hydraulic models such that they reflected the system conditions during the rain event. Storm water and sanitary sewer hydraulic modeling was then performed to determine whether these systems performed as expected during the rain event. The models were also used to identify locations for potential improvements. As a result of these analyses, several recommendations were developed for implementation by the City, the residents, and the Pittsfield Village staff to minimize the risk of flooding and basement backups in the future. A second public engagement meeting was held to present the findings and recommendations from the study to the residents.



One of the recommendations from this study was to perform a sanitary sewer and storm water evaluation survey in the Pittsfield Village neighborhood to identify sources of inflow and infiltration into the sanitary sewer system. OHM was retained by the City to perform this study. This effort involved performing physical condition assessments of the sanitary sewer and storm water manholes within the Pittsfield Village neighborhood as well as reviewing the City's sanitary sewer and storm water pipe inspection data to assess their condition. Smoke testing was also performed within this neighborhood to identify sources of inflow and infiltration into the sanitary sewer system. The condition assessment results and sources of inflow and infiltration were analyzed to develop recommendations for rehabilitation of these assets.

COMPLETION
Study
8.2021 - 5.2023

COST
Study
$120,880

CLIENT INFORMATION
City of Ann Arbor

Troy Baughman
Project Manager

301 E. Huron Street
Ann Arbor, MI 48104

734.794.6430x43798
tbaughman@a2gov.org

SERVICES PROVIDED
Community Engagement
Stormwater Engineering
Wastewater Engineering

STAFF INVOLVED
Mackenzie Chamberlain
Robert Czachorski

Pittsfield Village Improvements

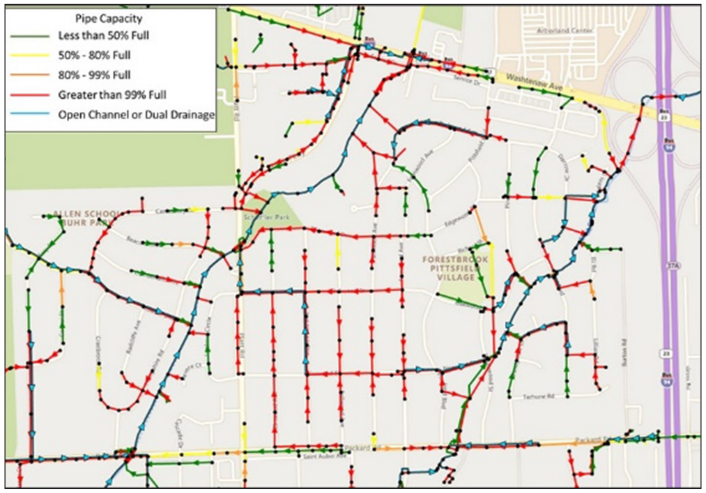
ANN ARBOR, MICHIGAN

The City of Ann Arbor has identified various proposed transportation, stormwater, sanitary sewer, and water system improvements for the Pittsfield Village neighborhood. The Pittsfield Village neighborhood has also historically experienced flooding and basement backups as a result of large rain events. Various sanitary sewer and stormwater improvements have been recommended as part of previous studies and analyses. This project involves development of a comprehensive plan that encompasses previously recommended utility and roadway improvements within the Pittsfield Village neighborhood. OHM Advisors is performing the field data collection as well as the detailed design and preparation of bidding documents for construction of the recommended improvements.

Proposed water main improvements include replacement and upsizing of the existing asbestos cement water mains throughout the neighborhood. Lead service line replacements will also be performed as part of this effort where needed. Roadway improvements include rehabilitation of approximately 2.7 miles of roadway within the neighborhood as well as development of a Pedestrian/Mobility Improvements Plan that will address sidewalk gaps and implement a bike corridor.

Previous sanitary sewer study efforts recommended upsizing a stretch of sanitary sewer as well as performing rehabilitation on select pipes within the neighborhood that were previously inspected and identified to have degradation or contribute significant stormwater inflow and infiltration into the sanitary system. As part of this project, OHM will perform data analysis and hydraulic modeling to review and verify these previously recommended improvements for inclusion in the final design of the sanitary sewer improvements.

Previous stormwater studies also recommended multiple improvements to the stormwater system that will improve water quality during smaller storm events and provide peak flow attenuation during larger storm events. As part of this project, OHM will update the City's hydraulic stormwater model with recent survey data to review and verify the previously recommended improvements for inclusion in the final design of the stormwater improvements. Recommendations may include construction of bioretention areas, upsizing conveyance pipes, and expansion of the stormwater system to areas of the neighborhood without direct access to a stormwater pipe.



Extensive public engagement with the Pittsfield Village residents will be required throughout the project to build trust and provide transparency to the residents. The project team will engage the public early and often throughout the course of the project, provide a schedule with clearly established milestones, and facilitate multiple meetings to create a collaborative environment that welcomes discussion.

The above efforts will provide the Pittsfield Village neighborhood with an updated utility and roadway system that will address previous issues and offer an improved level of service to the residents.

COMPLETION
Design
11.2023 - 12.2025

CLIENT INFORMATION
City of Ann Arbor

Igor Kotlyar,
Project Manager

301 East Huron Street
Ann Arbor, MI 48107

734.794.6410 ext. 43634
IKotlyar@a2gov.org

COST
Design
$1,140,971

SERVICES PROVIDED
Community Engagement
Drinking Water Engineering
Municipal Engineering
Planning
Site Design
Stormwater Engineering
Survey
Transportation Engineering
Wastewater Engineering

STAFF INVOLVED
Mackenzie Chamberlain
Robert Czachorski
Cresson Slotten
Chris Elenbaas
Karlin Danielsen

Ann Arbor Sanitary Sewer Wet Weather Evaluation Project

ANN ARBOR, MICHIGAN

The City of Ann Arbor performed approximately 2,700 footing drains disconnections (FDDs) from their sanitary sewer system between 2001 and 2012. The FDDs were focused on five priority districts around the City that experienced a high frequency of basement backups. In 2012, the City experienced several large storms that lead to flooding issues around the City and some basements were flooded. As a result, the City Council elected to suspend the FDD program and perform a sanitary sewer study to assess the following:

- How effective has the FDD program been?
- What is the risk of future basement backups from the sanitary sewer system?
- What long-term improvements should the City implement to improve the sanitary sewer system?
- How to effectively engage the public on the long-term plan?

To accomplish these objectives, the City retained OHM Advisors to perform an evaluation of the effectiveness of the FDD program and develop alternatives for improving the sanitary system. Our approach included flow metering, FDD effectiveness evaluation, hydrologic modeling, hydraulic modeling, capacity assessment, alternative evaluation, and an extensive public engagement program. Because of the complexities of evaluating wet weather flows in a sanitary sewer system caused by varying wetness conditions, our approach included a robust evaluation of the FDD effectiveness comprised of three scientific methods of evaluating the flows. When three independent methods are all in agreement, it provides a strong confidence in the results and a good basis for assessing the effectiveness of the FDD program. These three methods provided a valid, scientific method of evaluating the FDD effectiveness that accounts for varying wetness conditions on the flows

- Scatter plots with regression analysis to assess the statistical significance of the flow removal
- Meter correlations with control districts
- A continuous hydrologic model using the H2Ometrics Antecedent Moisture Model

OHM Advisors conducted an extensive public engagement process with our partners Project Innovations and Famous in Your Field. Throughout the project, information was shared with the public through multiple channels, including public meetings, the City's web site, social media, blog postings, video documentaries, and a Citizens Advisory Committee, City Council empowered the Citizens Advisory Committee to make a decision on what to recommend to City Council for the long-term plan. By engaging the public in this manner, the City was able to ensure that both engineering optimization and community values are reflected in the final plan.

COMPLETION
Design
2013 - 2015

CLIENT INFORMATION
City of Ann Arbor

Nick Hutchinson, PE
City Engineer

301 E. Huron Street
Ann Arbor, MI 48104

734.794.6411

COST
Design
$1,160,000

SERVICES PROVIDED
Community Engagement
Wastewater Engineering

STAFF INVOLVED
Robert Czachorski
Cresson Slotten (City of Ann Arbor)
Erica Morgan
Murat Ulasir

Ann Arbor Sanitary Sewer Improvements & Preliminary Engineering

ANN ARBOR, MICHIGAN

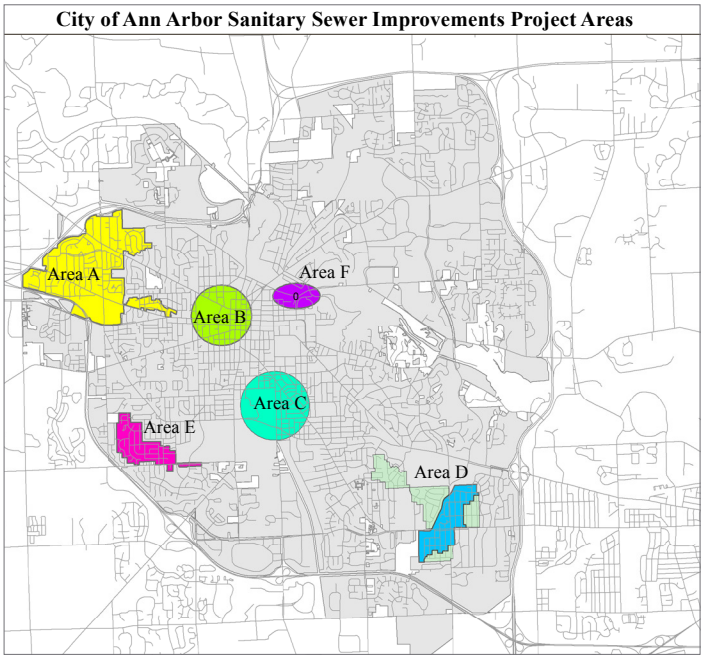
The Sanitary Sewer Improvements & Preliminary Engineering (SSIPE) project involved performing flow metering, sewer investigations, modeling and preliminary engineering for improvements to several interceptor sewers in the city. The study focused on six interceptor areas that were identified in the City's Sanitary Sewer Wet Weather Evaluation Project (SSWWEP) completed in 2015.

The SSWWEP, also performed by OHM Advisors, provided the basis for the City's long-term planning and improvements for the sanitary sewer system. As background, a summary of that project is provided here. The City of Ann Arbor performed approximately 2,700 footing drains disconnections (FDDs) from their sanitary sewer system between 2001 and 2012. In 2014, the City retained OHM Advisors to perform an evaluation of the effectiveness of the FDD program and develop alternatives for improving the sanitary system. The results of the study showed that the FDD program significantly reduced the risk of basement backup in the five target FDD neighborhoods, and that is was not necessary to continue the FDD program. However, the study also showed that there were six areas in the interceptor system that were overloaded during design flow conditions.

The SSIPE project involved development of preliminary engineering designs and cost estimates for the six interceptor areas. The scope of the project included these components:

- **Flow metering** – Performed by OHM to understand local flows and system performance.
- **Sanitary Sewer Evaluation Survey (SSES)** – CCTV review, smoke testing and manhole inspections to understand the physical conditions of the project areas.
- **Hydraulic modeling** – Modeled each project areas to aid in sizing improvements and evaluate alternatives.
- **Preliminary design** – Conducted field reconnaissance, preliminary design and cost estimates to inform the City's CIP for project staging.
- **Public engagement** – Performed within each project area to inform the public of the need for the projects and solicit their input on solutions.

The results of the SSIPE project provided the City with a comprehensive road map for managing and improving the sanitary sewer collection system to meet current and future needs.



COMPLETION
Design
01.2016 - Ongoing

CLIENT INFORMATION
City of Ann Arbor

Brian Slizewski, PE,
Senior Project Engineer

301 E Huron Street
Ann Arbor, MI 48104

734.794.6410

COST
Design
$934,000

SERVICES PROVIDED
Community Engagement
Wastewater Engineering

STAFF INVOLVED
Robert Czachorski
Mackenzie Chamberlain

Huron West Park Sanitary Sewer Replacement Phase 2 & 3

COMPLETION
Design
02.2020 - 03.2021
Construction
02.2024 - Ongoing

CLIENT INFORMATION
City of Ann Arbor
Nick Hutchinson, PE
City Engineer
301 E. Huron Street
Ann Arbor, MI 48104
734.794.6411

COST
Design
$30,000
CE
$560,000

SERVICES PROVIDED
Municipal Engineering
Tree Survey
Utility Layout
Construction Engineering
Construction inspection

STAFF INVOLVED
Robert Czachorski
Cresson Slotten
Chris Elenbaas
Karlin Danielsen

2023 Miscellaneous Utility Projects

COMPLETION
Design
07.2022 - 04.2023

CLIENT INFORMATION
City of Ann Arbor
Tracy Anderson, PE
Project Manager
301 E Huron Street
Ann Arbor, MI 48104
734.794.6410

COST
Design
$169,405
Construction
$4,100,000

SERVICES PROVIDED
Municipal Engineering
Survey
Utility Layout

STAFF INVOLVED
Cresson Slotten
Erica Morgan
Chris Elenbaas

Northside Interceptor Condition Assessment

COMPLETION
Assessment
09.2017 - 11.2017

CLIENT INFORMATION
City of Ann Arbor
Paul Matthews,
Public Works Unit Area
4251 Stone School Road
Ann Arbor, MI 48108

COST
Assessment
$53,000

SERVICES PROVIDED
Pipeline Condition Assessment
Manhole Condition Assessment
Surveying Drone

STAFF INVOLVED
N/A

Stormwater & Wastewater AMP

COMPLETION
Design
2016 - 2019

COST
Grant Budget
$1,170,000

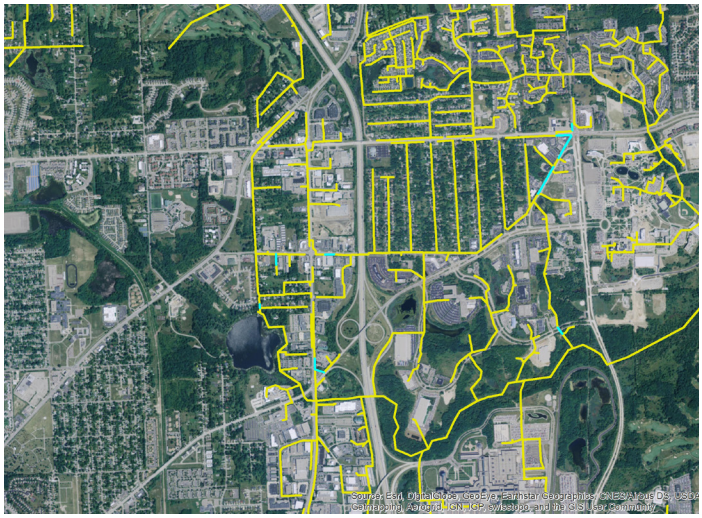
CLIENT INFORMATION
City of Ann Arbor

Jennifer Lawson
Systems Planning Unit

301 E. Huron Street
Ann Arbor, MI 48104

SERVICES PROVIDED
Asset Inventory
Condition Assessment
Remaining Life Determination
Life Cycle Cost Analysis
Level of Service Assessment
System Criticality Assessment
O&M Optimization
CIP Development
AMP Development

STAFF INVOLVED
Murat Ulasir



Sump Pump Installation Modification

COMPLETION
Study
05.2015 - 08.2018

COST
Study
$960,249

CLIENT INFORMATION
City of Ann Arbor

Nick Hutchinson, PE
City Engineer

301 E. Huron Street
Ann Arbor, MI 48104

734.794.6411

SERVICES PROVIDED
Construction Inspection

STAFF INVOLVED
Robert Czachorski

Developer Offset Mitigation Program Construction Services

COMPLETION
Design
04.2016 - Ongoing

COST
Design
$175,000

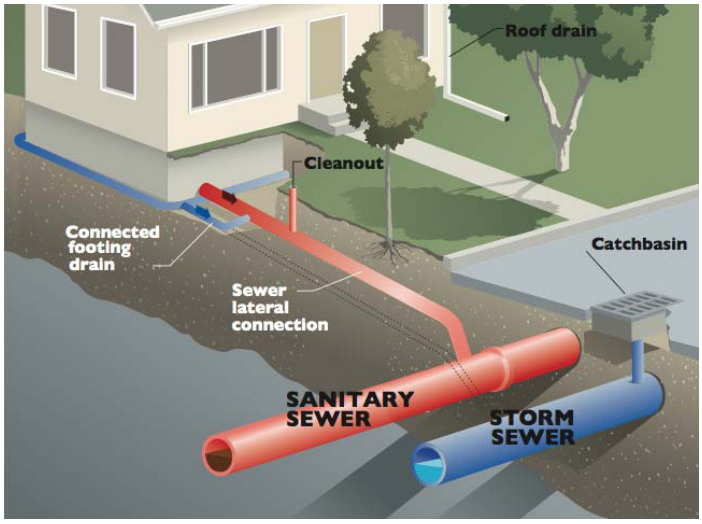
CLIENT INFORMATION
City of Ann Arbor

Amy Ponsock,
Private Developer Coordinator

301 E. Huron Street
Ann Arbor, MI 48104

SERVICES PROVIDED
Community Engagement
Construction Engineering
Consultancy
Municipal Engineering

