PROPOSAL

JANUARY 27, 2023

Springbrook Water Reclamation Center South Plant Expansion

RFP 22-343

City of Naperville

DONOHUE

CDM Smith

Donohue & Associates, Inc.
1755 Park Street, Suite 310 | Naperville, IL 60563
312.236.9147 | donohue-associates.com

January 27, 2023

Shanel Gayle, Procurement Officer
City of Naperville
Procurement Services
400 S. Eagle Street
Naperville, IL 60540

Re: RFP 22-343: Springbrook Water Reclamation Center South Plant Expansion

Dear Ms. Gayle:

Donohue & Associates, Inc. (Donohue), in partnership with CDM Smith, is grateful for the continued opportunity to submit the enclosed proposal for the South Plant Expansion. We understand the City's goal for this project is to design an expansion to the South Plant to immediately improve overall plant capacity and performance, while also preparing for the future implementation of phosphorus removal. Our Team is uniquely qualified to partner with the City on this project based on the following key attributes:

Extensive Knowledge of your Facility and Operations Resulting in Cost and Schedule Savings. Over the past 18 years, the City has trusted Donohue and CDM Smith to complete multiple projects for SWRC, including the North Plant Grit and RAS Pumping Improvements, the Biosolids Holding Tank, the Nutrient Removal Feasibility and Optimization Studies, the 2022 Facilities Plan, and most recently, the UV Disinfection Improvements project. We are also working jointly on the ongoing Influent Pump Station and Forcemain project and the South Plant RAS Grit projects. Based on our knowledge of the proposed project, we have prepared a conceptual rendering of the new facilities based on the information known to date. Please take a few moments to view a fly-through privately accessible through YouTube via the QR code to the right.

Scan the QR Code with your phone or click the code to see our vision for the South Plant Expansion

Proven Expertise Providing the City Reliable Results to Meet Plant Goals. In addition to our understanding of your facility, the Donohue/CDM Smith team includes many of the foremost experts in the field of wastewater treatment and nutrient removal. In addition to experts such as Dr. Kam Law (Donohue), Bill Marten (Donohue), Nathan Cassity (Donohue), Bill McConnell (CDM Smith), and Dr. Eric Staunton (CDM Smith), we have added Dr. Glen Daigger to the team specifically for his knowledge of the latest research and application of nutrient removal technologies. The City can rest easy with a team whose qualifications are equal to any in the engineering community.

Team Continuity and Commitment Throughout Project Implementation. Our Team is committed to the City and its desired outcomes. The key players identified on this project know your plant, are committed to your goals, and most importantly bring a personal commitment to you until the SWRC improvements are completed.

We look forward to continuing our excellent working relationship with the City of Naperville. If you have any questions, please feel free to contact us.

Sincerely,

Eric P. Cockerill, PE, BCEE
Vice President
312.583.7204

Amrou Atassi, PE, PMP, BCEE
Vice President
312.718.5143

Capability, Capacity, and Qualifications

01.27.2023 | Naperville, IL | Springbrook Water Reclamation Center South Plant Expansion

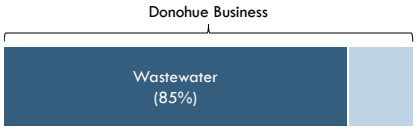
Capability, Capacity, and Qualifications

We are pleased to offer the highly capable, complementary team of Donohue/CDM Smith for your project. We have successfully partnered on a number of recent projects at the Springbrook WRC as well as for other Midwest communities, including Sheboygan Water Utility and Milwaukee MSD.

Overview of Firms

Donohue: Wastewater-Focused Firm Built to Deliver

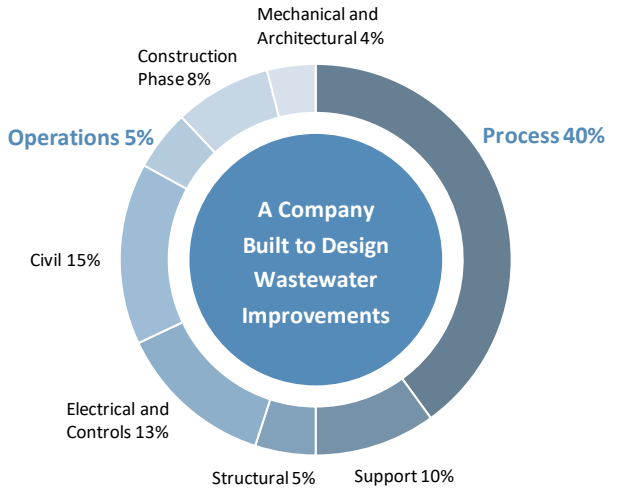
Donohue & Associates, Inc. is an award-winning, employee-owned wastewater specialty firm that large Midwest clients repeatedly trust to deliver their most challenging wastewater improvement projects. We have worked on over 3,500 water/ wastewater projects for more than 400 Midwest clients since forming in 1997. We currently have 120 employees in 11 Midwest offices, with a strong presence in Naperville and Chicago.



A Wastewater Company

Our impressive track record of successfully delivering complex projects is attributed to the technical excellence of our project managers and engineers, our acute attention to detail, our adherence to our rigorous Quality Control program, and our collaborative culture that demands we listen to and work closely with all of our clients' departments: management, engineering, operations, maintenance, procurement and diversity.

We have all the required engineering design disciplines in-house; however, our relatively high percentage of Process Engineers and design-focused Operations Specialists reveals our focus and commitment to wastewater treatment. All of our design teams include Operations Specialists. Their design role is essential to our ability to produce safe, practical, operable, and flexible solutions. The figure below is our staffing by discipline, expressed as a percent of our total.



Naperville Springbrook WRC Familiarity

Donohue has worked on previous projects at the Springbrook Water Reclamation Center, which has given us in-depth familiarity with the facility and its operations. Those projects include:

- Springbrook WRC Facilities Plan and UV Disinfection Design*
- Influent Pump Station and South Plant Forcemain*
- Regulatory Assistance*
- UV Disinfection Improvements*
- NPDES Compliance Program
  - Phosphorus Discharge Optimization Plan
  - Phosphorus Removal Feasibility Study
  - Pretreatment Program Development
  - Industrial User Inventory
- Springbrook WRC Structure Evaluation
- Biosolids Holding Tank
- 2015 Technical Assistance
- Grit Improvements Final Design
- Light Pole Structural Analysis
- Manhole Modifications Design
- Long-Term Biosolids Management Planning
- Assessment of Industrial Discharges

**In partnership with CDM Smith*

Selected Wastewater Treatment Experience

COMMUNITY/SANITARY DISTRICT	Peak Design Capacity (mgd)	Average Day Capacity (mgd)	SERVICES PROVIDED: Planning	Design	Construction	O&M/Training/Startup	SRF Funding	LIQUID TRAIN: Headworks	Biological Treatment	Primary & Secondary Clarification	Tertiary Filtration	Disinfection	Hauled-In Waste Receiving	Chemical System	Stress Testing	SOLIDS TRAIN: Aerobic Digestion	Anaerobic Digestion	Dewatering & Thickening	Storage	Class A: Dryers	Class A: Thermal Hydrolysis	Class A: Lime Stabilization	ENERGY: Biogas Conditioning	Biogas Utilization	Biogas Heat Recovery	Effluent Heat Recovery	Energy Optimization
Stickney MWRD, IL	1400	700	■						■																		■
Trinity River Authority, TX	425	189	■	■	■	■			■																		■
Milwaukee MSD – Jones Island, WI	330	100	■	■	■	■		■		■				■													
St. Louis MSD – Bissell Point	300	140	■	■	■	■											■	■									■
Belmont AWTP – Indianapolis, IN	300	120	■	■	■	■		■	■	■	■	■	■	■			■	■									
Milwaukee MSD – S. Shore, WI	300	100	■	■	■	■		■		■			■				■							■	■	■		
Western Lake Superior SD, MN	160	40	■	■	■	■		■				■	■	■			■	■						■	■	■	■	
Southport AWTP – Indianapolis, IN	150	125	■	■	■	■		■	■	■	■	■		■				■	■									
Cedar Rapids, IA	132	51		■	■					■				■				■									■
Decatur, IL	125	41	■	■	■	■		■									■	■	■					■	■	■		
Gary SD, IN	120	60	■	■	■	■		■									■	■										
Appleton, WI	115	16	■	■	■	■		■	■								■	■		■				■	■	■		■
Fort Wayne, IN	100	50	■	■	■	■		■		■		■	■	■	■		■	■						■	■	■		■
Kenosha, WI	100	28	■	■				■									■	■	■	■	■			■	■	■		■
NEW Water – Green Bay MSD, WI	96	49	■	■	■	■		■	■	■					■													■
South Bend, IN	83	50		■		■			■			■		■														
St. Louis MSD – Coldwater	75	46	■	■	■	■				■																		
Hammond, IN	68	48	■	■	■		■		■										■									
New Albany, IN	66	12	■	■	■			■		■		■		■			■	■										
Heart of the Valley MSD, Kaukauna, WI	60	12	■	■	■	■			■	■					■													
Sioux City, IA	59	29	■	■												■	■	■	■		■			■	■	■		
Sheboygan, WI	56	15	■	■	■	■	■	■		■				■			■	■	■	■				■	■	■		
Naperville, IL	55	26	■	■	■	■		■	■	■						■			■									■
Brookfield, WI	50	13	■	■	■				■	■	■	■		■			■		■					■	■	■		■
NSWRD – Gurnee, IL	47	28	■	■	■	■		■		■		■					■	■	■	■				■	■	■		■
Battle Creek, MI	46	27	■	■	■				■					■														■
Joliet, IL – Eastside	46	18	■	■	■	■	■	■	■					■				■										■
St. Cloud, MN	45	18	■	■	■	■	■		■				■				■	■	■	■	■			■	■	■	■	■
NSWRD – Waukegan, IL	44	22	■	■	■	■		■		■		■					■	■	■	■				■	■	■		■
La Crosse, WI	44	20	■	■	■	■	■	■	■	■	■	■		■			■	■	■					■	■	■		
Wyoming, MI	42	22	■	■	■				■																			■
Evansville, IN – Westside	40	22	■	■	■	■		■	■	■		■	■	■			■								■			■
St. Charles, MO – Mississippi Plant	36	11	■	■	■	■		■		■		■						■					■					
Wausau, WI	36	8	■	■	■	■	■	■	■	■	■	■	■	■			■	■	■	■				■	■	■		■
Eau Claire, WI	30	12	■	■	■	■	■			■		■		■			■	■	■					■	■	■	■	■
NSWRD – Clavey Road, IL	28	18	■	■	■	■		■		■		■					■	■	■	■				■	■	■		■
Joliet, IL – Westside	28	14	■	■	■	■	■	■	■					■														■

CDM Smith, Inc.

CDM Smith is a global, privately owned engineering and construction firm providing legendary client service and smart solutions in water, environment, transportation, energy and facilities. Passionate about their work and invested in each other, CDM Smith is inspired to think and driven to solve the world's environmental and infrastructure challenges. They are committed to listening to your needs, thinking about the right solution for each unique situation, and delivering high-quality results.

For 76 years, CDM Smith has provided innovative solutions combined with responsive, professional service to our clients. Worldwide, we deliver a full range of services that satisfy client needs for progressive planning, environmental evaluation, engineering, design, consulting, program management and construction management. CDM Smith maintains the size, stability and resources to take on a wide range of projects successfully.

Discovering one smart solution after another, our employees are always working to help our clients stay ahead of the curve. Energized by "impossible" technical challenges, we think new when a game-changing solution is required. Innovation defines the way we work, helps us redefine industry standards and fuels our curiosity for the unknown. Our cutting-edge research and development program, appetite for innovative technologies and expert virtual design and construction practices help us transform the industry one breakthrough at a time.

A Trusted Leader in Wastewater Treatment

CDM Smith was founded in 1947 on the basic principles to help clients source, treat, and supply high-quality water for our communities. Soon after, we began working with clients to effectively manage wastewater flows and implement technologies for high-quality effluent. Today, more than 80% of our $1.3B annual revenues is from our water and wastewater work, making us more dedicated than ever to helping clients like Naperville preserve their water sources and effectively manage wastewater.

Proven National Expertise

CDM Smith has delivered thousands of wastewater projects across the globe, establishing us as one of the top firms in the industry. We are highly active in establishing industry standards and authoring the Water Environment Foundation's (WEF) Manual of Practice (MOP) chapters on nitrogen and phosphorus removal processes, and operation of nutrient removal facilities. Our industry standing means you have access to the best in innovation, technology, and proven processes with one firm.

Unparalleled Knowledge of Tertiary Filter Technologies

CDM Smith's extensive experience in the design of thousands of wastewater treatment systems worldwide encompasses a comprehensive array of wastewater treatment processes for new and upgraded wastewater treatment plants (WWTP), including a full spectrum of treatment process studies, piloting, planning, design, and operations and maintenance (O&M) assistance. As proof of our excellence in this arena, we have performed planning, design, and/or construction services at 275+ WWTPs since 2000, including projects that feature filter evaluation and rehabilitation with a key focus on operational efficiencies across all plant processes. As a leader in filter work at WWTPs, CDM Smith has amassed a large portfolio of solutions that are cost-effective, robust, and meet required performance metrics. We have evaluated and implemented numerous tertiary treatment technologies, including cloth filtration. Many of these projects have focused on increasing plant flows and resolving hydraulic deficiencies.

Established Relationships with the Illinois Environmental Protection Agency (IEPA)

CDM Smith has enjoyed a successful, cooperative, and mutually beneficial relationship with the IEPA Construction Permits Division. Our relationship was founded on mutual respect and the common goal of construction and operation of water and wastewater treatment facilities that ensure the protection of potable water supplies to the people of Illinois. Over the past 25 years, the IEPA has approved permits for more than 50 plant improvement projects completed by CDM Smith, ranging from complete advanced water treatment plants to permission to perform filter stress testing on existing filters and new technologies, such as membranes and ultraviolet (UV) disinfection.

Illinois Expertise

CDM Smith's extensive experience throughout the Midwest and Illinois with plants and systems of similar size puts CDM Smith ahead of the curve in evaluating Naperville's needs. Since the Chicago office opened in 1984, CDM Smith has worked with regional clients, giving their team a thorough understanding of the challenges public utilities face.

Local Staff Ready to Serve the City of Naperville

CDM Smith's Lisle and Chicago offices offer Naperville 120+ staff dedicated to our local infrastructure and delivering client efficient service with one phone call.

A TEAM BUILT TO DELIVER A SUCCESSFUL PROJECT FOR NAPERVILLE

CITY OF NAPERVILLE

PROJECT MANAGER
Eric Cockerill, PE, BCEE ●

Highly experienced Project Manager with tremendous experience at the Springbrook WRC.

PROJECT DIRECTOR
Amrou Atassi, PE, BCEE, PMP ●

ASSISTANT PROJECT MANAGER
Doug Youngblood, PE, PMP ●

Key lead team member on facility planning, UV disinfection project, influent pump station upgrades and design of a new grit and RAS pumping station at Springbrook WRC.

TECHNICAL ADVISORS
Nathan Cassity, PE, BCEE ●
William Marten, PE, BCEE ●
William McConnell III, PE, BCEE ●
Glen Daigger, PhD, PE, BCEE, NAE ●

Provided advice regarding aerobic/anoxic cycling in digesters to solve pH and alkalinity problems.

Developed dual grid aeration system concept design for Wausau, WI, UCSD, and Danville SD, IL.

Renowned wastewater nutrient removal expert.

Wastewater expert; Task Force Chair and contributing author to WEF's Manual of Practice No. 37 Operation of Nutrient Removal Facilities.

BIOWIN MODELING	HYDRAULICS	PROCESS-MECHANICAL	I&C	HVAC/MECHANICAL	STRUCTURAL
Kam Law, PhD, PE, ENV SP ● Eric Staunton, PhD, PE ●	Mark Allen, PE ●	Alexandra Doody, PE, LEED AP ● Brooke Kenny, PE ● Eric Compton, PE ●	Jason Edwards ●	April Ricketts, PE, CPD, LEED AP BD+C ●	Brandon Diffenderfer, SE ●

CIVIL	ARCHITECTURAL	CONSTRUCTABILITY/CRS	ELECTRICAL	COST ESTIMATING	GEOTECHNICAL/SURVEY
Michelle Madrid, PE, CFM ●	Sarah Sutherlin, AIA, LEED AP ●	Bob Reid, PE ● Mark Battista ● Brooke Kenny, PE ●	Jeremy Farrer, PE ●	Paul Damon, PE ●	HLR ● TSC ●

Mark Allen, Eric Compton, Jason Edwards, Brandon Diffenderfer, Michelle Madrid, Jeremy Farrer: Key Discipline Leads for multiple previous projects at SWRC.

Consistent team members familiar with the site.

Firms
- ● Donohue
- ● CDM Smith
- ● One Water
- ● HLR (Survey)
- ● TSC (Geotech)

Donohue has assembled an exceptional team for this project

- ✓ Proven Leadership
- ✓ National Wastewater Expertise and Experience
- ✓ Demonstrated Ability to Work Together
- ✓ In-Depth Springbrook WRC Familiarity
- ✓ Local
- ✓ Longstanding Commitment To Naperville

Eric Cockerill, PE, BCEE
Project Manager

Donohue | Experience: 29 Years

Eric has 29 years of project management and engineering experience in water and wastewater treatment facilities. Has been involved with multiple projects for the City of Naperville including Facility Planning, Grit and RAS Pumping Improvements, Biosolids Holding Tank, Structural Assessments, and NPDES Permit Compliance. He has completed several local planning and design projects for clients including Joliet, West Chicago, and MWRDGC (multiple). In addition to his pre-construction experience, he has been involved with construction phase engineering services including a $27 million water treatment plant upgrade, $2.5 million elevated water storage tank, a $168 million sludge treatment project, and $5 million wastewater biosolids processing improvement project. He has been responsible for coordination of office services, submittal review, schedule review, contractor claim review, and correspondence with contractors.

