

Task Order No. – 2019-03

High Lift Pumps – Pump Shutdown Test

**In accordance with
Agreement
For
On-Call Engineering Services
Dated _____
By and Between
T&B Engineering, P.C.
and
Poughkeepsies' Joint Water Project Board**

1. Scope of Work:

ENGINEER shall provide services in association with conducting a pump shutdown test for the future evaluation and design of pipe restraints and surge suppression system modifications, if necessary, for High Lift Pumps as described and clarified in the attached scope of work dated November 4, 2019.

2. Time Schedule:

ENGINEER anticipates a 4-week schedule for the project if ENGINEER receives all the items in Subtask 1.1 and the valves for surge tank have been tested when the project is authorized, with an anticipated authorization date of November 15, 2019

3. Compensation

Services shall be provided on an hourly plus expense basis with a budget allocation of \$ 8,400. Invoicing will be in accordance with the terms of the AGREEMENT.

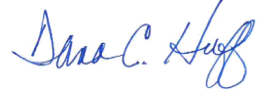
Accepted by:

POUGHKEEPSIES' JOINT WATER PROJECT BOARD

Authorized Representative

Date

T&B ENGINEERING, P.C.



Dana C. Huff, Director

11/4/2019

Date

Task Order No. 2019-03 –High Lift Pumps – Pipe Movement Evaluation Assistance SCOPE OF WORK – November 4, 2019

In response to your request, the ENGINEER has provided this task order scope for engineering services for assistance with evaluating the cause of the movement of piping beneath the High Lift Pumps at the Poughkeepsie Water Treatment Facility (WTF). This scope includes 1) preliminary review of existing surge protection components, 2) assistance with a shutdown test and 3) recommendation of next steps.

Background

The operators and maintenance personnel at the Poughkeepsie WTP have noticed the movement of the piping in the High Lift Pump Building beneath the pumps when the pumps stop abruptly due to a power failure. It appears that this phenomenon is due to hydraulic transients. There is an existing surge tank system that was designed to mitigate transients. The existing surge tank was installed outside at the southwest corner of the High Lift Pump Building in 2003, along with modifications to the piping for the High Lift Pumps. According to the plant personnel, the surge tank appears to operate when the High Lift Pumps start but not when the pumps shut down. During a power failure, there is a violent slamming when the pumps stop abruptly.

The steady-state pressure at the High Lift Pumps ranges from 120-135 psi. Although the new College Hill Storage Tanks are now in operation, the water elevation in these tanks is the same elevation as the existing College Hill Tanks. The magnitude of the transient pressure variations experienced during a pump shutdown is unknown, but sufficient to move the pipes. There is a concern that the pressure transients could cause damage or failure of the piping system. Because of these concerns we have already inspected the system and had discussions with the plant personnel.

During these site visits and discussions, the plant personnel indicated that the pressure transient phenomenon has become more severe over time, suggesting that component(s) of the surge tank system may not be working properly. Per our initial telephone conversation with the plant personnel on August 20, 2019 and our inspection of the system, we suggested that the plant staff examine the surge tank check valve and isolation valve for damage or other indication of malfunction and review historical SCADA data for discharge pressure trend data during a past power lost event. The plant staff reported that they have examined the surge tank check valve and isolation valve and found them to be in working condition.

In order to collect the necessary data, a reduced-flow pump shutdown at the plant is proposed. The concept is to perform a shutdown of one pump running at a reduced flow against a throttled control valve. Pressure data recorders would be placed at strategic locations to collect data during the shutdown. The data will help understand the transient phenomenon and allow the calibration of a computer model if it is decided to proceed with computer modeling.

Qualifications

Tighe & Bond staff are very experienced with understanding complex hydraulic issues and have significant experience building hydraulic models to better understand dynamic flow concerns and troubleshoot operational issues. Attached to this Task Order please find a table that presents our recent hydraulic modeling experience and the resumes of staff who will provide technical support on this task. Hydraulic surge can be a complicated issue that requires knowledge of all the various forces that can impact this piping. Tighe & Bond is confident that we have the experience to provide the needed assistance to diagnose the causes for the movement observed by plant staff.