STAFF INVOLVED
Robert Czachorski



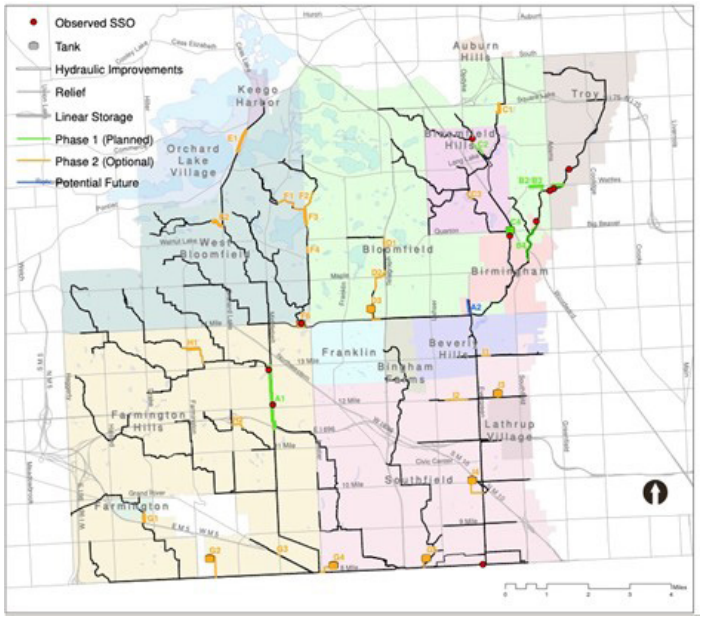
Evergreen-Farmington SDS As-Needed Services & Long-Term CAP

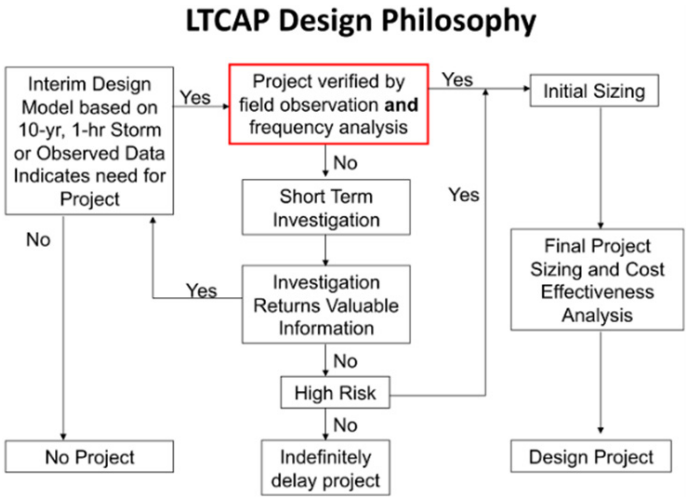
OAKLAND COUNTY, MICHIGAN

The Oakland County Water Resources Commissioner (OCWRC) owns and operates the Evergreen-Farmington Sanitary Drain (EFSD). The EFSD is a regional system that collects sewage from over 300,000 people within 15 communities in southern Oakland County. OHM has performed extensive meter data processing, data QA/QC, Antecedent Moisture Modeling (AMM), and hydraulic modeling for this system as OCWRC's trusted advisor.

This system was placed under an Administrative Consent Order (ACO) by the Michigan Department of Environment, Great Lakes and Energy (EGLE) to correct deficiencies that cause sewer overflows. OHM Advisors has been assisting OCWRC in implementing the requirements of the ACO to develop a Long-Term Corrective Action Plan (LTCAP). The LTCAP includes an extensive flow metering and modeling investigation of the system to identify required upgrades. These included:

- Meter-based billing system to charge communities based on actual sewer volumes and incentivize I&I control. Included flow meter data QA/QC review, data editing using meter correlations and AMM and a web-based data tool.
- Sewer system master planning using the SWMM model to identify hydraulic bottlenecks and evaluate improvements.
- Hydraulic discrepancy investigation to identify and resolve the sources of numerous hydraulic anomalies found from metering and modeling such as blocked pipes, unusual hydraulic losses, inefficient structures, etc.
- Antecedent Moisture Modeling was performed as the basis for system hydrology and to verify that the wetness conditions selected for the design model were appropriate. A long-term continuous simulation was performed to develop the probabilities of various peak flow rates, and this was used as the design basis.
- Long-Term Control Corrective Action Plan development including evaluating alternatives, performing conceptual engineering, cost estimates, report development and EGLE regulatory coordination.
- Community engagement with the 15 member communities to provide technical data, review alternatives, coordinate project locations, review and approve the LTCAP, and approve the cost allocation methodology.





Link to Overview Videos of AMM Tools

KEY PROJECT INNOVATIONS

AMM Model Development

OCWRC was one of the first utilities to utilize the AMM and several advancements were made to the model on the EFSD project. The model mathematics for temperature effects were updated from a linear relationship to a sigmoid function to place limitations on the temperature effects during extremely low or high temperatures. The updated parameterization was tested extensively on dozens of catchments that were calibrated and validated in the OCWRC system for use in data editing and system flow design.

Data Editing with AMM

OCWRC collects flow meter data from over 200 flow meters and rain gauges for use in system operations, meter-based billing of 26 communities in total, and for system modeling. Accurate data is critical for these functions. OCWRC had a peak-flow component to their billing system to incentivize I&I control, so verifying and estimating peak flow when a meter failed was critical. The AMM was used as a tool for data editing, especially data during wet weather periods.

Frequency Based Design

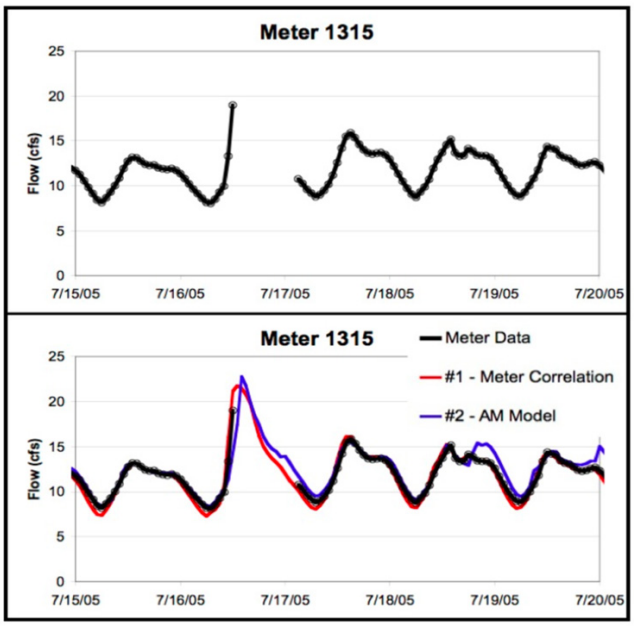
One challenge with traditional event-based design approaches, such as the 10-year, 1-hour storm, is that it is difficult to account for the wetness condition the event occurs on, which can have a large impact on design flows. OCWRC was one of the first utilities to use a frequency-based design approach using AMM. With an accurate AMM, a long-term continuous simulation can be performed for 50-60 years and then a frequency analysis can be performed to develop design flows and volumes that accounts for varying wetness conditions and make design decisions in a very transparent, scientific, and statistically sound manner.

Web-Based Data Application

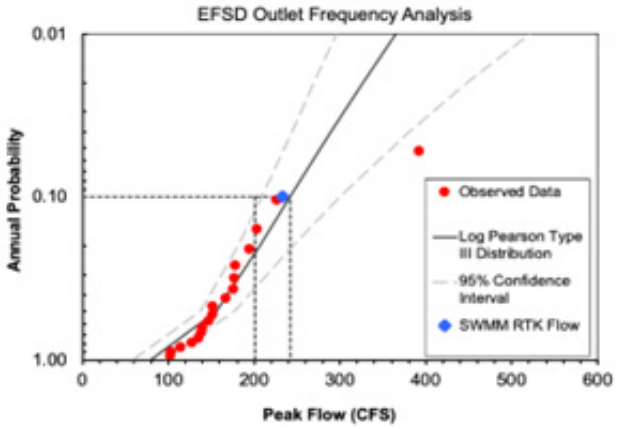
To facilitate the storage, data QA/QC review, data editing, and modeling of OCWRC's extensive network of meters and rain gauges, a cloud-based data application was utilized called H2Ometrics. The platform contains extensive AMM tools for use in calibration, parameter selection and model structure development, and is the primary tool used by OHM for AMMs.

Publication on OCWRC System:

"Tools for Accurate Sewer Metering and Billing". R. Czachorski, T. Prince, B. Bennett, V. Kaunelis, C. Humphriss. WEF Collection Systems Conference. 2008. DOI: 10.2175/193864708788812712



Frequency Analysis Design Basis Using AMM and Long-Term Continuous Simulation



Example of Data Editing Using Multiple Techniques

COMPLETION
Study
2009 - Ongoing

CLIENT INFORMATION
Oakland County Water Resources Commissioner

Tim Prince, PE, Commissioner

1 Public Works Drive
Waterford, MI 48328

248.858.1069

COST
Study
$3,000,000

SERVICES PROVIDED
Community Engagement
Funding
Wastewater Engineering

STAFF INVOLVED
Robert Czachorski
Erica Morgan
Murat Ulasir

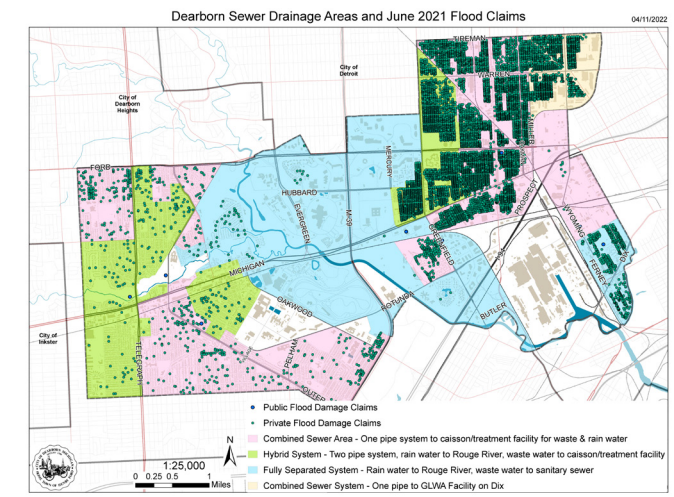
Dearborn Citywide Sewer Study (2022)

DEARBORN, MICHIGAN

During 2021, the City of Dearborn was impacted by three major urban flooding events that resulted in widespread basement backups and street flooding, causing millions of dollars of damage for the residents of Dearborn. In the face of significant flooding, ever-increasing development in the upstream reaches of the Rouge River watershed, and the uncertainty of future heavy precipitation events, the City of Dearborn proposed a study to evaluate the existing sanitary, combined, and stormwater conveyance systems within the city. The goal of this strategic study is to make informed decisions concerning potential short-term and long-term improvements to the City's sewer system and to mitigate associated risks.

Most of the city's sewer system was built as a one-pipe combined sewer system until the 1960s when the federal government prohibited the discharge of any raw sewage into waters of the state. Following the establishment of the federal Clean Water Act, the State of Michigan began incorporating Combined Sewer Overflow (CSO) control requirements into National Pollutant Discharge Elimination System (NPDES) permits. Since the program's inception, $450 million has been spent on various projects to eliminate the sewage discharges to the Rouge River that have included treatment facility construction, vertical storage shafts, full sewer separation projects, vortex flow regulators, and much more. The end result of these projects is a very complex system with six separate districts that all have their own unique challenges and controls that need to be modeled in order to determine alternative solutions.

OHM Advisors was brought in to lead this two-year study. OHM is leading the multidisciplinary team as the prime consultant to collect missing data, develop a hydraulic and hydrologic (H&H) model of the system, engage with and inform the public on progress, and develop and evaluate a set of alternatives that will help mitigate flood risk. OHM is also developing a 10-year roadmap for implementation of the proposed system alternatives.



COMPLETION

Study
09.2022 - 10.2024

CLIENT INFORMATION

City of Dearborn

Mark Gaworecki,
Water & Sewer Utility Manager

16901 Michigan Avenue
Dearborn, MI 48126

313.943.2150
mgaworecki@ci.dearborn.mi.us

COST

Study
$910,000

SERVICES PROVIDED

Community Engagement
Stormwater Engineering
Wastewater Engineering

STAFF INVOLVED

Robert Czachorski
Erica Morgan

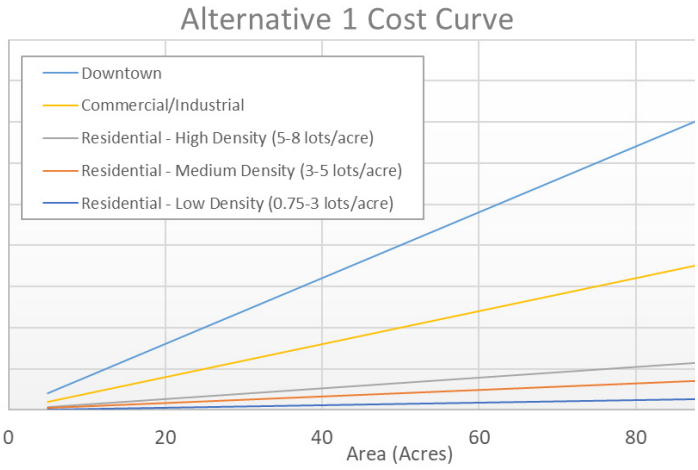
GLWA CSO Long-Term Corrective Action Plan

DETROIT, MICHIGAN

OHM is a sub-consultant on the LimnoTech team for development of the CSO Long Term Control Plan (LTCP) for this regional wastewater system serving four million people. OHM's tasks include leading the design standards and level of service development, alternatives evaluation, conceptual engineering, and stakeholder engagement for alternatives. OHM is also assisting with hydraulic modeling, water quality modeling and system optimization tasks. The LimnoTech team has a total budget of $7.8 million, with $1.1 million assigned to OHM.

The Great Lakes Water Authority (GLWA) was required under its NPDES permit to submit an updated combined sewer overflow (CSO) Long Term Control Plan (LTCP) by May 15, 2023. This LTCP is supporting GLWA in developing an updated plan that addresses three key goals – affordability improving water quality of the receiving waters, and approval by EGLE – by building on the significant work done in the recently completed Wastewater Master Plan (WWMP). Knowing that affordability is a critical constraint, this plan is being developed by leveraging the adaptive management approach from the NPDES permit with the flexibility embedded in the WWMP and the Regional Operating Plan (ROP) concepts to focus on maximizing water quality benefit in local waterways and gain regulatory approval of the updated LTCP. The LTCP will provide a clear roadmap for execution, including detailed project plans for the next 10 years, schedules, and budgets, as well as an operational plan for longer term planning using an adaptive management approach.

The project included a significant modeling component to update the SWMM model of the system and pair it with a water quality model of the Rouge River. The updated model was then simplified and skeletonized and used to perform alternatives optimization using genetic algorithms (performed by a partner firm). The best candidate alternative scenarios from the optimization process were then modeled by OHM in the full SWMM model to verify the performance and then OHM performed conceptual engineering and cost estimates for each alternative. The preliminary solution makes heavy use of in-line storage within the exiting trunk sewers paired with source control through green infrastructure and downspout disconnection to achieve the CSO control goals of the project.



COMPLETION
Study
12.2020 - 05.2023

CLIENT INFORMATION
Great Lakes Water Authority

Tim Kuhns,
Director of System Planning & Development

734.634.7861
Timothy.Kuhns@glwater.org

COST
Study
$1,100,000
(LimnoTech is prime, project budget is $7.8M. OHM's budget $1.1M.)