Doug Youngblood, PE, PMP
Assistant Project Manager

CDM Smith | Experience: 18 Years

Doug is a project manager and engineer with over 18 years of experience implementing wastewater projects throughout the Midwest. He is serving as project manager for several active projects at the Springbrook Water Reclamation Center. These projects include construction of a 26-mgd UV disinfection facility, influent pump station upgrades and design of a new grit and RAS pumping station. Doug has been successfully working as part of the CDM Smith / Donohue and Associates Project Management Team since the Naperville Facility Plan in 2020. In addition to working with Naperville, Doug has served as project manager implementing infrastructure improvements for other large sewerage districts in the region including the Milwaukee Metropolitan Sewerage District and the Western Lake Superior Sanitary District.

Amrou Atassi, PE, BCEE, PMP
Project Director

CDM Smith | Experience: 22 Years

Amrou is a senior project manager and senior project engineer specializing in drinking water treatment and distribution and energy efficiency/system optimization. With more than 22 years of experience, he has worked on all phases of water treatment projects, including pilot testing, distribution system modeling, corrosion control, master planning, water quality compliance issues, energy efficiency analysis/planning, design, and construction phase services. He has worked on a wide range of projects from $5,000 studies to over $1 billion capital improvement projects. He oversees water and wastewater projects in Illinois and has managed over 100 projects in the Midwest. He will work closely with our team to ensure schedule and budgets are met and that the City is satisfied with our work. Additionally, he has the authority to guarantee CDM Smith's commitment to this project and can bring in additional resources as needed

Nathan Cassity, PE, BCEE
Technical Advisor

Donohue | Experience: 24 Years

Nathan has 24 years of experience as a wastewater process engineer. He has performed numerous evaluations and designs for wastewater facilities, including primary and secondary treatment, advanced treatment, disinfection, odor control, and the handling, treatment, and disposal of biosolids. Nathan's is very familiar with the Springbrook WRC, having served as project manager and/or lead process engineer for multiple projects including biosolids thickening and aeration improvements, tertiary filter renovation evaluation and design, phosphorus removal pilot studies and planning evaluation, nutrient removal evaluation and grit removal and RAS pumping preliminary design.

Bill Marten, PE, BCEE
Technical Advisor

Donohue | Experience: 40+ Years

Bill's expertise includes researching, planning, designing, starting up, analyzing, and troubleshooting wastewater treatment systems. He is Donohue's Practice Leader for Wastewater Biological Processes and Nutrient Removal. Bill has been an operator, a wastewater utility engineer, and has managed a 15-mgd activated sludge plant, giving him a "real world" perspective on every project. This unique experience gives him an understanding of the constraints and concerns of operators, plant managers and utility engineers – and a commitment to finding robust, simple, and sound solutions to their challenges. His core values include operational simplicity and flexibility, cost- and process-effectiveness, and maintainability.

Bill has significant facility-wide and focused experience with wastewater treatment facilities at Urbana-Champign SD, North Shore WRD, Danville, Joliet, Decatur, and Rantoul, IL; Milwaukee, La Crosse, Wausau, Beloit, Sheboygan, Brookfield, Eau Claire, Superior and Sun Prairie, WI; Marquette, Holland, and Lansing, MI: Fort Wayne and Gary, IN; Faribault, Willmar, and Becker, MN; O'Fallon and St. Louis, MO.

William McConnell III, PE, BCEE
Technical Advisor

CDM Smith | Experience: 32 Years

William is a senior environmental engineer with a wealth of experience in the planning, design, operation, and construction of wastewater and water treatment facilities. He specializes in wastewater treatment process design and operations for biological nutrient removal (BNR), and he is focused on helping facilities to achieve cost-effective BNR by optimizing the use and efficiency of existing assets. William also tracks technology advancements in the field and balances the implementation of innovative approaches with the need for reliability and conservatism. He has contributed to many related publications and served as the Task Force Chair and contributing author for the Water Environment Federation's Manual of Practice No. 37 Operation of Nutrient Removal Facilities.

Glen Daigger, Ph.D., PE, BCEE, NAE
Technical Advisor

One Water Solutions | Experience: 40+

Dr. Daigger is President and Founder of One Water Solutions, a water engineering and innovation firm. He is a national nutrient removal expert and one of the world's most renowned wastewater experts. He is an internationally-recognized wastewater expert with a broad understanding of all facets of wastewater treatment processes and facilities. He provides strategic advice for and technical analysis of wastewater treatment systems.

Before starting One Water Solutions, Dr. Daigger served as a senior vice president with an international wastewater engineering firm. He served as the chief wastewater process engineer and was responsible for wastewater process engineering on a firm-wide basis.

Dr. Daigger has been actively involved with over 150 U.S. and international water resource recovery facilities ranging in size from <1 to >400 mgd and served on numerous technical advisory teams aimed at solving complex wastewater challenges or advancing the wastewater field. He is author or co-author of more than 100 technical papers, four books, and several technical manuals and holds 11 patents.

Alexandra Doody, PE, LEED AP
Process-Mechanical

CDM Smith | Experience: 16 Years

Alexandra is a project technical leader and process specialist with 16 years of experience in water reclamation process and mechanical design, wastewater process modeling and biosolids management. She is also a subject matter expert in nutrient removal for water reclamation facilities. She has been involved in the optimization, upgrade and expansion of numerous existing facilities both in warm and cold weather climates, as well as the design of several greenfield treatment facilities to facilitate future expansion. Alexandra is leading the process evaluation and preliminary design of BNR upgrades to the City of Wichita's Plant 2. She is overseeing all aspects of the BNR part of the design (with a construction value of approximately $80 million), including intensive wastewater sampling for characterization of two separate influent streams from different collection systems.

Brooke Kenny, PE
Process-Mechanical/Constructability-CRS

Donohue | Experience: 9 Years

Brooke is a professional engineer with experience in potable water and wastewater treatment planning, design & construction, Consent Decree negotiations, Long Term Control Plan development, and program management. She has led or contributed to detailed collection system and plant hydraulic calculations, preparation of testing protocol, preliminary design development, CAD design, Civil 3D modeling, Revit modeling, CSO regulator capacity analysis, design of chemical dosing system, field stress testing, leading tasks and project teams, coordination between disciplines, preparation of detailed design drawings and specifications, development of opinion of probable cost, development of bid documents, QA/QC, bidding assistance, and construction coordination.

R. Eric Compton, PE
Process-Mechanical

CDM Smith | Experience: 27 Years

Eric has 27 years of experience as a consulting design engineer, including the roles of project manager, design manager and process task leader, with projects completed primarily in the following areas: wastewater treatment plants, water/wastewater pump stations and conveyance, and site improvement engineering (water distribution, sanitary sewers, and storm drainage systems). For Interim Solids Improvements in Geneva, Eric managed the design of solids system pumping and flow measurement improvements – replacing RAS pumps, WAS transfer pumps, and adding four flow meters to solids transfer lines. For the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC), he served as project manager and process task leader for the design of Primary Settling Tanks and Grit Removal Facility at the Calumet Water Reclamation Plant.

Kam Law, PhD, PE, ENV SP
BioWin Modeling

Donohue | Experience: 28 Years

Kam brings significant experience in the planning and design for all aspects of water resource recovery facilities, from replacement, expansion, and construction of new facilities, to investigation of operational problems using process modeling tools.

She is Donohue's Practice Leader for Wastewater Innovations, where she is responsible for guiding Donohue teams and our clients in efforts to effectively employ and implement innovative and emerging technologies and practices.

Kam was involved in the planning and modeling of biological nutrient removal systems for several large facilities including the 400-mgd Stickney Water Reclamation Plant and 333-mgd O'Brien (formerly North Side) Water Reclamation Plant for MWRD-Chicago. Her recent lead design experience includes major

upgrades to the Four Rivers Sanitation Authority and Yorkville-Bristol Sanitary Authority wastewater treatment plants.

She is currently serving on an Advisory Board for a California Energy Commission funded project on Performance Evaluation of Advanced Primary and Secondary Treatment Systems, a technology research and development project using both full- and demonstration-scale technologies.

Eric Staunton, PhD., PE
BioWin Modeling

CDM Smith | Experience: 9 Years

Dr. Staunton is an environmental engineer with 9 years combined experience in academia and consulting covering an array of disciplines within the wastewater industry. His experience is focused on whole plant process modeling, facilities planning, solids processing, nutrient removal, and chemical feed systems. He is also co-author of Chapter 14 of the WEF Manual of Practice No. 8 "Suspended-Growth Biological Treatment." He recently was the process modeling lead for the Wichita, KS BNR upgrade project, thickening centrifuge replacement project in Newark, NJ, and led a team of process models to size new aerators for the City of Fort Myers Central and South advanced wastewater treatment processes.

Mark Allen, PE
Hydraulics Engineer

CDM Smith | Experience: 27 Years

Mark is a senior hydraulic engineer with 27 years of experience in the design, evaluation, and modification of hydraulic structures and is a nationally recognized leader in this field. His depth of knowledge with respect to fluid flow and its interdependence with conveyance structures and equipment offers him invaluable insight in the identification of key design parameters whose importance may normally be overlooked and/or underestimated. His expertise is frequently utilized through quality assurance and technical reviews for hydraulic designs produced by CDM Smith offices nationwide.

He served as a senior technical reviewer on the effluent disinfection project which included study, design, and construction phase services for the Westside WWTF Effluent Disinfection Design, Kansas City, Missouri.

Jason Edwards
I&C Engineer

Donohue | Experience: 23 Years

Jason's experience includes electrical engineering as well as electrical assembly, start-up, and maintenance. He is knowledge in programmable logic controller (PLC/HMI) control systems and ladder logic language for RS Logics 5000, Connected Components Workbench, Factory Talk View, Jmobile, and Siemens TIA Portal Software. He designs control and automaton systems with PLCs, HMI, VFDs, and various other instrumentation and has conducted factory testing and configuration of controls and automation systems. Jason is currently working on the Donohue-CDM Smith UV design for the Springbrook WRC.

April Ricketts, PE, CPD, LEED AP BD+C
HVAC/Mechanical

CDM Smith | Experience: 28 Years

April has 28 years of experience in the design of Building Mechanical systems for multiple facility types, including HVAC (heating, ventilation, and air conditioning) and plumbing designs for water and wastewater treatment plants; booster pump stations; laboratories; as well as various other facility types. She also has experience in the design of central plants, air/water distribution systems, pump witness testing, assessments, and green building design. April oversaw the design for the HVAC improvements at the return activated sludge (RAS/waste activated sludge (WAS) pumping station, grit/blower building, and raw

sewage pumping station at the Geneva WWTF. The HVAC design included electric unit heaters, packaged air handling units and makeup air units, and exhaust fans for the approximate 3,400 square footage of renovation.

Brandon Diffenderfer, SE

Structural Engineer

CDM Smith | Experience: 16 Years

Brandon is a structural engineer with experience in structural analysis, design, and condition assessment. He has structural experience in the investigation, repair, and rehabilitation of existing structures including water and wastewater facilities, parking garages, high-rise residential, and final effluent outfall structures. His responsibilities include analyzing and designing facilities, tanks, and other miscellaneous structures, condition assessment and repair of existing structures, and managing construction engineering services, and preparing addenda related to the contract documents. For the City of Geneva, he served as the project structural engineer responsible for developing the details and specifications to upgrade the blower building, bioreactor trains, RAS/WAS, raw water pumping stations, and clarifier tanks.

Michelle Madrid, PE, CFM

Civil Engineer

Donohue | Experience: 11 Years

Michelle is a civil engineer with experience providing a variety of engineering services for site design, sanitary sewer collection, water distribution, drainage/flood control, and site design projects. Her expertise includes flood control/mitigation, drainage modeling, analysis and design, site development, and construction related services.

Michelle is serving as civil engineer for the Springbrook WRC Facilities Planning effort. She has also provided recent civil/site design engineering for the Joliet Eastside WWTP Phosphorus Removal Design, the Four Rivers Sanitation Authority-Primary Filtration Phases 1 and II Design, and various wastewater conveyance projects throughout Illinois and Wisconsin.

Sarah Sutherlin, AIA, LEED AP

Architectural

CDM Smith | Experience: 15 Years

Sarah brings 15 years of architectural experience including digital design and fabrication. She is skilled in several advanced design programs including Revit AutoCAD, Rhinoceros, 3Dsmax, and Adobe CC. She utilizes these technologies, along with hand crafts such as sketching, welding and carpentry, to inform and communicate designs. She applies these technologies and methods to inform and coordinate designs with clients, consultants, and contractors. Sarah has served as Project Architect on multiple Water/Wastewater projects, including for the UV Disinfection Facility Design at Springbrook WRC; the electrical improvements and Facility Addition at Wilmette, IL; and for the Raw Water Intake and Pump Station design in Sheboygan, WI.

Bob Reid, PE

Constructability/CRS

CDM Smith | Experience: 19 Years

Bob has nearly two decades of experience in construction services on wastewater, water, and transportation projects. He has experience in overseeing construction of wastewater and drinking water treatment facilities, city street reconstruction, bridge deck overlay construction, and combined sewer work. Bob provided constructability review and value engineering during the design of the Springbrook WRC UV Facility upgrades. He is currently serving as Resident Project Engineer for the construction phase of this project.

Mark Battista
Constructability/CRS

CDM Smith | Experience: 30 Years

Mark is a construction industry professional with experience as a program manager, project director and construction manager. His experience includes heavy civil construction, water and wastewater treatment plants, earthwork/wetlands, utilities, roadway/bridge, pump/lift stations, demolition, dredging, marine, design build construction and environmental services.

Mark's experience includes management of government and commercial construction projects; design build (D/B); contract and change order negotiations; arbitration; claims/insurance settlement issues; subcontract management; design/value engineering; construction cost estimating; cost controls; scheduling; health and safety planning; and QA/QC management. His recent project work includes resident engineering for WWTF improvements in Geneva, IL and construction manager for WWTP improvements in Gary, IN.

Jeremy Farrer, PE
Electrical Engineer

Donohue | Experience: 26 Years

Jeremy is an experienced senior electrical and controls systems engineer, specializing in the design of power distribution, lighting, fire alarm, communication and network systems, SCADA systems, and control systems for water, wastewater, stormwater, and building projects. He has also been involved in numerous electrical studies, including short circuit, coordination, arc flash, thermal analysis, and harmonic studies. He is familiar with the Springbrook WRC, having served as lead electrical engineer for the design of three new 25-mgd UV trains, non-potable pump station, building facility, flow metering stations and lightning protection system.

Paul Damon, PE
Cost Estimating

CDM Smith | Experience: 40+ Years

Paul has successfully estimated construction jobs ranging in size up to $750 million and estimates for programs that are multiple billions of dollars. His responsibilities include the preparation of conceptual estimates, preliminary design estimates, final design estimates, detailed bid estimates, and change order pricing and negotiating. He evaluates scope and pricing on design-build proposals and provides value engineering services. Paul has prepared estimates encompassing a wide range of projects involving water supply and treatment facilities, wastewater treatment facilities, water and wastewater pump stations, transportation projects, remediation projects, industrial processing facilities, and solid waste recovery facilities.

References

The project write-ups that follow highlight our experience on similar projects.

Springbrook WRC Facility Planning
City of Naperville, Illinois

DONOHUE CDM Smith

What, Who, How Much, When

Services	Evaluation, Design, CRS
Reference	Joe Slevnik, Operations Manager 630.420.6125 slevnikj@naperville.il.us
Fees	$937k
Duration	June 2020 – Present

Highlights

- Comprehensive, site-specific planning
- Innovative solutions to meet needs and reduce capital and operating costs
- Clear roadmap for future iterative improvements over the next 20 years

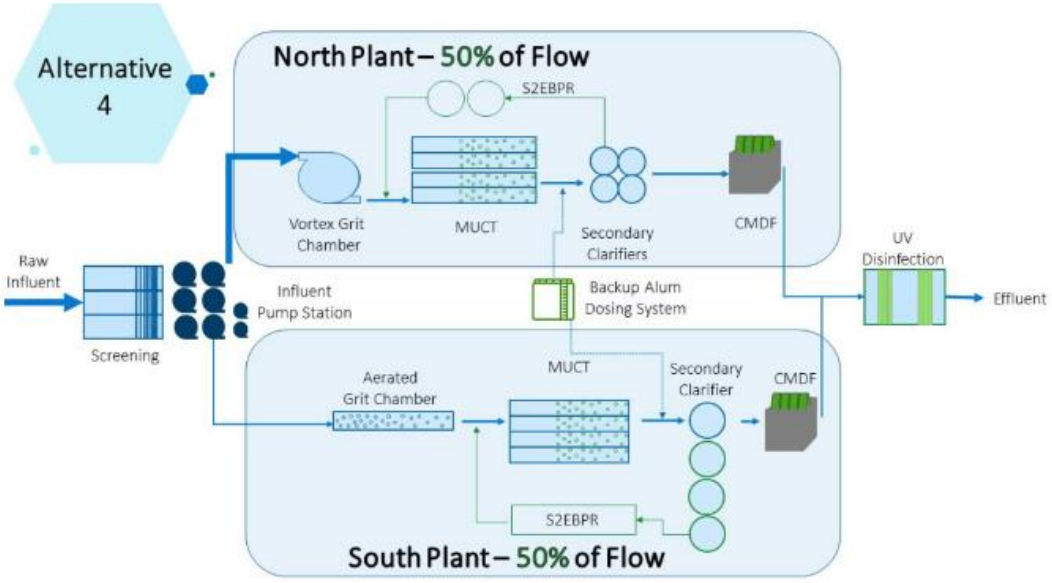
Donohue and CDM Smith have worked on various wastewater projects for the City of Naperville in recent years. This includes numerous evaluations to plan for anticipated nutrient removal requirements at the Springbrook WRC (SWRC). Based on that background, the City selected the team of Donohue and CDM Smith to develop a Facility Plan with prioritized 5-year, 10-year and 20-year Capital Improvement Program recommendations. The effort included:

- Comprehensive existing facilities asset evaluation
- Risk assessment and prioritized rehabilitation evaluation
- Detailed disinfection alternative evaluation
- Capacity and regulatory improvement needs evaluation
- Development of the Facility Plan Report
- Development of 5-, 10-, and 20-year detailed capital planning cost and implementation schedules

In order to meet the specific constraints of the SWRC, the facility plan recommended a solution that combined proven technologies with innovative components, such as S2EBPR, in order to reduce operating and capital costs.

