JOHN R. EVANS, PE
UTILITY MANAGEMENT SERVICES DIRECTOR

John Evans, PE, has 22 years of experience in utility and asset management, operational optimization, regulatory compliance, and information management. He has supported more than 50 public utilities nationwide representing more than 65,000 miles of linear assets. John's passion is to help his clients solve their toughest problems. Often, the problems involve multiple stakeholders that have very different drivers and perspectives. To help facilitate mutual success, John "speaks the language" of management, engineering, O&M and IT. Together with his clients and teaming partners, John has helped right-size capital programs, optimize O&M programs, and maintain regulatory compliance. John joined Blue Cypress in 2014 to form the company's Utility Management Services group after a highly successful career at large A&E firm.

Education

Bachelor of Science (with Honors), Civil Engineering, Georgia Institute of Technology, 1998

Professional Registrations

Professional Engineer, California, No. 65628, 2003

Professional Organizations

Georgia Association of Water Professionals, 2013 - present
National Association of Clean Water Utilities, 2016 - present
Water Environment Federation, 2002 - present
Society of American Military Engineers, 2019 - present

Relevant Project Experience

Gwinnett County Department of Water Resources (DWR) I&I Program Assessment, Lawrenceville, GA, Sep 2020 – Feb 2021. The scope of this project was to perform a programmatic assessment of DWR's current I&I program by conducting a three-pronged discovery process including: 1) data review and analysis, 2) document review, and 3) interviews with key stakeholders. The team documented key findings, and then developed recommendations that focused on enhancements to strategies and policies, operational improvements, data management and decision support, and performance management. Several stakeholder buy-in techniques were incorporated including voting on to accept, reject (with justification), or modify recommendations. The findings and recommendations were then presented to management, and then to all stakeholders. The implemented recommendations will help save the rate payers and business community of Gwinnett County $100s of millions of dollars while continuing to protect the environment and comply with regulations.

Charleston Water System Cityworks Optimization, Charleston, SC, August 2020 - Present. CWS is undertaking an initiative to optimize the way the organization collects, manages, and reports on data using Cityworks. CWS has already taken many steps to understand system and stakeholder needs. Now with Blue Cypress Consulting as a partner, CWS will conduct a gap assessment and develop a Cityworks improvement roadmap. Through assessments of data collection and operating procedures, the project will recommend concrete steps for leveraging data collection and process management in Cityworks to meet asset management goals.

GDOT Major Mobility Investment Program - Utility Coordination Improvements, Georgia, July 2020 - ongoing. The Major Mobility Investment Program (MMIP) is a Georgia Department of Transportation (GDOT) initiative to make major investments in Georgia's transportation network. Projects such as interchanges, express lanes, widening, and others will affect not just the transportation infrastructure surrounding them, but multiple significant utilities as well. To help mitigate utility coordination challenges, Blue Cypress has been brought on to the MMIP team to provide thought leadership, objective analysis, actionable recommendations, and implementation support to improve utility planning and coordination – and ultimately, to reduce program risk.

Clayton County Water Authority Pressure Sewer System: Assessment and Asset Management Plan, Morrow,

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GA, April 2020 – January 2021. Clayton County Water Authority (CCWA) is making a concerted effort to improve its knowledge of its pressure sewer system assets in order to improve system reliability and predictability. In addition to supporting the overall assessment project, Blue Cypress Consulting has been contracted to lead the development of preventative maintenance plans for lift stations and air release valves, as well as optimized implementation plans for the incorporation of new inspection activities and business processes into CCWA's maintenance activities. The development of the preventative maintenance plans and optimized implementation plans included identifying and cataloging existing maintenance practices, determining best maintenance practices for the specific assets operated by CCWA, and determining the most time- and cost-efficient manner to implement the suggested process changes to ensure that the maintenance program effectively ensures that each asset maintains its required levels of service.

DeKalb County Department of Watershed Management O&M Optimization and Dry Weather SSO Reduction, Decatur, GA, March 2020 - Dec 2020. In an effort to reduce dry weather SSOs, Blue Cypress performed an assessment and developed a roadmap for operational improvements. The assessment included a 3-pronged discovery process including data analysis, document review and staff interviews. Data analysis included SSOs, hydraulic models, CCTV, sewer cleaning, and acoustic inspections. The data was analyzed using Tableau analytics.

Henry County Water Authority Collection Assessment, McDonough, GA, March 2019 - present. The scope of this project was to perform an assessment, identify opportunities for improvement, and develop an operational optimization plan. The goals of the desired operational improvements included: continued regulatory compliance, enhanced levels of service provided to customers, increased productivity and quality of operations, and/or to lowered operating costs. The project included a discovery phase, a findings and recommendations phase, and a planning phase. The discovery phase consisted of three prongs: 1) documentation review, 2) data analysis, and 3) interviews. At the conclusion of the discovery phase was the findings and recommendations phase. The team documented key findings (both strengths and opportunities), and then developed recommendations that would help drive HCWA towards continuing to meet its operational goals. The final step of HCWA's process was the planning phase. The planning phase focused reviewing the recommendations to determine which would be acted upon, and which would not. The selected recommendations were then grouped into projects. The projects were prioritized, the level of effort was estimated, dependencies between projects were identified, and ultimately, the projects were scheduled over time into an operational optimization plan (Roadmap.) The plan was then used to communicate upcoming enhancements to stake holders, as well as manage the efforts over time. A special emphasis of this project was on HCWA's approach to work management. They did not have a CMMS, and were instead using a variety of GIS tools, spreadsheets and databases to manage the system. This project resulted in a roadmap to develop requirements, select, configure and roll out a CMMS.

Seattle Public Utilities CMOM, Seattle, WA, 2007-2014, 2018-present. John provided consulting services for CMOM Phase 1 and Phase 2 programs. Support has included: CMOM Assessment; developed a 6-year CMOM Implementation Roadmap to guide SPU's SSO Reduction activities; owners rep in SPU's CMMS upgrade; implementation of various information management systems; condition-based capital planning and forecasting; performance management and dashboard development; O&M program optimization; FOG program support; and Consent Decree negotiation. John was the lead technical consultant.

Gwinnett County Department of Water Resources iTracker Pilot Study, Lawrenceville, GA, Mar 2019 - present. Blue Cypress was selected to help determine the effectiveness of iTracker sensors and iTracking software for determining the source location of inflow and infiltration (I&I) issues in DWR's collection system. The pilot study will involve the investigation of a target sub-basin that has a known history of I&I issues. Blue

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Cypress will analyze the data collected during the pilot to determine whether iTracker sensors were a viable and cost-efficient technology to meet DWR's goals. If the pilot is successful, Blue Cypress will also develop best practices documentation for the most effective deployment of the sensors. John served as the Lead Senior Utility Management Consultant on this project.

DeKalb County iTracker Support Services, DeKalb County, GA, Dec 2019 – June 2020. Blue Cypress Consultinghas partnered with DeKalb County Department of Watershed Management (DWM) to optimize their use of iTracker sensors as tools to reduce inflow and infiltration (I&I). Blue Cypress has taken on oversight of the sensor implementation including identifying priority areas for assessment based on risk of I&I-related sanitary sewer overflows (SSOs), developing deployment plans to ensure that each priority area is monitored effectively in an effort to identify actionable sources of I&I that can be addressed through rehab projects or further investigation, interpreting the collected data to identify the areas with the highest contributions of I&I to the collection system within the study area, determining the appropriate technology for further investigation or repair in areas with highest contributions of I&I. Through this process, DWM is able to identify, investigate, and rehabilitate the specific areas with the highest contributions of I&I in known problem areas efficiently and cost-effectively.

San Antonio Water System (SAWS) Program Assesment, San Antonio, TX 2008-2013, May 2019 - present. Blue Cypress was on a team to perform an audit of SAWS Consent Decree compliance and adherence to asset management best practices. Blue Cypress performed an assessment of SAWS Capacity Assurance Program and developed a gap report. Prior to joining Blue Cypress Consulting, John was the lead technical negotiator of SAWS Consent Decree and subsequently participated on a Program Management Team that was selected by SAWS to collaboratively manage the implementation of the $1.3B U.S. EPA Consent Decree related sanitary sewer overflow (SSO) reduction program. John supported the development and updates of several major information management systems including their CMMS.

Winston-Salem Collection System Improvement Plan, Winston Salem, NC, 2015 - present. Blue Cypress Consulting is part of a team providing services including: general project/program management services; a strategic assessment and plan development; an assessment of operations and development of a roadmap for operational optimization and asset management; organizational chart update/staffing assessment and plan; implementing a change management program; supporting implementation of an enhanced O&M strategy including updates to the usage of Cityworks, a near-term condition assessment strategy, and SSO response improvements. John is the Deputy Program Manager for this project and Task Leader on several tasks.

City of Columbia Clean Water 2020 – Data Analysis and Assessment, Columbia, SC, June 2019 - present. Blue Cypress was contracted to perform an intensive data analysis and assessment of the City's use of Cityworks and associated strategies and tactics that relate to regulatory compliance, efficiency, quality and effectiveness of their O&M strategies. The analysis included CMMS, GIS, CCTV, SL-Rat, SSO tracking and many others. The assessment included review of strategic plans, SOPs, and other documents.

Clayton County Water Authority (CCWA) O&M Optimization Program, Morrow, GA, Mar. 2018 - Sept. 2019. Blue Cypress designed and implemented an optimized O&M program for the Clayton County Water Authority sewer collection system. This included an extensive assessment of strategies, processes and procedures, as well as a strong focus on Cityworks usage. The project resulted in significant updates to Cityworks usage including data collection, workflow, and functionality usage. Blue Cypress also implemented a decision support tool to optimize the maintenance frequency for each pipe in the CCWA system so as to not maintain it too often, and not maintain it too little, with the ultimate goal of reducing Sanitary Sewer Overflows (SSOs). John is the Lead Senior Utility Management

Consultant on this project.

Clayton County Water Authority (CCWA) Strategic Asset Management Plan (SAMP), Morrow, GA, Mar. 2018 - Mar. 2019. The SAMP covers all major assets managed by CCWA including water plants; wastewater plants; distribution, collection and stormwater systems; and warehouse. The comprehensive approach to developing this SAMP includes 1) establishing a guiding asset management framework in alignment with an organization's strategic goals, 2) assessing the current state of asset management activities, and 3) identifying improvement strategies and prioritizing these strategies in alignment with an organization's values using a set of defined criteria. Blue Cypress Consulting was contracted to lead the collection and distribution system portion of the project and participate in the Steering Committee.

Charlotte Water Collection System Optimization, Charlotte, NC, Apr. 2018 - Sept. 2018. Blue Cypress was contracted to assist Charlotte Water with identifying and leveraging existing data and resources to continue its efforts towards achieving an optimized approach to collection system management, operations and maintenance. The tasks include a rapid assessment of the collection system performance management, operations, condition assessment and capacity assurance programs as well as a high priority initiative identified by Charlotte Water to optimize sewer cleaning and enhance its usage of Cityworks. John served as the Task Lead for Performance Management and a portion of the operations assessment.

East Bay Municipal Utility District (EBMUD) Regional Data Management Plan Framework, Oakland, CA, July 2017 - July 2018. Following participation on an EBMUD assembled Advisory Panel to support the development of the Regional Technical Support Program (RTSP) which is a requirement of EBMUD's 2014 Consent Decree with the USEPA, Blue Cypress Consulting supported the development of a Regional Data Management Plan (RDMP). The goal of the RDMP was to develop a data management strategy to manage the data of, not only EBMUD, but also its 7 satellite collection system agencies. Data to be managed included: GIS, CCTV, manhole inspections, smoke/dye testing, flow meters, rain gauges, sewer cleaning, and a variety of other data types. The plan includes data architecture and an implementation plan.

Jefferson County Optimization Assessment, Birmingham, AL, February 2017 - July 2017. The goal of the structured cleaning program project is to assist Jefferson County in implementing a set of strategies, processes and procedures to optimize the sewer cleaning frequency for each pipe in the system so as to not clean it too often, and not clean it too little, with the ultimate goal of reducing Sanitary Sewer Overflows (SSOs) and compliance with the Consent Decree. This project involves significant data collection and analysis, and updates to data collection standards. This project resulted in several configuration updates to Cityworks including data collection, workflow and enhanced use of Cityworks existing functionality. John is the Lead Senior Utility Management Consultant on this project.

City of Raleigh Public Utilities Department (CORPUD) Collection System Optimization Study, Raleigh, NC, Jan. 2015 - Dec. 2015. CORPUD contracted Blue Cypress to perform a review of its sewer collection and water distribution operations to identify opportunities to optimize business processes, policies, and organizational structure. Work included assessment of current practices, with a focus on asset management, maintenance strategies, and implementation of a new work order management system for tracking asset detail and maintenance costs. John was the Subject Matter Expert for the sewer collection system portion of this project.

City of Bellevue Asset Management Roadmap, Bellevue, WA, June 2015 - Feb. 2016. Blue Cypress Consulting was part of a team that developed an Asset Management Roadmap that would guide the City's Asset Management Program for water, wastewater, and storm water over the following five years. The 5-Year Strategic

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Asset Management Roadmap was based on a gap analysis and maturity rating of numerous focus areas within the utilities. A special focus of the assessment and roadmap was on data driven decision making and data management systems such as CMMS, GIS, CCTV, and other data sources. John was the wastewater subject matter expert.

Celine Hyer, PE, IAM

Conveyance Practice Leader

EDUCATION
BS Chemical Engineering, Florida Institute of Technology 1988
MS Engineering Management, Florida Institute of Technology 1989

YEARS OF EXPERIENCE
Total – 32
With Arcadis – 15

PROFESSIONAL REGISTRATIONS
Professional Engineer – FL
Institute of Asset Management, IAM Certificate

Ms. Hyer has over 22 years of specific experience in asset management implementation using EPA, and ISO 55000 frameworks. She has led condition and risk assessments for water, and wastewater infrastructure for projects encompassing pipes, pumping facilities and treatment equipment totaling over 1,500,000 assets. As part of the risk assessments, she has created short- and long-range capital plans using business case templates and triple bottom line analysis. Most recently she has worked on writing comprehensive asset management plans as well as asset management strategic plans for utilities across the U.S Celine currently serves as the Vice Chair for the AWWA Asset Management Committee and the Water Main Condition Assessment and Committee and is the chair of the ASCE UESI Asset Management Division.

Risk Assessment, Project Prioritization and Asset Management, New York City DEP, NY

Task leader for the condition and risk assessment of assets covering water, wastewater, stormwater and all facilities owned and operated by NYCDEP, including over 50,000 equipment assets at treatment and pumping facilities and 200,000 pipe assets, including water, sewer and stormwater mains. The outcome of the data collection and evaluation was a 4- and 10-year capital plan for renewal and replacement of assets based on risk and remaining life. Business case templates and prioritization using a custom Arcadis-designed tool facilitated the CIP creation. Guidelines documents, tools and staff training will allow NYCDEP staff to make this an ongoing program. Tools included a custom asset management information system that stored all risk data and created business cases. Phase III is underway and will update the CIP through new risk assessment and business cases for treatment plant and pumping assets.

Sewer System Facilities Plan Update DC Water, Washington DC

Technical advisor for completion of the sewer facilities plan that provides recommendations for projects that need to be completed in the next 20 years for pumping stations, outfall structures, interceptors, force mains and the gravity sewer system. The plan will be risk based adopting best practice asset management standards and includes advanced statistical analysis of the gravity sewer system to predict future conditions and funding needs.

Asset Management Implementation, Toho Water Authority: Kissimmee, FL

Program manager for asset management program implementation work for Toho Water Authority's overall asset management program. Tasks included establishing asset hierarchy and definitions, performance measures, performing inventory, condition and risk assessments of 15 treatment plant and 300 lift station assets, creating procedures for prioritizing capital projects, analyzing asset criticality and consequence of failure and modifications to Infor EAM to produce capital planning reports.

Lift Station and Force Main Risk Based Master Plan, Plant City, FL

Technical Advisor for the risk-based capital plan that includes 44 lift stations and force mains. Assets for renewal were selected based upon risk scores and bundled into logical projects. Business case templates will be used to prioritize the projects and

Celine Hyer, PE, IAM
Conveyance Practice Leader

capacity needs will be incorporated to make a wholistic 5-Year Master Plan.

Indian River County Condition Asset Management Services, Vero Beach, FL

Project Manager for the implementation of an asset management program. Phase I activities included a formal gap analysis, strategy, pilot condition and risk assessment, and improvements to workflows and data capture in the CMMS. Short and long-term planning results and tools were provided for the pilot including recommended capital projects, enhanced maintenance, and funding needs based on service levels.

District-Wide Asset Management Program, Hartford, CT

Quality assurance for developing a District-wide Asset Management Plan to satisfy the Fiscal Sustainability Plan requirements of the Connecticut DEP for Clean Water Fund Projects for water and sewer pipelines pump stations and storage tanks.

Elkhart Asset Management and Capital Planning, Elkhart, IN

Quality assurance for developing a risk framework to prioritize long-term and short-term capital renewal of separate and combined sewer, water distribution, water and wastewater treatment plants, pump stations, and storage tanks. Procedures and results were documented in an Asset Management Plan.

Asset Management Framework Phase I, Miami, FL

Technical Advisor to perform a gap analysis and assist in business process improvements and mapping around service levels and performance management, capital planning, risk assessment, maintenance, and IT systems.

Asset Management Program Implementation Columbus Department of Public Utilities, OH

Task leader for creating the methodology and guidelines document for condition and risk assessment of water and wastewater treatment facilities. Assisted with reconfiguration of their Oracle WAM CMMS related to improving the asset hierarchy, defining asset attributes and defining physical condition assessment criteria.

Asset Management Program Austin Water Utility, TX.

Task leader for phase II asset condition, criticality and risk assessment methodology, and pilot project for linear and vertical assets. AWU implemented a comprehensive asset management program, including a gap analysis and implementation plan for the first phase and methodology for condition, criticality and risk assessment for renewal and replacement planning for the second phase. Phase II activities included workshops to establish the methodologies and a pilot field condition assessment at one water and one wastewater treatment facility that included over 8,000 assets. Assessment data was loaded into the INFOR EAM software package for renewal and replacement and asset management planning purposes.

Asset Management Program Implementation Tarrant Regional Water District, Fort Worth, TX

Task leader for the condition and risk assessment and asset management plans for three sub- systems, including transmission mains, pumping stations, pressure reducing stations, outlet works, and balancing reservoirs. This work includes creating asset management plans that are in compliance with ISO 55000 standards, gathering existing program information and holding workshops with TRWD staff for improvements related to operations and maintenance procedures, asset hierarchy and definitions, vertical asset condition, consequence and risk assessments, capital planning, and Maximo improvements. A pilot program tested the procedures for condition, risk and capital planning prior to finalizing the asset management plans. Phase III of the Program completed all condition assessments, replacement cost estimates, and streamlined capital

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planning and business cases to create the 5-Year CIP and look at long term funding needs.

Los Angeles Dept. of Water & Power: Asset Management & Capital Improvement Program/ Los Angeles, CA

Expert professional consulting services related to asset management and capital improvement program including asset management plans and strategic asset management activities.

San Diego: AC Water Main Replacement Plan / San Diego, CA

Lead Technical Support to create a risk-based replacement plan for 2,100 miles of Asbestos Cement water mains serving the City of San Diego residents. The project includes the Linear Extended Yule Process to forecast future pipe failures based on past break history and non-invasive acoustical wall thickness field condition assessments. A tool built in ESRI GIS the Arcadis renewal and replacement planning system, RRPS, was used to complete the master planning analysis and training and transfer was provided to City staff for future updates.

Lee County: Asset Management Plan, Fort Myers, FL

Program manager to implement a comprehensive asset management program for the county, including an organizational assessment, software evaluation, implementation of Lucity CMMS, pipeline, multiple treatment plants, and over 50/0 lift stations inventory condition and risk assessments, and multiple workshops to formulate an overall asset management policy and strategies. Guidelines documents, SOP's, short and long term R&R needs, service levels and KPI reporting have also been completed as part of this four phase project which was conducted over a three year period. Asset hound, AMIS and GIS RRPS tools were used to facilitate the risk analysis.