SERVICES PROVIDED
Wastewater Engineering

STAFF INVOLVED
Robert Czachorski
Erica Morgan

Sanitary & Storm Systems Experience

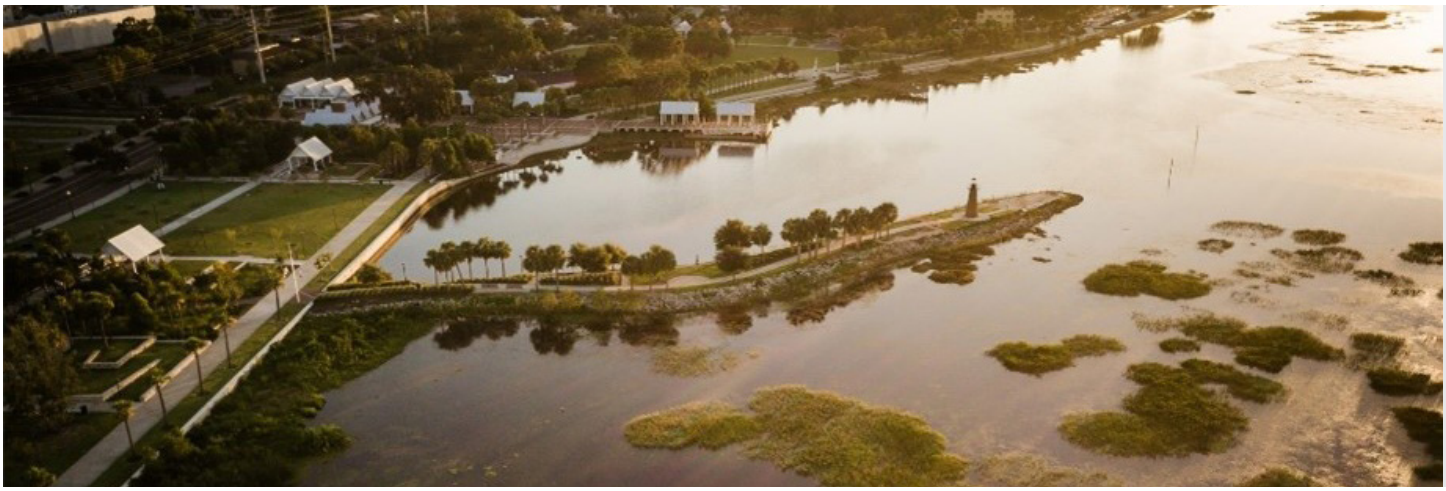
VARIOUS LOCATIONS

CITY / TOWNSHIP / VILLAGE	Population	Flow Metering/ Data Analysis	Sanitary Sewer Design	Smoke Testing / Manhole Inspections	Televising Analysis	Modeling	Sewer Rehabilitation/ Replacement	Pump Station	Asset Management/ Master Planning
Albion, MI	8,500		•		•		•		•
Alma, MI	9,000				•		•		•
Ann Arbor, MI	114,000	•	•	•	•	•	•	•	•
Auburn Hills, MI	20,000	•	•	•	•	•	•		•
Battle Creek, MI	51,000				•		•		•
Bloomington, IL	85,000	•				•	•		
Dearborn, MI	114,000	•	•			•			•
Dexter, MI	4,000	•	•	•	•	•	•	•	•
Evart, MI	2,000				•		•		•
Farmington, MI	10,000		•		•		•		
Fenton, MI	12,000		•						•
Hancock, MI	4,500	•	•	•	•	•	•	•	•
Harrisville, MI	500				•		•	•	•
Los Angeles, CA	3,800,000	•				•			
Livonia, MI	100,000	•	•		•	•	•	•	•
Milan, MI	6,000				•		•		•
Millersville, TN	7,000	•					•		
Northville, MI	6,500	•	•	•	•				•
Novi, MI	55,000	•	•	•	•	•	•	•	•
Oak Park, MI	30,000				•		•		•
Owosso, MI	14,500		•	•	•	•	•		•
Peoria, IL	111,500	•				•			
Rochester Hills, MI	76,000	•	•	•	•	•			•
Romulus, MI	31,500		•	•	•		•		•
Rose, MI	500				•		•		•
Southfield, MI	73,000				•		•		•
Springhill, TN	41,500	•							
Standish, MI	1,500				•		•		•
Traverse City, MI	15,500				•		•	•	•
Westland, MI	87,000	•	•	•	•	•	•		•

CITY / TOWNSHIP / VILLAGE	Population	Flow Metering/ Data Analysis	Sanitary Sewer Design	Smoke Testing / Manhole Inspections	Televising Analysis	Modeling	Sewer Rehabilitation/ Replacement	Pump Station	Asset Management/ Master Planning
Augusta Twp., MI	6,500				•		•	•	•
Canton Twp., MI	93,000				•		•	•	•
Columbia Twp., MI	7,500				•		•		•
Grant Twp., MI	2,000				•		•		•
Heart of the Valley, WI	20,000	•				•			
Napoleon Twp., MI	1,000				•		•		•
Oakland Twp., MI	16,500				•		•		•
Orion Twp., MI	39,500	•	•	•	•	•	•	•	•
Scio Twp., MI	18,000	•	•	•	•	•	•	•	•
Superior Twp., MI	14,000	•	•	•	•	•	•	•	•
Town of Fishers, IN	93,500					•			
Waterford Twp., MI	73,000			•					
Village of Baraga, MI	2,000				•		•		•
Village of Brooklyn, MI	1,000				•		•		•
Village of Chesaning, MI	2,000				•		•		•
Village of Hinsdale, IL	17,500	•				•			
Village of Maybee, MI	500			•	•		•		
Village of Milford, MI	6,500		•	•	•		•	•	•
Village of Ontonagon, MI	1,000				•		•		•
Village of Urbancrest, OH	1,000						•		
UTILITY SYSTEMS / LARGE AGENCIES									
Huron-Clinton Metropark, MI	NA								•
Great Lakes Water Authority CSO Control Plan	3,000,000	•				•			•
Metropolitan Sewer District of Greater Cincinnati	600,000	•				•			
Oakland County Water Resources Commissioner, MI	600,000	•	•	•	•	•	•	•	•
Wayne County, Huron-Rouge Sewer Disposal System, MI	300,000		•	•	•	•	•	•	
Ypsilanti Community Utilities Authority, MI	180,000	•	•	•	•	•	•	•	•

TOHO Water Authority Utility Rate & CIAC

KISSIMMEE, FLORIDA



As part of Stantec's Master Services Agreement, we supported Tohopekaliga Water Authority (Toho) with a wide range of financial consulting services. We have assisted Toho to proactively manage rate adjustments, equitably recover growth-related costs from new customers, benchmark operational needs against peers, maintain service levels for all customers, measure affordability key performance indicators, review customer assistance program options, and enhance equity and affordability.

Using our FAMS financial forecasting tool, we prepared a revenue sufficiency analysis that allows Toho to react to the impacts of revenue changes from factors such as a pandemic, backflow prevention charges, and utility acquisitions, as well as project future rate adjustments needed given O&M projections and capital improvement funding, such as WIFIA loan awards. We also completed a system development charge study reviewing appropriate level of service assumptions for non-residential customers and current values of the system fixed assets and recent master planning capital improvement project costs. Part of this study evaluates capacity reservation tracking to follow through on Toho's changes in its approach to capacity. Stantec assisted Toho staff in preparing a policy and approach for recovering costs of its utility main extension program and contributions-in-aid-of-construction (CIAC) fee to be credited back as new customers attach to the utility's system. This new program allows for Toho to recover costs of either Toho-installed or Builder-installed services to existing platted lots without water or sewer service. Stantec guided the approach and tools for staff to use in tracking properties that are to be charged a CIAC.

Stantec

COMPLETION
2020 - 2021

CLIENT INFORMATION
Tohopekaliga Water Authority

Todd Swingle,
Chief Executive Officer

951 Martin Luther King Blvd.
Kissimmee, FL 34741

407.944.5131
tswingle@tohowater.com

STAFF INVOLVED
Andrew Burnham
Carol Malesky

Water Rate Analysis & System Capacity Buy-In Fee

KALAMAZOO, MICHIGAN

The City of Kalamazoo, Michigan provides water and wastewater services to its residents, many large industrial customers, a major university, and several Connected Communities water and wastewater wholesale customers. They requested completion of an updated water comprehensive rate study, cost of service analysis, and the development of a new System Capacity Buy-In Fee for new customers connecting to their water system. New water rates were effective 1-1-24. In addition, the City asked that we present findings of the study at key intervals to the Utility Policy Committee (UPC), comprised of both City and Connected Communities personnel.

Stantec completed a revenue sufficiency analysis for the City's water system and developed an equitable cost allocation analysis to assign costs to each of the City's Connected Jurisdiction wholesale customers and to the City's retail customers. We used our FAMS model to develop alternative ten-year financial management plans and plans of annual rate adjustments that would be necessary to meet all the utility's financial obligations, including appropriate fixed fee recovery by rate mechanism, appropriate reserve levels, and annual capital improvement funding needs. We customized our models to integrate the multi-year infrastructure and asset management plans of the City to ensure the sustainability of the system and assisted the City in developing recommended reserve policies. We also developed a new charge termed the System Capacity Buy-In fees for new customers attaching to the water systems to pay their share of backbone infrastructure costs.

Stantec

COMPLETION
2023 - 2024

CLIENT INFORMATION
City of Kalamazoo Department of Public Services

James Baker, PE
Director

241 W South Street
Kalamazoo, MI 49007

269.337.8715
bakerj@kalamazoocity.gov

STAFF INVOLVED
Andrew Burnham
James Bearman

Water and Sewer Master Plan, New Customer Connection Charges, & Rate Analysis

FARMINGTON HILLS, MICHIGAN

Stantec was hired as a sub-consultant to OHM to integrate the results of the City's recently developed water and sewer master plan into a sustainable financial plan for each system. As part of the analysis, Stantec was asked to develop potential connection charges for each system, reflecting the staggered timing of completion of the master plan projects, while recognizing the impacts on existing utility customers. Multiple presentations were made to City staff and City Council identifying the impacts on existing customers as well as defensible customer connection charges for new customers and developers connecting to one or both utility systems.

Due to the ramifications of implementing the master plan on existing rates and the uncertainty of new customers connecting the City ultimately delayed implementation of the recommended water and sewer master plan.

Stantec

COMPLETION
2017 - 2018

CLIENT INFORMATION
City of Farmington Hills

Karen Mondora,
Assistant City Manager

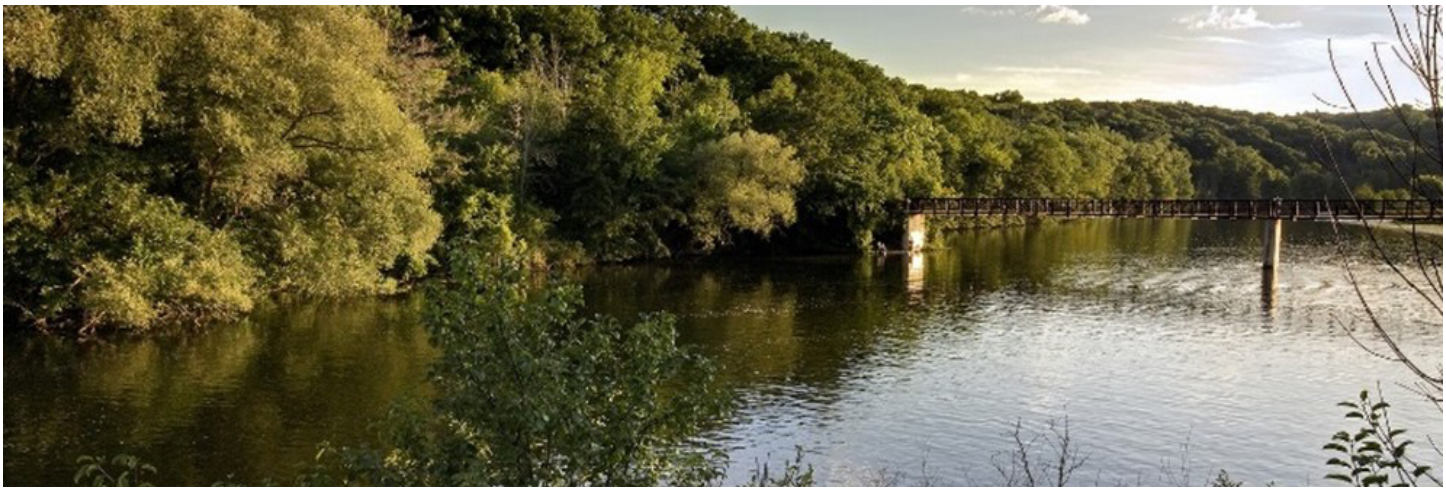
31555 W. Eleven Mile Road
Farmington Hills, MI 48336

248.871.2502
kmondora@fhgov.com

STAFF INVOLVED
Andrew Burnham
James Bearman

Stormwater Rate and Service Assessment & Water Rate Study and User Charges Studies

ANN ARBOR, MICHIGAN



The City is home to the University of Michigan and is both highly educated and progressive. Notably, the City created one of the first stormwater utilities in the U.S. and was one of the first adopters of advanced meter infrastructure.

Utilities in Michigan are effectively compelled by legal precedent to set utility rates that comport with cost-of-service results and ensure the proportionality of a customer's bill with regards to their usage of the system. The revenue requirements for the City's utilities were significantly increasing due to rehabilitations of its aged water and wastewater treatment facilities, increasing regulatory requirements, and stakeholder desires for enhanced level of service.

Through an integrated level of service and rate assessment, a multi-year plan was developed for stormwater that incrementally funded all community-desired level of service enhancement programs with annual rate adjustments that were acceptable to the City's stakeholders. Relative to the City's water and wastewater utilities, we evaluated multiple forecasts of revenue requirements and rate adjustments with stakeholders under a variety of assumptions and capital funding strategies using our interactive modeling system. Additionally, we analyzed the City's available data, customer usage patterns (on a monthly, daily, and hourly basis) past studies, and objectives to determine appropriate customer classes, cost of service methodologies, and rate structures that satisfied annual revenue requirements, adhered to cost of service, promoted conservation, and enhanced affordability. Notably, our review of available data led to the creation of a cost-based tiered rate structure and creation of a new multifamily rate classification. The benefit of a new lower rate for multifamily accounts will either directly flow to renters if their units are individually metered, or flow to the property owner if it is a master-metered complex (thereby potentially stabilizing rental prices in the community).

Stantec

CLIENT INFORMATION

City of Ann Arbor

Marti Praschan,
Chief Financial Officer

301 East Huron St.
Ann Arbor, MI 48107

Phone: (734) 794-6310 ext. 43105

Email: mpraschan@a2gov.org

STAFF INVOLVED

Andrew Burnham
James Bearman

SECTION C: PROPOSED WORK PLAN

C.1 Our Understanding & Approach
C.2 Staff Resources by Task
C.3 Project Timeline

Statement of Understanding

The City is under development pressure that is straining the sanitary sewer system. As a result, the City desires a Sanitary Sewer Collection System Comprehensive Plan (SSCSCP) to serve as a road map for capital improvements to manage flows from future growth. The City has been proactive in managing and planning upgrades to the sanitary sewer system in the past, resulting in a high level of service from the system. The City performed a footing drain disconnection (FDD) program from 2002–2012 that was very effective at reducing inflow and infiltration (I&I) and basement backups. This program was followed by the Sanitary Sewer Wet Weather Evaluation Project in 2015 and the Sanitary Sewer Improvements and Preliminary Engineering Project in 2017 that evaluated the FDD program, developed the City's design level of service, and laid out plans for managing the system that have been effective for the past ten years.

The City of Ann Arbor is experiencing densification and greater demands from new developments that are straining the sanitary sewer system and, in some cases, exceeding the capacity of the system.

The City is experiencing densification and greater demands from new developments that are straining the sanitary sewer system and, in some cases, exceeding the capacity of the system. The City is currently in the process of updating the Comprehensive Land Use Plan that is expected to reflect additional densification and growth within the City. Additionally, the wet weather flows in the sewer collection system model were developed from flow data collected in 2013. Both I&I removal efforts and normal system deterioration may have impacted the wet weather flows since 2013. The SSCSCP will facilitate an understanding of these impacts on the system so that capital improvements can be developed to serve this growth while continuing to provide the high level of service that the City and its residents expect.

Key objectives of the SSCSCP include:

1. Migrate the collection system model to InfoWorks™ and recalibrate the model using recent flow metering data to develop updated design peak wet weather flows that reflect current conditions.
2. Develop a wastewater master plan for handling projected future flows based on the Comprehensive Land Use Plan update and anticipated growth provided by other stakeholders.
3. Prepare cost estimates and a phasing plan for recommended improvements to help inform the City's capital improvement and financial planning.
4. Perform a policy and financial evaluation to help the City develop policies and funding strategies to support the recommended infrastructure improvements, which will serve as a foundation for a future capital cost recovery study to be undertaken by the City.