The Facility Plan identified over $125M in project over the next 20 years in order to meet the facilities needs for existing asset rehabilitation, capacity increases, and regulatory compliance. These improvements were laid out in an iterative approach that both meet regulatory deadlines while spreading costs over the study period.

As part of the recommended upgrades, the Donohue/CDM Smith team recently designed a new UV disinfection system that is under construction.



Award-Winning Eastside and Aux Sable BNR Upgrades

City of Joliet, Illinois

DONOHUE

What, Who, How Much, When

Services	Evaluation, Design, CRS
Reference	Allison Swisher, PE, Director of Public Utilities, 815.724.4222 aswisher@jolietcity.org
Fees	$681k (Eastside) $1.2M (Aux Sable)
Duration	2014 - 2021

Highlights

- BioWin modeling
- Activated sludge improvements to enhance biological phosphorus removal
- RAS pumping improvements to serve plant expansion and new secondary clarifiers

The City of Joliet has three sewage treatment plants (STPs): Eastside, Westside, and Aux Sable. New NPDES permits requires a new total phosphorus effluent limit of 1 mg/L for the three facilities.

Process improvements at the Eastside STP focused on implementing biological phosphorus removal and other upgrades to support that change. The existing aeration basins were altered to include anoxic zones in a modified A/O process arrangement, which promotes biological removal of phosphorus as well as reducing total required oxygen. In the event of biological process upset, a chemical removal system was added by converting an unused room into chemical storage and pumping.

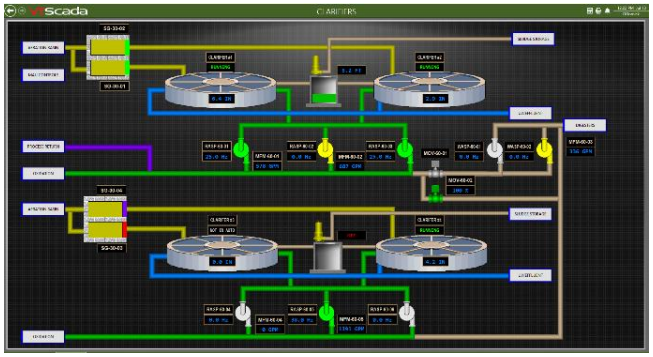
The changes provide the WWTP the ability to meet updated effluent limitations while increasing operational flexibility and creating a foundation for future improvements to energy and operational efficiency In addition, gravity belt thickeners were added to reduce the water content in the existing digesters and biosolids storage tanks.

As a result of modeling the activated sludge system with BioWin, Joliet elected to maximize the capacity of the Aux Sable STP in order to reduce flows currently treated at the West Side STP. Increasing the Aux Sable STP capacity required renegotiating the discharge permit. Donohue assisted the City in working with IEPA and negotiating with environmental groups for the new permit.

At the Aux Sable STP, Donohue designed a new biological selector (pictured below) that is built upstream of the existing oxidation ditch. This

selector structure allows the plant to operate in three different biological phosphorus removal arrangements depending on specific operating conditions.

This allows the facility to maintain biological phosphorus removal (avoiding $220,000 in chemical costs each year) through a broader range of operating conditions than a less robust approach. By adding two new final clarifiers, the selectors also provide additional biological treatment capacity to meet IEPA requirements for the plant expansion. RAS and WAS pumping improvements were included to support the additional flow capacity.



In addition to the activated sludge improvements, Donohue provided headworks improvements to support the increased flow including addition of a second S&L vortex grit tank, grit pumping improvements, and a second Huber grit washer. A recent project also replaced the existing multi-rake fine screens with new climber screens and replaced the screenings conveyor and wash press.

The Eastside project was selected for an ACEC IL Engineering Excellence Special Achievement Award in 2022 and the Aux Sable project received a Special Achievement Award and Judges Choice Award in 2020.

Aeration Efficiency and BNR Improvements at 46-mgd WRRF
City of Battle Creek, Michigan

DONOHUE

What, Who, How Much, When

Services	Evaluation, Design, CRS
Reference	Carl Fedders, Public Works Director City of Battle Creek 269.966.3490 cefedders@battlecreekmi.gov
Fees	$866k
Duration	Sept. 2015 – Feb. 2019

Highlights

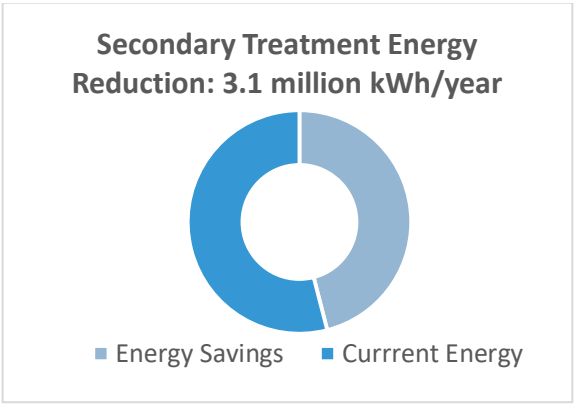
- Designed improvements to reduce total energy and chemical use in the secondary treatment system; resulted in 46% reduction in secondary treatment system energy usage
- Saved over $2.6M in bond debt costs due to energy savings

The Battle Creek Wastewater Treatment Plant is designed for a daily average flow of 27 mgd and peak flow of 46 mgd; the facility currently treats an average of 9 mgd. The process train consists of bar screens, grit removal, primary clarifiers, single-stage activated sludge with nitrification, and final clarification. The plant receives high industrial loadings that require the addition of nitrogen and phosphorus during secondary treatment to maintain the health of the biomass.

The City initially retained Donohue to perform an evaluation to select cost effective options for reducing energy consumption and chemical use in the Secondary Treatment System. After completion of the study, Donohue was retained to design the selected improvements. The design included the following secondary treatment system upgrades:

- Aeration displaced blower replaced with high speed turbo
- Valves and flowmeters for advanced DO control strategies
- New chemical dosing facilities and monitoring instrumentation for advanced chemical control.
- Two selectors in each aeration basin for biological phosphorus removal.
- Primary effluent, RAS, WAS, and mixed liquor valve a flowmeter improvements
- Scum pumping modifications
- Flow control and measurement to final clarifiers
- Complete PLC upgrades
- Power distribution system improvements

Donohue assisted with the application for Qualified Energy Conservation Bonds (QECBs) to fund the improvements. QECB funded projects must achieve a minimum of 20% energy reduction for the facility. The City was awarded $7M in QECBs, savings the City over $2.6M in bond debt costs. Donohue also prepared the application for a $150k Consumers Energy rebate.



Donohue served as the owner's representative during construction and provided on-site construction management for day-to-day construction activities, observation services, and project administration.

The successful project received the 2018 Public Works Project of the Year Award by the Southwest Branch of the Michigan Chapter of APWA (Environmental $5M-$25M category).

Facility-Wide Upgrade at 36-mgd WRRF

Wausau, Wisconsin

DONOHUE

What, Who, How Much, When

Services	Planning, Design, CRS
Reference	Eric Lindman Director of Public Works 715.261.6740 Eric.Lindman@ci.wausau.wi.us
Fees	$8.6M
Duration	March 2017 – Present

Highlights

- Led planning and design efforts for improvements to Wausau's aging WWTP
- Activated sludge modifications will enhance bio P and mixed liquor settling performance
- New secondary clarifiers and three upgraded secondary clarifiers

Faced with aging equipment and future lower effluent permit limits, Donohue led facility planning efforts and designed improvements to Wausau's 8-mgd average/36-mgd peak wastewater treatment facility. As part of comprehensive facilities planning, Donohue evaluated the condition and capacity of the plant's existing tertiary sand filters to meet future flows, waste load allocated BOD limits, and impending phosphorus TMDL.

The evaluation revealed that the existing sand filters have inadequate capacity. The goal was to develop a cost-effective phosphorus TMDL compliance strategy for increasing capacity and achieving consistent compliance. The City selected to proceed with disc filtration and activated sludge improvements that support enhanced bio-P.

Donohue designed a disc filtration system to treat up to 20 mgd. The disk filters and upstream rapid-mix, coagulation, and flocculation system fit within the existing filter building.

Other improvements include a new administration building, raw wastewater screening improvements, raw wastewater pumping improvements, grit system improvements, primary flow splitting improvements, primary treatment and solids pumping improvements, primary effluent conduit improvements, anoxic/anaerobic selectors for biological phosphorus removal, aeration basin configuration and efficiency improvements, aeration system improvements, secondary flow splitting improvements, effluent pumping, secondary effluent pumping, UV disinfection, primary solids screening, primary thickening, WAS thickening, digestion system enhancements, DSD dewatering, biosolids drying, and biosolids storage improvements.

The activated sludge modifications will enhance bio-P and mixed liquor settling performance. Solids train improvements will increase sidestream VFA production and decrease sidestream phosphorus loadings.

The $78M construction project is nearing completion.

Novel Aeration System to Enhance BNR, Alkalinity, and Efficiency

Wausau, Wisconsin

DONOHUE

What, Who, How Much, When

Services	Planning, Design, CRS
Reference	Eric Lindman Director of Public Works 715.261.6740 Eric.Lindman@ci.wausau.wi.us
Fees	$8.6M
Duration	March 2017 – Present

Highlights

- Novel dual aeration grid that enhances flexibility and performance
- High performance secondary clarifiers: rapid sludge removal, flocculating inlets, and Stamford baffles

For a major upgrade of the Wausau, WI wastewater treatment facility (WWTF), Donohue developed an innovative activated sludge system designed to achieve full nitrification while maximizing process performance and flexibility, energy efficiency and production of biological alkalinity. The upgrade included:

- Addition of a four-stage anoxic/anaerobic selector upstream of the aeration basins. The selector zones are mixed by low energy hyperbolic mechanical mixers, and provide for denitrification of nitrate contained in the return activated sludge (RAS) to save energy and produce biological alkalinity, while also achieving enhanced biological phosphorus removal.
- Replacing three 30+ year old multistage centrifugal blowers with new high efficiency turbo blowers.
- Addition of one secondary clarifier and upgrade of all four (three existing, one new) clarifiers with a new flow distribution splitter box, new flocculating inlets, density current (Stamford) baffles and TowBro rapid sludge withdrawal mechanisms.
- Converting six single pass aeration basins to two 3-pass aeration basins with "through the wall" low energy mixed liquor (ML) recycle pumping from the highly nitrified effluent end of each second pass into the high oxygen demand influent end of each first pass. This internal ML recycle pumping provides nitrate nitrogen to help stabilize BOD through denitrification in an area of the aeration basins where low dissolved oxygen (DO) concentrations are commonly found. Such "front end" denitrification saves on aeration energy by stabilizing BOD while also generating biological alkalinity, helping to minimize requirements for adding supplemental alkalinity.
- An innovative dual grid aeration diffuser upgrade, likely the first of its kind, shown in Figure 1 on the next page (this particular example is from Urbana-Champaign Sanitary District design). Each aeration basin air supply includes a manual isolation valve, an electric actuated airflow control valve, an air flowmeter and then branching to six aeration diffuser grids. The diffuser grids are divided into three zones, with each zone containing dual overlapping diffuser grids. This new grid design will allow enhance air supply flexibility.
- Some zones can have one of the two grids throttled or closed off, and possibly the other grid throttled, to reduce air supply to that zone while still maintaining minimum per diffuser and square footage airflow needs. This achieves low DO zones with adequate mixing, enhancing the ability to achieve simultaneous nitrification/denitrification (SND). Under such conditions DO is being used by nitrifiers to convert ammonia to nitrate, while the low aeration provides adequate mixing but achieves low DOs within bacterial flocs, allowing the nitrate being produced to be used by facultative heterotrophic bacteria, through denitrification, to treat BOD and produce biological alkalinity.
- Other zones can be operated with both grids open, providing higher localized zones of DO and nitrification. As a result, the basins can be set up to alternate between higher DO zones producing nitrate and lower DO zones where nitrification and adequate mixing are still occurring, but significant denitrification is occurring simultaneously.

With the conventional single grid designs, plants are limited in aeration turndown due to the minimum airflow per diffuser requirements. Dividing the diffuser grids in half greatly enhances turndown flexibility to maximize the energy savings and production of biological alkalinity through maximizing SND.

From the perspective of Wausau's potential operation, Figure 2 shows one possible operating condition in the three-pass basins – estimating where completely aerobic conditions and where low DO anoxic conditions, places where SND can be maximized, can occur.

Donohue believes this dual grid, enhanced process control and aeration supply flexibility design will become the future standard. Donohue is already implementing variations of this concept in design upgrades for the Danville WWTP and the Urbana-Champaign Sanitary District Southwest Plant in Illinois.

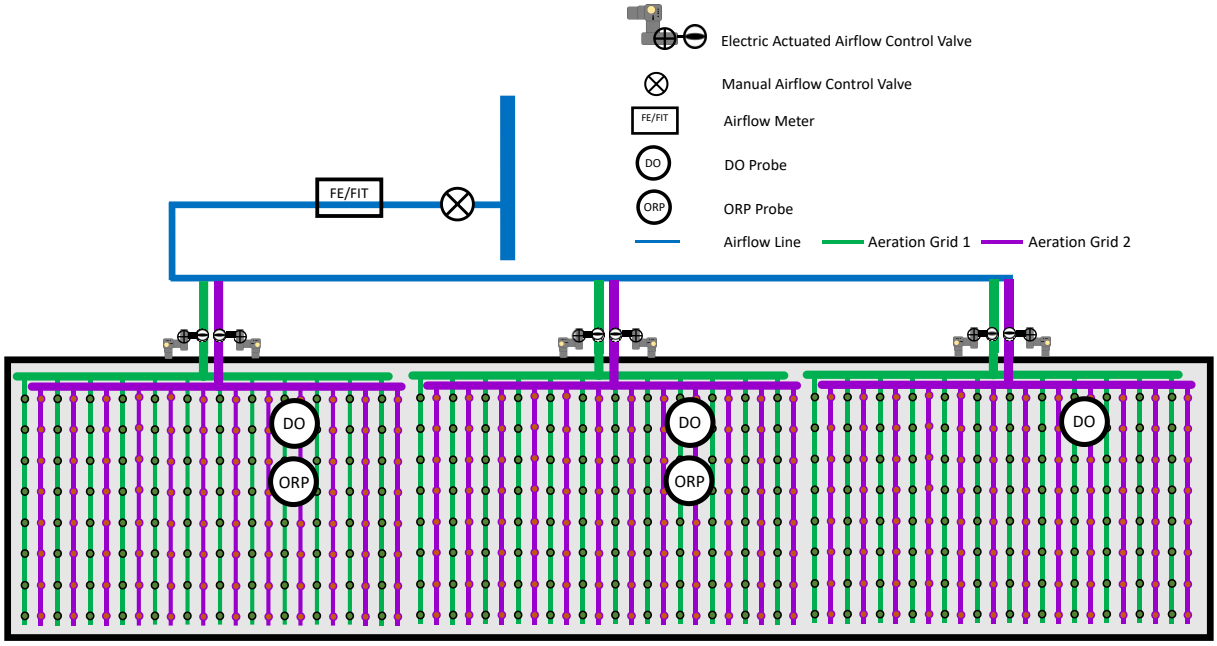


Figure 1: Schematic of Dual Grid Aeration System

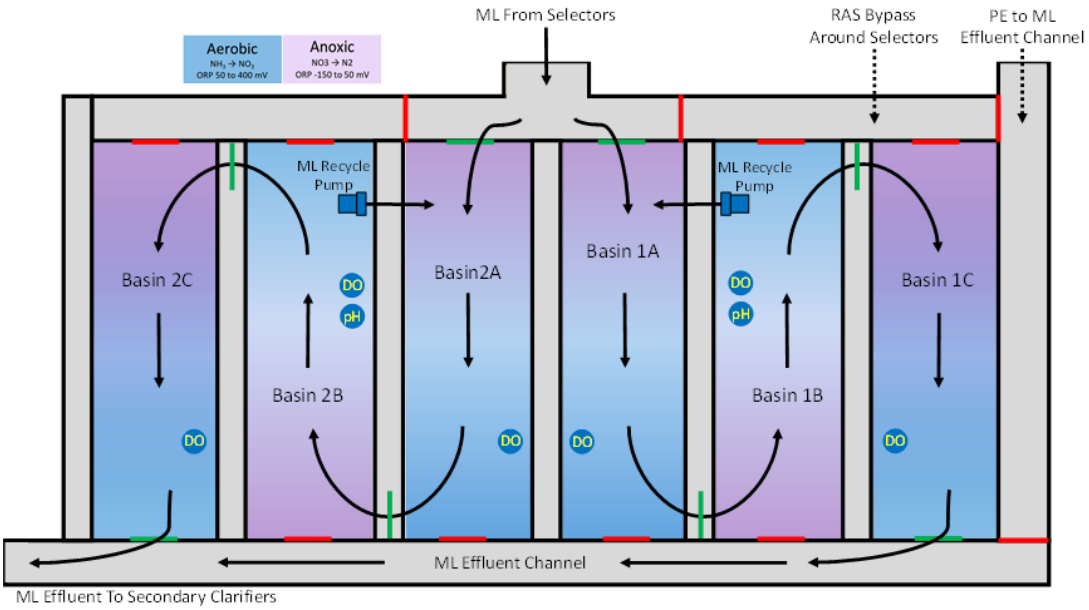


Figure 2: Configuration of and flow path through Wausau's (WI) Three-Pass Aeration System

Comprehensive Upgrade at 40-mgd BNR WWRF

La Crosse, Wisconsin

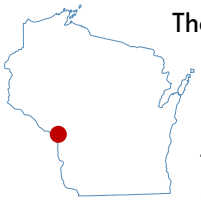
DONOHUE

What, Who, How Much, When

Services	Planning, Design, CRS
Reference	Jared Greeno WWTP Superintendent 608.789.7322 greenoja@cityoflacrosse.org
Fees	$4.1M
Duration	Oct. 2019 – Present

Highlights

- Process modeling for long-term nutrient removal planning
- Comprehensive treatment plant upgrade
- Improved biological phosphorus removal
- Low level phosphorus compliance
- Upgrades enhance safety, reliability, energy efficiency, solids processing and reuse



The City of La Crosse operates a regional wastewater treatment facility (WWTF) serving an extended sewer service area within the La Crosse metropolitan area and the City of La Crescent, Minnesota. The facilities were designed to treat an average flow of 20 mgd through the activated sludge process.