Scope of Services

ENGINEER has developed the following proposed Scope of Services based on our understanding of the project:

Task 1 – Pump Shutdown Test

- 1.1 **Data Review** – Review the following information:
 - Surge Tank SOP
 - Contract Drawings and Specification dated December 2001
 - Contract Drawings for the College Hill Tanks
 - Shop Drawings for the Surge Tank and High Lift Pumps
 - Hydraulic model for the Distribution System
 - Technical information for the HL pumps, pump control valves, piping system, and surge tank check valve
 - SCADA pressure trend data of previous power loss events, if available

- 1.2 **Pump Shutdown Test** – Assist with planning and executing a pump shutdown test. The test will be witnessed by the ENGINEER's senior hydraulic engineer and a project engineer. The test will be conducted with one pump running at a reduced flow against a throttled valve. The test will consist of installing pressure data logging instruments at several locations in the vicinity of the pumps, and abruptly stopping the pump. A preliminary evaluation of the results will be conducted in the field, and an additional shutdown(s) may be performed if necessary. The objective will be to induce a transient of sufficient magnitude to provide useful data but not to cause damage to pipes or equipment.

- 1.3 **Data Review and Deliverable** – Process and review data collected during the shutdown test. Prepare a memorandum documenting the test, reporting results and conclusions, and providing recommendations for additional actions (e.g., modeling).

We have presented a budget based upon 52 hours of site visits and engineering evaluation.

Additional Tasks – Water System Modeling

Should preliminary data collected indicate a serious condition exists, we anticipate future tasks would include:

- Development of a model to identify transient conditions
- Evaluation of surge protection alternatives
- A technical memorandum documenting evaluation and recommendations

Assumptions/Excluded Services

In an effort to provide a limited budget based on a specific Scope of Services, ENGINEER has made the following assumptions and exclusions, which define the intended services and associated costs.

1. Evaluation of pipe restraints and modifications to the surge suppression system will be conducted, if necessary, as an additional task, after the memorandum is approved.
2. Engineering design and construction services for pipe restraints and modifications to the surge suppression system will be conducted, if necessary, as an additional task, after the memorandum is approved.
3. The plant staff will install the pressure data logging instruments at the locations recommended by the ENGINEER.
4. Permitting applications for recommended alternatives are not included.
5. A hazardous material survey, geotechnical investigations, and site surveys are not included.

Contact information for this Task Order:

Project Manager: Erin Moore at 845-516-5835

Project Director: Paul Malmrose at 845-516-5863

Tighe & Bond's Recent Hydraulic Modeling Experience								
Client	Project Name	Asset Management/ Planning	Hydraulic Evaluation	Water Quality Modeling	Unidirectional Flushing Program	Transient Analysis	Model Development/ GIS Integration	Modeling Software
Aquarion	2018 and 2019 Available Fire Flow Mapping		✓					WaterGEMS
Aquarion	Southwest Regional Pipeline Master Plan	✓	✓					WaterGEMS
Aquarion	East & North Satellite System, 2018, and 2019 Master Plans	✓	✓				✓	WaterGEMS
Aquarion	On-call Modeling Services		✓				✓	WaterGEMS
Providence Water	Industrial Drive Transient Analysis					✓		Hammer (WaterGEMS)
Foxborough, MA	UDF Program Assistance		✓		✓			InfoWater
Medford, MA	Model Update and Unidirectional Flushing Program		✓		✓		✓	InfoWater
Webster, MA	Model Update and Unidirectional Flushing Program			✓	✓			WaterGEMS
Southington, CT	Water System Master Plan	✓	✓	✓				InfoWater
Taunton, MA	Water System Assessment	✓	✓	✓			✓	WaterGEMS
Jaffrey, NH	Water System Asset Management Plan	✓	✓					InfoWater
Jaffrey, NH	On-call Modeling Services		✓	✓				WaterGEMS/ InfoWater
East Lyme, CT	Interconnection Project	✓	✓	✓				WaterGEMS
East Lyme, CT	On-call Modeling Services		✓			✓		Hammer (WaterGEMS)/

Tighe & Bond's Recent Hydraulic Modeling Experience								
Client	Project Name	Asset Management/ Planning	Hydraulic Evaluation	Water Quality Modeling	Unidirectional Flushing Program	Transient Analysis	Model Development/ GIS Integration	Modeling Software
								InfoWater
S. Central CT Regional Water Authority	Brushy Plains Service Area Water Quality/Hydraulics Evaluations		✓	✓				InfoWater
S. Central CT Regional Water Authority	T.C.R Assistance			✓				InfoWater
S. Central CT Regional Water Authority	Ansonia-Derby Tank Siting Study	✓	✓				✓	InfoWater
Hartford MDC	Raw Water System Hydropower Evaluations		✓			✓		Hammer (WaterGEMS)
Hartford MDC	Distribution System Master Plan	✓	✓	✓				WaterGEMS
Hartford MDC	Reservoir 6 WTP Production Evaluation	✓	✓	✓				WaterGEMS
Wellesley, MA	Distribution System Assessment	✓	✓				✓	WaterGEMS
Williamsburg, MA	Water and Sewer System Assessments	✓	✓				✓	WaterGEMS
Trinity College	Water, Sewer, and Stormwater Modeling Study		✓	✓			✓	InfoWater
Belchertown, MA	Water System Model Development		✓				✓	WaterGEMS
Belchertown, MA	Water Storage Tank Study	✓	✓	✓				WaterGEMS