We are planning a modest public engagement effort for this study because the City is not changing the level of service for the system and the Comprehensive Land Use Plan includes a robust community engagement effort. As part of this SSCSCP development, we will utilize the City's public engagement toolkit, and we will develop a recommendation for a public engagement plan for each component of the SSCSCP.

Development pressure is straining the sanitary sewer so OHM Advisors will make the SSCSCP a priority project, but it is also important not to rush the development of the SSCSCP that will serve the City for decades to come. We have developed a sufficient project schedule to give this project the care and time that it deserves, and we have included an as-needed allowance task to address short-term analyses more quickly when development pressure demands.

Project Approach

This section details our team's approach to executing the project and how we plan to meet and exceed the City's requirements for this project. The Project Approach includes our detailed Scope of Work that identifies the individual steps that we will take to perform and deliver upon each required task. Every task included in the SSCSCP RFP has been covered in OHM's Proposed Work Plan, but they have been reorganized so they are presented to follow the flow of work as it would be completed. The following table details each task in the RFP and where it can be found in OHM's Proposed Work Plan.

Table 1. Where the SSCSCP RFP Tasks are addressed in the OHM Work Plan

SSCSCP RFP Task Number	OHM Work Plan Task Number	Task Description
1)	3	Update and recalibrate the hydraulic model
a.	3.C	Utilize flow meter data for establishing dry and wet weather conditions
b.	3.B	Update hydraulic model from GIS database
c.	3.A	Migrate model to InfoWorks™ software
d.	3.B	Update hydraulic model with planned capital improvement projects
e.	3.D	Utilize City's water meter billing data for determining flow allocation
2)	4.D and 4.F	Perform hydraulic analysis of collection system and identify capacity constraints with recommendations to meet current and future demands
a.	4.C	Organizations to engage for future growth projections
b.	4.A	Evaluate dry and wet weather conditions
c.	4.B, 4.E and 4.F	Compare the City's design event versus EGLE regulatory event
d.	4.C	Future conditions shall align with recommendations from the City's Planning Department Comprehensive Land Use Plan
e.	4.C	Include a collection system build out for township island areas
3)	5.A	Perform capacity assessment on the City's wastewater treatment plant
4)	6.A	Provide an implementation strategy for the recommended plan
5)	1.D	Conduct site investigations to confirm information
6)	7	Provide an overview of the hydraulic model
7)	6.B	Recommend on-going flow monitoring plan
8)	4.D	Identify low points in the system where SSO events or backups may be at high risk
9)	2.A	Identify areas with high rates of infiltration and inflow (I&I)
10)	4.F	Identify and review key bypass points in the collection system
11)	4.G	Delivery of model scenarios
12)	5.B	Review of existing city/township wastewater service agreements
a.	5.B	Hydraulic analysis to ensure adequate collection system and plant capacity to service contract flow amounts
b.	5.B	Perform analysis of available capacity for future agreement opportunities
c.	2.A	Recommend strategies for limiting infiltration and inflow from townships
13)	1.C	Identify any present and future regulatory concerns
14)	7	Provide training for up to four (4) city staff members on use of InfoWorks™ model
15)	8	Consultant shall include an initial engagement strategy
N/A	9	Policy and Financial Evaluation

TASK 1: PROJECT INITIATION AND INFORMATION GATHERING

OHM has been extensively involved in performing many of the City's previous sanitary sewer studies over the past ten years and is very familiar with the system's history and areas of concern. This historical knowledge will assist with OHM's review of available background information and previous studies. In addition to reviewing available information, OHM will also engage in discussions with City staff, operators, and applicable stakeholders to understand other valuable insights that may not be documented.

Task 1.A – Project Management

Project Meetings

Consistent, clear, and effective communication amongst the Project Team members (City of Ann Arbor, OHM Advisors, and Stakeholders) is key to a successful project, while keeping in mind the City's goals and objectives for the project. This will be achieved through regularly scheduled meetings of the Project Team as coordinated by the OHM Project Manager. The associated efforts for these meetings have been included within the technical tasks described subsequent to this section. Specific work sub-tasks will include the following:

- After the Notice to Proceed from the City, OHM will schedule a Project Kick-Off Meeting with the City's Project Manager and key project staff to review and confirm the project scope, review the project schedule, and to establish the Project Team's roles and responsibilities.
- Project check-in/status meetings will be held bi-weekly with the City's Project Manager. This standing meeting will occasionally be used for more extensive discussions with other City stakeholders as-needed. Project progress and key work products will be reviewed, and key milestones and delivery dates will be identified. It is anticipated that the project status meetings will be conducted virtually.
- Broader team check-in meetings that include the City's key leadership and staff involved with the project as well as OHM project team members will be held every two months to review key findings and milestones. These meetings will be held at the City.
- Technical break-out meetings will be scheduled as-needed at appropriate milestones in the progression of the technical work. These will be a mixture of virtual and in-person meetings as dictated by the needs of the technical task meeting.

Project Management

This project offers the opportunity to create a valuable and long-lasting SSCSCP, thus demanding a rigorous approach to team organization, communication, and project delivery. We will establish and implement sound project management strategies from the onset of the project and continuously employ them during the work. The scope and schedule outlined here will become our guiding project management plan (PMP) during project execution and will be reviewed with the City at the progress meetings discussed above. Regular review of the PMP with the City will help track the project progress against the schedule and keep the work tasks focused on the City's desired scope and direction for the project.

Together, the team of Robert Czachorski as the Principal-in-Charge (PIC) and Mackenzie Chamberlain as the Project Manager (PM) will be responsible for the successful delivery of the project. As PIC, Robert is responsible for overall client satisfaction, contract management, and assembling and maintaining an effective team to execute the project. As PM, Mackenzie will be responsible for day-to-day management and execution of the project, including managing the team, and developing our project deliverables within the specified schedule and budget. Effective project management will be central to our approach, enabling us to maintain open and effective communication through the project's lifecycle. This will encompass defining clear goals and objectives to steer project development, maintain and monitor schedule and milestones, and control project costs.

Quality Assurance & Quality Control (QA/QC) Plan

Quality is a fundamental project goal of OHM Advisors. Project quality begins with a team commitment to produce a quality work product consistent with our clients' goals and expectations. All members of the team are responsible for quality control and producing a quality work product that meets the standards of care and has an appropriate review by senior staff. Quality assurance and the implementation of processes and procedures to systematically produce a quality project

are the responsibility of the PIC and PM. Additionally, we included Cresson Slotten in a QA/QC role to provide a historical perspective and review the overall project direction and deliverables to help keep the project focused on the City's needs and expectations.

Sound project management and effective communication are critical components. OHM's commitment to excellence is what we strive for and is demonstrated as part of our comprehensive QA/QC program. QA/QC reviews will be performed at all critical milestones in the project. Time to perform project reviews is included within the project schedule. Reviews are tracked and documented by each team member to verify completion of the review. The results of our robust QA/QC program benefit our team and the City by delivering on-time, within-budget projects.

Task 1.B – Information Gathering

OHM will perform a detailed desktop review of available background information associated with the City's sanitary sewer system. The previous studies and analyses listed in the RFP will be reviewed and incorporated.

Additionally, OHM will compile a data request letter outlining information needed for this project. OHM anticipates collecting, reviewing, and assessing the following information, some of which may be requested to be provided by the City:

- InfoSWMM™ hydraulic model
- Sanitary System Geographical Information System (GIS)
  - » Sanitary sewers, sanitary manholes, lift stations
- Available flow meter, level sensor, and rain gauge data from current and previous flow metering efforts
- City's Comprehensive Land Use Plan
- Previous two (2) years of water meter billing data
- CCTV inspection videos, reports, and records for sanitary sewer mains and manholes
- Parcels with disconnected footing drains
- As-built plans for public streets, water mains, storm sewers, and sanitary sewers, as requested
- Historical incident reports of basement backups and sanitary sewer overflows
- Wastewater service agreements with connected Townships
- Available Supervisory Control and Data Acquisition (SCADA) data at wastewater treatment plant and lift stations
- Design capacities of each treatment process within the wastewater treatment plant
- Pump curves of the pumps at the wastewater treatment plant and at the lift stations of interest for this study

Task 1.C – Regulatory Review

As part of this task, OHM will identify any present or future regulatory concerns for the City's collection system. With the assistance of consultants and local system operators, EGLE has developed a draft General Permit for wastewater collection systems. Although the draft permit is not yet in effect, it provides insights into potential future regulatory requirements with which municipal wastewater systems will need to comply. OHM will review EGLE's draft General Permit requirements and will evaluate and document the City's compliance with each. OHM will then provide recommended actions for the City to take to address potential future regulatory deficiencies or concerns.

Task 1.D – Site Investigations

Through the review of the numerous sanitary sewer studies that have been performed over the past two decades, OHM expects to have a good understanding of the City's collection system and anticipates the hydraulic model to quite accurately reflect existing conditions as a result of its many updates and refinements over the years. As such, a substantial information verification effort is not anticipated. However, upon review of the information provided, site investigations may be necessary to confirm or verify information presented in record drawings or in previous sanitary sewer studies. OHM proposes to provide a two-person crew to perform up to two, full-day (8-hour) mobilizations to conduct site investigations or field reconnaissance to confirm or verify information, as needed. Site investigations may take place at locations within the City's collection system or at the wastewater treatment plant. OHM will coordinate the scheduling of planned site investigations with City staff prior to mobilizing.

Task 1 Deliverables

Each major project task will be summarized into a volume of the final report. This will allow the team to document their work progress as it is completed. Each

major task will represent a volume in the final report that will be delivered in electronic and hard copy formats.

As part of this task, OHM will summarize the Task 1 efforts into a System Overview introductory section of the final report. A draft version of this section of the report will be provided to the City for review, then the document will be finalized upon incorporation of the City's comments. One electronic and two hard copies of the finalized section will be submitted to the City.

SSCSCP Report Volumes	
#	Volume Title
1	Flow Metering Data Analysis and Inflow and Infiltration Evaluation
2	Hydraulic Model Update
3	Hydraulic Analysis and Recommended Improvements
4	Capacity Assessment of Wastewater Facilities
5	Phasing Strategy for Improvements
6	InfoWorks™ Training Materials
7	Public Engagement
8	Policy and Financial Evaluation

The System Overview section will include the following information:

- Summary of system operations
- Previous study report review matrix
- Matrix of draft General Permit requirements and City compliance with each
- Recommendation of actions for the City to take to address regulatory deficiencies or concerns
- Summary of site investigation findings
- Meeting materials including agendas, minutes, and presentations

TASK 2: FLOW METERING DATA ANALYSIS AND INFLOW AND INFILTRATION EVALUATION

Under this task, OHM proposes to review current and historic flow metering data to assess the magnitude of inflow and infiltration (I&I) throughout the collection system and at the Township connections. I&I is comprised of stormwater and groundwater that enter the collection system through a variety of pathways such as through pipe and manhole defects, connected footing drains and roof drains, and cross connections with the stormwater collection system. The City desires to minimize I&I contributions in order to reduce the amount of flow that is conveyed, pumped, and treated, thereby reducing operation and maintenance needs and costs of the wastewater facilities and collection system.

Task 2.A – Flow Metering Data Analysis and Inflow and Infiltration Evaluation

As part of this effort, OHM will analyze the flow metering data to identify tributary areas that have high peaking factors and rainfall capture fractions. A peaking factor is the ratio of the peak flow (during wet weather events) to the average or base flow (during dry weather). High peaking factors indicate a higher presence of rainfall-dependent I&I. The Ten States Standards for new systems has a maximum peaking factor of about 4, which is a good benchmark for a system with a relatively low presence of I&I. A rainfall capture fraction indicates the percentage of rainfall that was received, or captured, by the sanitary sewer collection system during a wet weather event. A higher rainfall capture fraction indicates a higher presence of rainfall-dependent I&I.

Flow metering data will be used to quantify the magnitude of I&I in each of the flow meters' tributary areas. OHM will then develop recommendations for further investigating and removing sources of I&I in those tributary areas and Townships with high I&I. Specific work efforts under this task include the following:

- Analyze flow metering data and lift station flow data to quantify the rainfall-dependent I&I in the areas tributary to each flow meter and lift station.
- Compare flow metering data from previous flow meter deployments to current flow metering data to identify changes in flow characteristics over time. The flow metering data will be compared in three ways:
  - » Tabulate and compare I&I metrics including peaking factors and rainfall capture fractions.
  - » Perform meter correlations between two meters installed at the same location in different years to identify trends and differences in their tributary areas' flow characteristics and I&I metrics over time.

  - » In locations that are currently metered and have also been metered in years past, compare current flow metering data to the antecedent moisture (AM) models that were developed by OHM as part of the 2015 Sanitary Sewer Wet Weather Evaluation Project to determine whether the current flow metering data shifts away from the AM model predictions at those locations.
- Identify tributary areas that have high I&I based on their wet weather peaking factors and rainfall capture fractions as categorized below:
  - » Peaking Factor
    - * High: Greater than 20
    - * Medium: 4-20
    - * Low: Less than 4
  - » Rainfall Capture Fraction
    - * High: Greater than 10%
    - * Medium: 2-10%
    - * Low: Less than 2%
- Compare the locations of the tributary areas with high I&I to locations where footing drain disconnections (FDD) have been completed.
- Review available CCTV data in those tributary areas with high I&I.
- Develop recommendations for investigating and reducing I&I in those tributary areas with high peaking factors and rainfall capture fractions.
- Develop planning-level cost estimates to perform recommended investigations of I&I sources.
- Analyze Township master meter flow data (if available) to quantify the rainfall-dependent I&I in the Townships tributary to each master meter.
- Identify Townships that have high I&I based on their wet weather peaking factors and rainfall capture fractions.
- Compare the Townships' peak flow rates to their contract flow rates.
- Develop recommendations for investigating and reducing I&I in the Townships with high I&I.

Task 2 Deliverables

As part of this task, OHM will summarize the Task 2 efforts into **Volume 1: Flow Metering Data Analysis and Inflow and Infiltration Evaluation** of the final report. A draft version of Volume 1 will be provided to the City for review, then the document will be finalized upon incorporation of the City's comments. One electronic and two hard copies of the finalized Volume 1 will be submitted to the City. Volume 1 will include the following information:

- Summary of flow metering data analysis and I&I metric calculations
- Summary and map of tributary areas and Townships with high I&I
- Map of locations with FDD and identified sources of I&I
- Recommendations for investigating and reducing I&I within the collection system and in the Townships

TASK 3: HYDRAULIC MODEL UPDATE AND CALIBRATION

A hydraulic model can be a valuable tool to assess the health of a sanitary system under different planning, operational, and wet weather conditions. The City's hydraulic model is generally in good shape and has been well maintained to reflect the collection system over the years. However, the wet weather flows in the model were developed from flow data collected in 2013. Both I&I removal efforts and normal system deterioration may have impacted the wet weather flows since 2013, which necessitates an update to the wet weather model calibration. With this in mid, the hydraulic model update includes the following:

- Infrastructure Updates
- Model Calibration Based on Current Conditions
- Operational Updates

Each of these components interconnects to create confidence in the model. Therefore, having trust in each of these elements will result in a valuable model for system planning purposes.

Task 3.A – Model Migration to InfoWorks™

With the sunsetting of the InfoSWMM™ model platform that currently houses the City's sanitary sewer model, the model will be migrated to InfoWorks™ to maintain access to software updates and technical support into the future. The model will be migrated to InfoWorks™ then updated and calibrated.

Migration of the model will include the following tasks:

- Migrate the model to InfoWorks™.
- Test the model under three key scenarios and confirm that the new software platform performs similarly to InfoSWMM™.
- Document any changes needed to reproduce the InfoSWMM™ output or achieve improved flow accuracy or visualization.

Task 3.B – Update Hydraulic Model with GIS Information, Capital Improvement Projects, and Operational Settings

The hydraulic model will be further updated by adding recent capital improvement projects, sanitary sewer extensions, and lining projects. Planned capital improvement and lining projects necessary to model future conditions will also be added to the model for the 10-year and 20-year growth model scenarios. Flows received from Scio, Pittsfield, and Ann Arbor Townships will be set to their contract maximums. OHM will also coordinate with City staff and operators as needed to confirm operations of the City-owned lift stations in order to accurately reflect their operation in the model.