In preparation for the anticipated 2024 phosphorus permit limits, the City elected to proceed with facility upgrades outlined in their 2040 Wastewater Facility Plan prepared by Donohue. In addition to improved biological phosphorus removal, the upgrades will enhance safety, reliability, energy efficiency, solids processing, and solids reuse capacity. Donohue designed the recommended improvements to the treatment facility which included, among others:

- Fine screen addition
- Upgrades to the primary solids pumping system
- Aeration basin conversion from A2O to MUCT system for enhanced bio-P removal
- Full diffuser replacement in aeration basins
- High efficiency turbo blowers
- Reconfiguration of all aeration piping
- Final clarifier mechanism refurbishment
- Conversion of existing chlorination channel into chemical mixing tanks for phosphorus removal
- Rotating disc filters for phosphorus removal
- Solids thickening Orege system
- Digester heating system
- Mixing upgrades to all four anaerobic digesters
- Biogas piping and waste gas burner
- Belt filter press
- Belt dryer with boiler and heat exchanger system, dust control system, odorous air control system, solids storage silo and load-out, and storage silo nitrogen purge system
- Biogas treatment and compression system
- Heat and power cogeneration engine
- Electrical utility upgrade
- Upgrade to building hydronic heating systems
- NFPA 820 compliance upgrades

The project was bid in 2021 and the $60M project is currently under construction with Donohue providing construction administration and observation services. Completion is scheduled for early 2024.

WWTF Improvements, Facility Update III
City of Geneva, Illinois

CDM Smith

What, Who, How Much, When

Services	Planning, Design, CRS
Reference	Bob VanGyseghem Superintendent of Water/ Wastewater, 630.232.1551 bvangyseghem@geneva.il.us
Fees	$1.8M Design
Duration	Sept. 2015 – Dec. 2019

Highlights

- Designed BNR process with existing aeration tanks to provide operational flexibility under seasonal conditions
- Used BioWin modeling, Revit 3D/BIM, and A20 process to design and meet new phosphorus limit
- 2020 Public Works Project of the Year Award by APWA Chicago Metro Chapter

In January 2015, a final National Pollutant Discharge Elimination System (NPDES) permit was issued by the IEPA for the City of Geneva Wastewater Treatment Facility (GWWTF). The permit includes annual average limits for a TP concentration of 1.0 mg/L and a TP load of 42 lbs/day (based on average daily flow of 5.0 mgd) or 104 lbs/day (based on peak flow of 12.5 mgd). CDM Smith was selected to evaluate the existing facility, design a BNR process and perform construction services to meet the January 2019 deadline for reaching the new phosphorus permit limit.

Working closely with GWWTF staff, CDM Smith designed the following BNR related upgrades:

- Aeration tank modifications, implementing an A2/O process to achieve enhanced biological phosphorus removal (EBPR) and denitrification, with flexibility to operate as an A/O process with swing zones
- Blower improvements to air bearing high-efficiency turbo blowers
- Secondary clarifier improvements, including replacement of clarifier mechanisms and drives
- RAS with automated flow control valves and WAS pumping station improvements for additional capacity

Aeration Tank Modifications

Design for the aeration tank modifications was strategically flexible to allow GWWTF to meet both the new phosphorus limits and existing ammonia limits within the tank volume. The design incorporated an internal nitrate recycle that feeds to two locations and two swing zones that can operate in three modes: anaerobic, anoxic, or aerobic. Aerobic solid retention time (SRT) requirements, which increase during winter months for nitrifiers, are met by adding aerobic volume through swing zones in addition to decreasing wasting rates. Through BioWin modeling, this was shown to be an effective way to meet permit limits without exceeding the maximum allowable solids loading rates for the secondary clarifiers. Additionally, the ability to use the existing tank volume was a significant savings as compared to a tank expansion.

RAS Flow Control

CDM Smith recommended simple, yet innovative improvements for the RAS pumping station at the GWWTF to provide more operational control during varying flow and loading conditions.

Sidestream EBPR Design Flexibility

Included in the design of the BNR process is an anaerobic recycle that returns flow from the second cell of the anaerobic zone to a mixing chimney in the first cell. Turning the mixer off in the second cell allows for some settling of mixed liquor creating a sidestream fermentation process. This sidestream EBPR (S2EBPR) technique, also known as unmixed in-line fermentation, can help improve the resiliency of the EBPR process.

Simulation	Cold Weather	Avg. Temp	Warm Weather
Temperature (°C)	9.50	15.5	21.0
Aerobic SRT (days)	11.50	8.00	6.00
Effluent TP (mg/L)	0.92	0.83	0.66
Effluent Ammonia	0.45	0.16	0.09
Swing Zones On	2	1	0

BioWin predicted effluent TP and ammonia at design conditions at three temperature operating conditions (A/O configuration).

Various Design and Construction Projects at 120-mgd WWTF
Gary Sanitary District, Indiana

CDM Smith

What, Who, How Much, When	
Services	Design, CRS
Reference	Dan Vicari, Board Chair 219.682.8801, vicari@garysan.com
Fees	$1.2M (Aeration); $800k (Boiler); $225k (Grit); $50k (Filter)
Duration	2018 - Present

Highlights

- New aeration control system and blower efficiencies are saving over $100k/month in energy costs.
- New high-efficiency boilers and automated controls reduced electrical and natural gas consumption significantly
- Filter rehab project used advanced inspection methods and products to repair concrete filter tanks with minimal downtimes

Gary Sanitary District (GSD) operates a WWTP with a design peak flow of 120 mgd, and CDM Smith has been working with GSD on many projects in the past few years. Highlights for several recent relevant projects are provided below.

Aeration System Improvements

CDM Smith completed design and construction services on this project that replaced the existing aeration system with a new system that reduced electrical usage and allows GSD to reliably meet aeration requirements for nitrification and re-aeration. Construction was completed on budged at $7.8 million. This project included the removal of the existing aeration system, and the installation of four new blowers, a new control system, a new diffused air system for re-aeration using fine bubble membrane disc diffuser grids, and ancillary improvements at the wastewater treatment plant (WWTP).

This project had detailed sequencing plans and temporary air requirements to maintain plant operations throughout the duration of the project. GSD's electric bill was reduced by over $100,000 per month once the new system was up and running. The payback period for the project is only a few years.

Boiler System Improvements

CDM Smith completed design and construction services on this project that replaced the existing boiler system with a new system that reduced electrical and natural gas consumption usage and allows GSD to reliably meet requirements for the system. Construction was completed on budged around $1 million. This project included the removal of the existing boiler system, and the installation of three high-efficiency condensing hot water boilers, new control system for automatic operation, and new piping and valves. The payback period for the improvements was less than two years.

Grit System Improvements

CDM Smith completed design and is currently managing construction on this project to replace the existing grit pump and classifier system with a new system that reduces electrical usage and allows GSD to reliably meet grit removal requirements. This project includes the removal of the existing system and the installation of two new grit pumps, two new grit classifiers, modifications to the existing building (including raising the roof height), new control and electrical systems, and upgrades to the heating and ventilation systems to meet NFPA 820 standards. This project is currently in progress.

Filter Inspection and Rehabilitation

CDM Smith's work to rehabilitate four of GSD's filters included the removal of media from the filters, structural inspections and repairs of the filters, installation of media, underdrains, stainless steel air piping, etc., and testing of the new filters. This project was completed in 2020 and has resulted in the rehabbed filters performing as required.

Suitability and Quality of the Approach

Suitability and Quality of the Approach

Project Understanding

Our Project Understanding was developed based on information provided in the Request for Proposal, the team's work on the Facility Plan, Donohue/CDM Smith's previous and ongoing design projects at Springbrook Water Reclamation Center (SWRC), and previous discussions with Naperville staff. We understand that the City of Naperville wishes to accomplish the following objectives:

- Increase the aeration and clarifier capacity of the South Plant to accommodate 50% of current and future flows and loadings
- Configure the South Plant for future Phosphorus removal

Additionally, based on our team's understanding and experience working with the City, we believe secondary goals include:

- Facilitate future aeration improvements and Phosphorus Removal at the North Plant, which will require portions of the existing North Plant aeration tanks to be taken out of service for extended periods.
- Plan and implement the improvements in a sequence that reduces disruption to plant operations and coordinates multiple concurrent construction projects.
- Provide a reliable, efficient, automated secondary treatment process using proven, state-of-the-art design practices and equipment selections.
- Under the current market conditions, develop the project with cost and schedule in mind in order to meet the long-term improvement goals using the funding sources selected by the City.
- Incorporate flexibility in the design for future regulatory compliance.

These secondary objectives can be reduced to overall goals of **Performance, Flexibility, and Maximum Value**.

With that understanding of the project, the Donohue/CDM Smith team has identified several key design concepts that should be considered during the project and a detailed task list to plan and execute the project. The key design concepts were developed specifically to help achieve the project goals. The plan for execution of the project will keep the City and design team moving forward towards project completion with the budget and timeframe established by the City.

Key Design Concepts

Seasonal impacts on process performance, more frequent and intense wet weather events, and the upcoming regulatory requirements all contribute to the need for the South Plant Expansion. With Donohue/CDM Smith's extensive knowledge of the SWRC, we believe that it is crucial to design the South Plant expansion with a focus on operational flexibility. We have identified seven key potential features of the design that will meet the overall project objectives.

1. Equal volume between the RAS fermenter and the aeration tanks
2. Dual grid aeration system for improved turndown
3. Three pass aeration tank configuration to promote plug flow behavior
4. Pump RAS to RAS fermenter
5. High F:M in anaerobic zone
6. Two larger final clarifiers
7. WAS surface wasting and settling

Each of these concepts will require additional detail and evaluation during the project, but are worth considering because they offer benefits to one of the three overall goals.

Proposed Design Features and Benefits to SWRC

Design Concept	Performance	Flexibility	Maximum Value
1) RAS Fermenter Volume	✓	✓	
2) Dual Grid Aeration	✓	✓	✓
3) Three-Pass Reactor	✓		
4) Pumped RAS	✓	✓	
5) High F:M	✓		✓
6) Two Larger Clarifiers	✓		✓
7) WAS Surface Wasting and Settling	✓		✓

1 Design Concept 1 – Equal Volume Between RAS Fermenter and Aeration Tanks

Performance | Flexibility

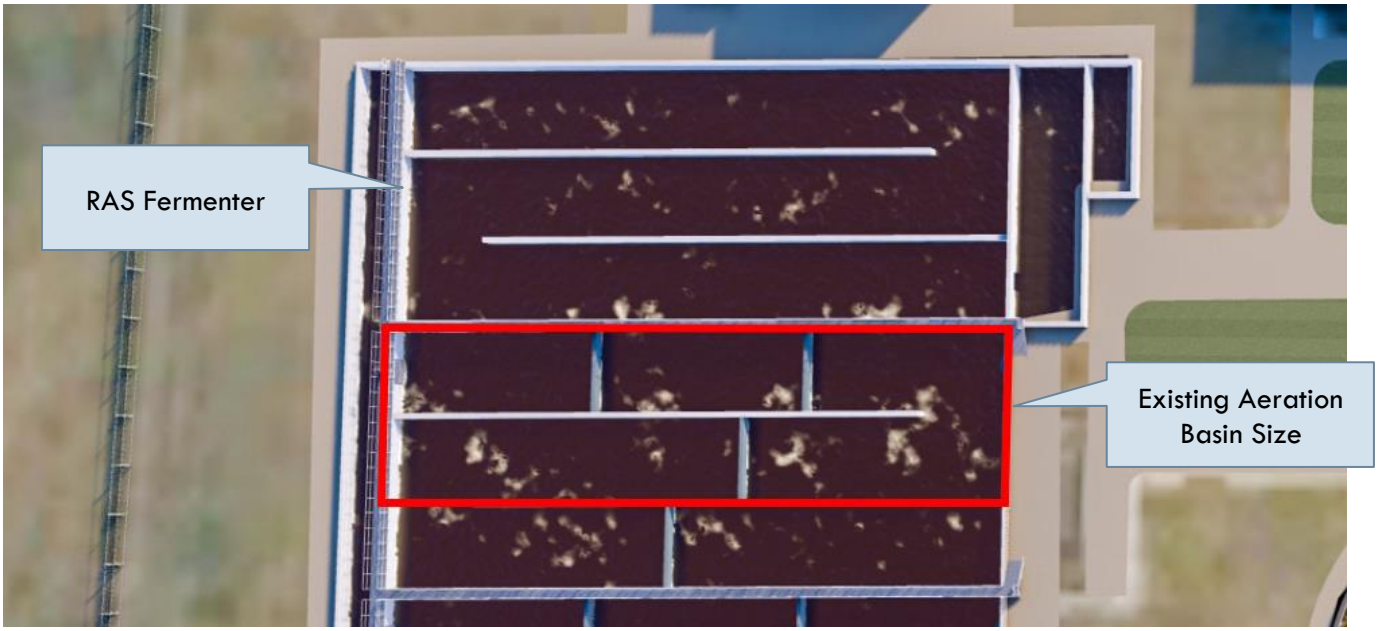
The City is currently evaluating the potential to implement S2EBPR at SWRC to provide cost-effective biological phosphorus removal in the absence of sufficient carbon. If this approach proves successful, the additional carbon generated by RAS fermentation can supplement the carbon deficit that Springbrook WRC may occasionally experience, while avoiding the need to rely on chemicals to reduce effluent phosphorus under normal conditions. While the volume of the RAS fermenter is currently under evaluation, a long-term benefit of using the same volume between the RAS fermenter and the aeration tanks is the potential to reuse the RAS fermenter as an additional aeration tank if needed.

The design team will leverage the experience of the Technical advisors, such as Glen Daigger, and the team's experience with similar S2EBPR projects like the project in Geneva, Illinois to design an effective system based on the pilot work currently being conducted.

Proper mixing design will be critical to the successful operation of the fermenter. Including the ability to provide constant versus intermittent mixing in different zones, the ability to increase mixing in the final portions of the fermenter to encourage scum to exit the tank, and the ability to route a portion of the raw influent to the fermenter to augment carbon generated by the fermentation process will all contribute to operational performance and flexibility.

FERMENTER SIZING

Preliminary evaluations indicate that approximately 8 to 24 hours of retention time can be provided using the same aeration tank volume for RAS fermentation based on 30% of the RAS flow (when RAS is 100% of raw influent flow) and 15% of RAS flow (when RAS is 60% of raw influent flow), respectively, which is within a reasonable operating range for RAS fermentation.



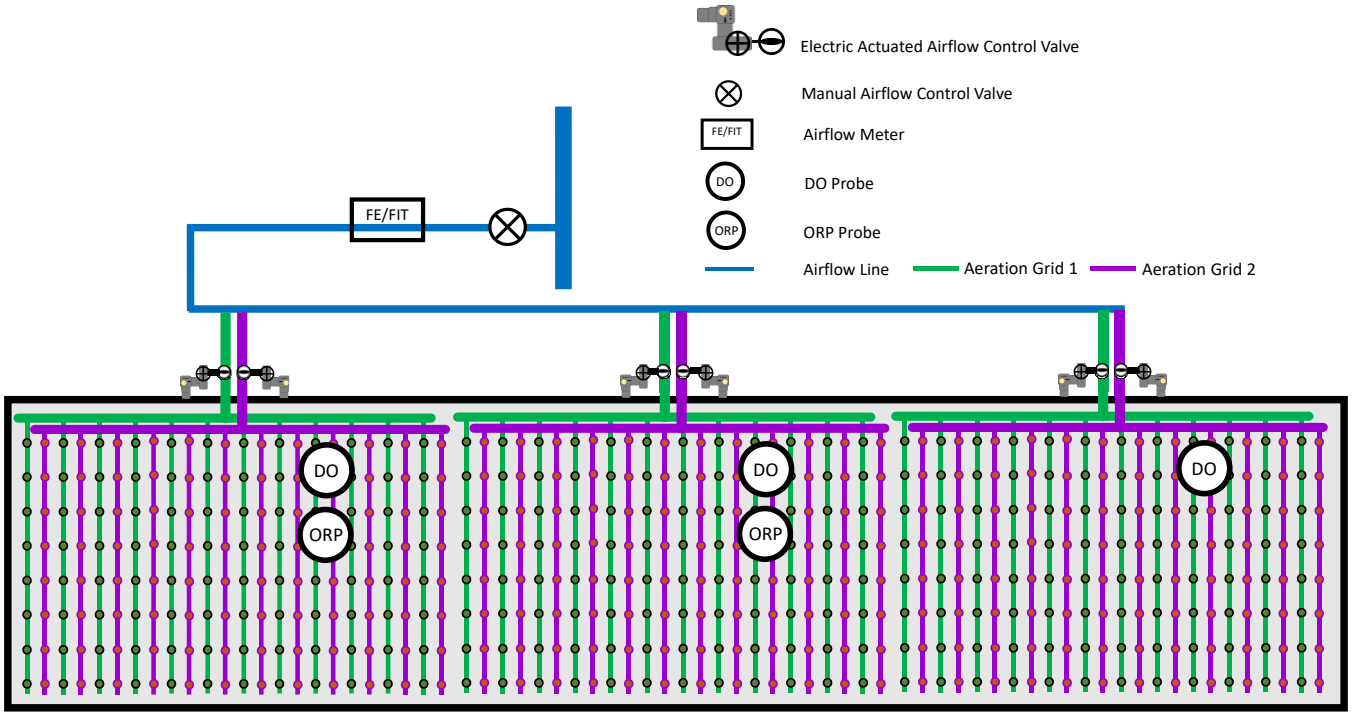
RAS Fermenter Volume, along with mixing design and augmentation with raw influent, will dictate process performance and phosphorus removal reliability, as well as offer flexibility for future changes.