Tighe & Bond's Recent Hydraulic Modeling Experience								
Client	Project Name	Asset Management/ Planning	Hydraulic Evaluation	Water Quality Modeling	Unidirectional Flushing Program	Transient Analysis	Model Development/ GIS Integration	Modeling Software
Wellesley, MA	Hydraulic Modeling Study	✓	✓	✓			✓	WaterGEMS
Taunton, MA	Hydraulic Modeling Study		✓				✓	WaterGEMS
W. Springfield, MA	Drinking Water System Improvements Study	✓	✓					WaterGEMS
Holden, MA	Shrewsbury St. Water Main Evaluation		✓					WaterGEMS
Littleton, MA	Water System Capacity Analysis		✓					WaterGEMS
S. Hadley, MA Fire District No. 1	Hydraulic Model Development and Assessment	✓	✓				✓	WaterGEMS
Greenfield, MA	Water System Master Plan Update	✓	✓				✓	WaterGEMS
Chicopee, MA	UDF Program	✓	✓		✓		✓	WaterGEMS
Scituate, MA	Water System Master Plan	✓	✓		✓		✓	InfoWater
Westford, MA	Water System Master Plan	✓	✓	✓			✓	InfoWater



JOHN MCCLELLAN, PhD, PE

VICE PRESIDENT

John McClellan specializes in water treatment and environmental modeling. John joined Tighe & Bond after completing his doctorate in environmental engineering at the University of Massachusetts. He has done extensive work in computer modeling of chemical reactions and transport in environmental systems. His doctoral research included modeling the dynamics of chlorine decay and disinfection by-product formation in drinking water distribution systems. John has managed numerous water system evaluation and improvement projects for clients throughout New England.

EXPERIENCE

20 Years

SPECIALTIES

Water Supply & Treatment

Water Quality Modeling

Hydraulic Modeling Studies

Water Distribution Systems

Process Evaluation Studies

Water Treatment Plant Upgrades

EDUCATION

Bachelor of Science

Civil Engineering

University of Massachusetts Amherst

Master of Science

Environmental Engineering

University of Massachusetts Amherst

Doctor of Philosophy

Civil Engineering

University of Massachusetts Amherst

LICENSES & REGISTRATIONS

Professional Engineer

MA #45195

CT #24174

NH #11499

ME #15123

RI #12044

VT #134337

PROFESSIONAL AFFILIATIONS

New England Water Works Association

American Water Works Association

American Society of Civil Engineers

WATER RESOURCES

CAPITAL PLANNING, ASSET MANAGEMENT & HYDRAULIC MODELING—NEW ENGLAND

Performed hydraulic modeling, asset management and capital planning studies for numerous clients including Connecticut Water Company, Aquarion Water Company of CT, The Metropolitan District, the University of Connecticut, the University of Massachusetts, the Towns of East Lyme and Southington, CT, the Towns of Amherst, Ashburnham, Belchertown, Palmer, Longmeadow, East Longmeadow, and Webster, MA, the Town of Jaffrey, NH, and the Cities of Portsmouth, NH, Dracut, MA, and Medford, MA.

WATER MODELING AND TRANSIENT ANALYSIS.

Performed water modeling and transient analysis for a 4.2 MGD Aqueduct Water Pump Station for Providence, RI, and a 2.1 MGD water pump station in East Lyme, CT. Performed a transient analysis for 250 KW power generating turbine for the Metropolitan District Commission of Connecticut (MDC) in Hartford, CT.

WATER QUALITY MODELING STUDIES—MASSACHUSETTS & CONNECTICUT

Performed system-wide water quality modeling studies for Aquarion Water Company and the South Central Connecticut Regional Water Authority including state-of-the-art modeling of disinfection byproducts. Performed modeling studies for the Metropolitan District, Hartford, CT, South Central Connecticut Regional Water Authority, Amherst and Southwick, MA, and Birmingham Utilities to evaluate potential distribution system sampling sites for their Initial Distribution System Evaluation (IDSE) plans.

WTP IMPROVEMENTS PROJECT—STONINGTON, CT

Managed construction phase services for Aquarion Water Company of Connecticut's Palmer Dam/Dean's Mill WTP Improvements project. This challenging project involved replacing a dam, construction of a new chemical feed building, and water treatment process upgrades.