Specific tasks included in Task 3.B include the following:

- Add recent lining work to the model.
- Add sanitary sewer extensions to new developments to the model.
- Add planned Capital Improvement Projects to the model.
- Verify that Township flow contributions are set to their contract maximum limits.
- Confirm typical operations of City-owned lift stations during dry and wet weather.

Task 3.C – Utilize Flow Meter Data to Establish Wet and Dry Weather Conditions

The first step in updating the hydraulic model will be to establish present dry and wet weather conditions. The City deployed 15 flow meters throughout the collection system in 2023 that have been gathering data to characterize present flow conditions. System characterization is further supported by data from flow meters at the Ann Arbor Wastewater Treatment Plant as well as data from five City rain gauges. The data will collectively be utilized to update and calibrate the hydraulic model.

Data from the flow meters will be analyzed within the H2Ometrics software platform. H2Ometrics is an analytics software that is used to quantify the effects of soil wetness or dryness on inflow and infiltration into sewer systems. It is especially valuable in developing antecedent moisture models (AMMs) to predict the magnitude of flow into the sanitary system that can be expected from various wetness conditions and storms of varying sizes. AMMs are used to create a continuous hydrologic model that predicts the effects of the wet weather response at multiple points in the sanitary system. The AMMs will be calibrated to the data collected since 2023 and will use varying storm events. The AMMs will take into consideration the ground's preceding moisture content and predict the sewershed response over an extended period using rainfall and air temperature data.

Calibrated AMMs are analyzed for model bias and predictive accuracy by quantifying the accuracy of fit for peak flows and volumes for each storm event. Once calibrated, AMMs are used to perform frequency analyses to estimate the peak flow for various return periods. This is completed by using long-term climatological data sets of rainfall and air temperature, readily available through national weather services, and then performing a statistical analysis on the flow output. Because the long-term data sets contain a variety of storms as well as air temperature variations and wetness conditions, the long-term model output includes a flow frequency content that reflects a wide variety of antecedent conditions and storms. The long-term model flow response is then used to determine the probability of a flow to occur, such as the 25-year frequency design event. The design events are then validated using past flow data and expected flow responses at metering locations. The updated design event will then be incorporated into the hydraulic model for use in the hydraulic analysis.

Data from five of the flow meters along major sewer interceptors will be analyzed to develop AMMs and frequency analyses. Up to an additional three AMMs will be developed on flow meters in more upgradient portions of the sanitary network where needed. These results will be summarized into a section of the final report with the calibration plots, accuracy of fits, and frequency analysis results.

Specific work items performed as part of this task include the following:

- Analyze the flow meter and rain data utilizing the H2Ometrics platform.
- Perform AMM for up to five flow meters along major sewer interceptors and up to three flow meters in upgradient portions of the system.
- Quantify the AMM performance with an accuracy of fit analysis that compares modeled versus observed flows.
- Develop the 25-year frequency design event.
- Compare AMM results to previous model peak flows and extend the results to other meters that did not have AMM performed.

Task 3.D – Update Flow in Upstream Portions of the Model

It is expected that the flow distribution is accurately represented throughout most of the model. However, in locations where there are discrepancies between the flow metering data and the modeled flows, the City's water meter billing data may be used to estimate and distribute dry weather (base) flows. This may especially be the case in the more upstream reaches of the collection system. It is anticipated that no more than 10% of the model will require adjustments to the dry weather flow distribution.

Specific tasks included in Task 3.D include the following:

- Compare model-predicted baseflow to flow meter data.
- Identify locations where there is a discrepancy between model dry weather flow and meter data.
- Update dry weather flow from water meter billing data where necessary.

Task 3 Deliverables

As part of this task, OHM will summarize the Task 3 efforts into **Volume 2: Hydraulic Model Update** of the final report. A draft version of Volume 2 will be provided to the City for review, then the document will be finalized upon incorporation of the City's comments. One electronic and two hard copies of the finalized Volume 2 will be submitted to the City. Volume 2 will include the following information:

- Model software migration process
- Documentation of model updates inclusive of flow distribution updates
- Antecedent Moisture Model development process inclusive of AMM creation, accuracy of fits, validation, frequency analyses, and peak flow development processes

TASK 4: HYDRAULIC ANALYSIS AND RECOMMENDED IMPROVEMENTS

Upon successful completion of Task 3: Hydraulic Model Update and Calibration, we will proceed with Task 4: Hydraulic Analysis and Recommended Improvements. This critical task encompasses a comprehensive evaluation of the City's collection system and an assessment of its ability to meet both current and future capacity needs as well as regulatory requirements and City design standards. The analysis will assess the City's system and its performance under existing and anticipated future demand scenarios, and identify improvements needed to meet current and future growth needs.

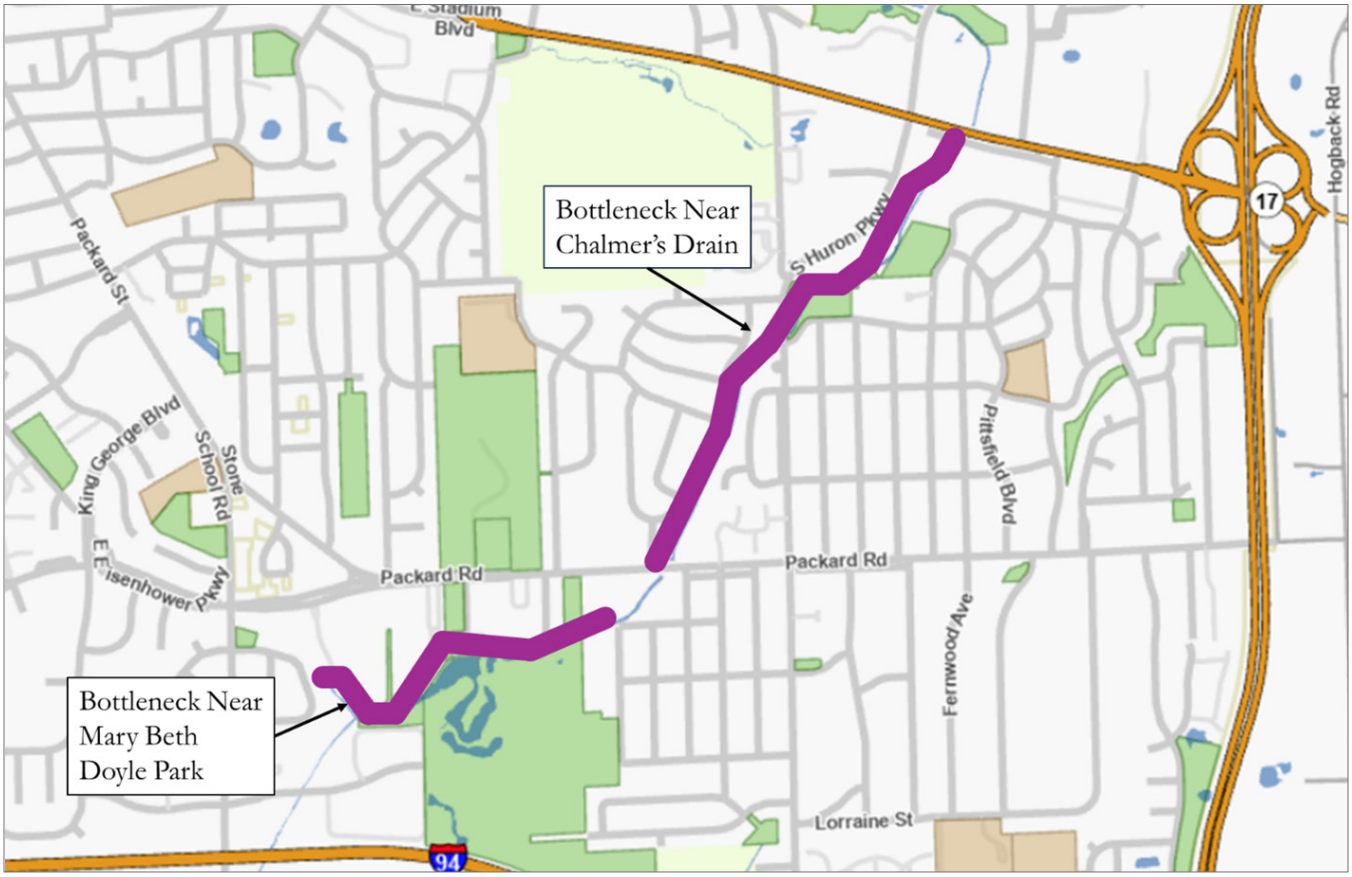
Task 4.A – Existing Conditions Evaluation

Task 4.A will evaluate capacity constraints within the collection system under existing conditions. The evaluation will be performed under dry weather and wet weather flow conditions. An example of existing capacity constraints is shown in Figure 1 (*on the following page*), which depicts locations near Mary Beth Doyle Park and Chalmers Drain where sewer capacity constraints are expected to exist under wet weather conditions. The wet weather flow scenario will use the City's design event of a 25-year recurrence interval peak sanitary flow plus 10% additional peak flow to accommodate for climate change and/or additional future growth. OHM will verity that the Township flows are set to their contract maximums.

Specific work items under this task include the following:

- Identify capacity constraints under existing dry and wet weather conditions.
- Tabulate flows and the extent of surcharging under dry and wet weather conditions.
- Prepare a map to illustrate locations with capacity constraints.

Figure 1.
Existing Capacity Constraints in the Sanitary Interceptors Near Mary Beth Doyle Park and Chalmer's Drain



Task 4.B – Existing Conditions Evaluation under EGLE and City Design Event

To prioritize capital improvement projects, peak flows under existing conditions will be evaluated against the Michigan Department of Environment, Great Lakes, and Energy (EGLE) 10-year recurrence interval design storm and the City's 25-year recurrence interval design storm. This evaluation will identify capacity constraints that occur during EGLE's 10-year design event and the City's 25-year design event under existing conditions. The hydraulic analysis of existing conditions under EGLE's design event will also be utilized to facilitate the permitting process for new developments by identifying projects that could be permitted through EGLE without the need for sanitary improvements.

Specific work items under this task include the following:

- Identify capacity constraints that exist under the EGLE 10-Year Recurrence Interval design storm for existing conditions.
- Identify capacity constraints that exist under the City's 25-year Recurrence Interval design storm for existing conditions.

Task 4.C – Establish Future Conditions

It is understood that the City Planning Department is developing a Comprehensive Land Use Plan that identifies anticipated areas of growth and densification. This effort will incorporate known developments including the University of Michigan housing expansions and future growth of the two approved transit corridors located at the intersection of Jackson Avenue and Maple Road and near the Briarwood Mall as well as the two proposed transit corridors at Plymouth Road and US 23 and Washtenaw Avenue and US 23. OHM has been working with preliminary growth projections provided by the City's Planning Department to evaluate the effects of growth on the sanitary sewer system and will work closely with the City to obtain updated growth projection information as it becomes available.

The first step in this analysis will be to compile predictions of future dry weather flows within the collection system from the local planning organizations within the City including the City of Ann Arbor Planning Department, the University of Michigan, Ann Arbor Public Schools, and the surrounding Townships served by the collection system. OHM proposes to collect contact information from the City and meet with each organization to introduce the project and review their growth projections. The project team will then summarize each organization's projected growth.

It is anticipated that the City will extend sanitary sewer service to the township island areas located within the City limits. Dry weather sanitary flow from these areas will be added to the future conditions model scenarios based on water meter billing data where available, otherwise the dry weather flow estimates will be based on industry-standard average residential usage per capita.

The collective growth projections will then be mapped and tabulated in terms of residential equivalent units (REUs) and flow rates. OHM proposes to summarize the results by meter districts, or sections of the City served by each flow meter deployed along the major sewer interceptors. The growth projections will be tabulated and compared to each meter district's existing population and flows based on raw numbers and percentages. The projections will then be reviewed with the City and the City's Planning Department. Once finalized, the modified growth predictions will be included in the model.

Future wet weather demand estimates will be built with assistance from the Office of Sustainability and Innovations (OSI) and the City regarding climate adaptation goals. OHM proposes to reach out to OSI and review the process used to develop the previous model scenario (25-year plus 10%) that was utilized in the 2015 Sanitary Sewer Wet Weather Evaluation Project. In this meeting, the project team will request an update on OSI's climate adaptation research efforts. The design event model scenario will be updated to accommodate anticipated climate change projections established through discussions with OSI, if needed.

Specific work items under this task include the following:

- Meet with local planning organizations and compile growth predictions.
- Establish flow predictions for future connection/build out of township islands.
- Develop modified flow projections by meter district.
- Update the model with the future growth projected flows.
- Incorporate climate adaptation goals from the Office of Sustainability and Innovations (OSI).

Task 4.D – SSO and Basement Backup Risk Evaluation

Basement backups and sanitary sewer overflows (SSOs) can occur in low lying locations especially when pipes are overcapacity or blocked by debris. OHM proposes to identify locations with a high risk of SSOs and basement backups under existing conditions and under the 10-year and 20-year growth projections using the City's design event. OHM will work with the City to identify which future growth land use scenario to utilize in this evaluation. OHM will evaluate locations that may be at high risk for SSOs or basement backups, such as locations where the sanitary sewer hydraulic grade line is within eight feet of the ground elevation or where capacity constraints exist under design event conditions. In locations where parallel pipes are present, OHM proposes to evaluate the locations of sanitary lateral connections and records of footing drain disconnections to provide a more accurate representation of individual properties that may be at risk. Maps of locations at risk for SSOs and/or basement backups will be provided for existing conditions as well as the 10-year and 20-year growth scenarios. The outcome from this task will inform the improvements evaluated in the Future Growth Evaluation. Specific work items under this task include the following:

- Create a map of locations with a high risk of SSOs and basement backups using the City's design storm and the most aggressive land use scenarios.
- Refine the map locations based on sanitary lateral connection information and records of footing drain disconnections.

Task 4.E – Identify Capacity Constraints Under Future Growth Projections

Task 4.E explores how future conditions are anticipated to put additional stresses on the collection system. Since future conditions are estimates, the magnitude of future peak flows will be simulated under multiple growth scenarios to capture the range of possible impacts from future growth.

It is understood that the City's Planning Department will develop several land use scenarios as part of the Comprehensive Land Use Plan that will each have different planning time periods (10-year and 20-year). OHM proposes to calculate the 10-year and 20-year peak flow projections utilizing input from stakeholder discussions as well as planning projection information provided in the Comprehensive Land Use Plan developed by the City's Planning Department.

The project team will evaluate capacity constraints for future conditions consistent with the Land Use Plan for up to three land use scenarios in each the 10-year and 20-year time periods based on the City's design event. The most aggressive 20-year growth scenario will also be evaluated under the EGLE design event to help prioritize improvements for the phasing plan.

Specific work items under Task 4.E include the following:

- Tabulate the magnitude of capacity constraints based on the City's 25-year design event under the 10-year and 20-year growth projections.
- Tabulate the magnitude of capacity constraints based on EGLE's 10-year design event for the 20-year planning period for the most aggressive land use scenario.
- Create maps to illustrate the locations of capacity constraints under each set of scenarios.

4.F – Develop Improvement Alternatives

Potential alternatives will be identified to address each capacity constraint that considers source reduction, storage, and conveyance improvements. Up to three alternatives will be considered for each upgrade needed, but not all alternatives will warrant three alternatives if the needed improvement is obvious.