2 Design Concept 2 – Dual Grid Aeration System

An efficient aeration control system not only offers energy savings, but also improves effluent quality, including effluent total phosphorus. Efficient aeration can be achieved by a simple **dual grid diffuser system** design. By providing the flexibility to provide added range to the aeration rate compared to conventional aeration systems while staying within the operating range of individual diffusers, aeration control is simplified. With greater turndown, simultaneous nitrification and denitrification is promoted. Donohue has designed several dual grid aeration systems and gained first-hand experience to ground truth the benefits of this approach.

An innovative dual grid aeration diffuser upgrade in Wausau, Wisconsin is shown below. Each aeration basin air supply includes a manual isolation valve, an electric actuated airflow control valve, an air flowmeter and then branches to three aeration diffuser zones. Each zone contains dual overlapping diffuser grids. This new grid design will enhance air supply flexibility. We believe this dual grid design will become the standard of the future.

Alternatively, ammonia based aeration control (ABAC), whether it is feed-forward or feed-back, can be considered for energy savings and added to either a conventional or dual-grid system. ABAC feed-forward is best for handling slug ammonia load. Danville SD decided to implement ABAC feed-forward control due to high ammonia industrial load periodically received at the plant. By installing an ammonia probe after grit removal, air valves to the aeration tanks can be adjusted before the load reaches the aeration basins. On the other hand, the Northeast Treatment Plant of the Urbana-Champaign Sanitary District implemented ABAC feedback control where a wet ammonia analyzer works in conjunction with DO probes in the aeration tanks to ensure that the optimum amount of oxygen is supplied for nitrification. ABAC offers the benefits of energy saving while maintaining nitrification, but it also increases system complexity and sensor maintenance requirements.

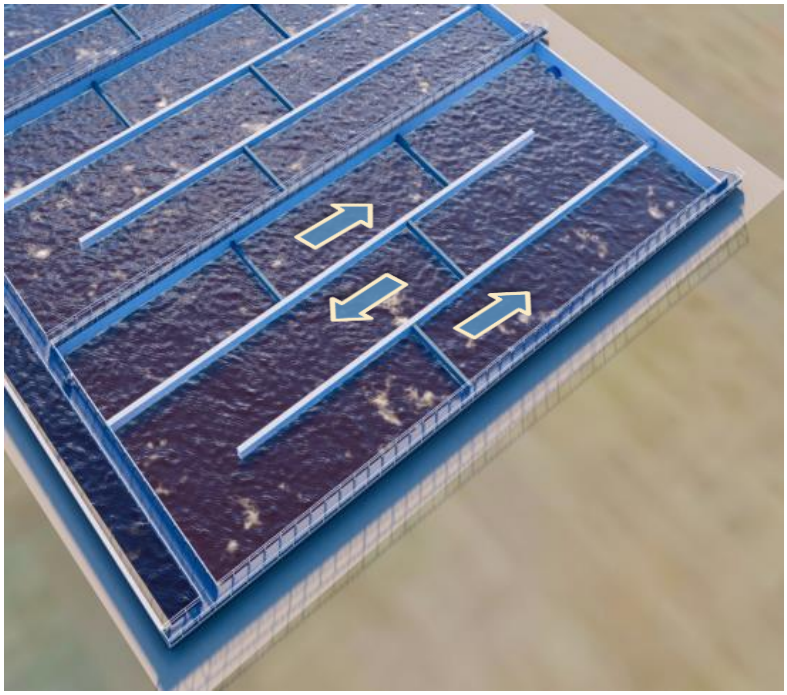


Aeration Grid System first implemented in Wausau, WI and enhanced at Urbana & Champaign Sanitary District with additional automation. The dual grid system promotes simultaneous nitrification denitrification for energy savings and better effluent quality. Another facility currently under design and construction with a dual grid system is at Danville Sanitary District, IL.

3 Design Concept 3: Three-Pass Aeration Tank Configuration

Performance

A plug-flow reactor configuration, with a preferred length-to-width ratio greater than 10:1, allows for reduced risk of short circuiting and improved effluent quality. For SWRC, the existing aeration tanks are single-pass tanks, 166-ft long and 46-ft wide. This results in a 4:1 length-to-width ratio. During the Facility Plan project, in order to minimize rework of the existing aeration tanks while keeping the existing general flow direction (west to east), a three-pass serpentine configuration was recommended. In addition, a three-pass reactor allows for simpler internal recycle by strategically locating selector zone baffles.

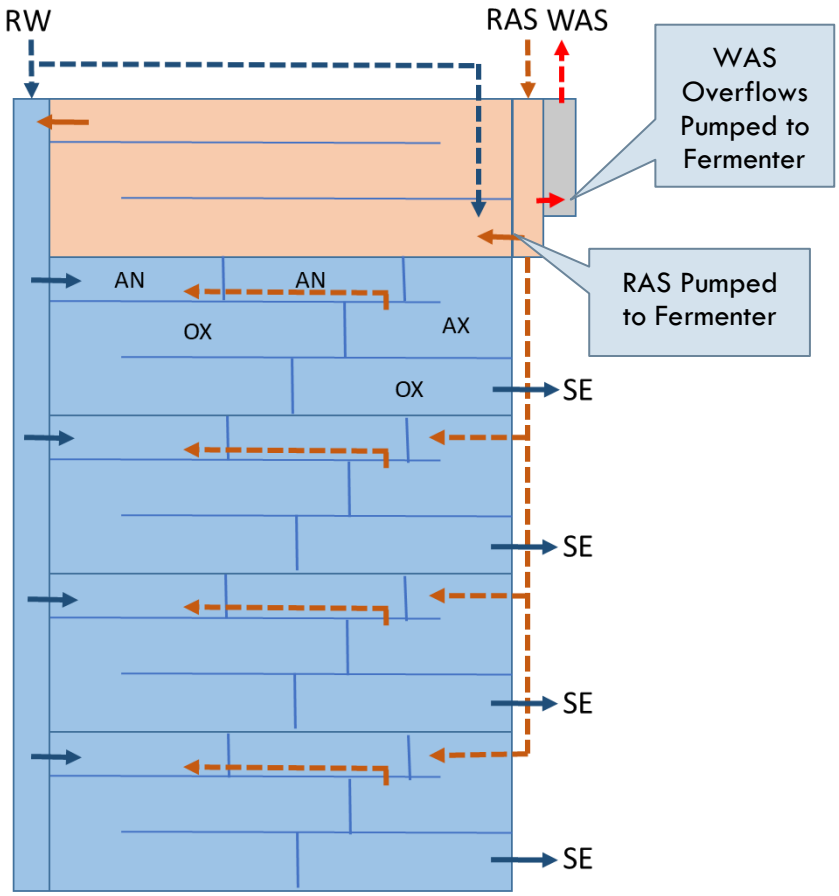


Three-pass basins with correctly sized selectors will improve overall performance of both carbon and nutrient removal and encourage a well settling sludge.

4 Design Concept 4: Pumped RAS to RAS Fermenter

Performance Flexibility

As discussed earlier, the City is currently evaluating the design basis for the RAS fermenter. It is important to provide the capability to easily control the amount of RAS diverting into the fermenter. This can be achieved by pumping the RAS into the fermenter and using the control system to automatically adjust the RAS pumping rate. The remaining RAS can then be distributed into the anoxic zone of each aeration tank via gravity flow with automated valves and flow meters.



Example RAS fermentation configuration with raw wastewater (RW) and RAS feed flexibility.

The concept fits well with other design concepts, including providing the ability to add additional carbon to the fermenter using raw influent and wasting by surface overflow from a RAS settling box (discussed below). Alternatively, sludge intensification could be accomplished by hydrocyclones at the fermenter and each aeration basin.

5 Design Concept 5: High F:M Ratio in Anaerobic Zone

Performance Value

Recent research has shown that operating a high F:M ratio in the anaerobic zone can promote formation of larger floc and granules. The larger the flocs, the faster they settle and higher the clarifier performance for total suspended solids removal. Therefore, it is Donohue's design philosophy to drive a high F:M (in the range of 0.3 to 0.4 mg rbCOD/g VSS/d) in the first selector zone regardless of the treatment objectives. This promotes sludge granule formation (along with other process features) that improves settling and selects for preferred bacteria. In examining the BioWin model that was previously calibrated for SWRC, the mass of the first anaerobic zone allows for a 0.4 F:M ratio, which is ideal for large floc formation. During final design, we will take a closer look at the latest data to update the process model and to ensure a high F:M ratio for granule formation.

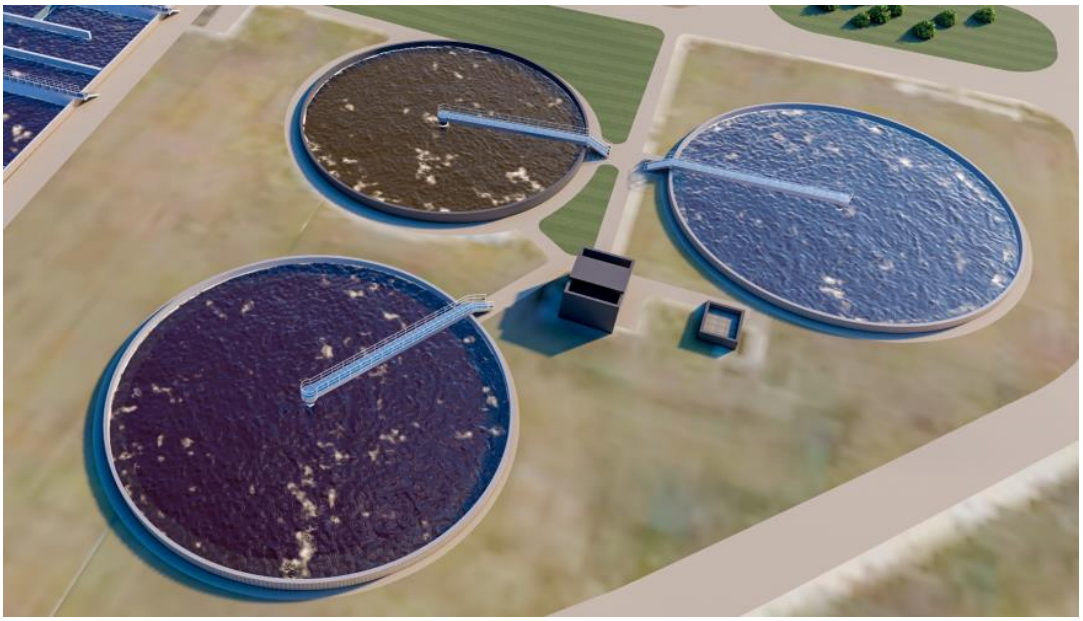
6 Design Concept 6: Two New, Larger Final Clarifiers

Performance Value

As part of the Facility Plan developed by our Team, three new 115-ft diameter final clarifiers were recommended to meet a surface overflow rate (SOR) of 1,000 gallons per day per square feet (gpd/sf) under peak hour conditions per the Illinois Recommended Standards for Sewage Works (IRSSW). Upon a closer look of the site plan and space availability, it may be more economical to construct two 125-ft diameter final clarifiers. With two new larger and the existing final clarifier, the SOR would be at 1,044 gpd/sf, slightly higher than the IRSSW guideline of 1,000 gpd/sf.

The MLSS from the aeration tanks would be piped into the distribution structure. With properly sized downward-opening gates or weirs, MLSS can be distributed to each final clarifier proportionally to surface area.

Reducing the total number of clarifiers will reduce both capital and operations costs.



Two new final clarifiers can save significant cost while providing equivalent treatment.

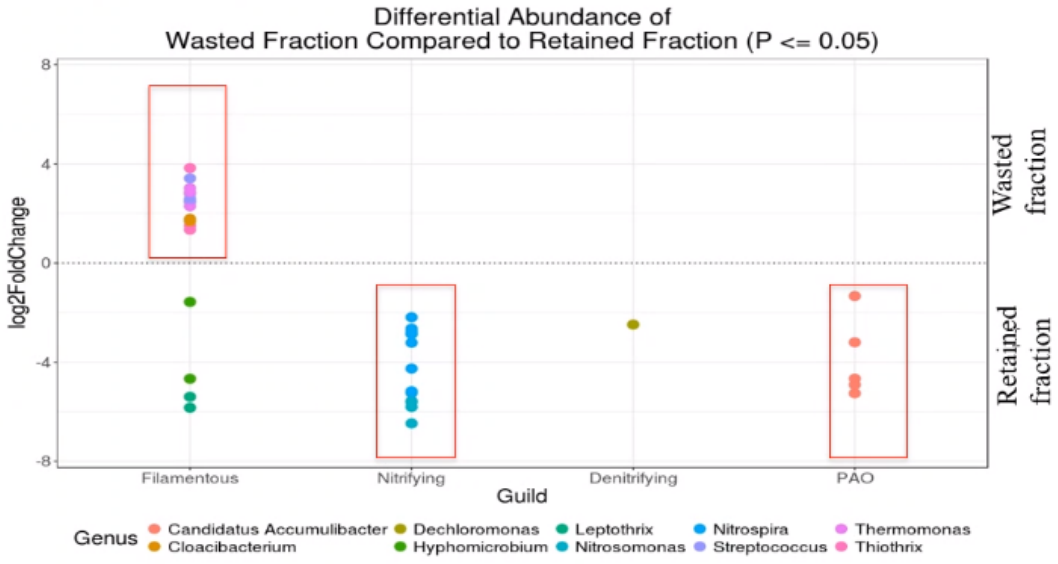
7 Design Concept 7: WAS Surface Wasting and Settling

Performance Value

Advances in the industry's understanding of activated sludge has expanded to include the impacts of granular sludge on overall performance. Granulated sludge provides many benefits in terms of improved settling and improved nutrient removal through simultaneous nitrification/denitrification within the granules. Methods of mechanically selecting for heavier, larger activated sludge "granules" has been the subject of extensive research and development. However, design approaches have been developed to encourage granule formation within the activated sludge system without mechanical intervention. This can be accomplished through appropriate sizing of selectors (the ideal F/M ratio) and surface wasting after allowing the return activated sludge to settle. Surface wasting also aids in removing microorganisms that cause sludge foaming. While less important than the F/M ratio, surface wasting nonetheless can provide an important benefit, including reduction of scum throughout the secondary process.

For the South Plant Expansion, a cost efficient approach to retain larger granules is proposed. A WAS wet well is proposed next to the RAS channel in order to overflow the surface scum and other "light" and "useless" sludge from the RAS channel into the WAS wet well.

Alternatively, intensification technology such as inDENSE™ can be considered to promote selective sludge wasting. inDENSE™ is setup such that a portion of the RAS is pumped through a series of hydrocyclones which results in lighter sludge leaving the cyclone through the overflow and is wasted while the more heavy biomass/granules is recycled back to the aeration tanks. Despite a proven process, there are limited full scale installations in the U.S. mainly due to the number of hydrocyclones required. In addition, it is preferred to locate the hydrocyclones as close to the aeration tanks as possible. This may not be practical for facilities that are subject to harsh winter weather.



WAS intensification has proven capable of selectively wasting less desirable species. (Sturm et al, 2016)

The advantages and disadvantages of these approaches will be evaluated with the City during the Basis of Design Phase in order to reach the best solution at SWRC's South Plant. That solution may be different at the North Plant during future projects.

Coordination with Other Projects

One of the critical success factors on this project is coordination with ongoing SWRC projects for seamless integration of all improvements and, most importantly, single point of responsibility for the design of SWRC improvements. The Donohue/CDM Smith team is prepared to coordinate closely with other ongoing and future improvement projects. These projects include (or will include):

- Influent Pump Station (CDM Smith/Donohue)
- South Plant Influent Forcemain (CDM Smith/Donohue)
- South Plant Grit and RAS Facility (Donohue/CDM Smith)
- Regulatory Negotiations Donohue (Donohue/CDM Smith)
- S2EBPR Pilot Project
- Future South Plant Expansion
- Future North Plant Expansion

This coordination will include revisions to the hydraulic and process model to update the proposed improvements based on new and updated information, information sharing with the City and its other consultants, and coordination with other stakeholders. The Donohue/CDM Smith team offers the benefit of in-depth familiarity with these projects and coordination efficiencies.

Project Approach

Our team has developed this project approach based on the outlined City and project objectives and goals, and our collaborative team approach with the City. This section describes our approach to complete the goals described below:

1. Design a robust South Plant expansion to provide immediate relief to operational challenges at SWRC.
2. Coordinate closely with current and future capital projects to deliver a cohesive final product over the next decade or more.
3. Prepare for future regulatory requirements related to phosphorus (and potentially nitrogen) removal.
4. Develop an ultimate solution that maximizes efficiency and flexibility to set SWRC and the City up for long-term success

Task 1 – Project Initiation

The first task will include project management of the design team, including the initial kick off meeting, and bi-weekly project status meetings. The bi-weekly status meetings will be conducted in conjunction with other ongoing meetings for related project involving the design team to maximize the City's input and encourage collaboration between the projects. In addition, initial data collection and evaluation task will be undertaken. Because the design team already possesses significant information on the existing facility, this data is expected in be limited in scope, but will certainly include operating and result data from the S2EBPR pilot for incorporation into the process model and design.

Basis of Design

Using the data evaluation, the design team will begin a concise and through evaluation of the outstanding issues with the purpose of developing a Basis of Design Report.