WTP UPGRADE—STONINGTON, CT

Managed preliminary design, bidding, and construction phase services for an upgrade of a 1 MGD iron and manganese treatment facility for Aquarion Water Company of CT. This project involved modifying the existing green sand filtration process into a two-stage process that will remove disinfection byproduct precursors in addition to iron and manganese.



PRESSURE ZONE PROJECT—SOUTHINGTON, CT

Managed a comprehensive master plan study for the Southington, CT Water Department. One of the recommendations of the master plan study was the creation of a new pressure zone. Managed design and construction of a new storage tank, pump station, and transmission main to serve the new East Side Pressure Zone.

WTP FILTER REHABILITATION PROJECTS—CONNECTICUT

Managed design and construction phase services for filter rehabilitations at Aquarion Water Company's 25 MGD Trap Falls WTP, Aquarion Water Company's 4 MGD Dean's Mill WTP, and The Metropolitan District's 21 MGD Reservoir 6 WTP. Each of these projects involved replacing the filter underdrain systems and media while keeping the facilities in continuous service.

BIOLOGICAL IRON AND MANGANESE SYSTEMS—MA & VT

Managed design and construction of a new iron and manganese treatment facility in Cavendish, VT. This project is the first application of a new biological filtration process in Vermont. Managed design for a new biological iron and manganese treatment facility for Middleborough, MA. The project included obtaining new technology approval from the Massachusetts Department of Environmental Protection (MassDEP).

WATER TREATMENT PLANT (WTP) UPGRADE—AMHERST, MA

Managed design and construction phase services for a comprehensive upgrade of a 1.5 MGD greensand filtration plant. The project included refurbishing inlet, underdrain, and air scour systems, replacing the filter media, and recoating the plant's four 10 ft diameter pressure filters.

WATER SUPPLY & TREATMENT PROJECTS—NEW ENGLAND

Managed design and construction phase services for water supply and treatment projects for numerous clients including Aquarion Water Company of CT, South Central Connecticut Regional Water Authority, The Metropolitan District, South Hadley (MA) Fire District No. 1, Amherst, Groton, and Southwick, MA, Southington, CT, and Jaffrey, NH.

WATER DISTRIBUTION AND STORAGE PROJECTS—NEW ENGLAND

Managed design and construction of new storage tank/storage tank rehabilitation projects for the Towns of Jaffrey, NH, Cavendish VT, Southington, CT, and Aquarion Water Company of CT. Managed water main design and construction of water main improvements/replacements for the Towns of Cavendish, VT, Amherst, MA, Southington, CT, and Jaffrey, NH.

WATER TREATMENT PROCESS AND CORROSION CONTROL EVALUATION STUDIES—NEW ENGLAND

Performed studies for numerous clients including Aquarion Water Company of CT, South Central Connecticut Regional Water Authority, The Metropolitan District, the Massachusetts Department of Conservation and Recreation, and the municipalities of Manchester, CT, and Northampton, North Adams, Holyoke, Amherst, and Chester, MA.

WATER SYSTEM IMPROVEMENTS—JAFFREY, NH

Managed various projects for Jaffrey, NH including water main replacement, new groundwater source evaluation, new production well, pump station, and water system evaluations.

GROUNDWATER MODELING STUDY—JAFFREY, NH

Performed study for Jaffrey, NH to evaluate the potential impact of a contaminant plume on a municipal production well. Based on the study results, the client was able to increase the withdrawal from the well.



PAUL MALMROSE, PE

VICE PRESIDENT

Paul Malmrose has 46 years of experience in environmental and civil engineering, including planning, designing, and constructing environmental engineering projects. He has been involved in a number of water resources projects, including designing water treatment plants, water pump stations, wells and water distribution systems. He has also participated in designing 15 water treatment plants and 6 SCADA systems for water treatment and distribution systems. Paul has worked on a variety of projects relating to water residual and biosolids treatment facilities for water and wastewater treatment plants, as well as planning, designing, and constructing sanitary sewers, wastewater pump stations, and storm water drainage systems.