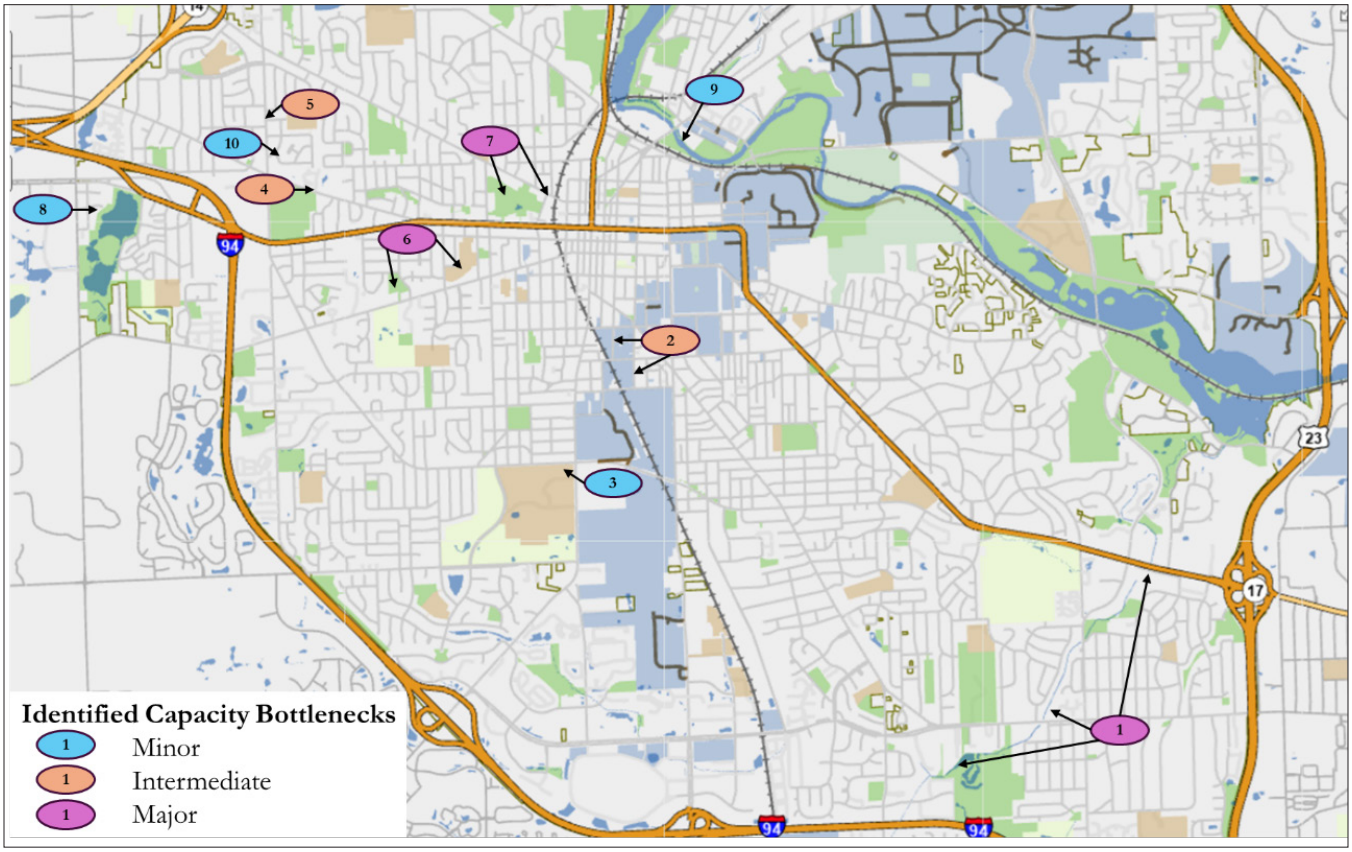
Potential alternatives will be considered for the major upgrades needed (as defined below) based on criteria to be established in coordination with the City including costs, constructability, community impacts, environmental impacts, sustainability, climate change impacts, and other factors. The recommended alternative will be documented and weighed according to the advantages and disadvantages of each. OHM proposes to work closely with the City to identify the recommended alternatives that best meet the City's long-term goals.

Conceptual engineering layouts of the recommended improvements will be developed and will be scaled and sized appropriately to meet the EGLE design event and the City's design event. This process will include field reconnaissance of the project and examination of available as-built drawings of the area. A conceptual GIS sketch will be developed for each recommended improvement. No survey or subsurface investigation will be performed as part of this preliminary analysis. Conceptual-level cost estimates of the recommended improvements will be developed for the City's financial and capital improvement planning.

It is important to clearly define a level of effort included within this task because the impacts of growth on the collection system will not be known until the Land Use Plan is complete and hydraulic modeling has been performed to understand the extent and magnitude of the improvements needed. For this reason, we have assumed the following level of effort for this task:

- For minor capacity constraints where a single stretch of pipe is overloaded and the improvement necessary is obvious, such as installation of a relief sewer or pipe upsizing, we will use the model to size the upgrade and develop a conceptual-level improvement layout and cost estimate. We anticipate that ten such minor improvements will need to be evaluated.
- We anticipate that there will be some capacity constraints that require more modeling and conceptual engineering evaluation than the minor capacity constraints. For these intermediate capacity restrictions, we will evaluate and model several localized improvement options to facilitate selection of the best option. We will then perform conceptual engineering and prepare a cost estimate for the recommended improvement. This will be the case for projects such as improvements to the local sewers near the U of M Housing project on South 5th Avenue or improvements at Veterans Memorial Park. We have assumed that this intermediate level of analysis will be needed at up to five (5) locations.
- For major interceptor restrictions, such as the known restrictions near Mary Beth Doyle Park and near the Chalmers Drain, a more extensive evaluation will be required. The level of effort for these areas will be similar to the recently completed evaluation of the Miller and First Street capacity restrictions evaluated for the U of M housing project. These evaluations

Figure 2.
Identified Sanitary Capacity Bottlenecks Observed Under Preliminary Master Planning Level Flows and Color Coded Based on the Anticipated Magnitude of Projected Effort



will include an examination of local and regional options for improvement as well as an alternative analysis using an evaluation criteria matrix with conceptual engineering and cost estimates prepared for each alternative. This level of evaluation will be the crux of the SSCSCP and the output from this work will function as the road map for the collection system for the coming decades. We have assumed that this major level of analysis will be needed at up to four (4) locations in the system.

- Should additional improvement evaluations be needed based on the results of the hydraulic modeling beyond these assumed amounts, they can be performed under the additional as-needed task described at the end of the technical scope. We would provide the City with a scope and budget for their approval before proceeding with any additional improvement evaluations.

We have based this assumed level of improvement evaluation on our experience working with the City's hydraulic model and the initial evaluation of future growth prepared for the recent U of M housing project evaluation.

Examples of the known capacity bottlenecks under the preliminary master plan level flows are shown in Figure 2 and tabulated in Table 2. Locations marked with blue symbols indicate anticipated minor bottlenecks. Those with orange symbols indicate locations that may require a more in-depth analysis, and those indicated with purple symbols are major bottlenecks that could require a more extensive investigation with multiple options evaluated.

This figure is intended to indicate the number and types of known capacity issues that will need to be evaluated. The capacity issues identified in Figure 2 (*above*) and Table 2 (*following page*) are not exhaustive as the Comprehensive Land Use Plan is still being developed.

Table 2. Description of Sanitary Capacity Bottlenecks Shown in Figure 2 and the Anticipated Magnitude of Project Effort

#	Bottleneck	Projected Effort
1	Pittsfield Trunkline	Major
2	U of M Student Housing (local pipes)	Intermediate
3	Pioneer High School	Minor
4	Veterans Memorial Park	Intermediate
5	Liberty Miller	Intermediate
6	Virginia Park to Murray Court	Major
7	West Park to Chapin and Miller	Major
8	Lakewood	Minor
9	Riverside Park	Minor
10	Faye Dr	Minor
11	Unanticipated-Based on New Growth Estimates (up to 6)	Minor
12	Unanticipated-Based on New Growth Estimates (up to 2)	Intermediate
13	Unanticipated-Based on New Growth Estimates (1)	Major

Once the recommended system improvements to adequately convey existing and future flows are identified, OHM will evaluate the constructability of each recommended improvement and determine the anticipated means and methods for constructing the project. Some recommended improvement projects may require bypass pumping during construction to allow for the replacement of infrastructure. Projects requiring bypass pumping will be identified, and anticipated flow rates will be quantified for sizing the bypass pumping. As part of this effort, we will assess the constructability of each recommended improvement, identify which recommended improvements will require bypass pumping for construction, quantify the dry weather and wet weather flow rates under existing and future 10-year and 20-year growth conditions at locations with recommended improvements that require bypass pumping, estimate the length of bypass piping necessary for each recommended improvement requiring bypass pumping, develop a map of locations illustrating recommended improvements, tabulate bypass location details and develop associated planning-level cost estimates for bypassing to include in the cost estimates for improvements that require bypassing.

Specific work items under this task include the following:

- Identify recommended improvements to address minor and intermediate-level capacity bottlenecks.
- Identify up to three alternatives to address each major capacity bottleneck.
- Prepare conceptual-level cost estimates for each recommended improvement and alternative.
- Evaluate alternatives based on City-defined factors.
- Identify recommended alternatives.
- Develop conceptual engineering layouts for each recommended alternative.
- Evaluate constructability and bypass pumping.

Task 4.G – Delivery of Model Scenarios

OHM will work with the City to identify the preferred method of model scenario transfer. The models will be delivered with documentation identifying the model run file locations and parameters included in each scenario. Each scenario, including the dry weather flow scenarios, will include the Townships' flow contributions set at their contract maximum flows. The following scenarios will be included:

- Existing conditions – dry weather flow
- Existing conditions – EGLE 10-year recurrence interval design event
- Existing conditions – City 25-year recurrence interval design event
- 10-year growth conditions – dry weather flow
- 10-year growth conditions – EGLE 10-year recurrence interval design event
- 10-year growth conditions – City 25-year recurrence interval design event
- 20-year growth conditions – dry weather flow
- 20-year growth conditions – EGLE 10-year recurrence interval design event
- 20-year growth conditions – City 25-year recurrence interval design event

Task 4 Deliverables

In addition to providing a copy of the updated and calibrated hydraulic model as part of Task 4.G, OHM will also summarize the Task 4 efforts into **Volume 3: Hydraulic Analysis and Recommended Improvements** of the final report. A draft version of Volume 3 will be provided to the City for review, then the document will be finalized upon incorporation of the City's comments. One electronic and two hard copies of the finalized Volume 3 will be submitted to the City. Volume 3 will

include the following information:

- Map of locations with capacity constraints and recommended improvements under existing and future growth scenarios
- Tabulation of flow rates for each model scenario and flows associated with each recommended improvement
- Maps of locations at high risk of basement backups or SSOs under existing conditions and 10-year and 20-year growth projections
- Improvement alternatives to address capacity constraints under existing and future conditions.
- Conceptual layouts and cost estimates for recommended improvements
- Map of locations for bypass pumping
- Tabulation of bypass locations, flow rates, bypass piping lengths, and associated planning-level cost estimates

TASK 5: CAPACITY ASSESSMENT OF WASTEWATER FACILITIES

The City desires to understand how the current capacities of the Ann Arbor Wastewater Treatment Plant (WWTP) and lift stations compare to the observed dry and wet weather flows these facilities receive. The City also desires to understand whether the collection system and WWTP have the capacity to convey the Townships' contract maximum flows. OHM will evaluate the design capacities of the wastewater facilities and compare their design capacities to observed and projected dry and wet weather flows from the collection system and Townships to identify whether infrastructure improvements are necessary to accommodate current or future flows.

Task 5.A – Wastewater Treatment Plant and Lift Station Capacity Assessment

As part of this task, OHM will evaluate the capacity of the WWTP and lift stations to adequately convey, pump, and treat projected dry weather and peak wet weather flows under existing and future conditions. Specific work efforts include the following:

- Review the design capacities of the various wastewater treatment plant processes.
- Review the pump curves for the pumps at the WWTP and at the lift stations relevant for the SSCSCP study.
- Review the data from the available flow meters at the WWTP and at the lift stations.
- Evaluate the ability of the WWTP and lift stations to convey the projected dry weather and wet weather flows under existing and future 10-year and 20-year growth conditions utilizing the City's 25-year recurrence interval design event.
  - » This will be accomplished by comparing the tributary dry weather and wet weather flows to the design capacities of the WWTP processes and lift stations.
  - » A tabulation will be prepared that compares the projected peak flows to the available facility capacities. It is assumed that the capacities of these facilities are readily available and will be transmitted to the OHM project team and that the development of rated facility capacities will not be required for this study.
- Capacity deficiencies identified at lift stations will be addressed as part of the Future Growth Evaluation outlined in Task 4.
- For any capacity deficiencies identified in the WWTP, we will identify recommended next steps that the City should undertake to further investigate them. We will not be evaluating recommended improvements for the WWTP.

Task 5.B – Review of Existing Wastewater Service Agreements

Under this task, OHM will review existing wastewater service agreements between the City and Townships to evaluate whether the City's collection system and wastewater treatment plant have the capacity to convey the contract maximum flows from the Townships. The design capacities of the wastewater facilities will be compared with projected peak flows from the collection system and Townships to assess whether capacity improvements are needed to meet current and future growth needs. Opportunities to revise the Townships' existing wastewater service agreements and/or their contract maximum flow limits will also be identified.

Specific work efforts associated with this task include the following:

- Review existing wastewater service agreements between the City and Townships.
- Coordinate with each Township that sends

wastewater to the City's WWTP to collect their most recent Sanitary Sewer Master Plans and growth projections for review, if that information is available.
- Compare observed wet weather flow rates from the Townships to their contract maximum flow rates.
- Analyze whether the wastewater collection system and treatment plant and applicable lift stations have the capacity to adequately convey, pump, and treat the observed peak flow rates from the Townships, and whether they have remaining capacity to adequately convey, pump, and treat the contract maximum flow rates from the Townships.
- Calculate how much additional flow capacity remains at the wastewater treatment plant and lift stations to accommodate future growth or future wastewater service agreements.
- Provide suggested modifications to the Townships' existing wastewater service agreements and/or their contract maximum flow limits based on the data analysis performed.
- Provide suggested additional contract terms for the City's consideration to include in future wastewater service agreements.

Task 5 Deliverables

As part of this task, OHM will summarize the Task 5 efforts into **Volume 4: Capacity Assessment of Wastewater Facilities** of the final report. A draft version of Volume 4 will be provided to the City for review, then the document will be finalized upon incorporation of the City's comments. One electronic and two hard copies of the finalized Volume 4 will be submitted to the City. Volume 4 will include the following information:
- Summary of capacity evaluations of the wastewater treatment plant and lift stations to convey projected dry weather and wet weather flows under existing and future conditions
- Recommended actions to further investigate identified capacity deficiencies
- Tabulation of observed peak flow rates from Townships compared to their contract maximum flow rates
- Tabulation of observed peak flow rates at the wastewater treatment plant and lift stations compared to their design capacities
- Summary of remaining flow capacities at the wastewater treatment plant and lift stations to accommodate future growth or wastewater service agreements
- Suggested modifications to the wastewater service agreements

TASK 6: PHASING STRATEGY FOR IMPROVEMENTS

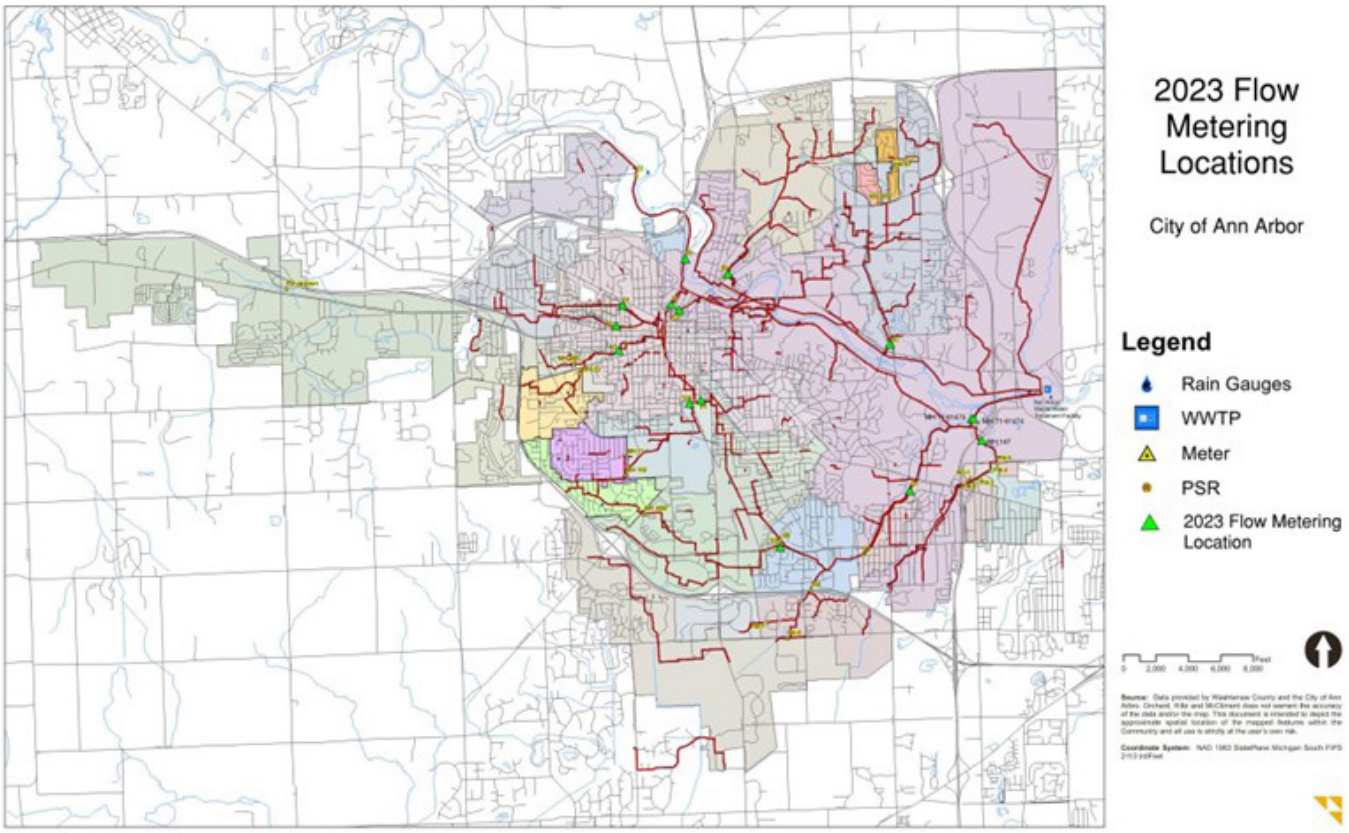
A phasing strategy will allow the City to prioritize, plan, and budget for needed improvements and will also allow for flexibility in planning based on how well actual future growth matches growth projections. The sanitary system phasing strategy will consider capacity constraints identified in Task 4: Hydraulic Analysis and Recommended Improvements.