The first step will be to update the process model with the new information collected during the S2EBPR pilot. Specifically, the site specific growth rates of the fermentation bacteria will be used to accurately predict fermentation capacity and size the RAS fermenter(s). Evaluation and modeling of the S2EBPR data, as well as interpretation of the results will be led by Kam Law in collaboration with the technical advisory team including Dr. Glen Daigger, Bill Marten, and Dr. Eric Staunton. Following the initial evaluation effort, the technical advisory team and project design team will conduct a Workshop with the City to present initial findings and their potential to impact the project.

Following the Workshop, the phosphorus removal performance and operating costs will be forecast in more detail and compared to the original Facility Plan forecasts. If acceptable, the Basis of Design will be continued. If questions remain and the City authorizes additional work, Task 9 will be completed to evaluate alternative approaches to phosphorus removal.

Those issues include:

1. Facility Layout and Arrangement
2. Tank Size
3. Proposed Project Facilities and Future Facilities
4. Major Equipment Selection (size, type, and manufacturers)
5. Control and Monitoring of the Process
6. Design Standards and Codes
7. Permit Requirements

We will evaluate each of these issues in the manner described in the RFP and outlined below. These evaluations will be performed in the context of the future looking issues discussed previously and coordinated with other ongoing design and construction projects.

An evaluation of the benefits and disadvantages related to preselection and/or pre-purchase of select equipment will be considered during this period. In addition, potential impacts of funding source related both to availability of pre-purchase/preselection and iron and steel procurement restrictions will be considered.

Preselection/Pre-purchase of select equipment may provide cost and schedule benefits in the current market, which our Team successfully completed on the UV Project.

After submitting the draft Basis of Design Report that documents this evaluation, we will conduct one Workshop to discuss the various issues and their alternatives. The format of our Workshops will likely be similar to those conducted during recent project efforts unless otherwise requested by the City to

improve their effectiveness. Workshops will be held in person or virtually as requested.

The Workshop will not only focus on the various equipment and their respective operation, but also on the important issues listed below.

1. Site use and future site flexibility
2. Operating strategies and control schemes
3. Operability
4. Maintainability
5. Construction sequencing
6. Staff preferences

In addition, several advanced operational and control concepts will be presented as part of the Basis of Design which may impact the proposed facilities (e.g. surface wasting arrangements would require re-pumping WAS). Through the Workshop, the City and the design team will determine the path forward for inclusion of all, some, or none of the advanced concepts.

Anticipated Deliverables

- Presentation on Initial Findings of Process Modeling
- Draft Basis of Design Report (PDF and three hard copies)
- Basis of Design Workshop
- Final Basis of Design Report (PDF and three hard copies)

In general, the remainder of the final design approach for this project consists of five parts:

1. Flow sheets/layouts (30%)
2. Design progress submittal (60%)
3. Construction document preparation (90%)
4. Funding related services
5. Bidding (100%)
6. Construction related services

Task 2 – 30% Design

The purpose of this Step is to develop initial site flow sheets and preliminary facility layouts. Flow sheets are developed as the basis for the future Process and Instrumentation Diagrams and show the general process flow diagram in order to solicit operations staff preferences, develop operational and control strategies, plan integration of controls into SCADA, and optimize equipment components. Flow sheets are a critical first step in communication between the process engineers and the rest of the engineering disciplines that make up the design team.

Coordination with other consultant projects will be ongoing during this period. Preliminary revisions to hydraulic modeling and final revisions to the process modeling to reflect final decisions related to number and size of tanks, pumps, etc. will be initiated. Final decision regarding preselection/pre-purchase will be made during this task.

We will deliver Flow Sheets and Narrative Control Descriptions to the City staff. Once the flow sheets are prepared, the design team will conduct a Workshop with City staff to review them and review comments and questions. Following the Flow Sheet Workshop, site survey and geotechnical, utilizing subconsultants that have previously worked with us (HLR and TSC), will be completed simultaneous to preparation of 30% preliminary layouts will be developed and delivered for City Review. A 30% Layout Review Workshop will be conducted to review the layouts and a 30% Opinion of Probable Construction Cost will be reviewed at the same time.

Anticipated Deliverables

- Flow sheets of each process (Aeration Basins, Final Clarifiers, Fermenters (future), and WAS Pumping (if required)
- Preliminary written process control strategies
- Preliminary list of monitored inputs and outputs to SCADA.
- Flow Sheet Workshop
- 30% Layouts including site plan
- Index of Anticipated Specifications
- 30% OPCC (opinion of probable construction cost)
- 30% Review Workshop

Task 3 – 60% Design

Following the 30% Review Workshop, the design team will advance the design for all areas and disciplines. The 60% Design is anticipated to include proposed drawings (plans and some sections) and a draft set of key equipment specifications.

During 60% design development, specific design questions and issues will be discussed at bi-weekly status calls in order to keep City staff informed of issues that arise during design and keep the project moving in an orderly manner.

Coordination with other consultant projects will continue during this period. Revisions to hydraulic and process modeling will be finalized in this task if required based on any changes to facility arrangements.

With the 60% Design Submittal, the design team will develop a 60% Opinion of Probable Construction Cost and present possible alternatives to reduce cost if so desired.

A 60% Layout Review Workshop will be conducted to review the progress submittal and, if necessary, discuss alternatives to reduce project cost.

Anticipated Deliverables

- 60% Design Plans (PDF and three hard copies)
- Draft Equipment Specifications (PDF and three hard copies)
- 60% OPCC
- 60% Review Workshop

Task 4 - Final Design

The purpose of this task is to incorporate all of the design decisions made during the previous work into the Bidding Documents. This will include developing the final Front End Documents and conducting final coordination with the City's SCADA Integrator.

The design team will submit pre-final design documents which are effectively ready for bidding for the City's review, including a revised Final OPCC. A 90% Review Workshop will be held to receive final comments. Following the workshop, final City comments will be incorporated into the documents and final PDFs delivered to the City for Bidding.

Anticipated Deliverables

- Pre-final Bidding Documents (90% Design) (PDF and three hard copies)
- Final OPCC
- 90% Review Workshop
- Final Bidding Documents (PDF and five hard copies)

Task 5 – Permitting

The design team will prepare and submit permit applications for the project. Permits are anticipated to include:

- Naperville Building Permit
- IEPA Construction Permit
- Will and South Cook County Soil Conservation District Permit

We do note that receipt of the IEPA construction permit prior to award of the construction contract is contingent on IEPA review duration being no more than 90 days.

Task 6 – State Revolving Fund (SRF)

We will provide assistance in the preparation of SRF loan applications. This will include:

1. Inserting required terms and conditions into our engineering agreement with the City
2. Preparing revised project nomination forms as required
3. Assisting the preparation of the loan application
4. Meeting with the IEPA Loan Program representatives if required
5. Inserting required terms and conditions into the Bidding Documents
6. Assisting in the finalizing the loan documents after award of the construction contract.

Task 7 – Bidding

We will provide assistance during bidding as required by the RFP including attending a pre-bid meeting, answering bidding questions, preparing addenda, reviewing the bids, and assisting with the recommendation for award. At the start of the bidding phase, we will contact selected contractors and subcontractors to increase potential bidding activity on the project to promote bidding competition.

Following award of the bid, the design team will prepare Conformed Documents and provide the City with hard copies and CAD files of those documents.

Anticipated Deliverables

- Conformed Documents (PDF and five hard copies)
- CAD Files of Conformed Documents

Task 8 – Construction Phase Services

Our construction-related services team has the experience, diligence, and dedication to work with both the City staff and the construction contractor. The same field team currently supporting the City with the UV Project will be available to support inspection services for this Project.

Prior to the start of construction we will meet with you to review important construction administration and operational requirements. We will use this information to establish approach that meets your objectives and expectations. The tasks will be included:

1. Prepare for and attend a pre-construction conference.
2. Attend monthly progress meetings.
3. Provide assistance to City staff in order to the following:
   a. Review major equipment shop drawings and other data the contractor is required to submit to determine general conformance with the contract requirements. The City will review other submittals
   b. Review portions of RFIs as directed by the City.
   c. 300 hours is included in fee proposal for the above services including reviewing major equipment submittals.
4. Attend progress meeting, provide staff field visits, and assist with punchlist/final inspection (500 hours included in fee proposal)

Task 9 – Alternate Phosphorus Removal Evaluation

Should the results of Task 2's revised process modeling and evaluation determined that S2EBPR cannot provide a cost effective approach to phosphorus removal, Donohue/CDM Smith will evaluate additional alternatives.

To initiate the evaluation, the technical advisory team will meet to review the appropriateness of the alternatives evaluated in the Facility Plan for further analysis and to identify up to two additional alternatives for inclusion in this evaluation. The City will be consulted to determine the final list of alternatives. For the selected alternatives, versions of the process model will be created to evaluate predicted performance and operating characteristics. With that data, the design team will develop conceptual layout, major equipment lists with preliminary sizing, capital cost estimates, and operating cost estimates. The results will be compiled into an Alternate Phosphorus Removal Technical Memorandum.

Upon completion of the Technical Memorandum, the design team will conduct a Workshop with the City to present the findings and determine the final phosphorus removal alternative, which will be incorporated into the proposed project design. Any comments received on the Technical Memorandum will be addressed and a final version submitted to the City for the record.

Anticipated Deliverables

- Draft Alternative Phosphorus Removal Technical Memorandum
- Alternative Phosphorus Removal Workshop
- Final Alternative Phosphorus Removal Technical Memorandum

Pricing Proposal

Included on the next page is a Fee proposal for the scope described in this proposal. The fee takes into account labor rate escalations through 2024 for design activities and 2027 for construction services. The total proposed fee is **$2,531,500**.

This fee was developed based on the scope of work listed in the proposal, the anticipated size of the construction proposed improvements, and our judgment regarding the volume of bidding documents that will be generated. We believe our fee falls well within the expected range for a project of this magnitude and complexity.

SWRC South Plant Expansion
Fee Estimate Summary
02-Mar-23

	Task Description	Total Hours	Total Labor	Donohue Expenses	CDM Smith Expenses	Other Expenses	Total Cost	Subtotals
1	**Project Initiation**							**$ 195,541**
1.1	Project Kickoff Meeting	176	$ 34,646	$ 150	$ 500		$ 35,296	
1.2	Data Review	116	$ 23,812				$ 23,812	
1.3	Process Model Update	148	$ 34,087			$ 15,000	$ 49,087	
1.4	Model Results Workshop	46	$ 10,847				$ 10,847	
1.5	Basis of Design	286	$ 59,218				$ 59,218	
1.6	Basis of Design Workshop	74	$ 17,082	$ 200			$ 17,282	
		-	$ -				$ -	
2	**30% Design**							**$ 404,929**
2.1	Flow Sheet and Control Strategy Submittal	250	$ 49,275				$ 49,275	
2.2	Flow Sheet Workshop	42	$ 9,189				$ 9,189	
2.3	Survey and Geotechnical Investigations	70	$ 15,964	$ 50		$ 24,000	$ 40,014	
2.4	Layout Submittal (30%)	1,501	$ 267,938				$ 267,938	
2.5	30% Opinion of Probable Construction Cost	126	$ 24,306				$ 24,306	
2.6	30% Design Review Workshop	58	$ 13,006	$ 200	$ 1,000		$ 14,206	
		-	$ -				$ -	
3	**60% Design**							**$ 486,729**
3.1	60% Design Submittal	2,576	$ 444,966				$ 444,966	
3.2	60% Opinion of Probable Construction Cost	148	$ 27,143				$ 27,143	
3.3	60% Design Review Workshop	60	$ 13,421	$ 200	$ 1,000		$ 14,621	
		-	$ -				$ -	
4	**Final Design**							**$ 745,707**
4.1	Pre-Final Bidding Document Submittal (90%)	3,298	$ 579,493				$ 579,493	
4.2	Final Opinion of Probable Construction Cost	184	$ 32,974				$ 32,974	
4.3	90% Design Review Workshop	62	$ 13,821	$ 200			$ 14,021	
4.4	Final Bidding Documents	636	$ 115,719	$ 2,500	$ 1,000		$ 119,219	
		-	$ -				$ -	
5	**Permitting**							**$ 22,302**
5.1	Naperville Buildling Permit	52	$ 11,697	$ 50			$ 11,747	
5.2	IEPA Construction/Operating Permit	38	$ 7,989	$ 50			$ 8,039	
5.3	WSCSCD Permit	16	$ 2,466	$ 50			$ 2,516	
		-	$ -				$ -	
6	**State Revolving Fund (SRF) Assistance**							**$ 5,494**
6.1	SRF Application	14	$ 2,902				$ 2,902	
6.2	Loan Finalization Assistance	14	$ 2,592				$ 2,592	
		-	$ -				$ -	
7	**Bidding Assistance**							**$ 30,296**
7.1	Attend pre-bid meeting (1)	30	$ 6,756	$ 100	$ 500		$ 7,356	
7.2	Answer bidder questions/Issue Addenda	62	$ 13,968				$ 13,968	
7.3	Review Bids and Provide Recommendation to City	38	$ 8,972				$ 8,972	
		-	$ -				$ -	
8	**Construction Phase Services**							**$ 251,523**
8.1	Attend Pre-Con and Monthly Progress Meetings	162	$ 36,567	$ 100			$ 36,667	
8.2	Review Selected RFI and Submittals (300 hours)	287	$ 61,896				$ 61,896	
8.3	Field Visits (500 Hours)	500	$ 90,205	$ 2,000	$ 5,000		$ 97,205	
8.4	Prepare Record Drawings	322	$ 54,050	$ 1,706			$ 55,756	
		-	$ -				$ -	
9	**Alternate Phosphorus Removal Evaluation**							**$ 146,243**
9.1	Identify Alternatives	100	$ 22,384				$ 22,384	
9.2	Additional Process Model Evaluation	192	$ 38,821				$ 38,821	
9.3	Alternate Evaluation and Costing	284	$ 50,265				$ 50,265	
9.4	Prepare Technical Memorandum	126	$ 24,976				$ 24,976	
9.5	Alternate Phosphorus Removal Workshop	38	$ 9,153	$ 200	$ 444		$ 9,797	
		-	$ -				$ -	
	Total	12,132	$ 2,232,563	$ 7,756	$ 9,444	$ 39,000	**$ 2,288,763**	**$ 2,288,763**
	Total Labor Dollars by Staff							

Milestones and Deliverables

Milestones and Deliverables

Project Schedule

We understand that the goal for this project is to advertise for bids by November 15, 2024. No issues are anticipated in meeting this schedule.

The anticipated schedule for project execution is presented on the next page. Note that a 2-month schedule floating task has been built-in pending on the need for completing Task 9 – Alternative Phosphorus Removal Evaluation.

Deliverables for this project are listed in the Project Approach Section, but we also note the following:

- Meeting minutes will be provided for all meetings (virtual or in-person).
- Electronic copies of all deliverables will be provided in PDF format.
- Where specifically noted, hard copies will be provided. When requested, three hard copies of all other deliverables will be provided at no additional cost.
- Drawings will be provided at half-size (11x17). Full-size drawings can be provided at additional cost.

Quality Assurance

In general, Donohue's philosophy and approach toward providing a high quality project is quite simple. We take a disciplined approach to "Planning our Work" and "Working our Plan." The most significant reason our projects have been successful is the discipline we use in developing a plan and then following the plan for each project implemented.

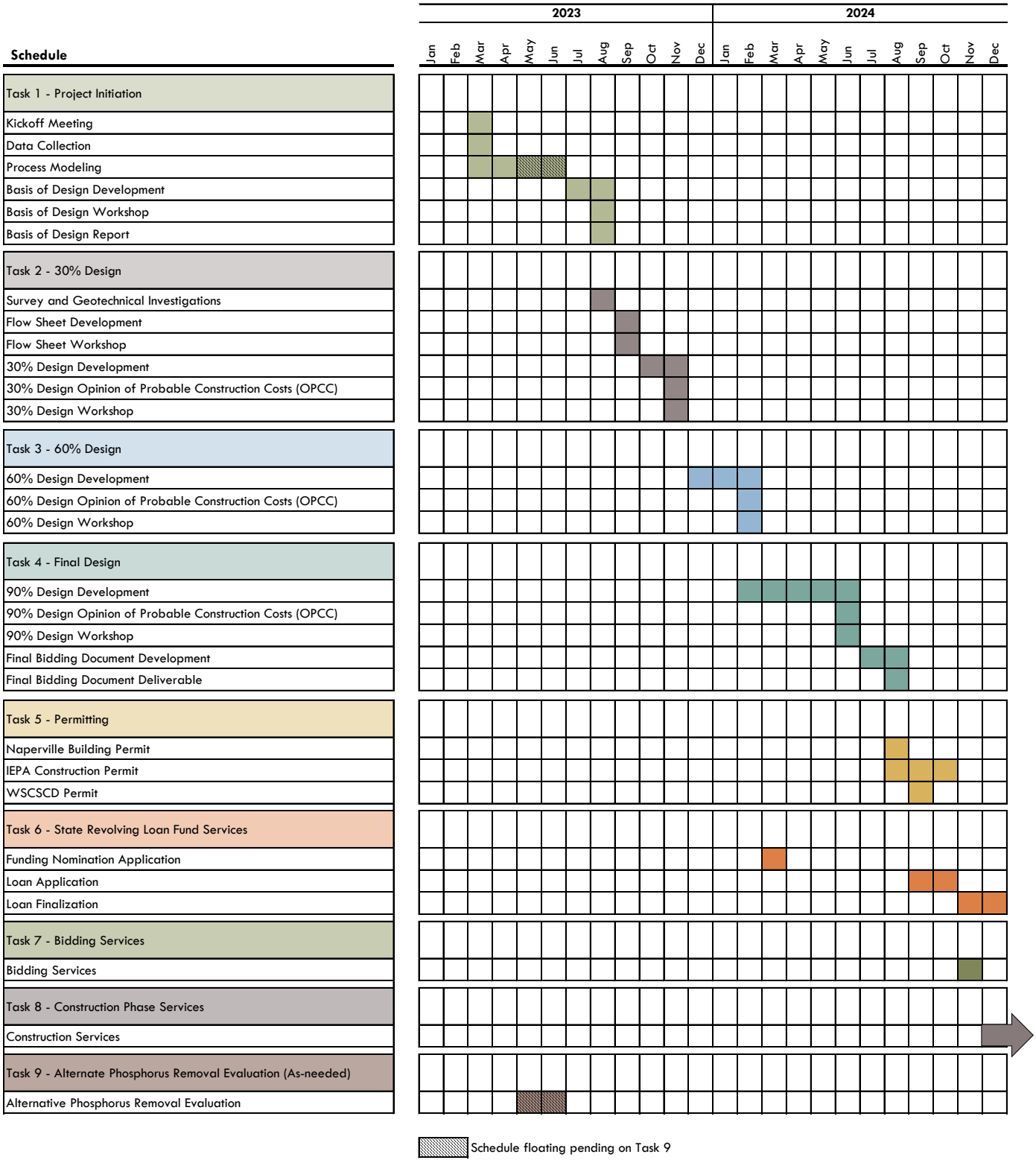
We follow a "first-things-first" approach. Concepts are developed and reviewed for value and quality before we proceed with the subsequent phases of the project. The City is involved, if they choose, in developing and reviewing the plan, and in the subsequent reviews that occur during each step of the project.