EXPERIENCE

46 Years

SPECIALTIES

Water Treatment Plant Design
Water Distribution Systems
SCADA System Evaluation and Design
Treatment Processes & Operational Procedures
Residuals Management
Comprehensive Environmental Planning

EDUCATION

Bachelor of Science
Environmental Engineering
Rensselaer Polytechnic Institute

LICENSES/REGISTRATIONS

Professional Engineer –NY (#055629)
Professional Engineer –CT (#27619)
Professional Engineer –MA (#49443)
Professional Engineer –NJ
(#24GE03813600)
Professional Engineer –OH (#67440)

PROFESSIONAL AFFILIATIONS

American Water Works Association
Water Environment Federation
Water Residual Committee of the Connecticut Section of AWWA
National Residuals Management Research Committee

WATER

POUGHKEEPSIE WATER TREATMENT FACILITY, DESIGN AND CONSTRUCTION SERVICES

Served as the Principal-in-Charge for this Poughkeepsie, NY project that increased the plant capacity from 16 MGD to 20 MGD. The project included upgrades to several facilities that had reached their useful life, such as the filtration system, solids contact clarifier mechanisms, and high lift pumps. New chemical storage and feed facilities were provided to improve plant safety and increase the reliability of the existing treatment processes. Disinfection with ultraviolet (UV) light, free chlorine and chloramines are part of a multiple barrier disinfection strategy. The project also includes a surge suppression system, an expansion of the plant's SCADA system, addition of new electrical switchgear, and upgrades to the ventilation, laboratories, and office space in the plant's Operations Building. The proposed UV disinfection system was one of the first surface water UV disinfection systems to be granted full disinfection credit by the State of New York Department of Health. The construction phase included construction management for \$13 million construction project.

REHABILITATION DESIGN OF EAST RIVER STATION WATER TREATMENT PLANT, IOWA-AMERICAN WATER COMPANY, DAVENPORT, IA

Served as the Process and Instrumentation & Control Engineer for 30 MGD plant. The project included evaluating the existing plant and control system and the design of a new raw water pump station, Superpulsator clarifiers, and the rehabilitation of 20 filters. Replaced the existing plant instrumentation system with a digital-based control system including 24 RTUs and new field and panel mounted instrumentation. The system has capacity to control and monitor the treatment process and to generate graphics and reports and manage maintenance.

WATER TREATMENT PLANT, MIDDLESEX WATER COMPANY, EDISON, NJ

Project manager for preliminary and detailed design of the upgrade and expansion of the WTP. Project included evaluating the existing plant, developing alternatives to expand the plant initially to 45 MGD and then 60 MGD, while meeting future regulations, and a pilot testing program of selected alternatives. Evaluation of the plant included the raw water pumps, chemical systems, flocculation and sedimentation process, residual handling facilities, filtration, and finished water pumps. Pilot plant studies included evaluation of Superpulsator clarifiers, intermediate ozone between clarification and filtration, and anthracite/sand filters at various loadings. The recommended process initially included Superpulsator clarifiers, additional filters, and a SCADA system. Second phase will include intermediate ozone and rehabilitation of existing filter.

PRELIMINARY DESIGN OF MORGAN WATER WORKS, CLEVELAND DIVISION OF WATER, OH

Served as the project manager for the rehabilitation of 150 MGD water treatment plant. The estimated construction costs were \$45-50 million. The project included the rehabilitation of 28 filters including replacement of underdrains, filter media, valves, instrumentation, and piping.

TRI-COUNTY WATER TREATMENT PLANT, NEW JERSEY-AMERICAN WATER COMPANY, CHERRY HILL, NJ

Served as the Process and Instrumentation & Control Engineer for a 30 MGD Superpulsator plant with expansion designed for 100 MGD. The plant included a raw water reservoir, low lift pump station, ozonation, clarification with Superpulsator clarifiers, GAC filters, clearwell, and high service pumps. Residuals treatment includes gravity thickener and belt filter presses. The project included the design of a distributed control system to monitor and control the treatment process. The design of the distributed control system included preparing detailed process and instrumentation diagrams (P&IDs), loop drawings, and specifications for digital equipment and field and panel mounted instruments.

HYDE PARK WATER AND SEWER DISTRICT EVALUATIONS

Served as Principal-in-Charge for the evaluation of six water districts and two sewer districts. The Town of Hyde, NY joined with the Dutchess County Water and Wastewater Authority (DCWWA) to secure funding through a Local Government Efficiency Grant, to determine if ownership and management of the Town's existing water and sewer districts could be transferred to the DCWWA. Prepared engineering reports to evaluate the existing districts' infrastructures and recommend short- and long-term improvements for the next 15 years. Project included the inspection and evaluation of water treatment facilities, wastewater treatment facilities, wells, water mains, sewers, and pump stations. Alternatives were evaluated that included continued use of all water source facilities as well as possible interconnections with DCWWA's water facilities. Estimates of probable construction costs and overall project costs were prepared for all recommended improvements.