City of Houston, Asset Renewal Program Support, Houston, TX

Technical Advisor for development of a condition assessment program for the 200-mgd Southeast Water Purification Plant (SEWPP), which is a surface water treatment facility. As part of this effort, Arcadis has developed an asset inventory; developed risk assessment guidelines; performed a Pilot Condition Assessment and Consequence of Failure Analysis; and has assessed the condition of 90% of the plant's assets for renewal and replacement prioritization. Arcadis is also in process of developing an immediate (1-year), near-term (5 year), mid-term (10 year), and long-term (50 year) Asset Capital Renewal Forecast.

City of Sugar Land, Water Main Replacement Planning, Sugar Land, TX

Technical Lead to create a risk based replacement plan for approximately 500 miles of water mains serving the City of Sugar Land residents. The project included the establishment of service levels to define pipe end of life, an evaluation of past failure history to determine the likelihood of failure by pipe cohorts, as well as an analysis of the social, environmental and financial impacts of pipe failure to assign the consequence of failure. A tool built in ESRI GIS the Arcadis renewal and replacement planning system, RRPS, was used to complete the short and long term needs analysis and training and transfer was provided to City staff for future updates.

JEA: Large Diameter Evaluation and Replacement Program /Jacksonville FL

Ms. Hyer served as the Program Manager to manage all aspects of over 900 miles of large diameter water, gravity, and force main pipelines for risk assessment, capital program development, conceptual design, and management of final design and construction over a 5-year period. The risk assessment includes GIS analysis of existing data and field condition assessment services including CCTV, sonar, Smartball acoustic gas pocket analysis, Echologics e-Pulse acoustic pipe wall thickness testing, Hydromax

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p-CAT pressure wave pipe wall thickness testing, Broadband Electromagnetic wall thickness assessment and soil corrosivity surveys.

Condition Assessment & Access Improvement for Three Critical Force Mains /City of Oceanside, CA

Technical Advisor for overall condition assessment activities including condition assessment planning, field condition assessment oversight, and data evaluation for three critical force mains for the City of Oceanside. The force mains for evaluation include two 24" and one 42" ductile iron force main approximately 13 miles long. The selected technologies will evaluate both internal and external corrosion failure modes and will include a variety of technologies such as Rock Solid Broadband Electromagnetic Technology for wall thickness assessment, Pure Technology Smart Ball for leak and gas pocket detection, Pure Technologies Pipe Diver to internally assess wall thickness.

City of Durham: Raw Water Mains Condition Assessment Planning / Durham, NC

Technical Lead for establishing a phased condition assessment plan for approximately 18 miles of 24 – 54" cast iron and PCCP raw water mains. The scope of work included an initial desktop condition and risk evaluation by looking at typical useful life by material and through a series of interviews regarding the installation, maintenance and failure histories with knowledgeable maintenance staff. The technology evaluation of various condition assessment technologies, including soil testing, external leak detection, internal leak detection, external electromagnetic wall thickness testing, external magnetic flux leakage wall thickness testing, internal EM inspection to locate broken PCCP wires, and internal remote field technology leakage and wall thickness testing. A final phased plan was created for $1.4 million dollars.

City of Virginia Beach: Water Main Renewal and Replacement Evaluation and Planning Study / Virginia Beach, VA

Technical task leader analyzing water mains to determine pipe life expectancies, consequence of failure, condition and risk scoring and replacement costs in order to create a 30-year funding plan and a 5-year Capital Improvement Program based on risk and remaining pipe life. High risk pipe areas and the potential condition assessment techniques were also identified for future pilot condition assessment and full-scale implementation. Proposed methodologies included external acoustic leak and wall integrity testing and external electromagnetic wall thickness assessment. All data was provided in a GIS tool that allows the City to run various funding scenarios and track replacement projects.

North Jersey District Water Supply Commission: Engineering Services for Work Associated with Commissioned Owned Pipelines / Wanaque NJ

Technical Lead for developing a risk-based approach to rehabilitation and repair to large diameter pipeline assets including 48" and 72" steel raw water mains, 102" pre-cast concrete embedded cylinder raw water main, and 74" and 42" lock bar steel finished water mains for the North Jersey District Water Supply Commission, a wholesale water purveyor to nearly 4 million residents in northern New Jersey. Arcadis' services included desktop risk studies, field visual investigations, development of a condition assessment plan, hydraulic modeling, and the development of design documents for repair of the pipeline as needed.

Patrick Flynn PE

Senior Water Networks Engineer

Patrick is a water resources engineer with over 14 years of experience in projects involving sewer master planning, hydrology and hydraulics, comprehensive watershed management, pump station analysis, and system optimization. He has extensive experience creating and calibrating hydraulic and hydrologic models for use in master plans and long-term control plans for sanitary sewer overflow (SSO), combined sewer overflow (CSO) systems, capacity assessment studies, capital project prioritization, real-time control (RTC) evaluation, green infrastructure evaluation, and collection system operational optimization. He is proficient with many modeling applications and software packages, including InfoWorks ICM/SE/CS/RS, USEPA Storm Water Management Model (SWMM), PCSWMM, XPSWMM, MikeURBAN, HEC-HMS, HEC-RAS, ArcGIS, and USEPA Sanitary Sewer Overflow Analysis and Planning (SSOAP) toolbox, and has served as technical lead for many large combined and sanitary sewer agencies throughout the United States and Canada.

EDUCATION

BSc, Civil Engineering, Purdue University, West Lafayette, Indiana, 2007

REGISTRATIONS

Professional Engineer #PE11200058, State of Indiana, 1/31/2012 - Present

PROJECT EXPERIENCE

SANITARY SEWERS AND FORCEMAINS

City of Greeley Sanitary Sewer Master Plan | City of Greeley Public Works | Greeley, Colorado | Lead Modeler

Mr. Flynn was responsible for updating and recalibrating the system hydraulic and hydrologic model to be used for master plan improvements and scheduling. He was also tasked with calibrating complex functions at lift stations and the wastewater treatment facility to analyze real-world effects and conditions of gate and pump operations.

East Marion County Interceptor and Lift Station Capacity Assessment | City of Indianapolis DPW | Indianapolis, Indiana | Lead Modeler

Mr. Flynn assisted in evaluating the hydraulic capacity in the City of Indianapolis' East Marion County Regional Interceptor (EMCRI) system. He developed the hydraulic portion of the computer model using as-built and surveying data and using EPA SSOAP software to quantify rainfall dependent infiltration and inflow (RDII) in this separate sewershed area. Mr. Flynn also analyzed flow monitoring data and used RDII parameters to calibrate the model and verify wet-weather flows for various storm events.

Basins 2 and 3 Collection System Improvements Project | City of San Mateo, CA | San Mateo, California | 2018-Present | Lead Modeler

Responsible for application of the system-wide InfoWorks ICM model to size replacement and parallel sewers to mitigate flood risk. Mr. Flynn is also responsible for ensuring that the mid-system 5.2 MG storage tank is meeting design criteria and developing a real-time control system that can provide protection to several in-system lift stations as well as the wastewater treatment plant.

WATER SEPARATE SEWER OVERFLOWS

Wastewater Collection System and Treatment Complex Master Plan | City of Piqua DPW | Piqua, Ohio | Lead Modeler

Mr. Flynn was responsible for complete hydraulic and hydrologic model development and calibration for assessment of the sanitary sewer collection system and WWTP equalization and headworks facilities. He was also responsible for application of predicted future flows for sizing of additional treatment facilities, as well as optimizing real-time controls to minimize sanitary sewer overflow volume and occurrences.

Hydraulic Assessment for Sanitary Sewer Discharge Control | City of Ft Wayne City Utilities | Ft Wayne, Indiana | Lead Modeler

The project team determined a cost-effective and technically reliable solution for fulfilling Consent Decree requirements to eliminate sanitary sewer discharges (SSD) in the Rothman Road study area. Mr. Flynn assisted in determining the RDII from the study area, and evaluated the hydraulic capacity of the wastewater collection system. The evaluation included enhancing the hydraulic model, calibrating the model, performing a hydraulic assessment, developing and evaluating improvement alternatives, and recommending a cost-effective solution within the framework of the city's overall SSO control strategy. Mr. Flynn evaluated potential improvements and performed QA/QC.

WATER URBAN FLOODING RISK REDUCTION

Upper Blackstone Water Pollution Abatement District (UBWPAD) CSO Facilities Planning and Flood Mitigation | City of Worcester DPW | Worcester, Massachusetts | Lead Modeler

Mr. Flynn was responsible for calibration of the hydraulic and hydrologic model of the UBWPAD system. This project included complete calibration of the storm, sanitary, and combined sewers, as well as surface creeks and rivers, while also mimicking real-world operation of two wastewater treatment facilities and flood control structures. Mr. Flynn was tasked with developing revised standard operating procedures (SOPs) and scenario analysis to analyze potential solutions to mitigate private property and street flooding problems. Recent extreme storms that occurred after calibration was complete validated the model output for storms well beyond what was observed during monitoring. Project costs are to be shared by the UBWPAD and Worcester DPW and are expected to be ~$40-50M.

McKinley Park Improvements | City of Sacramento | Sacramento, California | 2018 | Lead Hydraulic and Hydrologic Modeler

Responsible for using the InfoWorks ICM Hydraulic and Hydrologic model of the combined sewer system for the entire City of Sacramento sewer system to size the combined sewer storage tank in McKinley Park to maximize flood reduction in low-lying areas nearby. Mr. Flynn was also responsible for optimizing the location of diversion weirs and new piping to provide increased levels of service.

WATER AUTOMATION & SCADA CONSULTING

Real Time Control (RTC) Evaluation - Phase 1 & 2 | City of Indianapolis DPW | Indianapolis, Indiana | Modeler

Mr. Flynn assisted in optimizing the existing 20 million gallon in-line storage opportunities using existing RTC devices in the sewer system, utilizing EPA SWMM5. He also reviewed and evaluated additional RTC project alternatives within the existing system that could improve the city's ability to manage flow within the sewer system. The project team also helped the city identify an additional 5 million gallons of in-line storage that can be potentially utilized with RTC devices.

WASTEWATER / STORMWATER / RECLAIMED / RECYCLED / PURIFIED WATER

Stormwater and Deicing System Master Plan and Preliminary Engineering | Indianapolis Airport Authority | Indianapolis, Indiana | Project Engineer

Mr. Flynn was responsible for the evaluation of existing and future facilities to optimize system storage and conveyance of deicing runoff. He used 60+ years of rainfall data to develop appropriate recommendations to achieve the level of service needed to meet the consent decree requirements as set by the Indianapolis Airport Authority and other governing bodies given the unique flight schedules and hydrologic/hydraulic conditions inherent at this airport facility.

City of Las Vegas Wastewater Collection System Master Plan Update | City of Las Vegas | Las Vegas, NV | 2019-2021 | Project Modeling Lead

Mr. Flynn led the modeling team that created and calibrated a hydraulic and hydrologic model of the City of Las Vegas sanitary sewer collection system in support of long-term budgeting and capital improvement project prioritization. Working closely with City staff, the team developed wastewater statistics and analysis based on land use in support of hydraulic model DWF calibration. The team also used GIS and flow meter data to validate land use information and per capita wastewater usage assumptions and make adjustments where necessary to mimic observed data. These land use findings were then used to assess future project needs. By using LiDAR data and the hydraulic model, the project team was able to identify locations where entirely new sewer alignments may yield $100M+ in savings in comparison to the "wholesale" undersized pipe replacement approach that was taken in previous master planning efforts.

WATER AND WASTEWATER TUNNELS

I-35W Storm Tunnel Deep Cavern Storage Feasibility Update and Design Support | Minnesota DOT | Minneapolis, Minnesota | Project Engineer

Mr. Flynn was responsible for performing model applications to assist in sizing deep rock storage caverns (100+' below grade) to mitigate tunnel surge and street flooding along Interstate 35 in Minneapolis, MN. Mr. Flynn utilized the existing hydraulic and hydrologic model to obtain required storage volumes for different design storms as well as determine the most cost-effective configuration of new sewer pipes. This analysis was then used to facilitate more detailed design and scheduling for the project.

Minneapolis Central City Tunnel Pressure Mitigation and Alternatives Analysis | Minneapolis DPW | Minneapolis, Minnesota | Lead Modeler

Mr. Flynn was responsible for alternatives analysis and facilities sizing related to an aging deep tunnel storm sewer system with prohibitively expensive maintenance and upkeep costs. Mr. Flynn's tasks included performing quality control and assurance checks of the existing model as well as updating model inputs based on recent capital improvement projects. Mr. Flynn was responsible for providing hydraulic analysis and sizing/layout of parallel or upsized tunnel segments, analyzing impact and feasibility of implementing green stormwater infrastructure, simplified surge modeling and associated impacts, and storage sizing analysis. The accepted solution is planned to be phased into 2 construction periods totaling $40-45M.

WWF COMBINED SEWER OVERFLOWS

CSO Discharge Monitoring Reporting, Indianapolis | City of Indianapolis DPW | Indianapolis, Indiana | Lead Modeler

As part of the city's combined sewer overflow (CSO) control program, Mr. Flynn assisted in generating discharge monitoring reports (DMR) using a calibrated computer model of the interceptor system. The computer model originally used the SWMM version 4 RUNOFF and EXTRAN, and Mr. Flynn developed unique tools to assist in the modeling/rainfall analysis and to post-process model results and generate the DMR in a format that was appropriate for the City to submit to the Indiana Department of Environmental Management. Mr. Flynn was responsible for updating the model from SWMM version 4 to SWMM version 5 to facilitate efficiency and utilize additional functionality. With this effort, he was also responsible for reviewing data from CSO activation meters and recommended maintenance procedures on a monthly basis.

Real Time Control (RTC) Potential Evaluation | City of Fort Wayne City Utilities | Ft Wayne, Indiana | Lead Modeler

Mr. Flynn was responsible for application of the System Wide Hydraulic Model to assess potential RTC locations that would optimize in-pipe storage during wet weather to minimize the volume and frequency of combined sewer overflow events.

Hopple Street (CSO 012) Sustainable Infrastructure Improvements | Metropolitan Sewer District of Greater Cincinnati | Cincinnati, Ohio, USA | 2018 | Modeler

Mr. Flynn was responsible for calibrating the wet weather inflow responses as well as the hydraulic losses and influence of river tailwater on the collection system after completion of several green stormwater infrastructure (GSI) projects.

STORMWATER AND MASTER DRAINAGE PLANNING

University-Campbell Combined Sewer Separation and Stormwater Master Plan | City of Windsor | Windsor, Ontario | 2017-2019 | Lead Modeler

Responsible for recalibration of the study area using the system-wide InfoWorks ICM model. Recalibration included use of infrared flyover to estimate impervious coverages, DEM data, and integration with long term river stage gauges. After recalibration, Mr. Flynn was responsible for planning new layout alternatives, sizing pipes, and assessing the capacity of river discharge outfalls. Mr. Flynn was also responsible for developing several specialized tools to aid cost estimation and illustrate findings.

Indianapolis Stormwater Program Management | Indianapolis, Indiana | 2019-Present | Lead H&H Modeler

Mr. Flynn leads the team that provides support to the program management team by reviewing available data to evaluate problem areas for potential solutions to address drainage concerns on an as-needed basis. Evaluations include hydrologic and hydraulic analysis, review of DPW work order data and improvement alternatives, estimated cost opinions, and recommended solutions. Analysis compares potential solutions and determines a recommended option to be considered for detailed design.

City of Cambridge CSO and Stormwater Drainage Technical Services Support | City of Cambridge | Cambridge, Massachusetts | 2019-Present | H&H Modeling Technical Lead

Stantec has been performing hydraulic modeling in support of the city's Climate Change Vulnerability Assessment and the subsequent Climate Change Preparedness Report. Mr. Flynn has led the team that has integrated municipality sewer models with riverine models to evaluate flood mitigation measures within and outside the boundaries as well as provide a tool for assessment of impacts to neighboring communities. The team has also employed 2D surface modeling to evaluate system performance using the selected gray infrastructure alternatives under a series of different storm and tidal conditions and evaluated methods of reducing flooding under these rainfall conditions. Alternatives for capacity improvements in both underground and surface systems throughout the collection system have been evaluated with the goal to develop flood mitigation strategies to reduce surface flooding outside the right-of-way. Mr. Flynn also led the hydraulic modeling team that used the model to analyze the Mystic River watershed in the greater Boston area. The team utilized the model to generate watershed-area flood maps for future extreme storms and performed alternative analysis for implementation of active reservoir management and green infrastructure implementation. Model results were used to optimize and coordinate regional stormwater management and assist in the implementation of a Municipal Vulnerability and Preparedness (MVP) grant.

WWF INFILTRATION & INFLOW REDUCTION

Pure Waters District-Wide Infiltration and Inflow Master Plan | Monroe County Pure Waters District | Rochester, New York | Lead Modeler

Mr. Flynn was responsible for a comprehensive I/I analysis of the Monroe County Sewer Authority's sanitary sewer using SCADA data from pump stations across the system to assess priority areas for system maintenance, upgrades, and future needs.

Joint Meeting of Essex and Union Counties (JMEUC) Trunk Interceptor Capacity Assessment | Joint Meeting of Essex and Union Counties (JMEUC) | Newark/Elizabeth, New Jersey | Lead Modeler

Mr. Flynn was responsible for calibrating the trunk interceptor hydraulic and hydrologic model using InfoWorks for use in developing a master plan. Mr. Flynn was tasked with sewershed delineation, diurnal pattern development/analysis, and overall hydraulic and hydrologic quality control.

City of Columbus Miller/Kelton Sanitary Sewer Inflow and Infiltration Remediation | City of Columbus Public Utilities | Columbus, Ohio | Lead Modeler

Mr. Flynn was responsible for the development of a calibrated hydraulic/hydrologic model for the Miller/Kelton neighborhood and assisted in planning efforts for necessary system upgrades. Mr. Flynn also developed and implemented a sophisticated method of applying the model to predict potential basement flooding due to surcharged sewer levels using unique computer tools.

HYDROLOGIC & HYDRAULIC MODELING

ALCOSAN Regional Wet-Weather Plan Development | Allegheny County Sanitary Authority | Pittsburgh, Pennsylvania | 2012-2017 | Lead Modeler

Mr. Flynn was the lead modeler responsible for hydraulic and hydrologic modeling tasks associated with generation of discharge monitoring reports and other analyses including green infrastructure analysis, storage/treatment, operational, and conveyance alternatives. His efforts involved integration of radar rainfall, USGS river stage, and system operational data to quantify system performance and evaluate potential solutions to meet consent decree requirements. Modeling analyses was used to plan and implement over $2B of system improvements including deep tunnels, green infrastructure, near-surface sewers, and combined sewer separation to meet consent decree and regulatory agency requirements. Modeling analyses was also used to facilitate federal funding of green infrastructure projects totaling over $20M.

Model Expansion for Combined Sewer Overflow Facilities Planning and Design & Wet Weather Long-Term Control Plan | Indianapolis, Indiana | Modeler

Mr. Flynn assisted in developing a hydraulic model of the Fall Creek, Upper White River & Pogues Run, Lower White & Eagle Creek, and Pleasant Run watersheds. He was involved with developing the hydrologic and hydraulic portions of the SWMM model. During ongoing modeling tasks, he was involved in evaluating and reviewing flow monitoring and field surveying data. Mr. Flynn was also responsible for consolidating these watershed models into a single, system-wide, hydraulic model for long term assessments. Mr. Flynn also incorporated a water quality model of the system's receiving waters developed by the City under separate efforts to represent tail water conditions more accurately at the CSO outfalls and to validate previous estimates of pollutant loadings into these sensitive receiving waters. Mr. Flynn then worked closely developing the large scale hydrologic and hydraulic model for the entire Indianapolis sanitary and combined sewer service area to support the $1.7 billion CSO Long-Term Control Plan facilities planning and design projects, and sanitary capacity improvements.

System Wide Model Recalibration | City of Ft Wayne City Utilities | Ft Wayne, Indiana | Lead Modeler

Mr. Flynn assisted with a project to recalibrate the 's System Wide Interceptor Model (SWIM) and confirm the baseline sewer system performance in the combined and sanitary sewer system. This effort included coordinating field investigations; flow monitoring data collection and analysis; and updating, enhancing, and expanding the model. Mr. Flynn was responsible for GIS tasks such as basin delineation, and validating the existing hydrologic and hydraulic parameters for model recalibration. Modeling programs used in the effort include DHI MIKE URBAN (SWMM) and XPSWMM.