Quality assurance (QA) are reviews for quality of project concepts are conducted on an on-going basis throughout the duration of the project. The reviews are conducted with a clear view of the project-specific requirements that are established as part of the project plan.

The reviews are conducted by independent senior personnel who have expertise in the type of project being completed. The final review must be certified as being completed in accordance with the project plan and the company's Quality Review Policy. In addition, the primary QA reviewer, along with the Project Manager, is also responsible for ensuring that QC checks are completed.

Springbrook Water Reclamation Center South Plant Expansion

Anticipated Engineering Schedule



Outcomes to be Achieved

Outcomes to be Achieved

Our Team's primary objective is to deliver this design project to the City meeting all project goals. These goals include:

- Partnering with the City to achieve project goals.
- Providing a facility that meets the performance requirements of the project in terms of capacity, performance, and flexibility.
- Coordinate and facilitate the construction and startup of this proposed facility with multiple ongoing and future improvement projects.
- Providing a facility that is easy to maintain and operate
- Staying on design budget and schedule
- Staying within the programed capital budget and schedule given current market conditions

We are confident that our Team will be able to achieve the desired outcomes through our adherence to a detailed plan developed in collaboration with City's staff. Planned and periodic updates and QA/QC checks will ensure that there are no surprises and that the final product meets or exceeds your expectations.

These outcomes are achievable and our Team has delivered similar objectives on previous projects. Donohue's approach to project management and QA/QC ensures that the product will be delivered on time, within budget, and to your satisfaction.

Desired Outcome	How Achieved
Partnering with the City to achieve the goals of this project.	▪ Ten years of working closely with City staff on multiple projects, both design and planning ▪ Willing and eager to work with other consultants when that approach is in the best interest of the City ▪ Providing consistent staff through City staff transitions ▪ Staff available to add to the project team when needs arise ▪ EVIDENCE: Committing to local offices in Naperville (Donohue) and Lisle (CDM Smith)
Providing a facility that meets the performance requirements of the project in terms of capacity, performance, and flexibility.	▪ Implement a project plan that guides the City through complex technical decisions ▪ Apply our experience with effective processes and technologies to optimize performance ▪ Leverage our understanding of current and future operational needs to anticipate changes to the facility and accommodate those changes in this project. ▪ EVIDENCE: Team with highly respected leaders in the industry with a track record of successful efforts ▪ EVIDENCE: Successful implementation of innovative processes at communities such as Geneva and Wausau
Coordinate and facilitate the construction and startup of this proposed facility with multiple ongoing and future improvement projects	▪ Using our engineers' long history designing similar facilities throughout the Midwest ▪ Past performance on similar multi-year, multi-project ▪ EVIDENCE: Past performance on similar multi-year, multi-project efforts for communities like Joliet and Gary.

Desired Outcome	How Achieved
Staying on design budget and schedule	▪ Proven track record with Donohue/CDM Smith team to meet schedule and budget ▪ Maintaining many of the same project team members for this project, including the entire project management members ▪ EVIDENCE: Delivery of all design projects on schedule with only scope related fee adjustments
Staying within the programed capital budget and schedule given current market conditions	▪ Maintain an updated estimate of construction cost throughout design ▪ Provide creative ideas for minimizing project cost without sacrificing project quality ▪ Create a strategic approach to funding and procurement to produce higher value for the City ▪ EVIDENCE: Value engineering during the UV Design to use alternate materials to save over $1M

Procurement Forms

01.27.2023 | Naperville, IL | Springbrook Water Reclamation Center South Plant Expansion

PROCUREMENT NAME: SPRINGBROOK WATER RECLAMATION CENTER SOUTH PLANT EXPANSION
PROCUREMENT NUMBER: 22-343

CITY OF NAPERVILLE
REQUEST FOR PROPOSALS
PROPOSAL FORM

The proposer shall also include with their returned proposal a signed copy of the enclosed affidavit, as well as literature, samples, etc. as required within the Request for Proposals Specifications.

The undersigned proposer, having examined the specifications and other documents, hereby agrees to supply services as per the attached specifications and to perform other work stipulated in, required by and in accordance with the proposal documents attached for and in consideration of the proposed prices.

The undersigned acknowledges receipt of addendum(s): 1; 2; _____; _____.

CONTACT:

Donohue & Associates, Inc.
FIRM NAME

230 W. Monroe Street, Suite 2925
ADDRESS

Chicago, IL 60606
CITY, STATE AND ZIP CODE

SIGNATURE OF AUTHORIZED REPRESENTATIVE

Eric P. Cockerill/Vice President
PRINT NAME / TITLE

January 27, 2023
DATE

FOR CLARIFICATION OF THIS PROPOSAL:

Eric P. Cockerill
NAME

312.236.9147 or 630.340.7030
PHONE NUMBER

312.285.2791
FAX NUMBER

ecockerill@donohue-associates.com
EMAIL ADDRESS

AFFIDAVIT OF COMPLIANCE

APPLICANT: Donohue & Associates, Inc
Name

230 W. Monroe Street, Suite 2925, Chicago, IL 60606
Address

Federal Tax I.D. # 39-1873700

As a condition of entering into a contract with the City of Naperville, and under oath and penalty of perjury and possible termination of contract rights and debarment, the undersigned,

(Please Print or Type)
Craig W. Brunner being first duly sworn on oath, deposes and states that he/she is President (the sole owner, a partner, a joint venturer, the President, the Secretary, etc.) of Donohue & Associates, Inc. (Name of Company), the party making the foregoing bid, and that he/she has the authority to make any disclosures or certifications required by this Affidavit on behalf of the bidder and that all the information contained in this Affidavit is true and correct in both substance and fact.

DISCLOSURE OF BENEFICIARIES

Section 1. Ordinance 85-193, an ordinance amending Title 1 (Administrative) of the Naperville Municipal Code, as amended, by adding Chapter 12 thereto requires disclosure of certain interests by persons applying for permits, licenses, approvals or benefits from the City of Naperville.

A. Nature of Benefit sought by the undersigned (state Bid or RFP No.). 22-343

B. Nature of Applicant: (Please check one)

1. Natural person	☐	4. Trust/Trustee	☐
2. Corporation	☑	5. Partnership	☐
3. Land Trust/Trustee	☐	6. Joint Venture	☐

C. If applicant is an entity other than described in Section B, briefly state the nature and characteristics of the applicant below.

N/A

D. If in your answer to subsection B you have checked box 1, 2, 3, 4, 5, or 6 identify by name and address each person or entity who is a 5% shareholder in the case of a corporation, a beneficiary in the case of a trust or land trust, a joint venturer in the case of a joint venture, or who otherwise has a propriety interest, interest in profits and losses or right to control such entity:

NAME ADDRESS PERCENT OF INTEREST

1. See attached.

2.

3.

4.

IMPORTANT NOTE: In the event your answer to Section 1 identified entities other than a natural person, additional disclosures are required for each such entity.

BID RIGGING AND BID ROTATING

Section 2: That in connection with this procurement,

A. The bid is not made in the interest of or on behalf of any undisclosed person, partnership, company, association, organization or corporation;

B. The bidder has not in any manner directly or indirectly sought by consultation, communication or agreement with anyone to fix the bid price of said bidder or any other bidder or to fix any overhead profit or cost element of such bid price or that of any other bidder or to secure any advantage against the public body awarding the contract or anyone interested in the proper contract;

C. The bid is genuine and not collusive or sham;

Donohue & Associates, Inc.
Ownership: 5% or Greater Shareholder

Name	Address	Percent of Interest
Barbara A. Scheiber	341 Millersville Avenue Howards Grove, WI 53083	<12%
Randall M. Buss	544 Washington Circle Oostburg, WI 53070	<12%
Michael W. Gerbitz	3028 Warm Springs Drive Green Bay, WI 54311	<12%
Craig W. Brunner	1401 Barberry Lane Mt. Prospect, IL 60056	<12%
Joe Berktold	1207 North 49th Street Sheboygan, WI 53081	<12%

Note: Confidential Information; Not for Public Release

D. The prices or breakdowns thereof and any and all contents which had been quoted in this bid have not been knowingly disclosed by the bidder and will not be knowingly disclosed by the bidder directly or indirectly to any other bidder or any competitor prior to opening;

E. All statements contained in such bid are true;

F. No attempt has been made or will be made by the bidder to induce any other person or firm to submit a false or sham bid;

G. No attempt has been made or will be made by the bidder to induce any other person or firm to submit or not to submit a bid for the purpose of restricting competition;

Section 3. The undersigned further states that: **(check A or B)**

(●) A. He/she is the person in the bidder's organization responsible within that organization for the decision as to the prices being bid herein and that he/she has not participated, and will not participate, in any action contrary to paragraphs A through G above; or

( ) B. He/she is not the person in the bidder's organization responsible within that organization for the decision as to the prices being bid herein but that he/she has been authorized to act as agent for the persons responsible for such decision in certifying that such persons have not participated, and will not participate, in any action contrary to paragraphs A through G above and as their agent does hereby so certify; and

C. That he/she has not participated, and will not participate, in any action contrary to paragraphs A through G above.

Section 4. The undersigned certifies that the bidder has never been convicted for a violation of State laws prohibiting bid rigging or bid rotating.

THE REQUIREMENTS OF THE
ILLINOIS DRUG FREE WORKPLACE ACT

Section 5. The undersigned will publish a statement:

A. Notifying employees that the unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance is prohibited in the aforementioned company's workplace;

B. Specifying the actions that will be taken against employees for violations of this prohibition;

C. Notifying the employees that, as a condition of their employment to do work under the contract with the City of Naperville, the employees will:

1. Abide by the terms of the statement; and

2. Notify the aforementioned company of any criminal drug statute conviction for a violation occurring in the workplace not later than five (5) days after such a conviction.

D. Establishing a drug free awareness program to inform the aforementioned company's employees about:

1. The dangers of drug abuse in the workplace;

2. The aforementioned company's policy of maintaining a drug free workplace;

3. Any available drug counseling, rehabilitation, and employee assistance programs; and

4. The penalties that may be imposed upon employees for drug violations.

E. Making it a requirement to give a copy of the statement required by Section 5. to each employee engaged in the performance of the contract with the City of Naperville and to post the statement in a prominent place in the workplace;

F. Notifying the City of Naperville within ten (10) days after receiving notice under Section 5.C.2. from an employee or otherwise receiving actual notice of such a conviction;

G. Imposing a sanction on, or requiring the satisfactory participation in drug abuse assistance or rehabilitation program by, any employee who is so convicted, as required by Section 6., below;

H. Training personnel to effectively assist employees in selecting a proper course of action in the event drug counseling, treatment, and rehabilitation is required and indicating that an effectively trained counseling and referral team is in place;

I. Making a good faith effort to continue to maintain a drug free workplace through implementing these requirements.

J. Making a good faith effort to continue to maintain a drug free workplace through implementation of this policy.

Section 6. The undersigned further affirms that within thirty (30) days after receiving notice from an employee of a conviction of a violation of the criminal drug statute occurring in the aforementioned company's workplace he/she shall:

A. Take appropriate personnel action against such employee up to and including termination; or
B. Require the employee to satisfactorily participate in a drug abuse assistance or rehabilitation program approved for such purposes by a federal, state, or local health, law enforcement, or other appropriate agency.

TAX COMPLIANCE

Section 7. The undersigned on behalf of the entity making the foregoing proposal certifies that neither the undersigned nor the entity is barred from contracting with the City of Naperville because of any delinquency in the payment of any tax administered by the State of Illinois, Department of Revenue, unless the undersigned or the entity is contesting, in accordance with the procedures established by the appropriate revenue act, liability of the tax or the amount of tax.

Section 8. The undersigned or the entity making the proposal or bid understands that making a false statement regarding delinquency in taxes is a Class A Misdemeanor and in addition, voids the contract and allows the municipality to recover all amounts paid to the individual or entity under the contract in a civil action.

EQUAL EMPLOYMENT OPPORTUNITY

Section 9. This EQUAL EMPLOYMENT OPPORTUNITY CLAUSE is required by the Illinois Human Rights Act and the Rules and Regulations of the Illinois Department of Human Rights published at 44 Illinois Administrative Code Section 750, et seq..

Section 10. In the event of the contractor's noncompliance with any provision of this Equal Employment Opportunity Clause, the Illinois Human Right Act, or the Rules and Regulations for Public Contracts of the Department of Human Rights (hereinafter referred to as the Department) the contractor may be declared non-responsible and therefore ineligible for future contracts or subcontracts with the State of Illinois or any of its political subdivisions or municipal corporations, and the contract may be canceled or avoided in whole or in part, and such other sanctions or penalties may be imposed or remedies involved as provided by statute or regulation.

During the performance of this contract, the contractor agrees:

A. That it will not discriminate against any employee or applicant for employment because of race, color, religion, sex, age, disability, citizenship status, national origin, veteran status, marital status, sexual orientation, gender identity or any other characteristic that is protected by law. Further, that it will examine all job classifications to determine if minority persons or women are underutilized and will take appropriate affirmative action to rectify any such underutilization.

B. That, if it hires additional employees in order to perform this contract, or any portion hereof, it will determine the availability (in accordance with the Department's Rules and Regulations for Public Contracts) of minorities and women in the area(s) from which it may reasonably recruit and it will hire for each job classification for which employees are hired in such a way that minorities and women are not underutilized.

C. That, in all solicitations or advertisements for employees placed by it or on its behalf, it will state that all applicants will be afforded equal opportunity without discrimination because of race, color, religion, sex, marital status, national origin or ancestry, age, physical or mental handicap unrelated to ability, or an unfavorable discharge from military service.

D. That it will send to each labor organization or representative of workers with which it has or is bound by a collective bargaining or other agreement or understanding, a notice advising such labor organization or representative of the contractor's obligations under the Illinois Human Rights Act and the Department's Rules and Regulations for Public Contract. If any such labor organization or representative fails or refuses to cooperate with the contractor in its efforts to comply with such Act and Rules and Regulations, the contractor will promptly so notify the Department and the contracting agency will recruit employees from other sources when necessary to fulfill its obligations thereunder.

E. That it will submit reports as required by the Department's Rules and Regulations for Public Contracts, furnish all relevant information as may from time to time be requested by the Department or the contracting agency, and in all respects comply with the Illinois Human Rights Act and the Department's Rules and Regulations for Public Contracts.

F. That it will permit access to all relevant books, records, accounts and work sites by personnel of the contracting agency and the Department for purposes of investigation to ascertain compliance with the Illinois Human

Rights Act and the Department's Rules and Regulations for Public Contracts.

G. That it will include verbatim or by reference the provisions of this Equal Employment Opportunity Clause in every subcontract it awards under which any portion of the contract obligations are undertaken or assumed, so that such provisions will be binding upon such subcontractor. In the same manner as the other provisions of this contract, the contractor will be liable for compliance with applicable provisions of this clause by such subcontractors; and further it will promptly notify the contracting agency and the Department in the event any subcontractor fails or refuses to comply therewith. In addition, the contractor will not utilize any subcontractor declared by the Illinois Human Rights Department to be ineligible for contracts or subcontracts with the State of Illinois or any of its political subdivisions or municipal corporations.

Section 11. For the purposes of subsection G of Section 10, "Subcontract" means any agreement, arrangement or understanding, written or otherwise, between a public contractor and any person under which any portion of the public contractor's obligations under one or more public contracts is performed, undertaken or assumed; the term "subcontract," however, shall not include any agreement, arrangement or understanding in which the parties stand in the relationship of an employer and an employee, or between a bank or other financial institution and its customers.

Section 12. It is expressly understood that the foregoing statements and representations and promises are made as a condition to the right of the bidder to receive payment under any award made under the terms and provisions of this bid.

Section 13. Have written sexual harassment policies that shall include, at a minimum, the following information: (i) the illegality of sexual harassment; (ii) the definition of sexual harassment under State law; (iii) a description of sexual harassment, utilizing examples; (iv) the vendor's internal complaint process including penalties; (v) the legal recourse, investigative and complaint process available through the Department and the Commission; (vi) directions on how to contact the Department and Commission; and (vii) protection against retaliation as provided by Section 6-101 of this Act. A copy of the policies shall be provided to the Department upon request.

THE AMERICANS WITH DISABILITIES ACT

Section 14. The Americans with Disabilities Act (42 U.S.C. 12101 et seq.) and the regulations thereunder (28 CFR 35.130) (ADA) prohibit discrimination against persons with disabilities by the State, whether directly or through contractual arrangements, in the provision of any aid, benefit or service. As a condition of receiving this contract, the undersigned vendor certifies that services, programs and activities provided under this contract are and will continue to be in compliance with the ADA.

ILLINOIS PREVAILING WAGE

Section 15. The undersigned shall comply with the applicable requirements of the *Illinois Prevailing Wage Act, 820 ILCS sec. 130/0.01 et seq*. as amended for public works projects.