Task 6.A – Develop Phasing Strategy

Under Task 6.A, OHM will work closely with the City to define system goals and prioritization strategies based on growth projections and the timing of when capacity constraints are expected to occur. With these goals in mind, OHM proposes to develop a phasing strategy that will prioritize improvements needed to adequately convey flows under existing or rapidly evolving conditions so the City can continue to meet EGLE regulatory requirements and the City's level of service expectations. The phasing strategy will then present recommended improvement priorities within the collection system so downstream improvements can be implemented in time to accommodate growth upstream. The phasing strategy will consider the following:
- The City's current Capital Improvement Plan (CIP).
- Existing capacity constraints not addressed by projects included within the current CIP.
- Projected capacity constraints with future growth.
- Recommended improvements under existing and future conditions as identified in Task 4.

Projects will be prioritized based on the timeline and severity of capacity constraints. High, medium and low priority projects will be identified to address capacity constraints under existing and future growth conditions under both EGLE and City design standards. The highest priority projects will be those that are needed to address all these scenarios. Medium and low priority projects will be identified from evaluating the project needs for combinations of the other scenarios. We will work with the City to identify the scenarios to be used for project prioritization.

Figure 3.
2023 Flow Monitoring Locations



Task 6.B – Develop a Flow Monitoring Plan

As part of the phasing strategy, a flow metering plan will be developed that is designed to monitor flows and growth within the City. The flow metering plan will define clear objectives such that it supports the City's data needs for monitoring system performance as changes and growth occur within the system. These needs could include tracking actual growth versus projected growth, assessing sewer conditions, verifying that infiltration and inflow rates are within the ranges used for the SSCSCP, and updating the hydraulic model.

Permanent flow monitoring will be recommended at strategic locations along major sewer interceptors and within priority sewersheds to provide long-term data to facilitate operational decisions and recommendations for improvements. Short-term flow metering will be recommended to evaluate the performance of infrastructure improvement projects, the flow contributions from significant new developments, or other City-defined goals. OHM will develop a map of proposed flow meter locations and supporting rationale for selection of each location. The 2023 flow monitoring plan developed to inform data collection for the SSCSCP is shown in Figure 3 as an example.

Specific work items in this task include the following:

- Identify City metering goals.
- Develop short- and long-term flow meter location recommendations and illustrate the locations on a map.

Task 6 Deliverables

As part of this task, OHM will summarize the Task 6 efforts into **Volume 5: Phasing Strategy for Improvements** of the final report. A draft version of Volume 5 will be provided to the City for review, then the document will be finalized upon incorporation of the City's comments. One electronic and two hard copies of the finalized Volume 5 will be submitted to the City. Volume 5 will include the following information:

- City-defined goals and prioritization strategies
- City's anticipated timing of growth projections
- Phasing strategy for recommended improvement projects under existing and future 10-year and 20-year growth conditions
- Map of locations with recommended improvements
- Short-term and long-term flow meter location recommendations

TASK 7 – INFOWORKS™ TRAINING

OHM's proficiency in InfoWorks™ and hydraulic modeling uniquely positions us to deliver a high-quality training experience to City staff. The training would be specifically crafted to accomplish the training goals of the individual City staff members participating in the training.

Task 7.A – InfoWorks™ Training and Training Materials

Upon completion of the model update, calibration, and hydraulic analysis efforts, OHM will develop a user manual specific to operation of the City's hydraulic model. The user manual will provide an overview of the City's hydraulic model and its scenarios as well as instructions on how to manipulate and make updates to the model for future use. OHM will also provide a reference sheet that lists various online resources available for City staff to access for as-needed assistance with the InfoWorks™ model platform and functionalities.

Additionally, two OHM staff members will provide up to two, 2-hour training workshops (either in person or virtual) for up to four (4) City staff members on how to utilize and run the model. Topics to be covered during the training sessions may include:

- Model button functionalities
- Mapping functionalities
- Overview of model scenarios
- Model inputs
- Analysis and interpretation of model results

Task 7 Deliverables

As part of this task, OHM will summarize the Task 7 efforts into **Volume 6: InfoWorks™ Training** of the final report. A draft version of Volume 6 will be provided to the City for review, then the document will be finalized upon incorporation of the City's comments. One electronic and two hard copies of the finalized Volume 6 will be submitted to the City. Volume 6 will include the following information:

- City of Ann Arbor Hydraulic Sanitary Sewer Model User Manual
- InfoWorks™ Hydraulic Modeling Resources Reference Sheet
- Summary of items reviewed during the two training sessions with City staff

TASK 8 – PUBLIC ENGAGEMENT

The City emphasizes transparency with its customers and prioritizes public engagement to enhance stakeholder comprehension and involvement in decision making. We are planning a modest public engagement effort for this study for several reasons. The City is not updating the level of service for the system as part of this effort. The design storm was developed through an extensive public engagement process in 2013–2015, and the outcomes from that process are still valid and serve the City well. The growth from the City's Comprehensive Land Use Plan, which includes a robust community engagement effort, is likely to drive the need for some significant improvements to the system. Until those improvements are understood at a master plan level, it is difficult to know the appropriate level of public engagement or where it should be conducted. Public engagement will be critical once more details are known about the recommended improvement projects. OHM's proposed Public Engagement strategy is detailed below.

Task 8.A – Public Engagement

Recognizing that information assessed and derived from this project may be considered sensitive, OHM's engagement strategy primarily focuses on educating the public on the importance and purpose of a sanitary sewer master plan. As part of this SSCSCP development, we will utilize the City's public engagement toolkit and will develop a recommendation for a public engagement plan for each component of the SSCSCP. This will allow public engagement to be performed in the future that is focused on the needs of each improvement identified

OHM's public engagement strategy primarily focuses on educating the public on the importance and purpose of a sanitary sewer master plan.

from the SSCSCP. OHM will coordinate with the City to develop digital and social media materials that effectively communicate the project's process, outcomes, and impacts to interested stakeholders and residents.

Key efforts as part of this public engagement strategy will include:

- Complete the City's Community Engagement Toolkit with City staff.
- Create a target audience list, which may include stakeholders, City staff, and media.
- Develop a message model – identify the messages that should be communicated to engage stakeholders and introduce the project team's competencies and project merits.
- Develop digital media – coordinate with the City to develop a project website that will provide a summary of the project and will include educational materials, periodic project updates, dashboards, and a project video.
- Produce one (1) project video that provides a high-level overview of the project and its findings and recommendations.
- Develop and assist with up to three (3) presentations to City Council and/or City Commissions.
- Prepare a recommendation for future public engagement activities to be performed for each improvement identified in the SSCSCP.

Task 8 Deliverables

As part of this task, OHM will summarize the Task 8 efforts into **Volume 7: Public Engagement** of the final report. A draft version of Volume 7 will be provided to the City for review, then the document will be finalized upon incorporation of the City's comments. One electronic and two hard copies of the finalized Volume 7 will be submitted to the City. Volume 7 will include the following information:

- Completed Community Engagement Toolkit
- Target Audience List
- Message Model
- Digital Media
- Project Video
- City Council Presentation Materials
- Summary of public engagement efforts

TASK 9 – POLICY AND FINANCIAL EVALUATION

Our team understands that the City is interested in a review of the 2015 Capital Cost Recovery Charge Report and its continued policy use as the City implements its SSCSCP. We also understand the City is not looking for a sewer rate study at this point, but rather development of alternative policy and financial evaluations so that the cost of new development and potentially needed sewer capacity is fairly and reasonably borne by existing customers, developers, and new customers both now and in the future. Stantec Consulting Services (Stantec), as a sub-consultant to OHM, will lead the policy and evaluation efforts.

The City is currently in the process of updating the Comprehensive Land Use Plan that is expected to reflect additional densification and growth within the City. It is anticipated that this growth will drive the need for significant capital improvements to the sanitary sewer collection system. The City desires policy and financial tools to support new development infrastructure needs that are both equitable to existing and future customers and maintains a high level of service. Some of the policy concepts that need to be explored as part of the evaluation include:

- **Growth pays for growth** – The cost for upgrading the sewer system to handle new development should be borne by the development and not the existing rate payers.
- **Equitable cost sharing** – The cost for upgrading the sewer system should be borne by those who will benefit from the upgrades, not just the first development that overloads the sewer.
- **Consistent and fair treatment** – Development across the City must be treated in a consistent and

fair manner regarding the City's policy for funding required upgrades to the sewer system.
- **Comply with financial and legal requirements** – The City's policy must be defensible and comply with financial objectives.

As part of this effort, we will provide examples of policies and case studies from other communities describing how they plan for growth and finance system expansion. We will also assist with evaluation of different funding sources for this new investment and assist the City in communicating these important policy matters to impacted stakeholders. The Stantec team will complete five major tasks to complete the analysis.

Task 9.A – Project Initiation / Management & Data Collection

- **9.A.1** – Prepare initial data request list and detailed critical path schedule. Perform job set-up activities.
- **9.A.2** – Prepare for and facilitate kick-off conference call with City and OHM to discuss study scope, approach, and key project milestones.
- **9.A.3** – Compile and review historical, current, and other system data as provided by staff.
- **9.A.4** – Prepare for and participate in 6 project management calls, providing status updates and supporting materials as required.
- **9.A.5** – Prepare for and participate in 2 stakeholder working group meetings to present initial and final results of policy and funding option analysis.

Task 9.B – Review of Existing Capital Cost Recovery Model and DOM

- **9.B.1** – Review and evaluate the effectiveness of the City's current Capital Cost Recovery model in the context of future use with the SSCSCP Implementation and current City objectives.
- **9.B.2** – Review and evaluate the effectiveness of the City's existing Developer Offset Mitigation (DOM) Program in the context of continued use with the SSCSCP Implementation and current City objectives.
- **9.B.3** – Provide recommendations to continue the current DOM program/create sustainable alternatives for homeowners to disconnect footing drains
- **9.B.4** – Prepare for and conduct an interactive virtual call with City staff and OHM to review initial findings and obtain City feedback and direction
- **9.B.5** – Modify initial findings and recommendations based upon input from City staff and OHM.
- **9.B.6** – Finalize findings and recommendations through a second interactive virtual call with City staff and OHM.

Task 9.C – Research / Develop Policy Options & Funding Strategies to Implement SSCSCP

- **9.C.1** – Research and provide examples of pertinent policies from similar communities planning/paying for system growth and expansion.
- **9.C.2** – Review examples discussed in Task 9.C.1 for any conflict with regulatory concerns, rate payer fees, and fees paying for growth
- **9.C.3** – Prepare for and conduct third virtual interactive call with City staff and OHM regarding findings in Tasks 9.C.1 and 9.C.2.
- **9.C.4** – Modify findings based on comments and discussion in Task 9.C.3 and again review with the parties through a virtual interactive call.
- **9.C.5** – Finalize policy and funding evaluations reflecting comments received in Task 9.C.4.

Task 9.D – Presentations and Report

- **9.D.1** – Develop and virtually present a summary of analysis to City Administration explaining recommendations, tradeoffs and selection of options.
- **9.D.2** – Modify recommendations for input received and finalize recommendations.
- **9.D.3** – Revise presentation for discussions with City Council and other stakeholders regarding findings and recommendations of Stantec's analysis.
- **9.D.4** – Prepare for and attend 3 public meetings to present policy and funding analysis options and findings/recommendations (interim and final).
- **9.D.5** – Develop a one-page summary of identified options and funding strategies and provide to City.

Task 9 Deliverables

As part of this task, OHM and Stantec will summarize the Task 9 efforts into **Volume 8: Policy and Financial**

Evaluation of the final report. A draft version of Volume 8 will be provided to the City for review, then the document will be finalized upon incorporation of the City's comments. One electronic and two hard copies of the finalized Volume 8 will be submitted to the City. Volume 8 will include the following information:

- Case studies from other communities
- Recommendations regarding current Cost Recovery Model and DOM program
- Recommendations for funding policy(ies)

Optional Tasks

As-Needed Modeling Support

Additional as-needed services are included to address items that may arise during the project that were not anticipated during this scope development. These may include:

1. Addressing short-term development pressures with as-needed modeling and analysis support to evaluate the sanitary sewer impacts of new developments quickly when they arise. The City may desire to have more extensive development analysis efforts performed via an escrow account paid by the developer, but this as-needed allowance will enable the City to perform quick, initial evaluations of new developments as they arise, if desired, helping to alleviate the schedule pressures.
2. Evaluate additional improvement projects if more extensive improvements are needed than assumed in this scope.
3. Evaluate infrastructure optimization challenges such as redesigning the flow split at the First and Miller diversion structure.
4. Perform other additional modeling tasks presented by unforeseen emerging issues.
5. Perform additional public engagement focused on more specific improvement options and locations once the recommendations are better understood for the SSCSCP.
6. Other items that may arise as requested by the City.

The budget allowance for this task will not be used without advanced authorization from the City, and we will prepare a scope and a budget for each item for approval by the City before proceeding with any work under this task. This work would be completed under OHM's rate schedule for the year that the as-needed work is performed. This rate schedule is updated each year to reflect current market and economic conditions, and we will share this rate schedule with the City as the scope and fee is developed for any as-needed tasks desired.

Assumptions

This scope of work was developed with the following assumptions:

- The City's GIS is updated and accurate and no updates are necessary by OHM.
- The City can provide OHM with SCADA access and available flow meter data, design drawings, pump curves, wastewater service agreements with Townships, and design capacities of the wastewater treatment components upon request.

Schedule

Development pressure is straining the sanitary sewer system now, which brings schedule pressures to bear for this study. However, it is important not to rush a sanitary sewer master plan that will serve as the City's road map for decades to come. For this reason, we have developed a project schedule that is designed to allow for sufficient time to develop a high quality SSCSCP that is technically sound and carefully reviewed, understood, and approved by the City.

Assuming City Council authorization in September 2024 and contract execution in October 2024, OHM is prepared to begin the Project Initiation and Information Gathering task beginning in October 2024. OHM proposes to submit the final deliverable to the City by February 2026 assuming timely responses and participation from connected stakeholders. A more detailed schedule highlighting project milestones is summarized below.