South Bend Combined Sewer Overflow Long-Term Control Plan Re-Evaluation | City of South Bend | South Bend, Indiana | Lead Modeler

Currently serving as lead modeler responsible for updates, calibration, and facilities planning using the system-wide hydrologic and hydraulic model built using EPA SWMM 5. The collection system includes 30+ CSO locations with in-system real-time control mechanisms used to mitigate CSO and SSO occurrences, volume, and duration. Analyses included design storms as well as continuous simulations for existing and potential improvement solutions.

Hartford Metropolitan District Commission Long-Term CSO Control Plan Update | Hartford MDC | Hartford, Connecticut | Lead Modeler

Mr. Flynn was responsible for updating the hydraulic and hydrologic model to reflect preliminary tunnel design and perform long-term, continuous model simulations to verify that ~$900M of planned system enhancements will meet Consent Decree requirements. This process included dynamic modeling of all sanitary, storm, and combined sewers within the City of Hartford as well as receiving streams and tidal influences on the collection system. Mr. Flynn was responsible for developing a 132-site flow metering plan, coordinating with field crews, reviewing data, and coordination of modeling tasks for the ~75 square mile collection system. Mr. Flynn used 55+ years of rainfall data to validate system performance at more than 80 CSOs to achieve an optimal tunnel storage volume and dewatering scheme as well as to ensure that proposed consolidation sewers would perform to the required level of service. Mr. Flynn also developed a customized storage/dewatering assessment tool used to optimize tunnel size and layout, as well as drop shaft and consolidation sewer hydraulics.

Clean Water Atlanta Program | Atlanta, City of - Department of Watershed Management | Atlanta, Georgia, United States | 2019-Present | Hydraulic Modeling Project Lead

Mr. Flynn has supported and guided the City's Dept. of Water Management (DWM) on a range of hydraulic modeling and engineering planning projects. In addition to providing ongoing technical leadership using one and two dimensional hydraulic models to reduce flood risk, he was the modeling lead for the Green / Grey Infrastructure Optimization project. This project used Optimizer™ software to realize citywide opportunities for capital cost savings using the most efficient configuration of green and grey wet weather solutions to meet the City's ongoing consent decree, manage urban flood risk, and improve water quality.

PUMPING STATIONS - WASTEWATER LIFT STATION

N-10 & N-15 Lift Station Capacity and Improvement Analysis | Montgomery County Water Services Department | Dayton, Ohio | Lead Modeler

Mr. Flynn was responsible for utilizing the existing InfoWorks hydraulic and hydrologic model to assess current and future capacity constraints and flow ranges incoming to 2 lift stations. Results from this analysis were used to develop a plan and schedule to upgrade the lift stations and any portions of gravity sewers.

Lift Station Capacity and Improvement Analysis | City of Valparaiso Public Works | Valparaiso, Indiana | Lead Modeler

Mr. Flynn was responsible for collecting data, building, and calibrating a hydraulic and hydrologic model for the sanitary sewer system tributary to two lift stations. The model was then used to analyze current operation and assess improvement needs under various scenarios based on the presence of several large industrial users connected to the system. Mr. Flynn was also responsible for analyzing historical rainfall data to assist the city in the selection of synthetic storms to use for future design needs.

Combined Sewer Pump Station (CSPS) Improvement Design | City of Ft Wayne City Utilities | Ft Wayne, Indiana | Lead Modeler

Mr. Flynn was responsible for hydraulic evaluation for preliminary design of upgrading the existing pumping station. He performed sensitivity analysis on surrounding sewer structures as well as the WWTP headworks and coordinated with WWTP and client personnel to perform long-term analysis on the WWTP complex, including the CSPS.

City of Venice Wastewater Collection System Master Plan | City of Venice, FL | Venice, FL | 2018-2020 | Project Modeling Lead

Mr. Flynn led the modeling team that created and calibrated a hydraulic and hydrologic model of the City's sanitary sewer collection system in support of capital project need definition and prioritization. The team utilized GIS data, pump station and WWTP SCADA data, drawings, and historical flooding data to calibrate weekday and weekend dry day wastewater production as well as wet weather inflow and infiltration. The model was then used to assess pump station operation and performance at each of the 87 pump stations within the manifolded force main system and assess system performance and needs based on growth and development projections from several County and City studies.

REHABILITATION AND REPLACEMENT

4th St Interceptor Replacement Project | City of San Jose | San Jose, California | 2018-Present | Lead Modeler

Mr. Flynn was responsible for use of the InfoWorks ICM model to ensure that final design modifications will meet all standard design criteria. This includes ensuring that all dry weather flow can pass through 2 of the 3 interceptors, assuming the other will be taken offline for maintenance purposes. Project includes standard open cut as well as trenchless pipeline and 2 "squash boxes" needed to clear conflicting utilities.

GREEN STORMWATER INFRASTRUCTURE

Lake Michigan Watershed Restoration and Flood Management Plan | Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) | Chicago, Illinois | 2018 | Lead Modeler

Responsible for hydraulic and hydrologic model creation and calibration using EPA SWMM 5. Also responsible for creating representation of Green Stormwater Infrastructure (GSI) units and scenarios and assessing performance under a wide range of storm conditions.

South Bend Green Stormwater Infrastructure (GSI) Planning | City of South Bend | South Bend, Indiana | 2018-2019 | Lead Modeler

Mr. Flynn was responsible for developing and executing approach for assessing the impacts of planned and proposed green infrastructure projects within the combined sewer collection system. Project included explicit representation of planned and proposed green stormwater infrasctructure locations, contributing area, and technology types and assessing impacts to CSO frequency, duration, and volume.

CONVEYANCE - GRAVITY STORM & SANITARY SEWERS

Florence, Kentucky Micromonitoring Services | City of Florence | Florence, Kentucky | 2018-2019 | Project Technical Lead

Mr. Flynn has been responsible for execution and oversight of a targeted flow monitoring program to assess and pinpoint sources of inflow and infiltration within a sanitary sewer system that experiences frequent SSO and basement backup. He has led the team that developed the flow metering plan & review of data as well as building and calibrating a PCSWMM model of the system to assess performance and guide future planning efforts.

Santtu Winter

Project Manager/Jacobs

Education

B.S., Civil and Environmental Engineering, University of Washington, 2008

Professional Registrations and Certifications

Professional Engineer, Washington, 2012

Green Stormwater Infrastructure Design and Management Certification, University of Washington, 2015

Distinguishing Qualifications

- 13 years of experience helping municipalities develop creative solutions to their wet weather challenges, including issues related to combined sewer overflows (CSOs), sanitary sewer overflows (SSOs), wet weather impacts to wastewater treatment plants, and stormwater.
- Experienced wet weather planner and project manager, having worked on numerous CSO, SSO, and stormwater programs. Experience has included CSO planning, integrated CSO/stormwater planning, collection system modeling and hydraulic analysis, real time control, planning for the operational impacts of wet weather programs, and regulatory strategy development/execution.
- Experience with the planning, design, and construction of a variety of wet weather projects, including green infrastructure, storage, conveyance, and real time control.
- Developed expertise implementing asset management principles, such as cost-benefit analysis, life-cycle cost analysis, reliability centered maintenance/design, resource planning, operations planning to wet weather programs.

Relevant Experience

Mr. Winter is a project manager with Jacobs in Seattle, Washington. He has 13 years of experience helping municipalities understand their wet weather problems and developing creative solutions to address these challenges.

Representative Projects and Dates of Involvement

Project and Program Management

Contract Manager; Green Stormwater Infrastructure Program Support Services; Seattle Public Utilities, Washington; 2020-current. Leading a large multi-firm team to provide support to SPU with the expansion of their GSI program. Total contract value of $7.5M with nearly 90 tasks/projects being advanced in parallel.

Project Manager; Wastewater / Stormwater Risk Assessment; City of Spokane, Washington; 2020-current. Leading a team to conduct a high-level risk assessment on the City of Spokane's wastewater and stormwater systems. The outcomes of this project will help guide the City to focus on which problems need to be addressed with capital projects, operational changes, or policies.

Project Manager; Sewer Modeling On-Call Support Services; City of Spokane, Washington; 2020-current. Leading a team to provide modeling support to the City, including model extension, growth projections,

and capacity analyses. Responsible for developing the workflow processes, building teams, client satisfaction, and delivery of high-quality work.

Project Manager; Force Main Inspection Access Project Formulation; King County Wastewater Treatment Division; 2020. Led a team to develop conceptual designs and capital improvement plan placeholder budgets for installing permanent inspection access to King County wastewater force mains.

Project Manager; Strategic Asset Management Planning; City of Bellevue, Washington; 2019-current. Leading a team of subject matter experts to help the City conduct an asset management gap assessment and develop a strategic asset management plan.

Project Manager; Combined Sewer Overflow Program Support Services; Seattle Public Utilities, Washington; 2017-current. Leading and/or supporting the execution of several CSO Program tasks, including development and execution of regulatory strategy, developing an Operations and Maintenance Resource Plan, preparing an Operations Plan, and developing of CSO sizing criteria.

Project Manager; Collection System SCADA Master Plan; City of Spokane, Washington; 2017-2019. Leading the development of a master plan that identifies and evaluates real-time control opportunities in the City of Spokane's combined sewer system. The master plan also includes identifying monitoring and alarming improvements, along with the laying out the framework for a centralized collection system SCADA network. Responsibilities include being the client's point of contact, leading hydraulic analyses, and developing the report.

Project Advisor; Combined Sewer Overflow Program Management; Seattle Public Utilities, Washington; 2011-2016. Led or supported a number of initiatives related to improving project planning, options analysis, design, construction, and operations and maintenance. Tasks included developing the methodology to determine compliance of CSO outfalls, supporting SPU/King County negotiations, providing support to SPU project managers, assessing the impact of the CSO Reduction Program on operations and maintenance, providing input on facility control strategies, and supporting the development of a maintenance management program.

Task Lead; GSI Program Management Services; Seattle Public Utilities and King County Wastewater Treatment Division, Seattle, Washington, 2017-2019. Led several tasks related to SPU's GSI Program, including the update to the NDS Partnering Program Implementation Plan and cost forecast, developed an SDOT/SPU partnering framework and process, and compiled project information for evaluating incentive/rebates.

Task Lead; GSI On-Call Services; King County Wastewater Treatment Division, Seattle, Washington, 2017-2018. Led a task to develop perturbed (or modified) precipitation time series for use in stormwater and wastewater models. Process involved evaluating several approach to perturb the time series, facilitating KC through the selection process, building automated tools to execute the process, and delivering the modified time series.

Task Lead; Drainage and Wastewater Operations Plan; Seattle Public Utilities, Washington, 2015-2016. Led the development of the Drainage and Wastewater (DWW) Operations Plan, which described at a high level how SPU's system operates, compiled various information on the system, and described what direction the operation of the system is heading. Tasks included compiling large amounts of data from various sources, interviewing SPU employees, developing schematics of the sewer system in Seattle, and managing the development and review of the report.

Task Lead; Drainage and Wastewater Control Center Options Analysis; Seattle Public Utilities, Washington, 2015-2016. Led the options analysis of SPU's DWW control center, which needed to be developed to accommodate the large growth in wastewater facilities from SPU's CSO Reduction Program. Tasks included developing a custom process for conducting the options analysis, developing and evaluating options, coordinating stakeholder input, and presenting results to the client.

Deputy Project Manager; Natural Drainage System Program; Seattle Public Utilities, Washington, Current. Supported the implementation of the Natural Drainage System Program, which sought to install roadside bioretention facilities along roughly 60 blocks in Seattle. Tasks included developing a work breakdown structure; developing a tool to estimate planning, design, and construction costs; and developing processes for project development.

Assistant Project Manager; Long Term Control Plan, Seattle Public Utilities, Seattle, Washington; 2010-2015. Supported the development of SPU's LTCP from its original conception in 2010 through final publication and approval in 2015. Responsibilities included the development, selection, and cost estimation of CSO control alternatives; verifying compliance with regulatory requirements; development of the LTCP report; and serving as assistant project manager in 2015.

Assistant Project Manager; Henderson North CSO Reduction Project, Seattle Public Utilities, Seattle, Washington; 2013-2016. Served as the assistant project manager reporting directly to the SPU project manager for a 2.6 million gallon storage tank design project.

Wet Weather Planning, Modeling, and Regulatory Experience

Technical Lead; Integrated Watershed Management Approach; Salt Lake City Department of Public Utilities, Utah; 2017-2018. Project involved developing a framework for an integrated watershed approach to address Salt Lake City's numerous water quality-related challenges. Responsibilities included developing a process to evaluate and prioritize water quality challenges, leading a GSI feasibility assessment, and supporting the development of regulatory strategy.

Committee Member; Stormwater Strategic Initiative Advisory Team; Puget Sound Partnership, Washington: 2016-2018. Served on a committee tasked with guiding the investment of EPA National Estuary Program grant funding for regional stormwater projects, and to develop regional strategies and priorities for addressing stormwater pollution issues.

Compliance Modeling Task Lead; Windermere CSO Reduction Project; Seattle Public Utilities, Seattle, Washington; 2016-2019. Led the modeling effort to determine whether the recently completed Windermere CSO reduction facilities brought the basin's CSO outfalls into control, successfully meeting regulatory deadlines. Other tasks included advising SPU staff on regulatory coordination, and supporting the development of compliance plans.

Modeling Manager; Ship Canal Water Quality Project; Seattle Public Utilities, Seattle, Washington; 2016-2019. Managed the overall hydraulic and hydrologic modeling effort on behalf of the client. Modeling tasks for the SCWQP are on the critical path of a $450M project. Developed an efficient modeling schedule that aligned with required deadlines, and developed reporting and communication protocols to keep management apprised of progress.

Deputy Project Manager; Wet Weather Regulations Initiative; CH2M Internal Initiative, Bellevue, Washington; 2016. Led the day-to-day implementation of an internal initiative to summarize current

and anticipated future trends in wet weather regulations. Developed and executed the approach for the initiative on budget and schedule.

Project Advisor; San Mateo Clean Water Program; San Mateo, California; 2016. Advised the triple-bottom-line decision process and risk analysis for a large storage tank project for the San Mateo Clean Water Program. The Program is focused on reducing SSOs and blending/bypass at the wastewater treatment plant.

Project Engineer; Regional CMOM Assistance; North Texas Municipal Water District, Texas; 2016. Led the development of a fats, oils, and grease (FOG) control plan for the regional CMOM plan. The North Texas Municipal Water District (NTMWD) is a regional wastewater conveyance and treatment provider with many satellite communities contributing flow to their system. The FOG plan needed to delineate responsibilities between the NTMWD and satellite communities.

Project Engineer; Integrated Plan and CSO Plan Amendment; City of Spokane, Washington; 2012-2015. Co-led the development of the City of Spokane's Integrated Plan report and supported the development of the City's CSO Plan Amendment. Responsibilities included leading a feasibility assessment of green infrastructure, developing life-cycle cost estimates for conceptual water quality projects, estimating pollutant load reductions, and creating the framework for the triple-bottom-line assessments.

Project Engineer; Riverside Park Water Reclamation Facility NLT Engineering Report; City of Spokane, Washington; 2013. Developed an Excel spreadsheet-based hydraulic model of the Riverside Park Water Reclamation Facility to evaluate the impact of wet weather and combined sewer overflows on the performance of the various treatment processes.

Staff Engineer; Stormwater Treatment Feasibility Study, Seattle Public Utilities, Seattle, Washington; 2011-2012. Assisted in evaluating the feasibility of sending and treating stormwater at a CSO treatment plant in the City of Seattle. Responsibilities included developing planning level conveyance alternatives and costs, calculating pollutant load reductions, and communicating findings to SPU staff.

Modeler; Design Storm Analysis; Clean Water Services, Oregon; 2013-2014. Supported modeling and development of design storms for use in designing sewer pipelines. The innovative process involved selecting design storms that corresponded with a return period of flow in the pipe, as opposed to a return period based on rainfall depth.

Modeler; Genesee and Henderson CSO Reduction Project; Seattle Public Utilities; Seattle, Washington; 2008-2010. Assisted in data collection and analysis of combined sewer flows, construction and calibration of a combined sewer system model, development and modeling of CSO control alternatives, and presentation of results to city. Assisted in preliminary design of several CSO control alternatives in the City of Seattle. Projects included pump stations, storage tanks, and gravity and pressure pipelines. Other tasks included assisting with environmental permit documents and conducting field visits.

Data Screener; Long Term Control Plan, Seattle Public Utilities, Seattle, Washington; 2008-2010. Responsible for the quality control screening of raw flow monitoring data for the Genesee and Henderson basins, as well as the Delridge, Duwamish, North Union Bay, and West Seattle basins. Tasks included reviewing data on a weekly basis for abnormal hydraulic patterns, investigating the causes of those patterns, and summarizing results in a report.

Design

Lead Engineer; Fort Leonard Wood Bioretention Design, US Army Corps of Engineers, Kansas City, Missouri; 2014. Lead engineer designing a large bioretention facility to treat and infiltrate runoff from a military base.

Civil Engineer; Integrated Clean Water Plan; City of Damascus, Oregon; 2013. Led the development of a conceptual sewer system for the City of Damascus. Tasks included sizing and siting pipes and pump stations, and developing construction cost estimates.

Civil Engineer; Mitchell Way/West Bakerview Force Main Design, Port of Bellingham, Bellingham, Washington; 2014. Supported the design to upsize 3,000 feet of 8-inch-diameter force main to 12-inch-diameter to increase the capacity of a pump station.

Civil Engineer; Windermere CSO Reduction Project, Seattle Public Utilities, Seattle, Washington; 2011-2012. Civil discipline lead on the design of a 2.05 million gallon underground storage tank to reduce the discharge of combined sewer overflows for SPU. Tasks included designing site drainage, grading, and site roadway paving. Some specific components included design of bioretention planter boxes and associated underdrains, drainage composite system on top of tank, foundation drainage system underneath the tank, yard piping, pavement design and grading, exterior HVAC ducting, and water supply design.

Staff Engineer; Fort Lewis Wastewater Feasibility Study, USACE, Fort Lewis, Washington; 2009. Responsible for the quality control screening of raw flow monitoring data for the Joint Base Lewis-McChord sewer system. Tasks included reviewing data on a bi-weekly basis for abnormal hydraulic patterns, investigating the causes of those patterns, and developing an infiltration and inflow study based on the results of the flow monitoring.

Asset Management

Analyst; Asset Management Planning Program; Great Lakes Water Authority, Detroit, Michigan; 2019. Supported the preparation of the Strategic Asset Management Plan, including development of tools

Data Analyst; Asset Management and Lucity Configuration; City of Redmond, Washington; 2014-2015. Supported the development of the City of Redmond's asset management program and configuration of the City's computerized maintenance management software program, Lucity. Tasks involved documenting business processes, performing a gap analysis, and developing an asset management roadmap.

Designer; Environmental Net Effects Tool, Oil Sands Leadership Institute, Alberta, Canada; 2011. Assisted in the development of an interactive Excel tool to evaluate the environmental net effect of various project alternatives in the Oil Sands region of Alberta, Canada.

Specialized Computer Skills

Microsoft Excel, ArcGIS, InfoWorks CS, AutoCAD/Civil 3D, Ivara (RCM analysis software)

Supplemental Information

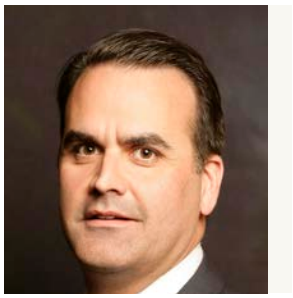
CH2M Hire Date: 4/2008

Employment History

2008 to Present; CH2M, Project Manager

FRITZ KLINGLER, P.E.