JUMPING BROOK WATER TREATMENT PLANT, NEW JERSEY-AMERICAN WATER COMPANY, CHERRY HILL, NJ

Designed Instrumentation and Process Requirements for a 10 MGD Expansion of the 10 MGD plant. The project included new high rate upflow clarifiers, new filters, chemical feed facilities, and rehabilitation of existing upflow clarifiers and filters. The residual treatment facilities included backwash clarifiers, gravity thickeners, and belt presses.

LAKE WHITNEY WATER TREATMENT PLANT, REGIONAL WATER AUTHORITY

Served as Principal-In-Charge for the design of an innovative treatment process for the Lake Whitney Water Treatment Plant in New Haven, CT. The plant has a maximum capacity of 20 MGD and firm capacity of 15 MGD. The plant process includes: dissolved air flotation (DAF), ozonation, and deep bed granular activated carbon (GAC) filters with the ability to add UV disinfection in the future.

WATER INTERCONNECTION PROJECT, EAST LYME-NEW LONDON

Served as Principal-in-Charge for a \$10.8 million project in East Lyme, CT. Designed this unique project which allows East Lyme to transfer ground water to the New London reservoir in winter when groundwater is abundant, and for East Lyme to take water from New London in the summer when there are restrictions on using groundwater. Project included two pump stations, a 4-mile, 16-inch water main between East Lyme and the New London WTP and new 400,000 glass-fused steel water storage tank. The project was funded by the Drinking Water State Revolving Fund and required numerous permits from Department of Public Health, Department of Energy and Environmental Protection and local agencies in three towns.



MILES MOFFATT, PE, BCEE

TECHNICAL DIRECTOR/VICE PRESIDENT

Miles Moffatt is vice president and technical director with 33 years of experience working on water and wastewater projects. He is experienced in planning, design and construction phase engineering support. His specialty has been water conveyance – up to and through headworks at wastewater treatment plants, and raw drinking water source conveyance. He supports the firm’s project management, standardization, and quality program delivery.

WATER RESOURCES

BIRMINGHAM WATERWORKS AND SEWER BOARD (BWWSB)

Program manager and bond engineering services that include:

- Engineering studies for new water sources, watershed best management practices, water quality and treatability, and dam surveys
- Design services for finished water storage and transmission in the Board’s 9 service areas.
- Design of backwash pumping systems and finished water pumping systems at the Board’s 24, 26 and 80 MGD water treatment plants to meet a range of pressure zones in the franchise area. Design included a transient analysis and surge suppression systems.
- Distribution studies and modeling to determine pressure and water quality levels in the franchise area
- Designs for upgrades and expansions of the Board’s four WTPs and one WWTP and booster pumping stations.
- Advising client on CIP program and engineering support necessary to manage program.

NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION

Project Manager for water supply studies and designs, and wastewater designs, responsible for:

- Design and startup services for the 1.5 BGD capacity Tunnel No. 3 water supply system, using hydraulic and water age models to select sites for chlorination dosing systems, design of temporary chemical dosing and unwatering stations.
- Design and construction administration services for 50’ diameter shafts and shaft sites for Delaware Aqueduct bypass tunnel
- Planning, design and construction services for the 90-acre Hillview Reservoir chemical addition, uptake and downtake structure rehabilitation studies, and dam and dividing wall stability analysis and improvements
- Design and construction services for chemical dosing, chlorine scrubber and hoisting systems at the Kensico Reservoir facilities
- Upgrading odor control facilities to North River WWTP, including covering of aeration basins
- Startup services for a PCE contaminated groundwater remediation system utilizing GAC treatment

EXPERIENCE

33 Years

SPECIALTIES

Water, Wastewater, and Stormwater
Conveyance
Treatment Facilities
Design and Construction Services
Comprehensive Wastewater Master
Planning based on Asset Management
Risk and Prioritization Assessment
Stormwater Management
Water Supply System Design

EDUCATION

Bachelor of Science
Mechanical Engineering
Rensselaer Polytechnic Institute
Master of Science
Mechanical Engineering
New York University

LICENSES & REGISTRATIONS

Professional Engineer
NY #063364
DC #904754
VA #0402041112
MD #32354

PROFESSIONAL AFFILIATIONS

American Academy of Environmental
Engineers and Scientists
Water Works Association
Water Environment Federation
American Water Works Association



CITY OF BALTIMORE

Deputy Project manager for treatability studies, pilot plant design and operation, and full-scale preliminary design for a green-field 120 mgd WTP. Treatability studies included sampling and bench testing methods of treatment of the Susquehanna River water source for the plant. The pilot plant was a 300 gpm facility constructed and operated for 9 months to demonstrate treatment via coagulation and rapid settling, membrane filtration, dual media filtration and GAC post filter adsorption. Preliminary design was for a pre-treatment plant consisting of raw water surge tank, flocculation and sedimentation, and a final treatment system of low pressure membranes and post-GAC adsorption.