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Staff Resources By Task

STAFF HOURS

STAFF NAME PROJECT ROLE (BILLING CLASS)	R. Czachorski PIC (Principal)	M. Chamberlain PM (GE III)	K. Danielsen Modeling (Specialist III)	Various Modeling (GE II)	C. Elenbaas Costs / Design (PE IV)	M. Cummings Municipal Support (GE II)	E. Morgan AMM Development (GE IV)	M. Ulasir Visioning (Principal)	M. Trzeciak GIS Support (GIS Support)	D. Pulver Admin Support (Admin)	C. Slotten QA/QC Engineer (PE IV)	A. Burnham Financials & Policy (Director)	C. Malesky Financials & Policy (Technical Lead)	J. Bearman Financials & Policy (PM)	K. Cook Financials & Policy (Sr. Consultant)	A Ruiz Design & Costs (Sr Consultant)	Various Financial Analysts (Analyst)	Lambert Admin Support (Admin)	Fees - Stantec	Fees - H2O Metrics	TOTALS
TOTAL HOURS	**320**	**815**	**907**	**564**	**295**	**353**	**126**	**46**	**39**	**34**	**81**	**50**	**35**	**75**	**60**	**94**	**45**	**10**	**1**	**15**	**3965**
TASKS																					
TASK 1: PROJECT INITIATION AND INFORMATION GATHERING																					
TASK 1 HOURS SUMMARY	8	51	60	30	20	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	185
TASK 2: FLOW METERING DATA ANALYSIS AND INFLOW AND INFILTRATION EVALUATION																					
TASK 2 HOURS SUMMARY	43	73	131	210	12	8	28	0	0	5	0	0	0	0	0	0	0	0	0	15	525
TASK 3: HYDRAULIC MODEL UPDATE AND CALIBRATION																					
TASK 3 HOURS SUMMARY	35	71	142	137	10	0	98	10	0	3	0	0	0	0	0	0	0	0	0	0	506
TASK 4: HYDRAULIC ANALYSIS AND RECOMMENDED IMPROVEMENTS																					
TASK 4 HOURS SUMMARY	121	221	394	129	221	329	0	20	9	10	40	0	0	0	0	94	0	0	0	0	1588
TASK 5: CAPACITY ASSESSMENT OF WASTEWATER FACILITIES																					
TASK 5 HOURS SUMMARY	25	134	0	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	199
Task 6: PHASING STRATEGY FOR IMPROVEMENTS																					
TASK 6HOURS SUMMARY	22	55	71	16	28	0	0	0	0	5	20	0	0	0	0	0	0	0	0	0	217
TASK 7: INFOWORKS TRAINING																					
TASK 7 HOURS SUMMARY	18	73	77	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	171
TASK 8: PUBLIC ENGAGEMENT																					
TASK 8 HOURS SUMMARY	30	112	32	2	2	0	0	4	30	2	0	0	0	0	0	0	0	0	0	0	214
TASK 9: POLICY AND FINANCIAL EVALUATION																					
TASK 9 HOURS SUMMARY	18	25	0	0	2	0	0	12	0	6	21	50	35	75	60	0	45	10	1	0	360
OPTIONAL TASKS (Hours not included in totals above.)																					
As-Needed Modeling Support	25	60	180																		265

Project Timeline

FROM START TO FINISH

PHASES & TASKS	2024 S	O	N	D	2025 J	F	M	A	M	J	J	A	S	O	N	D	2026 J	F
EXECUTED CONTRACT																		
TASK 1: PROJECT INITIATION AND INFORMATION GATHERING																		
TASK 2: FLOW METERING DATA ANALYSIS AND INFLOW & INFILTRATION EVALUATION																		
TASK 3: HYDRAULIC MODEL UPDATE AND CALIBRATION																		
TASK 4: HYDRAULIC ANALYSIS AND RECOMMENDED IMPROVEMENTS																		
TASK 5: CAPACITY ASSESSMENT OF WASTEWATER FACILITIES																		
TASK 6: PHASING STRATEGY FOR IMPROVEMENTS																		
TASK 7: INFOWORKS TRAINING																		
TASK 8: PUBLIC ENGAGEMENT																		
TASK 9: POLICY AND FINANCIAL EVALUATION																		
OPTIONAL TASKS																		
As-Needed Modeling Support																		

SECTION D: FEE PROPOSAL

D.1 Our Costs (*Under Separate Cover*)

SECTION E: AUTHORIZED NEGOTIATOR

E.1 Your Principal in Charge

Robert Czachorski, PE
Principal in Charge / Authorized Negotiator

34000 Plymouth Road
Livonia, MI 48150

e robert.czachorski@ohm-advisors.com

c (734) 635-5398

o (734) 466-4548

A trailblazer in a tie – that's Robert Czachorski. Robert has 30 years of experience in consulting with a primary focus on water resources and municipal engineering. With the firm since 2004, he is responsible for managing and overseeing a variety of projects for water, sewer and stormwater systems and for developing, mentoring, and managing related project staff. He is also the firm's lead technical expert on sanitary collection systems and heads all national sewer work. Robert has been the client representative for some of the firm's largest accounts, including the Oakland County Water Resources Commissioner, the City of Ann Arbor, the Metropolitan Sewer District of Greater Cincinnati, and Ypsilanti Community Utilities Authority. He has performed water and sewer studies for more than a hundred municipal utility systems throughout the country, and has helped each client agency gain a better understanding of its system, improve system performance, and optimize capital upgrades. A nationally recognized expert in wet weather issues and sanitary collection systems, Robert is the co-founder of H2Ometrics, a cloud-based software company that creates smart water and sewer systems using time-series measurements (flows, pressures, depths, etc.) from existing data sources like metering, telemetry and SCADA.

Robert has also published several papers that highlight many unique insights and techniques for systems analysis including a new hydrologic model for antecedent moisture impacts on sewer systems, which resulted in awards from the Water Environment Federation and the Consulting Engineers Council. His work on cloud data approaches for tackling harmful algal bloom on Lake Erie was part of the winning team for the Cleveland Water Alliance's Internet of H2O Challenge, which sought to develop a robust and resilient nutrient monitoring program with scalability across the entire Great Lakes.

SECTION F: REQUIRED FORMS / ATTACHMENTS

F.1 Required Forms

F.2 W-9

ATTACHMENT A
LEGAL STATUS OF OFFEROR

(The Respondent shall fill out the provision and strike out the remaining ones.)

The Respondent is:

- A corporation organized and doing business under the laws of the state of Michigan, for whom Robert Czachorski bearing the office title of Principal, whose signature is affixed to this proposal, is authorized to execute contracts on behalf of respondent.*

  *If not incorporated in Michigan, please attach the corporation's Certificate of Authority

- A limited liability company doing business under the laws of the State of _____, whom _____ bearing the title of _____ whose signature is affixed to this proposal, is authorized to execute contract on behalf of the LLC.

- A partnership organized under the laws of the State of _____ and filed with the County of _____ , whose members are (attach list including street and mailing address for each.)

- An individual, whose signature with address, is affixed to this RFP.

Respondent has examined the basic requirements of this RFP and its scope of services, including all Addendum (if applicable) and hereby agrees to offer the services as specified in the RFP.

Robert Czachorski _____ Date: 07/11/2024,
Signature

(Print) Name Robert Czachorski Title Principal

Firm: Orchard, Hiltz & McCliment, Inc. (dba OHM Advisors)

Address: 34000 Plymouth Road, Livonia, MI 48150

Contact Phone c (734) 635-5398
o (734) 466-4548 Fax (734) 522-6427

Email robert.czachorski@ohm-advisors.com

ATTACHMENT B
CITY OF ANN ARBOR DECLARATION OF COMPLIANCE

Non-Discrimination Ordinance

The "non discrimination by city contractors" provision of the City of Ann Arbor Non-Discrimination Ordinance (Ann Arbor City Code Chapter 112, Section 9:158) requires all contractors proposing to do business with the City to treat employees in a manner which provides equal employment opportunity and does not discriminate against any of their employees, any City employee working with them, or any applicant for employment on the basis of actual or perceived age, arrest record, color, disability, educational association, familial status, family responsibilities, gender expression, gender identity, genetic information, height, HIV status, marital status, national origin, political beliefs, race, religion, sex, sexual orientation, source of income, veteran status, victim of domestic violence or stalking, or weight. It also requires that the contractors include a similar provision in all subcontracts that they execute for City work or programs.

In addition the City Non-Discrimination Ordinance requires that all contractors proposing to do business with the City of Ann Arbor must satisfy the contract compliance administrative policy adopted by the City Administrator. A copy of that policy may be obtained from the Purchasing Manager

The Contractor agrees:

(a) To comply with the terms of the City of Ann Arbor's Non-Discrimination Ordinance and contract compliance administrative policy.

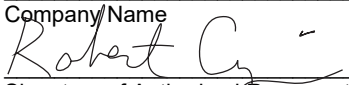
(b) To post the City of Ann Arbor's Non-Discrimination Ordinance Notice in every work place or other location in which employees or other persons are contracted to provide services under a contract with the City.

(c) To provide documentation within the specified time frame in connection with any workforce verification, compliance review or complaint investigation.

(d) To permit access to employees and work sites to City representatives for the purposes of monitoring compliance, or investigating complaints of non-compliance.

The undersigned states that he/she has the requisite authority to act on behalf of his/her employer in these matters and has offered to provide the services in accordance with the terms of the Ann Arbor Non-Discrimination Ordinance. The undersigned certifies that he/she has read and is familiar with the terms of the Non-Discrimination Ordinance, obligates the Contractor to those terms and acknowledges that if his/her employer is found to be in violation of Ordinance it may be subject to civil penalties and termination of the awarded contract.

Orchard, Hiltz & McCliment, Inc. (dba OHM Advisors)
Company Name



07/11/2024
Signature of Authorized Representative Date

Robert Czachorski, Principal
Print Name and Title

34000 Plymouth Road, Livonia, MI 48150
Address, City, State, Zip
c (734) 635-5398
o (734) 466-4548 robert.czachorski@ohm-advisors.com
Phone/Email address

Questions about the Notice or the City Administrative Policy, Please contact:
Procurement Office of the City of Ann Arbor
(734) 794-6500

Revised 3/31/15 Rev. 0 NDO-2

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ATTACHMENT C
CITY OF ANN ARBOR
LIVING WAGE ORDINANCE DECLARATION OF COMPLIANCE

The Ann Arbor Living Wage Ordinance (Section 1:811-1:821 of Chapter 23 of Title I of the Code) requires that an employer who is (a) a contractor providing services to or for the City for a value greater than $10,000 for any twelve-month contract term, or (b) a recipient of federal, state, or local grant funding administered by the City for a value greater than $10,000, or (c) a recipient of financial assistance awarded by the City for a value greater than $10,000, shall pay its employees a prescribed minimum level of compensation (i.e., Living Wage) for the time those employees perform work on the contract or in connection with the grant or financial assistance. The Living Wage must be paid to these employees for the length of the contract/program.

Companies employing fewer than 5 persons and non-profits employing fewer than 10 persons are exempt from compliance with the Living Wage Ordinance. If this exemption applies to your company/non-profit agency please check here [___] *No. of employees__*

The Contractor or Grantee agrees:

(a) To pay each of its employees whose wage level is not required to comply with federal, state or local prevailing wage law, for work covered or funded by a contract with or grant from the City, no less than the Living Wage. The current Living Wage is defined as $16.43/hour for those employers that provide employee health care (as defined in the Ordinance at Section 1:815 Sec. 1 (a)), or no less than $18.32/hour for those employers that do not provide health care. The Contractor or Grantor understands that the Living Wage is adjusted and established annually on April 30 in accordance with the Ordinance and covered employers shall be required to pay the adjusted amount thereafter to be in compliance with Section 1:815(3).

Check the applicable box below which applies to your workforce

[___] Employees who are assigned to any covered City contract/grant will be paid at or above the applicable living wage without health benefits

[X] Employees who are assigned to any covered City contract/grant will be paid at or above the applicable living wage with health benefits

(b) To post a notice approved by the City regarding the applicability of the Living Wage Ordinance in every work place or other location in which employees or other persons contracting for employment are working.

(c) To provide to the City payroll records or other documentation within ten (10) business days from the receipt of a request by the City.

(d) To permit access to work sites to City representatives for the purposes of monitoring compliance, and investigating complaints or non-compliance.

(e) To take no action that would reduce the compensation, wages, fringe benefits, or leave available to any employee covered by the Living Wage Ordinance or any person contracted for employment and covered by the Living Wage Ordinance in order to pay the living wage required by the Living Wage Ordinance.

The undersigned states that he/she has the requisite authority to act on behalf of his/her employer in these matters and has offered to provide the services or agrees to accept financial assistance in accordance with the terms of the Living Wage Ordinance. The undersigned certifies that he/she has read and is familiar with the terms of the Living Wage Ordinance, obligates the Employer/Grantee to those terms and acknowledges that if his/her employer is found to be in violation of Ordinance it may be subject to civil penalties and termination of the awarded contract or grant of financial assistance.

Orchard, Hiltz & McCliment, Inc. (dba OHM Advisors)
Company Name

Signature of Authorized Representative Date

Robert Czachorski, Principal
Print Name and Title

34000 Plymouth Road
Street Address

Livonia, MI 48150
City, State, Zip

c (734) 635-5398
o (734) 466-4548 robert.czachorski@ohm-advisors.com
Phone/Email address

City of Ann Arbor Procurement Office, 734/794-6500, procurement@a2gov.org Rev. 3/5/24

ATTACHMENT D

VENDOR CONFLICT OF INTEREST DISCLOSURE FORM

All vendors interested in conducting business with the City of Ann Arbor must complete and return the Vendor Conflict of Interest Disclosure Form in order to be eligible to be awarded a contract. Please note that all vendors are subject to comply with the City of Ann Arbor's conflict of interest policies as stated within the certification section below.

If a vendor has a relationship with a City of Ann Arbor official or employee, an immediate family member of a City of Ann Arbor official or employee, the vendor shall disclose the information required below.

1. No City official or employee or City employee's immediate family member has an ownership interest in vendor's company or is deriving personal financial gain from this contract.
2. No retired or separated City official or employee who has been retired or separated from the City for less than one (1) year has an ownership interest in vendor's Company.
3. No City employee is contemporaneously employed or prospectively to be employed with the vendor.
4. Vendor hereby declares it has not and will not provide gifts or hospitality of any dollar value or any other gratuities to any City employee or elected official to obtain or maintain a contract.
5. Please note any exceptions below:

Conflict of Interest Disclosure*	
Name of City of Ann Arbor employees, elected officials or immediate family members with whom there may be a potential conflict of interest.	( ) Relationship to employee ( ) Interest in vendor's company ( ) Other (please describe in box below)
OHM Advisors has no conflicts of interest.	

*Disclosing a potential conflict of interest does not disqualify vendors. In the event vendors do not disclose potential conflicts of interest and they are detected by the City, vendor will be exempt from doing business with the City.

I certify that this Conflict of Interest Disclosure has been examined by me and that its contents are true and correct to my knowledge and belief and I have the authority to so certify on behalf of the Vendor by my signature below:		
Orchard, Hiltz & McCliment, Inc. (dba OHM Advisors)		c (734) 635-5398 o (734) 466-4548
Vendor Name		**Vendor Phone Number**
Robert Czachorski	07/11/2024	Robert Czachorski
Signature of Vendor Authorized Representative	**Date**	**Printed Name of Vendor Authorized Representative**

Questions about this form? Contact Procurement Office City of Ann Arbor Phone: 734/794-6500, procurement@a2gov.org

Form **W-9**
(Rev. October 2018)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

▶ **Go to *www.irs.gov/FormW9* for instructions and the latest information.**

Give Form to the requester. Do not send to the IRS.

Print or type. See **Specific Instructions** on page 3.

1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.
Orchard, Hiltz & McCliment. Inc.

2 Business name/disregarded entity name, if different from above
OHM Advisors

3 Check appropriate box for federal tax classification of the person whose name is entered on line 1. Check only **one** of the following seven boxes.

☐ Individual/sole proprietor or single-member LLC ☑ C Corporation ☐ S Corporation ☐ Partnership ☐ Trust/estate

☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=Partnership) ▶ _____

Note: Check the appropriate box in the line above for the tax classification of the single-member owner. Do not check LLC if the LLC is classified as a single-member LLC that is disregarded from the owner unless the owner of the LLC is another LLC that is **not** disregarded from the owner for U.S. federal tax purposes. Otherwise, a single-member LLC that is disregarded from the owner should check the appropriate box for the tax classification of its owner.

☐ Other (see instructions) ▶

4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):

Exempt payee code (if any) _____

Exemption from FATCA reporting code (if any) _____

(Applies to accounts maintained outside the U.S.)

5 Address (number, street, and apt. or suite no.) See instructions.
34000 Plymouth Rd

Requester's name and address (optional)

6 City, state, and ZIP code
Livonia, MI 48150

7 List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN,* later.

Note: If the account is in more than one name, see the instructions for line 1. Also see *What Name and Number To Give the Requester* for guidelines on whose number to enter.

Social security number
[ ][ ][ ] – [ ][ ] – [ ][ ][ ][ ]

or

Employer identification number
3 8 – 1 6 9 1 3 2 3

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

Sign Here **Signature of U.S. person ▶** *Mark McComb* **Date ▶** 1/8/24

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to *www.irs.gov/FormW9.*

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following.

- Form 1099-INT (interest earned or paid)
- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding, *later.*

Cat. No. 10231X Form **W-9** (Rev. 10-2018)

OHM

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