PRINCIPAL ENGINEER



EDUCATION & LICENSURE

Bachelors, Civil Engineering, Michigan State University, 1987

Masters, Civil Engineering, Michigan State University, 1988

PROFESSIONAL ASSOCIATIONS & CERTIFICATIONS:

Professional Engineer: MI, IN, KY, SC, NC, GA, OK, DC, IL, WI, CO, TX, VA, AR, NE, P.Eng-ON

YEARS OF EXPERIENCE

– Total: 32
– Current Firm: 9

EXPERIENCE

Mr. Klingler has over 30 years of experience in underground engineering including investigations, evaluations, design and construction. His expertise is focused on infrastructure rehabilitation, tunnel and shaft design, underground engineering, and construction engineering. He has served as technical lead, project manager, project director, and/or design lead for hundreds of infrastructure projects, for both design and construction. He has led numerous forensic evaluations of engineering failures, including slope and excavation failures, dewatering failures, tunnel collapse, and others. Relevant project experience is presented below:

TECHNICAL EXPERIENCE

Mr. Klingler's experience and expertise in underground infrastructure is broad, ranging from water/wastewater projects, to tunnels and shafts, to large foundation designs, to shoreline engineering. Mr. Klingler has provided design, construction engineering, and forensic evaluations in all these areas.

WATER/WASTEWATER INFRASTRUCTURE EXPERIENCE

Experience has included serving as the project director and/or project manager on a number of large civil works projects:

Project Director, Oakland-Macomb Interceptor Sewer Repairs, Macomb, Michigan. Served as Project Director for the ongoing $160 million rehabilitation of various components of the 9 to 13 foot diameter OMID Sewer in Macomb County Michigan. This project is currently in year three of a seven year program, and involves design and installation of a number of deep shaft flow control structures, in-line tunnel rehabilitation and relining, pumping station installation and modifications, and a variety of other ancillary work.

Project Director for Design for North Gratiot Interceptor Drain Phase 1 in Mt. Clemens, Michigan. Served as project director for this this $22 million project. Role included overall oversight of geotechnical investigation, design, preparation of bid documents, selection of tunneling methods, cost estimating, estimation of boulder impacts, historical research, bidding assistance. Also served as technical consultant during

construction observation, direction of field staff, review of contractor submittals, claims, geotechnical instrumentation, etc. Project involved over 14,000 lineal feet of jacked-in-place 66-inch diameter pre-cast concrete pipe. Included evaluation of feasible tunnel runs, contractor proposed alternatives, review of difficult construction conditions, etc.

Project Director/Manager, Underground Engineering for DWSD Clarifier Nos. 17 and 18 Project. Managed and directed the geotechnical investigation and design for this project, and developed comprehensive geotechnical data and interpretive report. Designed large diameter connecting tunnels, and construction sequencing to eliminate the potential for settlement and damage to other components of the project being constructed simultaneously. Also designed several shafts and tunnel sections for the project, and oversaw the geotechnical instrumentation monitoring program.

Project Manager for Underground Engineering task for 72" Flint Transmission System Water Main Design. Managed and directed the geotechnical investigation, excavation sequencing, tunnel design, and instrumentation design for over 23 miles of large diameter water main in Oakland and Genesee Counties, Michigan. Designed carrier tunnels, bridge crossings, road crossings, installation sequences, and other aspects of the proposed construction.

Project Director for Perry Street Pump Station, Pontiac, Michigan. Managed and directed the geotechnical investigation and geotechnical design aspects including hydrogeological evaluations, temporary earth retention systems, bearing capacity, constructability review, tunneling, open excavation effects on existing structures, etc.

TUNNEL ENGINEERING EXPERIENCE

Mr. Klingler has lead numerous projects involving large diameter new tunnel and tunnel rehabilitation. Experience includes overall constructability evaluations, evaluation of design loads and appropriate ground support systems, tunnel design and evaluations, hydrogeologic analysis, prediction of groundwater infiltration, design of geotechnical instrumentation systems, rock grouting, design of internal bracing systems, temporary and permanent ground anchors, rock anchors and bolts, and various other components of underground construction. A few projects illustrating Mr. Klingler's project management and technical experience are summarized:

Project Director, Allen Park CSO Tunnel, Allen Park, Michigan. Served as Project Director and design lead for underground construction for this project. Project involved approximately 2,000 lineal feet of 102-inch diameter finished diameter primary lined tunnel through soft clay soils, and installation of five main deep shafts. Also included approximately 600 feet of micro-tunneled bore below I-94 Interstate.

Technical Consultation, Brightwater West project in Seattle Washington. Underground engineering consultant and design assistance for construction contractor. Role included Technical oversight for design of shafts and microtunneling leg into Puget Sound.

Design Oversight, Big Walnut Augmentation Relief Sewer project in Columbus, Ohio. Provided oversight for design project for contractor for the Earth Pressure Balanced Tunnel Boring effort, hand-mined tunnel design, shaft design, pre-cast segmental liner alterations, etc.

Design Oversight Little Calumet project in Chicago, Illinois. Provided oversight for geotechnical design for construction contractor on various shaft designs, tunnel support systems, and mircotunneling consultation (ultimately not used in favor of recommended cost-saving alternative).

Project Manager, Geotechnical Investigation and Feasibility Study for the Upper Rouge Tunnel, Detroit, Michigan. Served as the project manager for the Geotechnical Investigation and Feasibility Study for the Upper Rouge Tunnel, to evaluate the feasibility of construction of 7.5 miles of CSO capture and transport tunnel. Planned, coordinated, and conducted an extensive geotechnical investigation of soil and rock profiles for the project. Managed and coordinated the evaluations and analysis of the data including evaluations of subsurface conditions, selection of appropriate vertical and horizontal tunnel alignments, groundwater and tunnel seepage analysis, shaft constructability, tunnel constructability, as well as preliminary design of tunnel elements, drop structures, and diversion structures. Developed recommendations for appropriate construction techniques and provided an estimate of probable construction costs and appropriate project schedule. Prepared comprehensive data and interpretive reports, which served to define the conditions, feasibility, and risks for this project. All deliverables for this project were completed on time and under budget.

Project Manager, Clinton River Crossing WS-606 Water Main. Roll included serving as Project Manager for the Project which involved investigating causes of tunnel breach beneath the Clinton River causing complete flooding of a jacked-in-place tunnel. Designed recovery shaft to rescue tunnel boring machine and complete crossing in open excavation.

Project Advisor, Black River Storage and Transport Tunnel, Lorrain, Ohio. Served as overall project advisor directing design and reviewing all final deliverables for geotechnical investigation, primary and secondary liner design, and design documents for this large diameter tunnel through shale bedrock. Primary liner design consisted of steel ribs and wood lagging.

Project Director, Detroit Windsor Tunnel Annual Inspection. Served as overall project director for the annual inspection of the structural conditions of the Detroit Windsor Tunnel in 2014-2021.

FOUNDATION INVESTIGATION AND DESIGN EXPERIENCE

Foundation investigation and design experience includes a number of large projects of note, summarized as follows:

DRSTS Brine Cavity Evaluation and Foundation Evaluations, Detroit, Michigan. Mr. Klingler served as project manager responsible for overall coordination, management and quality assurance oversight. The project involves historical research of underground issues along the Detroit River Corridor, evaluation of feasibility of various river crossing alignments, historical research of brine well mining and issues along selected crossing alignments, as well as geotechnical and geophysical investigation of possible brine mining areas, and geotechnical investigation for bridge piers.

Comerica Park Foundation Investigation and Design, Detroit, Michigan. Mr. Klingler served as project manager and lead design engineer for the geotechnical investigation and analysis, and design of deep drilled pier foundations for the new baseball stadium. Developed innovative approach to the deep pier installation that saved the cost of casing the foundations and drilling under slurry.

PUBLICATIONS

- Miller, M.S., Klingler, F.J., and Alberts, J.B., "Rehabilitation of the Oakland Macomb Interceptor Drain: Innovative Design of Multi-Tiered Shafts to Accommodate Low Overhead Clearance" Proceedings of the North American Tunneling Conference 2012, 25-27 June, 2012, Indianapolis Indiana, U.S.A., pp. 806-812. Society for Mining, Metallurgy, and Exploration, Inc., Englewood Colorado, 2012.
- Johnson, C.R., Klingler, F.J., Alberts, J.B., Marion B., Bryans, B., Turpening, R., Diehl, J., Cording, E., "The Detroit River International Crossing: Implementing a Precedent Setting Geophysical Investigation to Evaluate Subsurface Geological Stability in an Area of Historical Solution Mining." Proceedings of the Solution Mining Research Institute Fall 2008 Technical Conference, 13-14 October, 2008, Galveston, Texas, USA, pp 51-80. Solution Mining Research Institute, Clarks Summit, PA.
- Mercado, V., Fujita, G., Shukla, R., Price, H.R., Swaffar, K.M., Klingler, F.J., "Emergency Repair of Oakland-Macomb Sewer Collapse: A Case History" Proceedings of the North American Tunneling Conference 2006, 11-14 June, 2006, Chicago, Illinois, U.S.A., pp. 415-424. Taylor & Francis Group plc, London, UK, 2006.
- Klingler, F.J., Swaffar, K.M., and DiPonio, T.S., "Control of Contaminated Groundwater during Tunneling: Five Case Histories." Proceedings of the North American Tunneling Conference 2002, 18-22 May 2002, Seattle Washington, USA, pp. 73-78. Swets & Zeitlingler B.V., Lisse, The Netherlands, 2002.
- Kalinowski, Steven A., Klingler, Fritz J., and Porta, Frank, "Innovative Contracting Practices to Control Risks, Schedule, and Costs." Tunnel Business Magazine, May, 2002.

- Klingler, Fritz J. and Modi, Bhushan C., "Comerica Park – A Grand Slam for Detroit." Proceedings of the 8th Great Lakes Geotechnical and Geoenvironmental Conference, Wayne State University, Detroit, Michigan, May, 2000.
- Klingler, Fritz J. and Johnson, William J., "Caisson Design and Construction Challenges on the New Tiger Stadium Project." Proceedings of the 24th Annual Conference of the Deep Foundations Institute, Dearborn, Michigan, October, 1999.
- Klingler, F.J., Swaffar, K.M., and Rabbaig, M.M., "Upper Rouge Combined Sewage Overflow Storage and Treatment Tunnel." Proceedings, Rapid Excavation and Tunneling Conference, Orlando, Florida, June 21-23, 1999. Society for Mining, Metallurgy, and Exploration, Inc., Littleton, CO, 1999.
- Klingler, F.J., Swaffar, K.M., Neyer, J.C., and Hausmann, R., "Sinking Caissons as an Effective Means of Construction Shafts." Proceedings, Rapid Excavation and Tunneling Conference, Las Vegas, Nevada, June 22-25, 1997, pp. 493-506. Society for Mining, Metallurgy, and Exploration, Inc., Littleton, CO, 1997.

Chris Ranck, P.E., BCEE, D.WRE, ENV SP

Collection Systems and Wet Weather National Planning Leader

Mr. Ranck is the national planning leader for collection systems and wet weather programs for Black & Veatch. He has expertise in numerous aspects of wet weather programs including hydraulic and water quality modeling, tunnel surge and air movement modeling, value engineering, combined sewer overflow (CSO) regulatory compliance, Long-Term Control Plan (LTCP) development, and the application of the Envision rating system.

Over the past 20 years, Chris has served as a project manager, technical lead, or technical oversight for collection system and wet weather projects in CA, DC, GA, IN, NY, OH, PA, and WI using EPA SWMM, InfoWorks, Mike Urban, and PCSWMM. Chris also has provided focused tunnel hydraulics for shaft design, surge analysis, and air movement analysis for two US tunnels, as well as the London Tideway Tunnel and the Singapore Deep Tunnel Sewerage System.

Chris is also the chair of WEF's Envision Task Force and is the past chair of the Collection System Modeling Technical Practice Group, which is part of WEF's Collection Systems Committee.

PROJECT EXPERIENCE

Citizens Energy Group (formerly Indianapolis DPW) | Consent Decree & Dig Indy Tunnel Program, Wastewater Modeling Program; Indianapolis, IN | 2020-Present

Collection System Modeling Technical Advisor. Currently providing technical oversight for Citizens' Underground Asset Management (UAM) staff use of the InfoWorks ICM hydraulic model. Responsibilities include methodology development, technical review of work performed by UAM staff, and model troubleshooting.

Water Quality Modeling Lead. Currently serving as technical lead for water quality model applications to evaluate recent wet-weather periods for instream bacteria and projected compliance of Citizens' consent decree program. Performed modeling and post-processing for seven and half years of recent rainfall data.

Technical Reviewer, Tunnel Surge Analysis. Provided review of UAM staff surge model simulations of recent wet-weather events and provided recommendations for tunnel gate closure.

Eastern Municipal Water District (EMWD) | Temecula Valley Inflow & Infiltration Investigation, Wastewater Modeling Program; Perris, CA | 2020

Technical Lead. The Temecula valley collection system experienced a 100-year storm event in February 2019. Mr. Ranck developed an InfoWorks ICM model of the four lift stations and force mains and verified the model to available monitoring data at the lift stations. Chris applied the verified model to evaluate future growth flows against EMWD's current CIP for the wastewater transmission system and wrote the hydraulic assessment sections of the technical memorandum. The model application identified an operational change to reduce peak velocities in the force mains during large storm events.

OFFICE LOCATION

Indianapolis, IN

EDUCATION

MSE, Environmental and Water Resources Engineering, University of Michigan, 2000

BSE Civil and Environmental Engineering, University of Michigan, 2000

PROFESSIONAL REGISTRATION

PE, Civil – 2008, HI, 13192, Not current as of 4/30/2020

PE, Environmental – 2004, IN, PE10403228

PE, Environmental - 2017, MA, 53509

PE, Civil – 2019, NY, 101861-01

BCEE, Water Supply & Wastewater – 2009, 09-10015

D.WRE – 2010, 555

PROFESSIONAL ASSOCIATIONS

Indiana WEA

WEF: Collection Systems Committee & Envision Task Force

ASCE: Two-Phase Flow Committee

YEAR CAREER STARTED

2000

YEAR STARTED WITH B&V

2020

City of Oakland | Sanitary Sewer Master Plan Update; Oakland, CA | 2020-Present

Collection System Modeling Lead. Currently serving as the technical lead for the expansion and recalibration of the City of Oakland's InfoSWMM model to include all pipes 8-inches and larger. Specific tasks included model and GIS review, methodology development, and oversight of the model expansion and calibration.

Broward County Water & Wastewater Services| Regional Wastewater Master Plan; Pompano Beach, FL | 2020-Present

Technical Advisor. Currently serving in a senior technical role for the master plan development of the regional transmission system in Broward County, which is also referred to as the wholesale wastewater system. Specific tasks included review of the previous master plans and available data to develop a methodology for representing peak wet-weather flows in the InfoWater model of the regional transmission system, review of previously prepared tributary InfoSWMM models for the retail wastewater system, and application of the InfoSWMM models to develop dry-weather and wet-weather inflows for use in the InfoWater model of the wholesale system.

PROJECT EXPERIENCE PRIOR TO JOINING BLACK & VEATCH

Citizens Energy Group (formerly Indianapolis DPW) | Consent Decree & Dig Indy Tunnel Program, Wastewater Modeling Program; Indianapolis, IN | 2002-2020

Mr. Ranck has been part of the Indianapolis consent decree program and collection system modeling since 2002 and has served in several roles. The wastewater system was acquired by Citizens Energy Group in 2011.

Collection System Modeling Lead & Technical Advisor 2008-2020. Served as the Hydraulics and Water Quality Lead for regulatory negotiations and made multiple technical presentations to senior IDEM, USEPA Region 5, and USEPA Headquarters staff during negotiations from 2008 to 2010. The completed regulatory negotiations resulted in $740 million in capital savings and were the subject of the February 2011 ENR and May 2011 Public Works magazine cover stories and an article in the February 2013 WE&T magazine.

Project Manager and Technical Lead for the hydraulic model re-calibration and evaluation to assess compliance with the Consent Decree performance criteria for the Upper White River watershed after completion of consent decree projects in 2011. Served as the primary author of the Post-Construction Monitoring Milestone Report, which was submitted to EPA Region 5 in December 2013.

Established the methodology and served as a technical lead for the update to Citizens sanitary sewer master plan (SSMP). Specifically, Chris set the methodology for future flow projections, established level of service (LoS) objectives for the master plan, and utilized historical flow monitoring data and interceptor R-values to project the expected effectiveness of Citizens' sewer rehabilitation CIP in wet-weather modeling. The completed master plan update resulted in $548 million in capital savings from the previous plan.

Water Quality Modeling Lead 2008-Present. Served as overall technical lead for the update of the 1997-era instream water quality model from EPA SWMM 4.4G and WASP 5.1 to InfoWorks ICM. The model was originally developed to evaluate the impacts of CSO discharges on water quality and consists of the White River in central Indiana and six tributaries, with a total stream length of 186 miles. The model update and recalibration was published in the March-April 2017 issue of the Stormwater magazine.

Chris applied the migrated and recalibrated water quality model in 2016-2017 to support Citizens' NPDES permit renewal for the Belmont and Southport advanced wastewater treatment plants, and successfully made the regulatory case to reduce the effluent limit for dissolved oxygen from 8.0 to 7.0 milligrams per liter, which allows Citizens to save approximately $200,000 per year in operational costs.

Chris applied the migrated and recalibrated water quality model in 2016-2019 to evaluate the projected compliance of Citizens' consent decree program against state standards to support the update of Citizens' Use Attainability Analysis (UAA).

Chris also provided regulatory support to Citizens to incorporate Indiana DEM and EPA feedback during the UAA development process.

Project Manager, Collection System Model Expansion 2016-2018. Chris served as project manager for the expansion of CEG's collection system model to include all pipes 12 inch and larger. As part of the project, all existing model subcatchments are being re-delineated to represent I&I via groundwater to facilitate isolation of I&I sources in rehabilitation projects. Coordinated the temporary flow monitoring planning, installation and data reviews for over 600 temporary flow monitoring locations. Citizens' InfoWorks ICM model was expanded from approximately 9,000 nodes to over 50,000 nodes. The first calibrated basin in the sanitary system identified a 50% reduction in peak I/I flows which allowed Citizens to avoid a $10M capital project. The second calibrated basin in the combined system identified reduced peak CSO discharges in the Pogues Run watershed which allowed Citizens to avoid a $6M capital project.

Project Manager & Technical Lead, Tunnel Surge Analysis 2010-present. Project manager and local technical lead for the systemwide tunnel surge evaluation using the Transient Analysis Program (TAP) model developed by Applied Science, Inc. Specific tasks included the sizing of surge mitigation structures, ventilation analysis, development of the tunnel operational scheme, and coordination with the tunnel design teams. Served as technical reviewer for the 2014 update to the surge model by Citizens staff. The update included design configuration changes and evaluate the potential for passive overflow and ventilation facilities.

In 2015, developed a spreadsheet post-processing tool to evaluate potential air induction, pressurization, ventilation, and migration in surcharged conditions based on current research in air movement in closed conduits. In 2016, provided oversight and review for a focused evaluation on air movement and ventilation, with Auburn University as a sub-consultant using their state-of-the-art HAST2 model. The evaluation focused on leading research in numerical simulations of two phase (air/water) modeling of the tunnel to further characterize the geyser risk.

In 2018, performed surge model updates and simulations to evaluate contractor proposed change orders to simplify the lining of tunnel bifurcations from a cavern shape to a smaller wye shape to expedite the schedule. The analysis included focused post-processing for air movement and pressurization to develop acceptable wye configurations at two tunnel bifurcations.

Project Manager, Tunnel Operational Planning 2014-2016. Served as project manager and technical lead for the development of a desktop tunnel operational plan for Citizens' 25-mile long, 18' diameter CSO tunnel network. The operational plan includes considerations for surge mitigation, flushing, dewatering, instrumentation, SCADA connectivity, and ventilation. The desktop phase also includes coordination with the collection system and treatment plant operational staff and a review of current operational practices by peer utilities. The operational planning included an air dispersion evaluation of a tunnel ventilation shaft for Citizens' CSO tunnel. AEROMOD modeling was performed to evaluate the potential impacts of H2S and ammonia from combined sewage captured by the tunnel. The air dispersion evaluation also included the sensitivity of the results to multiple emission rate methods, benchmarking against other CSO tunnel systems, and benchmarking of local and national odor and health standards for H2S and ammonia.

The tunnel operational planning was the cover story of the July 2017 issue of WE&T.

Indiana Department of Environmental Management | Total Maximum Daily Load Development; Indianapolis, IN | 2002-2004

Project Engineer. TMDL reports were prepared in response to the 303(d) listing for three Indianapolis watersheds. Developed a predictive E. coli bacteria model to characterize bacteria loadings into Indianapolis streams and to evaluate the impacts of control scenarios. Wrote the TMDL reports for the Fall Creek, Pleasant Run, and White River watersheds. The TMDLs were approved by IDEM in 2003 and US EPA Region 5 in 2004.