WASTEWATER

DC WATER SEWER PROGRAM MANAGER—WASHINGTON DC

Program Director for the planning and delivery of \$100M per year of capital improvement projects for the storm and sewer collection system. Role on the project included management of:

- Asset management inventory of and condition assessment of the District's 28 pumping stations
- GIS and record drawing upgrades for the 1,900 miles of sewer and stormwater collection pipes and related flow diversion and CSO structures
- MS4 Permit support; confirming, assessing and prioritizing improvements to 587 stormwater outfalls
- Permitting and design of upgrades to 12 wastewater pumping stations, including screening, washing and compaction of debris and SCADA control upgrades to the related flow control structures
- I/I Control Plan development; including qualification and impact assessment and recommendations for a long-term plan.
- Hydraulic modeling of gravity sewers, interceptors, and force mains to confirm capacity and flow characteristics through isolation structures and pumping stations
- Prioritizing capital and O&M expenditures based on risk scoring, ranking, and business case evaluations of identified water, sewer and stormwater improvement needs
- Electrical and SCADA improvements at bypass structures, pumping stations and metering and dosing facilities
- FEMA funding support and design for back-up generators at critical pumping facilities
- Inspection, heavy cleaning and condition assessment of large sanitary and combined sewers
- Design of pipe trenchless rehabilitation including cured-in-place, carbon fiber and shotcrete methods

DC WATER BLUE PLAINS WWTP—WASHINGTON DC

Project manager for design services for improvements, including:

- Improvements to the raw wastewater pumping station, including new pumps, controls and power supply
- Upgrades to the final filters influent pumping station, including piping, valves and actuators
- Retrofitting air scour systems
- Addition of primary clarifier enhanced coagulation system
- Remodeling historic structures on site, and managing lead paint and asbestos remediation



FREDERICK A MUELLER, PE

PRINCIPAL ENGINEER

Frederick Mueller has more than 27 years of experience managing and implementing projects related to wastewater, environmental remediation, and regulatory compliance. His expertise includes: municipal and industrial wastewater treatment systems, pumping systems energy conservation and management, soil and groundwater remediation systems, air emissions compliance, odor control, electrical systems, SCADA systems, hazardous waste, and petroleum and chemical storage systems. Prior to joining Tighe & Bond, he served as engineer for the Mattabasset District in Cromwell, CT, gaining experience in several aspects of municipal wastewater engineering including operations, maintenance, and designing and managing plant equipment upgrades.

EXPERIENCE

27 Years

SPECIALTIES

Municipal & Industrial Wastewater Treatment Systems
Energy Conservation & Management
Soil & Groundwater Remediation Systems
Air Emissions Compliance
Odor Control
Electrical & SCADA Systems
Hazardous Waste, Petroleum & Chemical Storage Systems

EDUCATION

Bachelor of Science, Electrical Engineering, University of Rochester
Master of Engineering, Electrical Engineering, Rensselaer Polytechnic Institute
Master of Science, Environmental Engineering, University of Massachusetts Amherst
Construction Management Certificate, University of Hartford
Construction Institute
40-hour OSHA HAZWOPER Training and 8-hour OSHA Supervisory Training
Connecticut Class II Wastewater Operator Certification

LICENSES & REGISTRATIONS

Professional Engineer
MA #51718
CT #18382
NY #095693

PROFESSIONAL AFFILIATIONS

Water Environment Federation

WASTEWATER—PUMP STATIONS

FRANCIS T. PATNAUDE INTER-MUNICIPAL PUMPING STATION—MIDDLETOWN, CT

Served as project manager for the HVAC, odor control, plumbing, fire protection, electrical, instrumentation and controls design of a 26 MGD pump station with 20,000 gallon surge suppression tank in Middletown, CT that will allow the City to decommission the existing water pollution control plant and send flow to through a 3 miles force main to the Mattabasset District treatment plant. Currently serving as senior technical manager during construction and startup of the pump station including all process equipment including 4 wet weather pumps, 2 dry weather pumps, surge control system, monitored surge buster check valves, mechanical screens, grit removal, odor control systems, and SCADA system.

SOUTHINGTON PUMP STATIONS

Acted as process and team leader for developing a facility plan to evaluate and develop a \$7,400,000 capital improvements plan for the town's 10 wastewater pumping stations. Designed, and currently managing the construction of, the upgrade of the Queen Street Pump station using an innovative suction lift system that will allow the town to upgrade the existing flood prone station (located in a floodway) while also achieving their budgetary goals.