Milwaukee Metropolitan Sewerage District | Conveyance System Evaluation & Software Selection; Milwaukee, WI | 2018-2020

Project Manger. Served as project manager for the development and implementation of the overall collection system modeling framework for Milwaukee MSD. The project included a review of the existing modeling framework, recommended changes to improve the efficiency and stability of the modeling approach, model updates and re-calibration, and implementation of on-call services including design support and the development of software tools. Chris piloted the proposed framework of migrating both model hydrology and real time control to PCSWMM, which was the accepted framework. Developed the approach for calibration in the migrated PCSWMM model, and provided technical oversight for the calibration, which was executed by a team of local subconsultants based in Milwaukee. The calibration was completed in January 2020.

Chris also managed the development of two Power BI dashboard tools for flow meter scattergraph review and future flow development. Chris also served as task manager for the Edgewood Near Surface Collector (NSC) Extension design support modeling to establish the design criteria for a new relief sewer to improve the level of service in the Village of Shorewood during wet-weather events.

Office of Green Infrastructure | Green Infrastructure Applied Research; New York, NY | 2016, 2019-2020

Technical Advisor. Served in a technical advisory and review role for the evaluation of consent decree compliance by New York City's Green Infrastructure Program. Assisted in developing the methodology for modeling GI within the framework of the City's LTCP models, provided technical review of the final model simulations, and assisted in benchmarking the processes used by peer utilities. The methodology was incorporated into NYC's GI performance measures report, which was submitted to NY state DEC in June 2016. From 2019-2020, Mr. Ranck provided oversight and methodology development for citywide two dimensional (2D) overland flow modeling to evaluate stormwater resiliency. The methodology emphasized continuity between the overland flow modeling, NYC's existing LTCP modeling program, and the ability to evaluate GI interventions for surface flooding.

Department of Environmental Protection | East Side Coastal Resiliency Project; New York, NY | 2016-2017

Technical Advisor. Provided hydraulic modeling support to evaluate the potential impacts of pressurized air on New York City's combined sewer regulators and outfall pipes, since the resiliency project will seal the outfall pipes as part of the flood-proofing of the collection system. Utilized NYC DEP's hydraulic model, with focused post-processing to evaluate the risks of transients, air pocket formation, air pocket migration, and negative pressures.

Department of Design and Construction | Sheldon Avenue Improvements; New York, NY | 2016

Envision Application. Served in a support and review role for the Envision Award submission. The Envision application was prepared as part of the construction administration for the Sheldon Avenue wetland and storm sewer project. The Sheldon Avenue project is part of the overall Staten Island Bluebelt program and includes conversions from septic to sanitary sewer and a wetland serving as a stormwater BMP. Prepared the application for 14 Envision credits, which was approximately one third of the total credits in the project's Envision application. The project received a Silver award in 2017.

DC Water | Potomac Interceptor Transient Evaluation; Washington, DC | 2016

Technical Lead. As part of the sanitary program management team, served as a technical lead for a transient and air movement evaluation of the Potomac Interceptor in DC Water's collection system. The Transient Analysis Program (TAP) model developed by Applied Science, Inc. was used for the transient evaluation with a post-processing spreadsheet tool to evaluate air movement and potential pressurization. Evaluated alternatives to improve the hydraulic capacity and minimize the effects of trapped air in the interceptor and developed a recommended operational scheme to mitigate transients and trapped air pockets with minimal capital investment.

Thames Tideway Tunnel Company | Thames Tideway Tunnel Due Diligence Review; London, UK | 2014-2015

Technical Advisor. Served as US-based project manager for the independent due diligence review of the Thames Tideway Tunnel (TTT) to facilitate the funding of the tunnel construction and associated works by outside investors. Provided technical review for tunnel hydraulics, transient and air movement, and the overall O&M plan. The technical reviews included a focused 9-day working session in London in February 2015. Served as a key author to the following sections of the Stage 2 and Stage 3 Vendors' Due Diligence Reports: Design & Technical, Project & Program, O&M, and Commissioning.

Ed. Züblin AG - Singapore Branch, Singapore PUB| Deep Tunnel Sewerage System Phase 2 Drop Shaft Design; Singapore| 2018-2019

Technical Lead. Served as hydraulics lead for the design-build of Contract T-07 of the Deep Tunnel Sewerage System (DTSS) Phase 2. Performed industry standard shaft design calculations to refine the reference design for 4 drop shafts and 1 diversion shaft and provided an overall hydraulic review of the tunnel system and the reference design criteria. Presented the hydraulic design to Singapore PUB's program manager in March 2018 to facilitate acceptance of the final hydraulic design. Coordinated CFD modeling of the four drop shafts during final design. To facilitate constructability of the diversion shaft, Mr. Ranck developed an alternate concept to replace the helicoidal ramp diversion in the tender design with a baffle plunge shaft to eliminate the need for bypass pumping and reduce the shaft diameter from 10 meters to 8 meters. The baffle plunge alternate was accepted by PUB in 2019.

City of Santa Monica, Kiewit| Sustainable Water Infrastructure Project; Santa Monica, CA | 2018-2019

Envision Application. Served as Envision Lead for the Sustainable Water Infrastructure Project (SWIP), which is a design build project under Kiewit. The SWIP includes an advanced wastewater treatment facility (AWTF) and upgrades to the existing stormwater treatment facility known as the Santa Monica Urban Runoff Reduction Facility (SMURRF) to provide non-potable water for reuse in municipal buildings and long-term aquifer recharge. Mr. Ranck provided document review and developed the initial Envision assessment for the project and provided recommendations for potential design changes to increase the Envision achievement. Mr. Ranck developed the initial credit application for approximately 20 Envision credits.

Metropolitan Sewer District of Greater Cincinnati | Lower Muddy Creek Interceptor SSO Remediation; Cincinnati, OH | 2015

Technical Lead. Served as technical lead and technical reviewer for the transient and air movement evaluation of an SSO remediation project for the Lower Muddy Creek interceptor. Since the recommended project included sealing low-lying manholes near the Ohio River, the transient analysis was necessary to confirm that the sealed system would not be at risk for overflows due to transients or damage to interceptor or structures from trapped air. The analysis determined that potential surge or air pressure was negligible.

City Utilities Engineering | Pond 3 Water Quality Model; Fort Wayne, IN | 2014-2015

Technical Lead. Per City Utilities request, developed and calibrated an InfoWorks ICM water quality model for Pond 3 at the Water Pollution Control Plant (WPCP) to simulate dissolved oxygen (DO). Utilized the model to evaluate the effects of algae, temperature, additional aeration, and pond size on effluent DO to support capital decisions for the WPCP.

City Utilities Engineering | 3RPORT Tunnel Hydraulic Modeling Oversight; Fort Wayne, IN | 2015-2016

Technical Advisor. Served in a technical oversight role for the design support hydraulic modeling for the Three Rivers Pollution and Overflow Relief Tunnel (3RPORT) and associated consolidation and connection infrastructure. Oversight has included focused reviews of surge and air movement modelling performed by the design team. The deep tunnel is the critical element of Fort Wayne's CSO LTCP. Utilized the spreadsheet post-processing tool to evaluate potential air induction, pressurization, and migration based on the preliminary hydraulic modeling of the 3RPORT performed by the design team.

City of Newburgh | Water Quality Model Development and Application; Newburgh, NY | 2014-2015

Technical Advisor. Served as a technical advisor for the development and application of an InfoWorks ICM water quality model to evaluate fecal coliform in the Hudson River, to determine the water quality impacts of the City of Newburgh's LTCP projects, as requested by New York DEC. Developed the overall methodology and provided technical review for the water quality model, which included a representation of tidal conditions. Presented the approach to DEC to facilitate approval.

Los Angeles Sanitation | TOS SN-49: Dynamic Design Storm and Sewer Per Capita Update; Los Angeles, CA | 2016-2017

Technical Advisor. Provided technical oversight to Los Angeles Sanitation for the updates of several critical elements in their sewer capacity planning that had been in place for over 20 years: 1) The replacement of a static 10-year design storm with a spatially and temporally varied storm derived from gauge adjusted radar rainfall (GARR) data , 2) The update of the per-capita wastewater flows for both residential and employment populations, 3) The update of long-term growth projections for the service area. Specific tasks included siting of temporary flow monitors and data processing to calculate per-capita flows, review of spatially varied storm data prepared by Vieux & Associates, and review of population projections developed by Water Resources Planning, Inc.

Mr. Ranck transitioned to project manager in 2017 to complete the initial three tasks and oversee additional work assigned by LA Sanitation to include the model application of recent rainfall by LA Sanitation and DHI staff, and a holistic assessment of LA Sanitation's hydraulic modeling practices. The project concluded with a focused 2-day knowledge transfer workshop at LA Sanitation's offices.

DeKalb Water Management | Sewer Capacity Requests and Peaking Factor Task Order; Decatur, GA | 2018-2020

Technical Advisor. Served as a technical advisor to DeKalb Water Management (DWM) for the Sewer Capacity Request (SCR) process, which is part of the DWM's consent decree program. Provided review of DWM's hydraulic model and SCR process and identified best practices from other sewer utilities for implementation to enhance the process. In 2019, Mr. Ranck served as a technical advisor for the development of updated peaking factors and per-capita flow parameters for use in the SCR process moving forward. The updated peaking factors and per-capita parameters were derived from flow metering, water consumption data, land use and zoning data, and benchmarking with neighboring utilities.

City of Buena Park | Sewer Master Plan Update, Buena Park; CA | 2018-2019

Technical Advisor. Provided technical oversight to the master plan update and developed the methodology for flow meter siting, model software selection, InfoSWMM model development, delineation, model calibration, sewer per capita flow calculation, level of service criteria for capacity assessment, alternative evaluations, and CIP project prioritization. Facilitated multiple onsite workshops with City staff.

Durham Water Management | Raw Water Main Condition Assessment; Durham, NC | 2014

Technical Lead. Served as technical lead for the development of a cost-effective and scalable inspection program for Durham Water's pit cast and PCCP raw water mains. Specific tasks included staff interviews, inspection technology reviews, soil and record review, and the development of the phased internal and external inspection program that Durham will utilize in a future inspection RFQ.

Delaware County Regional Authority (DELCORA) | Eastern Service Area Planning and Modeling; Chester, PA | 2017-2018

Technical Lead. Served as overall technical lead for the development, calibration, and application of an EPA-SWMM model for the Eastern Service Area (ESA). The model was calibrated to a continuous period to account for seasonal effects of groundwater in inflow and infiltration (I/I) flows at the three regional pump stations in the ESA. The project included the development of cost curves and a genetic algorithm optimization of capital planning alternatives using Optimatics' Optimizer Wastewater Collection Systems (WCS). The Optimatics evaluation identified a capital plan for DELCORA under

$100 M, where previously studies had identified capital plans of $175 M and higher to achieve a 10-year level of service. The project concluded with training for DELCORA staff on use of the calibrated SWMM model.

Selected Publications

Value Engineering Saves $740 Million. Water Environment and Technology, February 2013.

EPA's Integrated Planning Framework: A Holistic Approach to Maximize Benefits. Air & Waste Management Association Environmental Magazine, June 2013.

Water Environment Federation (WEF), 2016, Applying Envision 1.0 to Wastewater Projects. Mr. Ranck served as task force deputy lead for collection systems and authored guidance for four individual credits in the final document.

Water Environment Federation (WEF), 2017, Sanitary Sewer Systems: Rainfall Derived Infiltration and Inflow (RDII) Modeling Fact Sheet. Mr. Ranck oversaw the fact sheet development as technical practice group chair.

The Value of Integrated Modeling for Predicting Bacteria and Dissolved Oxygen in Urban Streams. Stormwater Magazine, March-April 2017.

You Can Dig It, But Can You Operate It? Proactive Combined Sewer Overflow Tunnel Operational Planning. Water Environment and Technology, July 2017 (Cover story).

SAMRIN A. KUSUM | CURRICULUM VITAE

skusum@ncsu.edu • 919-917-1893 • www.linkedin.com/in/samrinkusum

EDUCATION

03/2020 – Present
Ph.D. Candidate | Civil, Construction, and Environmental Engineering (CCEE); 3.5/4.0 GPA
North Carolina State University (NCSU)

05/2016
M.S. | Civil Engineering; 3.5/4.0 GPA
Bangladesh University of Engineering and Technology (BUET)

04/2012
B.S. | Civil Engineering; 3.7/4.0 GPA
Bangladesh University of Engineering and Technology (BUET)

RESEARCH EXPERIENCE

01/2020 – Present
Research Assistant, North Carolina State University | Dr. Joel Ducoste, Dr. Muhammad Pour-Ghaz
Project: Understanding the FOG Deposit Adhesion Mechanism on Different Sewer Line Surfaces

08/2016 – 12/2019
Research Assistant, North Carolina State University | Dr. Joel Ducoste, Dr. Muhammad Pour-Ghaz
Project: Evaluation of Alternative Binder Material to Reduce Sewer Collection System Infrastructure Maintenance and Enhance Sustainability

07/2014 – 02/2016
Research Assistant, Bangladesh University of Engineering and Technology | Dr. Mahbuboor Rahman Chowdhury
Project: Quality and Maturity Assessment of Compost Produced from Aerobic Decomposition of Organic Municipal Solid Waste

TEACHING EXPERIENCE

08/2019 – 12/2019
Graduate Teaching Assistant, North Carolina State University | Dr. Tarek Aziz
CE 282: Hydraulics – 60 Students

01/2019 – 05/2019
Graduate Teaching Assistant, North Carolina State University | Dr. Muhammad Pour-Ghaz
CE 530: Properties of Concrete and Advanced Cement-Based Composites – 20 Students

08/2018 – 02/2019
Mentor, Fall/Winter Mentorship Program at the NC School of Science and Math (NCSSM)

Mentored a high school senior for an academic year 2019-2020 through the collaboration of NC State University and NCSSM to support the development of student's research skills from an early age. Additionally, guided the student to prepare a research proposal and poster for the final presentation.

06/2018 – 08/2018
Co-mentor, 2018 Research Internship Summer Experience (RISE) Program | Dr. Joel Ducoste
Co-mentored an undergraduate student at the 2018 RISE program of the NC State University that aims to prepare students for graduate studies, professional development and diverse research atmosphere.

06/2017 – 08/2017
Mentor, 2017 Global Engagement in Academic Research (GEAR) Summer Research Program
Mentored an international undergraduate student at the 2017 GEAR program (a unique academic, research and cultural exchange program) administered by the NC State Global Training Initiative (GTI).

03/2013 – 11/2015
Senior Lecturer, Stamford University of Bangladesh
- Taught undergraduate courses (CE 201: Engineering Materials, CE 331: Environmental Engineering I, CE 333: Environmental Engineering II, WRE 303: Hydrology, CE 401: Project Planning and Management, CE 315: Design of Concrete Structures I, CE 317: Design of Concrete Structures II)
- Supervised undergraduate research students.

04/2012 – 03/2013
Lecturer, University of Information Technology and Sciences
- Taught undergraduate courses (CE 201: Engineering Materials, CE 331: Environmental Engineering I, CE 333: Environmental Engineering II, WRE 303: Hydrology, CE 401: Project Planning and Management)

PUBLICATIONS

- Kusum, S. A., Pour-Ghaz, M., & Ducoste, J. J. (2020). Reducing Fat, Oil, and Grease (FOG) Deposits Formation and Adhesion on Sewer Collection System Structures Through the Use of Fly Ash Replaced Cement-Based Materials. *Water Research*, 186, 116304.

- Kusum, S.A., Pour-Ghaz, M., & Ducoste, J. (2018). Evaluating Alternative Binder Materials For Sewer Collection System Concrete Structures to Reduce Fat, Oil, and Grease Related Sanitary Sewer Overflows. *Proceedings of the Water Environment Federation.*

- Zafer Siddik, M.A., Asib, A.S., and Kusum, S.A. (2013). Spatial Distribution of the Effect of Temperature and Rainfall on the Production of Boro Rice in Bangladesh. *Journal of Remote Sensing*, 1, 88.

RESEARCH PRESENTATION

Oral Presentations
- "Evaluating alternative binder materials for sewer collection system concrete structures to reduce FOG related SSOs", WEF Collection System 2018, Virginia Beach, VA
- "Alternative binder materials and its application in concrete sewer structures for possible reduction in fat, oil and grease related sanitary sewer overflows", NC-AWWA 17th Annual Spring Symposium (2018), Asheville, NC

Poster Presentations

- "Evaluating the adhesion phenomena of Fat, Oil and Grease (FOG) deposits on different sewer line surfaces", 2020 EWC Graduate Research Symposium, NC State University, Raleigh, NC
- "Application of Fly Ash (FA) as a cement replacement to reduce the Fat, Oil and Grease (FOG) related Sanitary Sewer Overflows (SSOs)", 2019 NC Onsite Water Protection Conference, Raleigh, NC
- "Reducing the formation and adhesion of Fat, Oil and Grease (FOG) deposition on sewer line surfaces", 2019 EWC Graduate Research Symposium, NC State University, Raleigh, NC
- "Reducing the adhesion of Fat, Oil and Grease (FOG) deposition on sewer line surface", NC-AWWA 98th Annual Conference (2018), Raleigh, NC
- "Evaluation of alternative binder materials for sewer collection system construction to enhance sustainability and reduce FOG related SSOs", NC-AWWA 97th Annual Conference (2017), Raleigh, NC
- "Evaluation of alternative binder material to reduce sewer collection system infrastructure maintenance and enhance sustainability", 2017 EWC Graduate Research Symposium, NC State University, Raleigh, NC

AWARDS AND HONORS

12/2020
Top 10 Finalist of 3MT, 2020 3MT Competition, North Carolina State University, Raleigh, NC

03/2020
1st Place Student Poster Award, 2020 EWC Graduate Research Symposium, North Carolina State University, Raleigh, NC

02/2020
1st Place Departmental 3MT Competition, Department of Civil, Construction, and Environmental Engineering, North Carolina State University

10/2019
1st Place Student Poster Award, 2019 NC Onsite Water Protection Conference, Raleigh, NC

11/2018
2nd Place Student Poster Award, NC-AWWA 98th Annual Conference (2018), Raleigh, NC

11/2018
Best Designed Student Poster Award, NC-AWWA 98th Annual Conference (2018), Raleigh, NC

SKILLS

- **OS:** Windows, Mac
- **Languages:** C++, R
- **Analysis tools:** Excel, MATLAB, Visual MINTEQ, R
- **Suites:** Google, Microsoft Office, Adobe
- **Learning management systems:** Moodle

SERVICE AND OUTREACH

- President (2019-2020), Bangladesh Student Association (BSA) at NC State University
- Instructor (2019), NC State Engineering Merit Badge Boy Scouts
- Workshop Organizer (2019), Professional Engineers of North Carolina (PENC)
- Treasurer (2018-2019), Professional Engineers of North Carolina (PENC)
- Mentor (2018-2019), Fall/Winter Mentorship Program at the NC School of Science and Math (NCSSM)
- Secretary (2017-2019), Bangladesh Student Association (BSA) at NC State University
- Volunteer (2018), PENC Triangle Chapter Stream Clean, Raleigh, NC
- Volunteer Room Monitor (2018), Nutrient Removal and Recovery Conference, Raleigh, NC
- Mentor (2017), Global Engagement in Academic Research (GEAR) Summer Research Program

Anastasia Rudenko, P.E., BCEE, ENV SP

Project Engineer

Qualified: B.S., Biological and Environmental Engineering, Cornell University; M.Eng., Agricultural and Biological Engineering, Cornell University; Registered Professional Engineer: MA; Board Certified Environmental Engineer (BCEE), American Academy of Environmental Engineers (Sustainability), Envision Sustainability Professional, OSHA 10 - Construction

Connected: Water Environment Federation (WEF), New England Water Environment Association (NEWEA), American Society of Civil Engineers(ASCE), Massachusetts Water Environment Association (MAWEA)

Professional Summary: A credentialed Sustainability Professional and Professional Engineer, Anastasia has over 10 years of experience in a variety of environmental engineering projects with a focus in nutrient management planning and sustainability in wastewater treatment.

Nutrient Management Planning

Project Engineer
CWMP Wastewater Planning Project | Town of Uxbridge | Uxbridge, Massachusetts, USA

Project engineer for the Town of Uxbridge's Comprehensive Wastewater Management Plan (CWMP). Responsibilities included conducting an evaluation of existing conditions and wastewater needs within the Town, cost estimation, preparation of a Needs Assessment Report for a twenty year planning period, preparation of an Alternative Screenings Analysis Report, and Recommended Plan Report documenting the findings of the project.

Project Engineer
CWMP Wastewater Planning Project | Town of Oak Bluffs | Oak Bluffs, Massachusetts, USA

Project engineer for the Town of Oak Bluff's Comprehensive Wastewater Management Plan (CWMP). Responsibilities included development of flows and loadings for a twenty-year planning period, evaluation of sewering and non-sewering nitrogen management alternatives and evaluation of existing wastewater treatment and collection system infrastructure.

Project Engineer
Nutrient Management Services and Comprehensive Wastewater Management Planning | Town of Falmouth | Falmouth, Massachusetts, USA

Project engineer for the Town of Falmouth's nutrient management planning project. Responsibilities included evaluation of the Town's existing wastewater treatment infrastructure, development of flows and loads for future flows, and collection system conceptual layout development.

Project Engineer
Comprehensive Wastewater Management Planning | Town of Eastham | Eastham, Massachusetts, USA

Planning effort focused on wastewater and nitrogen management needs for watersheds in the Town of Eastham, Massachusetts. Completed an update of previous studies based on the Massachusetts Estuaries Plan (MEP) reports and the 208 planning tools developed by the Cape Cod Commission.

Project Engineer
Comprehensive Wastewater Management Planning | Town of Mashpee | Mashpee, Massachusetts, USA

Planning effort focused on the management of nitrogen loading impacts from septic systems in multiple shared watershed in the Town of Mashpee. Responsibilities included evaluation of existing packaged wastewater treatment facilities within the Town, flow and load development and preliminary design development for a new greenfield municipal wastewater treatment facility.

Wastewater Infrastructure

Project Manager
Mashpee Water Resource Reclamation Facility (WRRF) Design | Town of Mashpee | Mashpee, Massachusetts USA

Project Manager for the preliminary design of the greenfield 0.12 mgd Mashpee Water Resource Reclamation Facility. The Membrane Bioreactor (MBR) facility is designed to achieve a total nitrogen effluent limit of 3 mg/L. The design includes a new Preliminary Treatment Building with fine screening and grit removal, two modified ludzack-ettinger (MLE) reactors, two ultrafiltration MBR trains, process blowers, ultraviolet disinfection and open sand beds for effluent recharge to groundwater. The Envision rating system was utilized

during design to identify opportunities for incorporating sustainable design features into the project.

Project Engineer
Bernat Interceptor Hydrogen Sulfide Corrosion Condition Assessment and Rehabilitation Design | Town of Uxbridge | Uxbridge, Massachusetts, USA

Conducted a condition assessment of a portion of the Town's collection system that was suspected of being vulnerable to hydrogen sulfide corrosion. The investigation included ultrasonic pipe thickness testing of a ductile iron force main and analysis of Closed Circuit TV Inspection (CCTV) data of the downstream reinforced concrete gravity trunk sewer. The investigation identified significantly reduced wall thickness in a portion of the force main, a partial collapse in the gravity trunk sewer, and a severely degraded interceptor manhole. Following evaluation and costing of rehabilitation options the final design included replacement of the degraded portion of the force main and gravity sewer with PVC piping and installation of new epoxy coated manholes to reduce vulnerability to future hydrogen sulfide corrosion.

Project Engineer
Existing Private WWTF and Potential Expanded Collection System Evaluations | Town of Mashpee | Mashpee, Massachusetts, USA

Evaluated the major treatment components of two private wastewater treatment facilities in the Town of Mashpee to assess the feasibility of connecting neighboring areas to the existing collection systems of each facility. Developed preliminary layouts for each collection system.

Project Engineer
Infiltration and Inflow Analysis | Town of Edgartown | Edgartown Massachusetts, USA

Conducted an inventory of existing conditions and developed a flow metering program to fulfill the requirements outlined in the MassDEP 'Guidelines for Performing Infiltration / Inflow Analyses and Sewer System Evaluation Survey', revised May 2017. Responsibilities included flow monitoring analysis, development of a rainfall/inflow relationship based on a design storm evaluation and recommendations for further study.

Project Engineer
WWTF Plant Evaluation and Condition Assessment | Town of Edgartown | Edgartown Massachusetts, USA

Conducted a condition assessment of the Town's wastewater treatment facilities and eight largest pump stations. The deliverable for this project was a Capital Improvement Plan (CIP) which outlined recommended projects to maintain the existing level of service for the Town's wastewater infrastructure and provided a schedule for implementation.

Project Engineer
20-Year WPCF Capital Improvement Plan | Town of Wareham | Wareham, Massachusetts, USA

Prepared a 20-year Capital Improvement Plan (CIP) for the Wareham Water Pollution Control Division. The CIP reviewed the Town's existing wastewater infrastructure, and provided anticipated costs and a schedule for renewal and replacement projects on an annual basis.

Project Engineer
Treatment Technology Evaluation for Indirect Water Reuse | Town of Oak Bluffs | Oak Bluffs, Massachusetts, USA

Evaluation of indirect water reuse technologies to meet a 3 mg/L TOC limit for effluent discharge into a zone II drinking water source. Technologies considered include reverse osmosis, advanced oxidation, coagulation and ion exchange systems. Responsibilities included plant data analysis, bench scale testing to determine whether a coagulation process was feasible at the plant and cost estimation for implementing potential technologies.

Project Engineer
WWTF Plant Evaluation | Town of Falmouth | Falmouth, Massachusetts, USA

Performed an assessment of treatment capacity and capacity limitations on all unit processes at the Falmouth WWTF. Assessment included a determination of the physical state of equipment and structures, review of plant operations and comparison of all processes and groups of equipment to current standards.

Engineer
Enhanced Nutrient Removal (ENR) Upgrade and Expansion | City of Front Royal | Front Royal, Virginia, USA

Responsible for the detailed design of an ultra-violet disinfection system and septage receiving station as part of a treatment facility expansion to 5.3 MGD. The upgraded facility was designed to meet 3.0 mg/L TN and 0.3 mg/L TP limits. Responsible for preparing calculations, specifications, contract drawings, cost estimates, and coordinating between other disciplines (structural, electrical, and instrumentation) during the design phase.

Project Engineer
Nitrogen Optimization Study | Town of Falmouth | Falmouth, Massachusetts, USA

Conducted an evaluation of the existing wastewater processes at the Falmouth Wastewater Treatment Facility to determine whether the facility is capable of consistently meeting an average effluent nitrogen and nitrate nitrogen concentration of 3 mg/L. The evaluation included targeted recommended improvements to help improve the nitrogen removal capability of the facility.

Engineer
Enhanced Nutrient Removal (ENR) and Biosolids Upgrade | City of Westminster | Westminster, Maryland, USA

Responsible for the detailed design of an upgraded aeration system and new blower building as part of an ENR upgrade to an existing 5.0 MGD facility. The design included construction of a new reactor tank and modifications to the existing reactors as part of an upgrade project designed to achieve 3.0 mg/L Total Nitrogen and 0.3 mg/L Total Phosphorus limits.

Project Engineer
Odor Control and Corrosion Prevention Evaluation | Rodney District Council | New Zealand

Technical appraisal and development of solutions for a program of short-term and medium-term improvements to reduce community complaints from odors from several sewage catchments. Responsibilities included a detailed design of two biofilter odor beds to treat hydrogen sulfide emissions from the system and assisting in the calibration of a hydraulic model for the Hibiscus Coast sewer system.

Coastal Infrastructure

Project Engineer
Ocean Outfall Conceptual Design and Hydrodynamic Model Analysis | Town of Falmouth | Falmouth, Massachusetts, USA

Developed a conceptual design and conceptual cost estimates for a proposed ocean outfall. Coordinated the data analysis from a high-resolution hydrodynamic ocean model (generated by the Unstructured Grid Finite Volume Community Ocean Model – FVCOM) which simulated the movement and dilution of an effluent plume discharge from the proposed ocean outfall. Model results were used to determine the optimal location and length of the proposed ocean outfall and to assess potential nitrogen impacts of the proposed ocean outfall.

Project Engineer
Final Design to Increase the Coastal Resilience for Three Vulnerable Priority Pump Stations | Town of Wareham | Wareham, Massachusetts, USA

Final design of retrofit measures to dry flood-proof three priority dry pit/wet pit pump stations in the Town of Wareham funded by the Massachusetts Coastal Zone Management (CZM). The design flood elevation for the project was established using FEMA maps, applicable codes, and consideration of sea level rise to the end of infrastructure design life. Retrofit measures incorporated into the design included an internal structural reinforcement system to allow the walls to withstand the hydrostatic pressure of a storm event, installation of flood-proof doors, and design of a flood-log system to prevent water entry into the building.

Project Engineer
Permit Level Design to Increase the Coastal Resilience for Three Vulnerable Priority Pump Stations | Town of Wareham | Wareham, Massachusetts, USA

Final design of retrofit measures to dry flood-proof three priority dry pit/wet pit pump stations in the Town of Wareham funded by the Massachusetts Coastal Zone Management (CZM). Project responsibilities included development of the Basis of Design Memorandum outlining the recommended retrofit measures for each station, development of conceptual designs for the three stations, attendance at project meetings, and presentation of the project to the Town's Sewer Commission.

Project Engineer
Climate Change Vulnerability Assessment | Town of Wareham | Wareham, Massachusetts, USA

Project engineer responsible for conducting an assessment of existing conditions for the Town's major wastewater infrastructure (42 pumping station, collection system and wastewater treatment facility), development of a Risk and Vulnerability Assessment as it relates to coastal flooding and climate change, development of proposed infrastructure improvements, and presentation of the results of the study to the client and Town's Sewer Commissioners. The project allowed the Town to identify its most vulnerable infrastructure and provided a methodology to prioritize coastal resilience retrofits of the most vulnerable stations.

Green Energy/Sustainable Design

Envision Sustainability Professional
Lake Simcoe Water Reclamation Centre | Regional Municipality of York | Ontario, Canada

Envision Sustainability Professional responsible for conducting the Envision assessment for the Lake Simcoe Water Reclamation Centre (WRC). The greenfield 40 MLD (10.6 MGD) annual average day flow facility is designed to produce treated wastewater effluent suitable both for discharge to Lake Simcoe via the East Holland River and as a nutrient rich reclaimed water for irrigation. The treatment process train, which is designed for a Total Phosphorus limit of 0.08 mg/L, includes chemically enhanced primary treatment, biological nitrification/denitrification for conventional treatment, microfiltration, reverse osmosis, ultraviolet disinfection, and post-conditioning. Responsibilities included conducting the Envision assessment, coordinating and reviewing required documentation, and submittal of the Envision verification submittal.

Project Engineer
Wastewater Effluent Recovery (WWER) Pilot Project | Town of Barnstable | Barnstable, Massachusetts, USA

This project piloted the first Huber Thermwin heat recovery installation in North America at a raw wastewater pumping station. The WWER unit takes advantage of the relatively constant temperature of wastewater for space and water heating during the winter and to dissipate excess building heat in the summer. The primary objectives of the pilot were to assess the operational requirements of the unit in a raw wastewater application and to determine the cost effectiveness of a permanent WWER unit to replace the chillers at two municipal buildings in close proximity to the pilot site. Responsibilities included coordinating the installation of the pilot unit with the manufacturer and contractors, troubleshooting operation of the unit during the initial weeks of the pilot, conducting pilot data analysis, and development of a report summarizing the results of the study.

Project Engineer
Analysis of Beneficial Byproducts Options at the Hyannis WPCF | Town of Barnstable | Barnstable, Massachusetts, USA

Conducted a co-digestion feasibility study at the Hyannis WPCF. Responsibilities included conducting a market analysis of solid waste on Cape Cod, screening co-digestion technologies, and compiling a technical and economic feasibility analysis.

Project Engineer
Green Energy Projects, Hyannis WPCF | Town of Barnstable | Barnstable, Massachusetts, USA

Managed a three-part project consisting of two 100 KW wind turbines, an 800 KW ground-mounted solar array, and various energy efficiency improvements to the plant. Responsibilities included design during construction, resident representative services, acting as the point of contact between multiple contractors and the client, and coordinating the net metering interconnection with the local utility.

Project Engineer
Chatham Water Pollution Control Facility Upgrade Design | Town of Chatham | Chatham, Massachusetts USA

Conducted an analysis of the Chatham Water Pollution Control Facility Upgrade Design using the Envision rating system to assess the sustainability aspects of the design.

Project Engineer
Evaluation of a Solar Array | Water Pollution Control Facility. Town of Chatham | Chatham, Massachusetts, USA

Responsible for identifying funding sources for a roof-mounted solar array evaluation on a new Operations Building located at the facility. The solar array is projected to offset the electrical consumption of the building that it is mounted on. Assisted in coordinating design modifications to accommodate solar array, during construction.

Hydraulic Modelling

Project Engineer
Preliminary Evaluations of Sewer Project Alternatives for the Great Pond Watershed | Falmouth, Massachusetts, USA

Developed sewer project alternatives to reduce septic system nitrogen impacts to the Great Pond watershed. Responsibilities included development of a conceptual sewer layout for the proposed sewer area utilizing SewerCAD model software by Bentley Systems, Inc., development of projected flows and loadings for the Study Area and evaluation of required wastewater treatment facility upgrades and effluent disposal options.

Project Engineer
Sewer System Hydraulic Model Development | Town of Uxbridge | Uxbridge, Massachusetts, USA

Development of a sewer system hydraulic model for the Uxbridge collection system utilizing SewerCAD model software by Bentley Systems, Inc. The model was used to evaluate existing and projected capacity restrictions and to assess the impact of proposed developments on the collection system.

Water Infrastructure

Project Engineer
Domestic Water Infrastructure Alterations | New York State Office of General Services | New York, USA

Detailed design of a chlorine booster feed system at the Mohawk Correctional facility. Responsibilities included preparation of drawings, specifications, and cost estimates for the project.

Environmental

Project Engineer
Environmental Audits and Permit Applications | Boston Autoport | Charlestown, USA

Prepared an annual environmental audit for the 100-acre Boston Autoport property, located in the City of Boston. The audit considered land use, petroleum product handling and storage, underground tank permitting and monitoring, stormwater monitoring and reporting, City Conservation Commission applications for new projects, and design of improvements to pavements and seawalls.

Stormwater

Project Engineer
Stormwater Utility Feasibility Study | City of Dover | Dover, New Hampshire, USA

Assisted in running a series of stakeholder committee meetings to determine the best method for the City to fund their stormwater system. Also assisted with compiling a recommendation report for the City Council based on the committee's decision.

Project Engineer
Kinlock Reserve Wetland Redesign | Rodney District Council | New Zealand

Hydraulic analysis and redesign of a constructed wetland to aid in stormwater retention and sediment removal.

Project Engineer
View Road Stormwater Design | Rodney District Council | New Zealand

Stormwater design for rural access road to the View Road Wastewater Treatment Plant.

Grant Application Services

Ms. Rudenko has provided grant application services and successfully obtained grant funding for the following projects:

- Town of Cotuit, MA—Water System Improvements (USDA)
- Town of Halifax, MA—Monponsett Ponds Remediation Program: West Monponsett Pond Nutrient Management Project (319 Nonpoint Source Pollution Grant Program)
- Town of Wareham, MA – Final Designs for Three Priority Pump Stations (Massachusetts Coastal Zone Management (CZM) Coastal Community Resilience Grant Program)
- Town of Wareham, MA—Permit Level Designs for Three Priority Pump Stations (Massachusetts Coastal Zone Management (CZM) Coastal Community Resilience Grant Program)
- Town of Barnstable, MA—Anaerobic Digestion Options at the Hyannis WPCF Feasibility Study (Massachusetts Clean Energy Center)

Other related areas of interest

Awards

- 2018 Kenneth J. Miller Founders Award from Water for People

Research History

- MEng Thesis Research. Collaborated on an algorithm capable of producing an AutoCAD rendition of the project team's water treatment plant. The algorithm will allow engineers in Honduras to design plants for rural communities based on expected flow rates. Background knowledge in hydraulic design of small-scale water treatment systems utilizing processes such as flocculation, sedimentation, and chlorination.
- Solar Decathlon Competition. Worked on a project team to design a grey-water reuse system for the Solar Decathlon Competition in Washington, DC. The system used a constructed wetland designed to remove excess nutrients from the water stream.

Additional Skills: Facilitation Experience

- Regional Municipality of York, Ontario Canada – Upper York Sewage Servicing Envision Workshop. Co-facilitator of a session involving the client and discipline leaders of the design team that evaluated the feasibility of obtaining Envision certification for a Water Reclamation Center combining advanced treatment with comprehensive sustainable design principles.

Presentations

- "Mitigating Nutrient Impacts on a Stressed Watershed Through a New Ocean Outfall", Rudenko, A., Quackenbush, L., presented at the Annual NEWEA Conference, January 2020
- "Adapting Collection System Infrastructure to Changing Flood Vulnerabilities – Southeastern Massachusetts Case Studies", Rudenko, A. presented at the MWPCA Quarterly Meeting, December 2019
- "Aiming for Envision Platinum in Advanced Wastewater Treatment Plant Design – Upper York Sewage Servicing (UYSS) Water Reclamation Centre Case Study", Rudenko, A., Lachmann, A., presented at the Annual NEWEA Conference, January 2019
- "Lessons Learned in PFAS Water and Wastewater Treatment from Half Way Around the World" Drainville, M, Rudenko, A., presented at the Annual NEWEA Conference, January 2019
- "Increasing the Water Security of the Island Republic of Kiribati Through a Multi-Prong Approach", Rudenko, A., Degnan, A., presented at the Annual NEWEA Conference, January 2019
- "Increasing the Coastal Resilience of Vulnerable Wastewater Infrastructure on Cape Cod and the Islands – Two Case Studies" Rudenko, A. presented at the NEWEA Spring Conference, June 2017

- "The Path to Energy Neutrality – Ithaca WWTP Case Study' Rudenko, A, presented at the Annual NEWEA Conference, January 2017
- "Eastham's Integrated Approach to Nutrient Management – Initial Implementation and Next Steps" Janney, J, Crowley, J, Rudenko, A, presented at the Annual NEWEA Conference, January 2017
- "Reducing the Net Energy Consumption at an Energy Intensive Public Works Facility" Drainville, M, Rudenko, A, presented at the APWA New England Chapter Summer Conference, June 2015.
- "Tapping Into That Dirty Water – Opportunities in Wastewater Energy Recovery (WWER)" Rudenko, A, Drainville, M, presented at the Annual NEWEA Conference, January 2015.
- "Utilizing Excess Anaerobic Digester Capacity to Process Source Separated Organics – Three Case Studies" Rudenko, A, presented at the Annual NEWEA Conference, January 2014.
- "Applying the Envision Rating System to Wastewater Infrastructure – Chatham WPCF Case Study" Rudenko, A, presented at the NEWEA 2013 Annual Conference, January 2013.
- "Incorporating Sustainable Design Features into Wastewater Collection and Treatment Facilities", Wong, K. and Rudenko, A, presented at the NEWEA Energy and Plant Operations Seminar, May 2012
- "Total Organic Carbon Removal at a Municipal Wastewater Treatment Facility in Oak Bluffs, MA," Drainville, M. and Rudenko, A., presented at the New England Water Environment Association 2011 Annual Conference, January 2011.
- "Sustainable Water Treatment for Honduran Communities," Rudenko, A, presented at the NEWEA Annual Conference, January 2011
- "Reduce, Recover and Renewables: Three R's to Minimizing a WPCF's Net Energy Consumptions," Drainville M., Rudenko A, presented at the New England Environment Association/New York Water Environmental Association 2011 Joint Spring Meeting and Exhibition, June 2011

Papers

- 'Energy Recovery Using Raw Wastewater – Barnstable Pilot Project' Rudenko A et. al, published in the NEWEA Journal, Fall 2016
- "Reducing the Carbon Footprint of the Hyannis WPCF Through Renewable Energy Production and Energy Efficiency: Drainville, M, Rudenko, A, Saad, D, Doyle, P, published in the NEWEA Journal, Fall 2014
- "Innovative Strategies for Removing Total Organic Carbon in an Indirect Water Reuse Application – Town of Oak Bluffs, Massachusetts Case Study" Drainville, M., Rudenko, A., Mysore, C., published in the NEWEA Journal, summer 2012.