WINDSOR LOCKS PUMP STATIONS

Managed and authored facility plan for the Windsor Lock's wastewater treatment facility and collection system. The Facility Plan addressed 10 wastewater pump stations that ranged in capacity from 120 to 4,400 gpm. Also managed the design, bidding, and construction replacement of one of the submersible pump stations.

PUMP STATION EVALUATION AND CAPITAL IMPROVEMENT PLAN—STRATFORD, CT

Served as project manager and lead process engineer for the capital improvement assessment of six pumps stations for the Town of Stratford CT. The stations were over 35 years old and ranged in size from 1.7 to 9.4 million gallons per day. Recommended plans included \$10,000,000 of electrical/controls, structural, site, HVAC and process equipment improvements to be phased over the next 20 years.



SOUTHINGTON QUEEN STREET PUMP STATION

Designed, and currently managing the construction of, the upgrade of the Queen Street Pump station in Southington, CT. Design included an innovative suction lift system that will allow the town to upgrade the existing flood prone station (located in a floodway) while also achieving their budgetary goals.

PUMP STATION ALTERNATIVES EVALUATION—MIDDLETOWN, CT

Managed the development of upgrade alternatives for the North Main Street and Johnson Street Pump Stations in Middletown, CT. The evaluation considered the feasibility of various alternatives for consolidating and upgrading the pump stations with new force mains; this was part of the city's \$37 million-dollar effort to shut down their city's WPCF and regionalize with the neighboring Mattabassett District.

SOUTH MAIN PUMP STATION REPLACEMENT—MIDDLETOWN, CT Managed the design of the upgrade of an existing and aging ejector pump station with a new submersible style pump station. Project challenges including the entire site was within the 100-year flood plain, the existing pump station was located at a gasoline station site within a few feet of the state right-of-way and contaminated soil was present at the site.

MATTABASSETT DISTRICT PUMP STATION IMPROVEMENTS

Designed, bid, and managed the construction upgrades for a 90-mgd plant influent pump station at the Mattabassett District. Included replacement bar racks, screenings grinders, and energy efficient VFD Driven SCADA based pumping control, systems with new SCADA based control panels.

WATER

AQUARION WATER COMPANY PUMP STATIONS

Served as lead investigator for condition assessment and capital improvement plan for 20 pump stations for the Aquarion Water Company's greater Bridgeport system. Installed pump stations with capacities ranging from 900 to 24,000 gpm, with a majority of the stations in the range of 2,000 to 6,000 gpm

MANCHESTER GLOBE HOLLOW WATER TREATMENT PLANT

Performed construction observation and managed construction administration for portions of this \$11 million-dollar treatment plant upgrade which included ozone pre-treatment, upgrades to the chemical feed systems, and modernization of the general office area.

MDC RESERVOIR SIX CHEMICAL SYSTEM UPGRADES

Designed a sodium hypochlorite bulk storage tank, day tank, and chemical feed system to eliminate gaseous chlorine disinfection as well as improvements to the other chemical feed systems at this 13 MGD average daily flow water treatment facility.

NORWALK FIRST TAXING DISTRICT

Managed the evaluation of technologies suitable for performing water main condition assessments on the District's raw water and treated water transmissions mains.

WASTEWATER

WASTEWATER TREATMENT FACILITY FACILITIES PLAN—VERNON, CT

Process and team leader for developing a facility plan and design for this 7.1 MGD treatment facility in Vernon, CT with the goals of modernizing the aging upgrading the plant for nitrogen removal and low-level phosphorus removal and improving energy efficiency. The recommended plan with is now under design includes eliminating their unique Zimpro PACT-WAR Process, IFAS activated sludge, installing a new secondary solid handling processes and electrical systems with total upgrade cost of approximately \$80M.

WASTEWATER TREATMENT FACILITY UPGRADES—SOUTHINGTON, CT

Designed interim improvements and upgrades to the plant during the facilities planning process. These included assisting the plant staff with achieving interim phosphorus limits through chemical addition, a digester cleaning and conditions assessment project, the design and construction of a sludge thickening and odor control project using rotary drum thickeners to enable staff to eliminate co-settling of sludge and the reduce odors, and the design of the plant modernization and phosphorus upgrade.

WASTEWATER TREATMENT FACILITY PHOSPHORUS UPGRADE PLANNING—CT

Serving as project manager and lead process designer for the facilities planning studies to upgrade the Thompson CT, Plainville CT, and Southington CT plants for phosphorus removal. Evaluations include chemical and biological phosphorous removal and chemical removal to levels as low as 0.1 mg/L.