Work history

2010 - present	GHD, Hyannis MA
2009 - 2010	GHD, Orewa, New Zealand
2009 - 2010	GHD, Raleigh, NC

Fazle Rabbi, PE

Managing Engineer, Houston Water Planning, Houston Water, HPW, City of Houston, TX

Mr. Rabbi has over 38 years of experience in water resources planning, design, operations and management, with a major emphasis in municipal drainage, water & wastewater utilities master planning, design, operations and rehabilitation through the applications of hydraulic modeling, GIS, advanced predictive analytics, SCADA and O&M databases. Mr. Rabbi's vision is to complete the on-going development of a self-sustained world class next-generation planning team and processes involving state-of-the technologies for water & wastewater utilities within the City Operations.

Professional Expertise

- ✓ Water, Wastewater and Drainage Systems Hydraulic Modeling, Master Planning, Rehabilitation and Operations Support
- ✓ Strategic Asset Management and Advanced Predictive Analytics for Water and Wastewater Utilities.
- ✓ Utility Project/Program Management & Evaluation

Education

BS, Civil Engineering. 1981
Bangladesh University of Engineering & Technology

Registration/License

Professional Engineer, Texas

URS-Certified Project Manager

Professional Experience:

Water, Wastewater, Urban Floodplain and Drainage Systems Modeling, Planning, Rehabilitation and Operations Support

- ★ **Managing Engineer, Water and Wastewater Infrastructure Planning, Houston Water, City of Houston, TX, Ongoing** Leading the planning and operations team setting up an automated interactive dynamic analytics and reporting platform for the upcoming Consent Decree under an agreement with the EPA. Managed the in-house and consulting team to successfully to complete the citywide wastewater collection and transmission system calibrated hydraulic models using InfoWorks software, which is an essential tool for ensuring adequate hydraulic capacity of the wastewater infrastructure. Managed the in-house team to develop a long-range wastewater facilities consolidation plan and similar effort for developing a long-range water plan is currently in-progress. Managed building citywide all-pipe water transmission & distribution system calibrated model that is now being used to address low-pressure & water quality issues. The all-pipe model is used by in-house water modeling team on a regular basis for scheduled and emergency water system shutdown modeling, planning & scheduling. In addition to day-to-day system-capacity-related support, working closely with water & wastewater operations to establish a dynamic & live strategic asset management system to develop balanced repair, renewal & replacement and consolidation program for water & wastewater infrastructure minimizing the risk of failure. Also, working on developing a dynamic integrated platform for adaptive comprehensive planning, which will help identifying the needs as well as mitigation plans on a timely basis. Managing the team to support water & wastewater wholesale contract management and water rights assessment and acquisition of new water sources.
- ★ **Project Manager, Master Plan Development for Sanitary Sewer and Odor Control Systems for Upper Brays and West District Service Areas, City of Houston, TX, 2011-12** The City of Houston operates and maintains 40 plants treating an average of 250 MGD wastewater. The Master Plan study encompasses areas served by the 26.4 MGD West District WWTP and 18 MGD Upper Brays WWTP. The project tasks included performing a comprehensive capacity and conditions evaluation of sewer systems using the City's operations, work orders, facilities inspection, and incident databases, and InfoWorks modeling analysis, and a comprehensive odor control evaluation, developing and analyzing alternatives for odor control.
- ★ **Project Manager, Facility Plan Development, La Presa Colonia, TX, (Funded by USACE, Galveston District), 2012** The project involved developing a Facility Plan to provide water and wastewater services to the residents. The TWDB requires a completed, approved facility plan as part of an application for EDAP construction funding. Among other things, the facility plan described current conditions in a proposed project area; determines EDAP eligibility for the proposed project; evaluates various alternatives for bringing water and/or wastewater services to a project area; describes and selects the best alternative for providing services; estimates the cost of the selected alternative; and identifies permits, agreements and/or other issues needed for project completion.

- **Senior Modeler, InfoWorks CS Sanitary Sewer Model Calibration, Verification and Validation, Mill Creek & Pond Creek Watersheds, Cincinnati, OH (Metropolitan Sewer District), 2011-12** The project involved sanitary sewer model calibration and verification for 2007, and verification and validation for 2010, for both dry and wet weather hydrologic conditions. It also involved conducting QA/QC for Hite Creek watershed modeling performed by others.
- **Technical Reviewer, H&H Modeling, Minne Lusa Stormwater Conveyance and Detention Basin Improvements. City of Omaha, NE, 2011** The project involved H&H modeling using XP-SWMM and InfoWorks to provide a range of results to perform cost-effective infrastructure design.
- **Project Manager, Hydraulic Modeling Training Workshop, City of Houston, TX, 2009** Hands-on training workshop included hydraulic model development and applications for collection system operations and management utilizing InfoWorks software, City's O&M databases and GIS. The training workshop was conducted over a 3-month period.
- **Project Manager, Integrated Water and Wastewater Master Plan Development, City of Laredo, TX, 2008-10** The City of Laredo's estimated population for 2007 is 217,506. The TWDB projected population growth to 450,000 in 2040 and 650,000 in 2060. The existing water system includes 681 miles of water pipes, 18 booster stations, 8 ESTs and 3 treatment plants. The existing wastewater systems include 515 miles of sewer pipes, 70 lift stations and 5 treatment plants. The project involved identification and correction of existing deficiencies, and identification and sequencing of future expansions to accommodate growth. The InfoWorks™ CS and WS software were used for hydraulic modeling. The project identified and prioritized cost-effective water and wastewater infrastructure to accommodate future projected population growth during 2010-60 for the City of Laredo.
- **Project Manager, Sanitary Sewer Overflow (SSO) Program Development for the Wastewater Systems, City of Laredo, TX, 2009** The TCEQ has developed a SSO Outreach Initiative (an alternative approach to implement CMOM) to reduce the number of SSOs that occurs each year in Texas. Participation in this program is entirely voluntary and it allows municipalities to improve the infrastructures on an agreed upon schedule. Mr. Rabbi led the URS Team to develop SSO Plans for two WWTP Service Areas of the City of Laredo. It involved a detailed analysis of the available historical SSO data, type and condition of the collection system pipelines, and operating conditions of the lift stations. It included examining the relationship between SSO locations, land use and location, age and conditions of the infrastructure and contributing area. Mr. Rabbi identified several measurable and verifiable activities and developed a 10-year plan and schedule for the collection system maintenance and management. The City is currently implementing SSO Plans under an agreement with the TCEQ.
- **Senior Project Manager, Public Works & Engineering, Utility Planning Analysis Branch, City of Houston, TX, 2005-08** In October 2005, Mr. Rabbi was hired by the City to lead the City's new initiative to develop an in-house hydraulic modeling group for enhanced planning, design and operations of the City's 32 million-LF collection system that includes 40 treatment plants (permitted capacity of 564 MGD) and 420 lift stations. The modeling group on a regular basis builds InfoWorks™ models, monitors system performance, conducts collection system performance evaluation and recommends cost-effective solutions through alternatives analysis. They provide hydraulic analysis support to City's engineering design consultants, analyze impacts due to new developments, and identify critical facilities for rehabilitation. The group also conducts special studies for strategic planning and operational improvements. Mr. Rabbi led the group to develop an emergency response plan for the wastewater lift stations to maintain continuous operation during power outages utilizing a limited number of available mobile diesel generators. In less than three years, the modeling group was expanded to seven engineering staff.
- **Task Manager, Master Plan Development for Wastewater Systems in Greater Almeda Sims and Kingwood Service Areas, City of Houston, TX, 2004-05** Mr. Rabbi led the development of master plans for five wastewater service areas. It includes a total of 1125 miles of sewer pipes, 85 lift stations and 5 WWTPs. InfoWorks™ CS models were used for the hydraulic analysis that involved: performance evaluation of the existing sewer facilities and identification of system bottlenecks; evaluation of hydraulic response for possible alternatives; sewer basin prioritization for I&I reductions; identification of collection system improvements; identification of facilities for future projected population growth. The study examined various alternatives for treatment plant consolidation with current and target levels of I/I in the system before recommending a cost-effective road map for infrastructure development.
- **Modeling Manager, Hydraulic Model Development Program for Houston's Wastewater Collection System, City of Houston, TX, 2002-05** In 2002, the City of Houston decided to develop detailed hydraulic models suitable for infrastructure planning as well as regular operations and management of collection system flows. The InfoWorks™ modeling software was selected for the purpose. The development of hydraulic models involved application of the state-of-the-art technologies, RADAR rainfall, LIDAR ground elevation data for improved results. The project also

included field verifications of the actual operating conditions of key infrastructure. It also used City's SCADA and O&M databases. Mr. Rabbi led the development of service area models for approximately 55% of the City's 32-million LF collection system networks. The completed service areas include: Sims Bayou (30,000 ac), Kingwood (8,000 ac), Greater Almeda Sims (50,000 ac) and Northeast (9,000 ac). The models included a combined total of 3.6 million LF of pipe ranging from 8 to 84 inches and 14,500 manholes. It involved intensive monitoring for 326 flow meters & 82 rain gages, physical inspection & GPS survey for 4,450 manholes, pump tests & operations monitoring for 120 lift stations.

- **Task Manager, Evaluation of the Greater Houston Wastewater Program (GHWP), City of Houston, TX, 2000-02** The City of Houston implemented a $ 1.2 billion GHWP during 1992-97 to control excessive wet weather flow in the collection system. The evaluation phase was designed to identify facilities improvement at the basin level through detailed field investigations and re-monitoring of the collection system flows.
- **Project Manager, Drainage Master Plan, Formosa Plastic Plant, Baton Rouge, LA, 2008** The Formosa Plant has 5 pump stations and about 27,700-LF of storm sewer pipe ranging in diameter from 18 to 36 inches and 1,600-LF of open trench for conveying storm water. A hydraulic model was built for the existing drainage system using EPA-developed SWMM software to study the response of the 25-year, 24-hour design storm. Mr. Rabbi recommended several capital improvements and O&M activities. The project also identified level of flooding risks for each critical facility inside the plant boundary in the case of pump failure during storm events.
- **Task Manager, Replacement of American Canal, U.S. International Boundary Water Commission (IBWC), El Paso, TX, 2002** The Riverside Dam was constructed in 1928 as part of the Rio Grande Federal Irrigation Project. The original dam, weir and diversion structure failed in 1987 due to high flows in the Rio Grande River. In 2000, the IBWC contracted MWH to provide a design of a structure that can be properly operated and maintained, replacing the existing structure. The project involved developing alternatives for removal and replacement of the existing diversion dam structure with a grade control structure combined with diversion structures and storage structures. HEC-RAS software package was used for modeling analysis.

Engineering Design & Construction Management

- **Task Manager, Water & Wastewater Utility Design, IH35 Expansion at Temple, TX, 2011** The project involves expansion of existing four-lane freeway to six-lane freeway with two-lane frontage roads on each side. Mr. Rabbi is managing the URS Team to evaluate the impacts of the proposed project on the existing water and wastewater utilities and to perform detailed design, prepare construction specifications and cost estimate of the water and wastewater pipelines for the proposed conditions.
- **Task Manager, Water & Wastewater Utility Design, US 290/Hempstead Corridor, Segment-2, Houston, TX, 2010-11** The project involves expansion of existing four-lane Hempstead highway to four-lane toll road with frontage roads on each side. Mr. Rabbi is managing the URS Team to evaluate the impacts of the proposed project on the existing water (approx. 13,000-lf) and wastewater (approx. 23,500-lf of sewer lines and a pigging station) utilities and to perform detailed design, prepare construction specifications and cost estimate of the water and wastewater pipelines for the proposed conditions.
- **Task Manager, Replacement of American Canal, U.S. International Boundary Water Commission (IBWC), El Paso, TX, 2002** The American Canal, located in El Paso, Texas was originally constructed in 1940's to divert 1200 cfs of water from the Rio-Grande River under an agreement between the USA and Mexico. The structure has experienced damage over time, and also the IBWC desired to increase the design capacity of the 2-mile long canal from 1200 cusecs to 1535 cusecs. In 2000, the IBWC contracted MWH to investigate and recommend replacement alternatives. HEC-RAS software package was used for modeling analysis.
- **Project Manager, Master Street and Drainage System Planning and Design, Storage Terminal, OilTanking, Texas City, TX 2008** The project involved evaluation of the existing drainage system and identification of the needed improvements. The project also involved detailed design of street layouts, drainage conveyance systems and a pump station.
- **Field Manager (Civil), Fertilizer Plant #4, Baijee, Iraq, 1986-90** The US $500 million project involved constructing a 1000 tons/day Ammonia plant, 1750 tons/day Urea plant, and full utilities and offsite facilities. Mr. Rabbi coordinated the construction of; 30 km pipeline to carry water from the Tigris River to the plant, access roads for the plant, 7 km in total length, and storm water drainage system, a total length of 22 km. At the final stage, Mr. Rabbi was responsible for issuing Taking-Over Certificates and to monitor the Defects Liability Period for civil works.

Water Resources Planning and Management (Overseas)

- **Institutional Development in Bangladesh, 1995-99** Mr. Rabbi is one of the key members that helped building Surface Water Modeling Center (now renamed as Institute of Water Modeling), a not-for-profit self-sustained organization, as a respected organization in the Southeast Asia. Mr. Rabbi coordinated the development of strategic business goals that helped the organization grow revenue three times in three years.
- **National Water Management Plan, Bangladesh, 1997-99** Mr. Rabbi led the planning analysis that involved hydraulic modeling for river and coastal hydraulics, river and coastal morphology and salinity, consumptive use of surface and groundwater to develop the 1999 National Water Management Plan for the Bangladesh.
- **Water Resource Management Study for Dhaka City, Bangladesh, 1996-97** The Dhaka City, the capital of Bangladesh with a population over 10 million (in 1996) suffers from shortage of safe drinking water, 95% of which comes from groundwater. The groundwater has been in overdraft for many years. The use of surface water to supplement the groundwater was an urgent issue in 1996. Mr. Rabbi led a study that analyzed both surface and groundwater resources (both quantity and quality). A consumptive use of surface and groundwater was recommended by Mr. Rabbi for long-term sustainability of the greater Dhaka City.
- **Flood and Drought Management in Bangladesh, 1995-1999** Bangladesh suffers from flood during rainy season as well as drought during dry weather season. Mr. Rabbi led planning studies for numerous projects in Bangladesh addressing chronic flood and drought issues.
- **Flood Management Modeling (FMM), Bangladesh, 1992-94** Bangladesh experienced disastrous floods in 1987 and 1988. The 1988 flood inundated over 60% of the country. Following the devastating floods of 1987 and 1988, the Government of Bangladesh undertook a comprehensive review of flood policy and flood protection measures. The objective of the FMM was to establish an improved analytical basis for flood management by developing a modeling system suitable for the rivers and floodplains in Bangladesh. Mr. Rabbi participated in the development of a modeling system by integrating MIKE11 river model and GIS (Arc INFO) to produce flood maps for the rivers and floodplains in Bangladesh. The computer generated flood maps provided depth, duration and extent of flooding at discrete time interval under different hydrological conditions. FEMA adopted the methodology later for developing Flood Insurance Rate Maps for managing floodplains in USA.
- **Flood Hydrology Study, Bangladesh, 1990-92** Bangladesh experienced disastrous floods in 1987 and 1988. The 1988 flood inundated over 60% of the country. Following the devastating floods of 1987 and 1988, with the help of international communities the Government of Bangladesh undertook a comprehensive review of flood policy and flood protection measures. Mr. Rabbi performed the Flood Hydrology Study to develop a uniform hydrological basis for engineering design for the facilities along the major rivers in Bangladesh. The country-wide river models were used extensively to generate the required design parameters based on historical hydrological conditions.
- **India-Bangladesh Joint Rivers Commission (JRC), Bangladesh, 1981-86** The JRC is responsible for helping the respective countries for managing water resources of 54 rivers common to both countries. Mr. Rabbi was involved with several studies undertaken by the Commission, such as determining available flow based on historical data, water demands, selection of suitable methods for river flow measurement etc. Mr. Rabbi also participated in the implementation of the Ganges water sharing agreement signed between the two countries by monitoring river water discharge measurement and appropriate release according to the agreement.

MINI GEORGE PANICKER, PMP, P.E.
A successful engineer with a proven record in Wastewater Project Management
Tel: (313) 267 8996
Email: mini.panicker@glwater.org

ACADEMIC QUALIFICATIONS

M. S. (1999) **Wayne State University,** Detroit, MI

LICENSES/SKILLS

- Certified Project Management Professional
- Certified Professional Engineer, State of Michigan
- Certified Soil Erosion and Sedimentation Control Inspector
- Management of Large Wastewater Projects

PROFESSIONAL EXPERIENCE

Project Manager/Project Engineer (2016-Present) **Great Lakes Water Authority**
Detroit, MI

- Led very large capital improvement program projects and critical needs projects for approximately 944 square miles of the GLWA regional collection system
- Position included a variety of responsibilities including project management and engineering in the wastewater collection system and water transmission system

Sr. Associate Chemical Engineer (2013- 2015) **Water and Sewerage Department**
Detroit, MI

- Lead Wastewater Engineer for DWSD System Control Center.
- Provided technical support required to maintain the efficiency and effectiveness of the DWSD sewer collection system and the wastewater treatment facility in meeting water quality standards as mandated by the Environmental Protection Agency and the Department of Environmental Quality.
- Led capital improvement program projects, small capital projects, and critical needs assessment program projects
- Monitored and generated monthly GDRSS billing volume data for DWSD and its suburban customers

Associate Chemical Engineer (2004- 2013) **Water and Sewerage Department**
Detroit, MI

- Reviewed and critiqued proposals, plans, and designs related to wastewater treatment systems.
- Provided recommendations to reduce overall level of equipment and facility ownership cost
- Monitored and generated monthly GDRSS billing volume data for DWSD and its suburban customers
- Optimized preventive maintenance program
- PCB/Mercury minimization program
- Led capital improvement program projects and critical needs assessment program projects for the wastewater treatment plant
- Optimized preventive maintenance program
- Led process safety management and risk management programs

Project Manager (2010- 2011) **Water and Sewerage Department**
Detroit, MI

- Ran $15 million maintenance projects for the wastewater plant
- Project management for WWTP contracts as required (skilled trades, equipment testing, etc.) including contract procurement
- Created equipment replacement schedule for capital improvement projects
- Managed the predictive maintenance program
- Reduced equipment downtime by enhancing preventive maintenance program

Sr. Asst. Chemical Engineer (1999-2003) **Water and Sewerage Department**
Detroit, MI

- Investigated materials discharged into the collection system, analyzed its effects and developed methods of treatment and disposal for the compliance of NPDES permits
- Conducted water quality studies to identify and characterize water pollutant sources
- Analyzed and recommended sludge treatment and disposal methods
- Researched new and innovative technologies for treatment processes and made appropriate recommendations for the compliance with the Clean Water Act and the Clean Air Act

Water System Chemist (1997-1999) **Water and Sewerage Department**
Detroit, MI

- Monitored water quality to meet NPDES discharge permits
- Supervised and monitored chemical addition for the safe return of treated water to the environment
- Determined sludge volume index, oxygen uptake rate, total residual chlorine, coliform bacteria, and pH of the water effluent
- Conducted gravimetric analysis of total, suspended and volatile solids for water quality monitoring

Volunteering (1998-Present) **St. Thomas Orthodox Church**
Warren, MI

- Worked in the Women's Spiritual Organization
- Tutored young children

REFERENCES available upon request

Daniel Rodriguez, P.E., SPRAT I

Asset Management Support – Inspection Oversight – Facility and Pipeline Condition Assessment – Field Engineering – Pipe Rehabilitation Design

Daniel has 3 years of experience as a condition assessment engineer in the Condition Assessment Group at Black & Veatch. Since joining the group, he has conducted numerous civil, structural, and mechanical condition assessment assignments to determine the remaining useful life of assets and make O&M recommendations to clients. These assignments have included both linear and vertical assets. He received his SPRAT certification in 2018 to facilitate inspections requiring rope access. He also has experience with trenchless and conventional pipe rehabilitation design.

PROJECT EXPERIENCE

City of Livermore | Lift Station and Pump Station Condition Assessment; Livermore, CA | December 2019 - Present

Condition Assessment Engineer. B&V is responsible for performing condition assessment inspections of sewer and storm lift stations, as well as potable water pump stations. Services include:

- Inspecting 4 sewer lift stations, 3 storm water lift stations, and 4 potable water pump stations using non-destructive inspection techniques.
- Providing a condition assessment report, along with O&M and capital improvement recommendations, and an associated Class 5 OPCC.

San José - Santa Clara Regional Wastewater Facility | Yard Piping and Road Improvement Project; San José, CA | June 2018 - Present

Project Engineer. B&V is responsible for providing condition assessment, pre-design, and design services for the rehabilitation of buried process yard pipes and roadways at the RWF. Services include:

- Producing a Conceptual Design Report that includes design criteria, a Class 5 OPCC, and recommendations that will drive the condition assessment, design, and construction activities.
- The review of condition assessment inspection plans and oversight of inspections.
- Design of all process pipes and roadways requiring rehabilitation.
- Contract support and construction phase services.

Metropolitan Council Environmental Services | Blue Lake Wastewater Treatment Plant Final Stabilization Facility Condition Assessment; Shakopee Minnesota | November 2018 – March 2019

Condition Assessment Engineer. B&V performed a condition assessment inspection of a Final Stabilization Facility, capable of producing 53.3 dry tons/day of biosolids. Responsibilities of the inspection included:

- Visually inspecting the condition of approximately 400 assets at the biosolids facility of the Blue Lake WWTP.
- Performing Ultrasonic Thickness testing of the high-wear pieces of equipment.
- Assisting in writing a report that includes the condition of the existing infrastructure, as well as repair/rehabilitation recommendations for the Client.

OFFICE LOCATION
Walnut Creek, CA

EDUCATION
MS, Environmental Engineering, University of Southern California, 2013

BS, Civil Engineering, University of Southern California, 2012

PROFESSIONAL REGISTRATION
P.E. – 2019, CA, #C99123
SPRAT I – 2020, #171025

CERTIFICATIONS
NAASCO PACP/MACP

PROFESSIONAL ASSOCIATIONS
PUG
CWEA
ASCE

YEAR CAREER STARTED
2013

YEAR STARTED WITH B&V
2013

LANGUAGE CAPABILITIES
English & Spanish

ADDITIONAL INFORMATION
Accomplished classical pianist
National Hispanic Scholar
Wilderness First Aid Certified
Member of Society of Hispanic Professional Engineers
Avid Rock Climber

Contra Costa Central Sanitary District | Solids Handling Facilities Improvement Project; Concord, CA | June 2018 - Present

Condition Assessment Engineer. B&V was responsible for the inspection of Thickened Waste Activated Sludge (TWAS), centrifuge feed, and potable water lines. Condition assessment test methods included visual observations, ultrasonic thickness testing, and coating thickness measurement. Certain lines were taken offline, and fittings were removed so that a pushrod camera could be inserted into the pipe. A condition assessment report was written that included the condition of the existing lines, as well as capital improvement and O&M recommendations.

San José - Santa Clara Regional Wastewater Facility | Advanced Facility Control and Meter Replacement Project – Phase 1; San José, CA | May 2018

Condition Assessment Engineer. B&V performed non-destructive condition assessment tests on existing concrete structures to determine their suitability for anchorage for new instrument panels. Tests that were conducted include surface penetrating radar to measure rebar cover, slab impulse response to detect any concrete delamination, and rebound hammer to determine approximate concrete compressive strength. A comprehensive report was written to explain test results and validate the test sites as appropriate candidates for anchorage.

Coachella Valley Water District | Asset Inventory and Related Services Project; Coachella Valley | March 2018 – Present

Condition Assessment Engineer. B&V was retained to perform asset inventory of horizontal and vertical assets for CVWD. Major tasks include the following:

- Provide a photograph, condition rating, and GPS information for sanitary and potable assets, including manholes, valves, hydrants, and vertical assets at wastewater treatment plants.

San Francisco Public Utilities Commission | O'Shaughnessy Outlet Works Access & Drainage Improvements Subproject; Mather, CA | October 2017 – July 2018

Condition Assessment Engineer. The Access & Drainage Improvements Subproject included work elements that are related to improving safety, access, and drainage inside of O'Shaughnessy Dam, summarized as follows: Replace Access Structures in Ladder Wells, Install Fall Protection Systems, Seal or Mitigate Existing Leakage, Drainage Improvements, and Replace Watertight Door between Ladder Wells 3 & 4. Visual assessments were performed on the above assets, and a report was written, complete with observations, and CIP recommendations.

San Francisco Public Utilities Commission | O'Shaughnessy Dam Spillway Condition Assessment; Mather, CA | October 2017 – July 2018

Condition Assessment Engineer. B&V was responsible for the inspection of the spillway structure at the O'Shaughnessy Dam. The inspection consisted of using ropes to access all areas of the spillway structure. Inspection methods performed were visual inspection, slab impulse response, and hammer sounding. A condition assessment report was written, which detailed the inspection findings and repair recommendations.

San José - Santa Clara Regional Wastewater Facility | San Jose Digester and Thickener Facilities Upgrade Project; San Jose, CA | 2017 – Present

RFI and Submittal Coordinator. Coordinate B&V's responses to received RFIs and Submittals. Responsibilities include:

- Review RFIs and Submittals from a civil perspective.
- Coordinate the review of different disciplines and ensure RFIs and Submittals are responded to within the contractually required review period.
- Visit the site to meet with the CM/Contractor/Client when a design detail needs to be field verified, or when otherwise required.

The City of Phoenix | Cave Creek Wastewater Reclamation Plant Condition Assessment; Phoenix, AZ| August 2017 – May 2018

Condition Assessment Engineer. B&V inspected a mothballed 8 MGD wastewater reclamation plant and write condition assessment reports. Responsibilities include:

- Visually inspect the condition of approximately 2,000 assets at a wastewater reclamation plant.
- Coordinate confined space entry for structural inspection subcontractor.

- Assist in writing a report that includes the condition of the existing infrastructure, as well as repair/rehabilitation recommendations for the Client before re-starting the plant.

The City of Folsom | Wastewater Lift Station Condition Assessment; Folsom, CA| August 2017 – February 2018

Condition Assessment Engineer. B&V inspected 15 wastewater lift stations and wrote a condition assessment report. Responsibilities include:

- Use confined space entry equipment to visually assess confined spaces associated with lift stations, including wet wells and grinder pits.
- Visually assess and use ultrasonic thickness gauge to inspect mechanical equipment at the lift stations.
- Assist in writing report that includes field findings, as well O&M and capital improvement recommendations to the client and their associated costs and timeframes.

The City of San Diego | Programmatic Water Transmission Pipeline Condition Assessment; San Diego, CA | 2016

Condition Assessment Engineer. B&V inspected steel concrete reinforced wrapped pipe and write condition assessment reports. Responsibilities include:

- Use slab impulse response and sounding hammer to determine condition of the interior reinforced concrete coating of the pipe.
- Assist in writing report that includes field findings, as well O&M and capital improvement recommendations to the client and their associated costs and timeframes.

Minera Escondida Limitada and BHP Billiton, Escondida Water Supply Project (Seawater Desalination Project), Definition Phase Study, Antofagasta, Chile | 2013 - 2016

Turnover Coordinator. Support start-up activities of a 2,500 L/s (approximately 57 mgd) Seawater Reverse Osmosis (SWRO) Desalination Plant in Antofagasta, Chile. Responsibilities include:

- Assemble turnover packages for 70 plant systems that B&V is responsible for pre-commissioning.
- Facilitate the closure of B&V punchlist items, typically questions about design.
- Receive systems from construction to be able to begin pre-commissioning tests of systems.
- Lead walkdowns with the client (BHPB) to be able to turn systems over to them, and start with commissioning activities.

Civil Staff Resident Engineer. Assist with oversight of the construction of 2,500 L/s Seawater Reverse Osmosis Desalination Plant and associated facilities under EPC delivery method. Responsibilities include:

- Attend weekly engineering meetings with Client, providing updates on critical B&V deliverables.
- Communicate internal design changes to Contractor, and ensure that the changes are actually implemented during construction, mainly through Field Engineering Change Notices.

Lead numerous weekly walkdowns to ensure our design is being followed during construction, preventing costly re-work.

Civil Engineer (2013 to 2014) | Off-shore location | Kansas City, MO. Support lead engineers during the design process of a 2,500 L/s (approximately 57 mgd) Seawater Reverse Osmosis (SWRO) Desalination Plant in Antofagasta, Chile. Responsibilities include:

- Review, and coordinate the review of, technical submittals and RFIs.
- Provide general support with updating drawings and specifications.
- Lead various other civil fronts, including an MR package and drainage design.
- Coordinate building and sanitary permits for construction of facilities on site.

Tim Schutz, PE

TimSchutz.TS@gmail.com ❖ (614) 557-4855 ❖ Returning to Detroit in 2021

CORE SKILLS

Water Treatment and Hydraulics | Large Project Coordination | Project Management

QUALIFICATIONS AND PROFESSIONAL ASSOCIATIONS

18 years in consulting; 11 years as a professional engineer; more than 6 years of onsite construction inspection
Certified Project Manager within Arcadis, Registered Professional Engineer in Ohio and Michigan
Certified Construction Documents Technologist (CDT)
Former Chair of the American Water Works Association, Ohio Section, Southeast District (2015 – 2018)

PROJECT EXPERIENCE

Water Master Planning Study
City of Newark, Ohio
Currently in progress

- Estimating water demands in the City's growth areas. Performing business case evaluation for water infrastructure. Meeting with the City and local stakeholders to determine projected growth, coordinating an update of the hydraulic model, and comparing capital costs to revenue. Reporting results and recommendations.

Fourth Street Combined Sewer Separation
City of Newark, Ohio
2019 Currently performing construction administration.

- Project manager for replacement of more than one mile of 130-year-old brick sewer with new storm and sanitary pipes. The design set the stage for future separation of the entire sewershed. The work includes consolidation of two combined sewer overflows (CSOs) into one structure with flood control features, modifications to a pump station, replacement of water distribution pipe, and new road and streetscaping with roundabouts at intersections, green infrastructure, and pedestrian-friendly features. Sewer and water pipes will be installed by jacking and boring underneath an active railroad and flood control levee. I lead the conceptual design, detailed design, permitting, bidding, and construction.
- The design was completed under budget and on time.

Well Pump Replacement Study
City of Columbus, Ohio
2019

- Project management and design. Performed preliminary design for replacement of eight 200-hp to 250-hp vertical turbine pumps in three horizontal collector wells. Coordinated with our hydraulic modeling team to develop and validate a model of the entire raw water pumping system. Evaluated variable frequency drives versus pressure sustaining check valves. Compared historical pumping data to the rate structure to accurately predict operation costs and minimize demand charges. Provided new flow monitoring and controls.

Riverbank Filtration Study
City of Newark, Ohio
2018

- Project manager for the implementation of riverbank filtration for the City's source water. Together with a hydrogeologist, we determined the necessary size and quantity of collector wells and piping. We performed a field study and obtained regulatory and land owner buy-in.

Reservoir Condition Assessment and Upgrades
City of Findlay, Ohio
2018

- Process mechanical design and planning. Evaluated in-situ pipe inspection technologies for a critical water supply pipe. The five-mile concrete gravity pipe connects the WTP to the reservoirs. Identified deployment sites for hot-tapping and inserting free-swimming robotic tools to assess for leaks and air pockets. Generated a plan and cost estimate for the condition assessment and upgrades to critical valves and vaults that are used to manage the reservoirs. Coordinated with regulators and obtained approval for the upgrades.

ODOT State Route 16 / Mt. Vernon Road Sewer Upgrades
City of Newark, Ohio
2017

- Conceptual scoping, detailed design, permitting, bidding assistance, and construction administration for 2,400 linear feet of sewer separation and 1,200 linear feet of water line replacement. Tailored drawings and specifications to conform to Ohio Department of Transportation requirements and coordinated with a separate consultant who performed the roadway design.

Well Number 14 Upgrades
City of Evart, MI
2016

- Process mechanical engineering. Investigated the existing groundwater pumping system and recommended a 100-horsepower vertical submersible pump based on hydraulic requirements and client preference. Hydraulic calculations accounted for interaction with an existing pump station. Wrote a technical memorandum which served as basis-of-design and helped obtain regulatory approval.

Downtown Renovation – Phase I
City of Newark, Ohio
2015

- Design lead. Successfully lead the renovation of the downtown Courthouse Square which helped spur economic development.
- Employed an integrated approach to separate 3,800 linear feet of combined sewer, consolidate water lines, reconfigure traffic patterns, and add green infrastructure and pedestrian-friendly features. Selected alignment and designed the buried utilities, oversaw the detailed design for all disciplines, and oversaw construction including coordination with engineering subconsultants. I lead all permitting, pipe condition assessment, and site investigations for the buried infrastructure including soil borings, buried utility mapping, structural investigations, and archaeological investigations. I developed an accurate estimate of cost and provided a smooth bidding process for this complex project. The project was recipient of a 2018 ACEC Engineering Excellence Honor Award.
- My team was selected by the City of Newark for follow-up work.

Sodium Hypochlorite Storage and Distribution System
City of Grand Rapids, Michigan
2014

- Study and design lead. Performed a study to evaluate disinfection alternatives including onsite generation of low-strength and high-strength sodium hypochlorite. Preliminary design and a cost-benefit analysis included the possibility of selling high-strength chemical to surrounding utilities. The result was selection of a 60,000-gallon bulk sodium hypochlorite storage and feed system. I designed the system to be retrofit into an existing chemical feed facility and provided construction administration and startup support.

Membrane Element Replacement
City of West Carrollton, Ohio
2013

- Lead the selection of replacement low-pressure membrane elements. Performed hydraulic analysis and optimized use of a throttling valve to maintain system pressures.

Lebanon Pump Station
Greater Cincinnati Water Works
2012 - 2013

- Process mechanical designer. Designed a 5.7-mgd water distribution booster pump station; expandable to 7.0-mgd. The pump station includes horizontal centrifugal, constant-speed pumps, an overhead crane, and a sodium hypochlorite feed system. I selected the combination of pumps to cover the flow range without variable speed control.

Raccoon Creek Sewer Separation
City of Newark, Ohio
2012

- Design lead. I performed conceptual design, detailed design, bidding services, and construction administrative services for one mile of dual 48-inch diameter gravity sewers within a floodway corridor. The sewer has limited pipe cover between the river and an Army Corps levee. The sewer crossed gas transmission mains, two road bridges, water lines, and other trunk sewers. Four inverted siphons and three river crossings were included.

Thomas E. Steward Water Treatment Facility Improvements
Del-Co Water Company, Inc.
2012

- Assistant project manager for a study, detailed design, and construction administration to re-rate the water treatment plant from 4.3 to 6.0 mgd.
- Lead all phases of the project and determined hydraulic, chemical feed, and electrical upgrades necessary to re-rate the plant and improve monitoring and controls. I designed improvements which included selective replacement of three of five high service pumps and incorporation of variable frequency drives. Planned and implemented a construction sequence with the owner which caused no interruptions to customers. I worked with regulators and obtained approval of the WTP capacity re-rating.

370,000-gallon Clearwell
City of West Carrollton, Ohio
2011

- Design lead. Performed preliminary engineering, detailed design, and construction administration services for a new buried, cast-in-place concrete clearwell. I lead a study to determine the best type of tank for the application, determined the geometry to ensure adequate volume, and laid out yard piping and the valve vault. Updated the owner's front-end construction contract documents to meet EJCDC standards.

La Virgencita Water Treatment Plant Rehabilitation – Phase II
Puerto Rico Aqueduct and Sewer Authority
2011

- Lead the design of a new horizontal collector well and pumping station. Designed the pump station to operate hydraulically within an existing raw water pipe network with two other pumping stations. Coordinated the design of the collector well installer, hydrogeologist, structural engineers, and electrical engineers.

Shades Mountain Filter Plant Upgrades
City of Birmingham Water Works Board, Alabama
2010

- Process mechanical designer. Designed "liquid lime" feed system and chemical feed piping across the site.

Membrane Pilot Testing
City of Delaware, Ohio
2009 - 2010

- Ran and maintained an onsite, high-pressure membrane and high-rate iron removal pilot skid. Responsibilities included initial calibration of the system to meet projected values, maintenance, troubleshooting, data collection, and data analysis. I performed daily maintenance and testing, changed out membrane elements, calibrated and adjusted chemical feed and backwash rates to optimize performance.

Carson Filter Plant Upgrades
City of Birmingham Water Works Board, Alabama
2008 - 2009

- Process mechanical designer. Designed an all new chemical feed facility for all plant chemicals including a "liquid lime" feed system and onsite generation of sodium hypochlorite. Designed new raw water flow control and pretreatment infrastructure. Redesigned the plant water and sample taps for the entire plant. Updated process and instrumentation drawings and established asset management numbering system for all valves at the WTP. Developed an in-house design guidance manual for sodium hypochlorite onsite generation systems.

Sodium Permanganate Feed Facility
City of Findlay, Ohio
2009

- Design lead. Designed a stand-alone, remote sodium permanganate feed facility which controls the spread of zebra mussels in Ohio's largest up-ground reservoir. Determined the required dose from pilot testing data, laid out the facility, selected equipment, and accurately calculated the hydraulics. I coordinated with the Owner to ensure the facility is low maintenance while preventing zebra mussel growth on the reservoir's raw water intake. Innovative construction techniques were employed to avoid penetrating the existing levee.
- This was the first operational application of sodium permanganate for zebra mussel attenuation in the nation.

Campbellsville Landfill Closure
Kentucky Department of Environmental Protection
2007 and 2008

- Resident project representative. Lead the on-site engineering and inspection for Kentucky's largest landfill closure (80 acres). Construction included relocation of waste, soil testing, construction of a complete landfill cover system, clay perimeter berms, leachate collection system, landfill gas collection system, water monitoring wells, and a flexible membrane liner.

Sana Muerto Filtration Plant Upgrades
Puerto Rico Aqueduct and Sewer Authority, Orocovis, Puerto Rico
2006

- Detailed design lead. Designed upgrades to the water treatment plant including a new, standalone membrane filtration plant, a packaged conventional water pretreatment plant, chemical feed, and pumping systems. I designed the new facilities, laid out the yard piping, and lead the specialty engineering disciplines. I calculated the hydraulic conditions and selected equipment for the new treatment processes. I developed the room layout for the membrane facility and sized the building. I created a construction sequence that allowed the plant to stay in operation during construction.

Rock Mill Corporate Park – Part 2 Phase 2
City of Lancaster, Ohio
2005

- Resident project field representative for construction of a two-million-gallon water storage tank, 21,000 feet of 16-inch and 12-inch diameter water pipe, and 8,000 feet of 12-inch to 18-inch gravity sewer. The project included a 1,300-foot 21-inch diameter pipe installed by directional drilling under a freeway, as well as three smaller directional drills.

Delphos Water Treatment Plant Upgrades
City of Delphos, Ohio
2004

- Task lead. The work included construction of a reservoir and plant improvements to add activated granular carbon treatment. I reviewed the contractor's bill of materials and pipe schedule for the activated carbon system and wrote the stormwater plan for the reservoir work.

Olentangy Water Treatment Plant
Del-Co Water Company, Inc.
2003

- Task lead. Reviewed shop drawings and answered engineering questions from the contractor during construction of this new 19.2-mgd water treatment plant and surface water intake pump station. Performed field inspection during construction and shop drawing reviews.

Long Term Control Plan, Overall Engineering Coordination
City of Columbus, Ohio
2003

- Field technician. Wet weather sample collection from rivers during storm events. Maintenance and calibration of in-situ river water quality and water level monitoring equipment.

Jennings Tar Pit
Michigan Department of Natural Resources
2002

- Resident project representative. Observed offshore sheet piling installation, dewatering of a lakebed, and removal of contaminated soil.

SKILLS & INTERESTS

- **Skills:** Proficient with Esri ArcGIS. Knowledge of AutoCAD Civil 3D and Bentley Systems Microstation.
- **Interests:** Cycling; fishing; hiking. Tinkering with various hobbies. Very interested in living closer to the U.P.