EMPLOYEE SAFETY AND HEALTH

Section 16. The undersigned shall comply with all applicable Laws and Regulations of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor's duties and responsibilities for the safety and protection of the work shall continue until such time as all the work is completed and accepted by the City.

A. Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the work. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to all employees on the work; all work, materials and equipment to be incorporated therein, whether in storage on or off site; and other property at the site or adjacent thereto in the course of construction.

Signed by: _____

Name Craig W. Brunner

Title President

Resumes

DONOHUE

ERIC COCKERILL, PE, BCEE

PROFESSIONAL ENGINEER
Illinois: 62053666

PROFESSIONAL DESIGNATION
Board Certified Environmental Engineer – American Academy of Environmental Engineers (Water/Wastewater Engineering)

YEARS OF EXPERIENCE
29

EDUCATION
Master of Science
Environmental Engineering
University of Michigan
1995

Bachelor of Science
Environmental Engineering
Northwestern University
1994

PROFESSIONAL ASSOCIATIONS
Illinois Water Environment Association
Water Environment Federation
American Public Works Association
American Academy of Environmental Engineers
ACEC Illinois

AWARDS
2022 ACEC Illinois Engineering Excellence Special Achievement Award, Project Manager: Eastside WWTP Phosphorus Removal Project, Joliet, Illinois.

2020 ACEC Illinois Engineering Excellence Special Achievement Award, Project Manager: Preparing for the Future: Upgrades at Aux Sable, Joliet, Illinois

2020 ACEC Illinois Engineering Excellence Judges Choice Award, Project Manager: Preparing for the Future: Upgrades at Aux Sable, Joliet, Illinois

PUBLICATIONS
"CFD Modeling Optimizes the Design of Primary Settling Tanks at MWRDGC's Calumet Water Reclamation Plant," WEFTEC, 2008 (with E. Podczerwinski, E. Brosius, T. Weber, M. Garcia, X. Liu, and C. Brunner).

"Elevated Water Tower: Cooperation/ The Cutting Edge/The Competitive Edge," Illinois Section of the American Water Works Association Conference, Springfield, Illinois, 2004 (with E. Glatfelter).

PRESENTATIONS
"Sludge Drying," CSWEA B.E.E.R Seminar, November 2019

"Biosolid Management Approaches", IAWA Technical Meeting, July 2019

"Efficient Design of High Efficiency Blowers: Dynamic Modeling and Control Strategies Reduce Costs," WATERCON, March 2014

Mr. Cockerill has 28 years of experience in water and wastewater treatment facilities. This includes conceptual and detailed design for wastewater treatment and collection system projects encompassing lift stations, sewers, CIPP sewer rehabilitation, grit removal systems, scum handling, biological nutrient removal, chemical treatment/disinfection, wet weather treatment, sludge pumping, sludge thickening and sludge conditioning. His work in water drinking facilities includes pump station design and rehabilitations, control strategy development, water transmission main design, and O&M manual development. He also has experience with many computer models used in planning and design of water, wastewater and water resources projects. These include H2ONET, XP-SWMM, HYDRA, BioWin, and STOAT.

In addition to his pre-construction experience, Mr. Cockerill has been involved with construction phase engineering services including a $168 million sludge treatment project, $27 million water treatment plant upgrade, $2.5 million elevated water storage tank, and $5 million wastewater biosolids processing improvement project. He has been responsible for coordination of office services, submittal review, schedule review, contractor claim review, and correspondence with contractors.

Grit Removal and Return Activated Sludge Pumping Addition, Springbrook Water Reclamation Center, Naperville, Illinois. Project Manager: Lead design for the addition of vortex grit removal tanks (60 mgd) and grit washing/classifying equipment and new RAS pumping station. Work included bypassing of full plant flow around work site and construction sequencing to maintain plant operations. Provided office services during construction.

Biosolids Holding Tank, Springbrook Water Reclamation Center, Naperville, Illinois. Project Manager for the addition of one 500,000 gallon biosolids holding tank for post-digestion sludge storage. Tank was CIP concrete with flat, aluminum truss cover. Mixing provided by vertical hyperbolic mixer with provisions to provide fine bubble aeration to prevent anaerobic conditions to develop and release soluble phosphorus. Project included addition of positive displacement blower, electrical modifications, and control system changes.

Eastside WWPT Phosphorus Removal and Sludge Management Improvements, Joliet, Illinois. Project Manager: Managed design of improvements to the 16 mgd daily average flow facility including activated sludge selectors for biological phosphorus removal, selector mixing, chemical feed facilities, WAS and primary sludge thickening, TWAS pumping, mobile centrifuge dewatering, and a major renovation of the plant's administration building. Responsible for budget, schedule, and work coordination for multi-disciplinary project.

Aux Sable Creek Basin and Westside WWPTs Phosphorus Removal and Plant Expansion, Joliet, Illinois. Project Manager: Construction for the expansion of the Aux Sable Creek Basin WWTP including new grit removal facilities, activated sludge selectors for biological phosphorus removal, oxidation ditch hydraulic modifications, final clarifiers, UV disinfection expansion, aerobic digester coves, RAS pumps, a biosolids storage tank, and chemical feed facilities.

Chickasaw Hills WRF Regionalization Phase I, Illinois American Water Company, Homer Glen, Illinois. Technical Advisor: Design for the replacement of an existing packaged wastewater facility with a new biological nutrient removal facility with UV disinfection and aerobic digestion. Work included review and input for design of aeration basins, secondary clarifiers, aerobic digesters, UV disinfection, post aeration, and blower facilities.

Aeration System Evaluation, Metropolitan Water Reclamation District of Greater Chicago, Cook County, Illinois. Project Manager: Project involved evaluation of the existing aeration systems to determine what equipment and control modifications are required to optimize the energy consumption at Stickney WRP, a 1.4 BGD peak flow facility. Used SIMBA# modeling software to develop an advanced model of the

"How Much Chemical Will I Really Need? Estimating Chemical Demands for Phosphorus Removal," WATERCON: Illinois AWWA and Illinois WEA Joint Conference, March 2013

"The Role of Owner, Contractor, and Engineer during Construction," ISAWWA/IWEA Joint Conference, Springfield, Illinois, 2009.

"Challenges and Successes of Residuals Solids Treatment Startup," ISAWWA/IWEA Joint Conference, Springfield, Illinois, 2006.

biological system and controls. Estimated capital costs and energy savings for evaluating project payback.

New Primary Settling Tanks at Stickney Water Reclamation Plant and Calumet Water Reclamation Plants, Metropolitan Water Reclamation District of Greater Chicago, Illinois. Assistant Project Manager: Design new primary settling tanks at the Stickney WRP (390 mgd average annual flow) and Calumet WRP (240 mgd average annual flow). The tanks at SWRP were designed to be 225-feet diameter clarifiers and the tanks at CWRP to be 155-feet diameter clarifiers. In addition to project management duties for the CDM portion of the Joint Venture, involved with the process mechanical design including scum and sludge removal systems. Directly responsible for evaluation of the proposed grit removal facility at CWRP including evaluation of sampling and laboratory testing protocols, evaluation of testing results, evaluation of available alternatives including vortex grit removal, aerated grit removal, and primary sludge degritting, and recommending a proposed solution.

Grit System Improvements, DuPage County Public Works, Illinois. Project Manager: DCPW was interested in replacing existing aerated grit removal processes at two of its WWTPs (Woodridge-Greene Valley and Knollwood) with the Eutek Headcell™ for grit removal and SlurryCup/Grit Snail™ for grit washing and dewatering. The proposed project included retrofitting the new equipment into existing tankage where possible and interfacing new facilities with existing facilities. Treatment capacity of the new system will be 8 mgd average flow and 30 mgd peak flow. Responsible for all aspects of the design including lead process mechanical engineer and coordination of supporting engineering disciplines.

High Efficiency Blower Addition, Flagg Creek Water Reclamation District, Burr Ridge, Illinois. Project Manager and Lead Process Engineer: Designed addition of high efficiency blower addition (turbo-blower) for energy savings. Blower sized for 350 hp and 7500 SCFM. Project included addition of Most Open Valve (MOV) control.

Stickney Water Reclamation Plant, Sludge Thickening Facilities, Metropolitan Water Reclamation District of Greater Chicago, Illinois. Project Manager: Construction services project for improvements to the biosolids processing system at this 1,440 mgd facility. The project included eight new 80-foot diameter gravity thickeners enclosed in a new building, sludge screens, rehabilitation and replacement of existing pre-digestion centrifuges, multiple sludge pumping systems, a manufactured media biofilter system, city water and effluent water improvements, and extensive site work. Mr. Cockerill's role involved coordination of RFI response, submittal review, coordination of discipline reviews, change order review and proposal estimating, and construction document control coordination. Total construction cost was more than $168 million.

North Side Water Reclamation Plant, Battery E – Preliminary Design, Metropolitan Water Reclamation District of Greater Chicago, Illinois. Lead Task Manager: Plant hydraulic evaluation and primary and final settling tanks' design. As part of the hydraulic evaluation for the overall 450-mgd peak flow plant, led evaluation process that included determining that supplemental pumping would be required, identifying the most effective location for the pump station, and planning for future unit processes. Led a team to develop several approaches to accomplish the flow split of 450 mgd while meeting the District's objectives of operational flexibility, precision, and constructability; provided verification of preliminary sizing of the facilities, determined design details for inclusion in the final design, and estimation of process performance in order to support process modeling; responsible for statistical analysis of plant operating data and solids flux analysis to support design activities; proposed CFD modeling for the final settling tanks and primary flow splitting structure, and supported the CFD modeling team.

Northeast Treatment Plant – Phase III B Improvements, Urbana Champaign Sanitary District, Urbana, Illinois. Lead Civil Engineer and Process Engineer: Design of multiple improvements to the 16-mgd Northeast plant. Led process design for a new 22.5-mgd submersible stormwater pump station to accommodate flows in excess of the plant's secondary treatment capacity.

DOUG YOUNGBLOOD, PE, PMP

PROFESSIONAL ENGINEER
Minnesota: #47071

PROFESSIONAL DESIGNATION
SWPPP Certified (Design of Construction Stormwater Pollution Prevention Plans)

CERTIFICATIONS
Project Management Professional
NASSCO Pipe Assessment, Manhole Assessment and Lateral Assessment Certified
NASSCO Pipe Assessment, Manhole Assessment and Lateral Assessment Certified Trainer
NASSCO Inspector Certification Training Program

YEARS OF EXPERIENCE
18

EDUCATION
Master of Science
Environmental Engineering
University of Nebraska
2005

Bachelor of Science
Civil Engineering
University of Nebraska
2003

Mr. Youngblood is a licensed professional engineer and certified project management professional with 18 years of experience implementing wastewater projects throughout the Midwest. He is serving as project manager for several active projects at the Springbrook Water Reclamation Center. These projects include construction of a 26-mgd UV disinfection facility, influent pump station upgrades and design of a new grit and RAS pumping station. Doug has been successfully working as part of the CDM Smith / Donohue and Associates Project Management Team since the Naperville Facility Plan in 2020.

Springbrook WRC Facility Plan, UV Disinfection Facility Design and Construction, and Pumping Station Upgrades Naperville, Illinois. CDM Smith Project Manager: Mr. Youngblood managed the evaluation of infrastructure at the Springbrook WRC conducted with the CDM Smith/Donohue and Associates Project Management Team. This evaluation assessed 250+ assets to develop a prioritized capital improvement plan. A key need was identified to rehabilitate the facility's chemical disinfection system. He also managed design of the 26-mgd UV disinfection facility. He has served as project manager throughout the design and construction of the UV Disinfection Facility. Additionally, he is managing the influent pump station upgrades and design of a new grit and RAS pumping station at Springbrook WRC.

Wastewater Treatment Plant Headworks Solids and Grit Removal, Beardstown, Illinois. Project Engineer: The City of Beardstown, Illinois required construction of an expanded headworks that is capable of providing preliminary treatment to 8 mgd of flow and could bypass an additional 92 mgd to a combined sewage treatment facility. Mr. Youngblood prepared drawings and specifications for process equipment. Process design included one 20-mgd coarse bar screen (2-in bars), two 8 mgd screw pumps, one 8 mgd fines screen (step-screen type), one 8 mgd vortex grit collection unit, grit washing/dewatering systems and associated slide gates.

Wastewater Treatment Plant Combined Sewer Overflow (CSO) Disinfection, Jacksonville, Illinois. Project Engineer: Mr. Youngblood prepared drawings and specifications to convert an unused gas distribution system at the Jacksonville wastewater treatment plant into a CSO disinfection system. The system was designed to treat a maximum CSO flow of 60 mgd. The design included construction of two 5,000-ppd chlorine evaporators, one 1,000-ppd chlorinator and one 3,000-ppd chlorinator. Design also included associated safety valves and piping.

Wastewater Treatment Plant Solids Improvements, Moorhead, Minnesota. Project Engineer: Mr. Youngblood completed the facility planning, preliminary design and final design for the Moorhead Solids Improvements Project (6 mgd ADF treatment plant). Tasks involved designing improvements to the solids treatment train. Design included two 0.75 m gravity belt thickeners, two 63,600 gal sludge storage and aeration basins, three spiral-guided digester heating systems, three digester jet mixing systems, two 60 ft dia. fixed digester covers, one 60 ft dia. flexible membrane gas holding cover, digester gas safety equipment, and sludge pumping. Mr. Youngblood also wrote the project's operations and maintenance (O&M) manual and provided construction services for this project.

WALCOMET Aeration System Energy Efficiency Improvements, Delavan, Wisconsin. Project Engineer: The Walworth County Metropolitan Sewer District desired to replace an old aeration blower with a high-efficiency turbo-blower. CDM Smith was retained to complete this project as a design/build contract. Mr. Youngblood prepared drawings and specifications to install a 1,800-scfm blower that supplies air to three aeration basins. He also designed a slide gate to alleviate an operations concern when conveying flow to the final clarifiers.

Wastewater Treatment Plant Rouge River Outfall No. 2 Design, Detroit, Michigan. Project Engineer: The Detroit WWTP constructed improvements to the Rouge River Outfall system. A key component to the design was to construct a pneumatic system to actuate gas safety valves at the rail car receiving facility. Mr. Youngblood prepared the

drawings and specifications for construction of two pneumatic systems (chlorination and dechlorination facilities). Each system included two air compressors, receiver tank, desiccant dryer, and six rail tank closure systems.

Esko Pump Station Reconstruction, Duluth, Minnesota. Project Manager and Technical Lead: The Esko Pump station is a critical component to the Western Lake Superior Sanitary District wastewater conveyance system service. This pump station reached its intended useful life. Consequently, WLSSD retained CDM Smith to reconstruct the pumps station with modern, energy-efficient equipment. Mr. Youngblood managed the project and served as the lead engineer during design and construction phases. Process design included an evaluation of system hydraulics, design of a new wet well and wet weather storage basin, submersible pump design with a 1.75 mgd firm capacity and associated civil improvements. This project was completed on budget and received an Excellence in Engineering Award from the American Council of Engineering Companies.

Combined Sewage Pump Station Improvements, Fort Wayne, Indiana. Project Engineer: Mr. Youngblood completed preliminary design for the flood protection, grit management, and dewatering components of the City of Fort Wayne Combined Sewage Pump Station. The pump station is located within the 100-year flood plain. Consequently, flood protection alternatives were evaluated and the optimal alternative (raising grade and installing flood protection doors) was selected. The grit management and dewatering design includes installing two 10 mgd centrifugal pumps with materials selected to handle heavy grit loads.

Knoxville Utility Board (KUB) Composite Correction Plan, Knoxville, Tennessee. Project Engineer: Mr. Youngblood was involved in alternatives development and screening for the KUB composite correction plan. The intent of the plan was to develop alternatives to improve wet weather at two wastewater treatment plants in Knoxville, Tennessee. One plant has an ADF of 40 mgd and the second has an ADF of 10.8 mgd. Five alternatives were developed for each plant including chemical addition, construction of a wet weather headworks and high rate clarification. Alternatives were compared in terms of cost and feasibility.

Lake County Public Works Sanitary Sewer and Potable Water Pipe System Assessment and Capital Programming, Lake County, Illinois. Project Manager and Technical Lead: Mr. Youngblood led the risk assessment of 693 miles of water main and sanitary sewer pipes. Tasks involved using ArcGIS assessment tools to assign a consequence of failure and probability of failure rating for 21,669 pipe assets. High risk assets were then organized into a series of 45 rehabilitation and replacement projects. Capital projects were developed to include cost estimates, project maps and narrative descriptions of project scope. The projects were then scheduled into a 5-year CIP.

Duluth Flow Monitoring/Modeling Program – Duluth, Minnesota. Technical Lead: Mr. Youngblood worked with the City of Duluth to meet Consent Decree requirements by developing and implementing a sanitary sewer flow monitoring and modeling program. The first task was flow meter evaluation. Mr. Youngblood completed flow data review, analysis and modeling. Data review and analysis was conducted using the USEPA SSOAP program to quantify infiltration / inflow (I/I) volumes in each of the City's sewersheds. I/I parameters were used as input to the USEPA SWMM 5 model developed by CDM Smith. Mr. Youngblood calibrated the SWMM model and used it to evaluate the system during a 60-year continuous simulation and an actual 100-year rain event that occurred in the 1950s. The second task was to evaluate pre- and post-rehabilitation flows to quantify the effectiveness of the City's I/I source reduction program. Source reduction activities included sewer main rehabilitation, lateral lining and foundation drain disconnection. This evaluation assessed I/I reduction, as well as the City's technical and fiscal capabilities to sustain the program. Due to the measured success of the source reduction program, the USEPA concluded the consent decree obligations two years early.

AMROU ATASSI, PE, BCEE, PMP

PROFESSIONAL ENGINEER
Illinois

PROFESSIONAL DESIGNATION
Board Certified Environmental Engineer (BCEE), American Academy of Environmental Engineers and Scientists
Project Management Professional (PMP)

CERTIFICATIONS
HAZWOPER
Confined Space Entry
OSHA Construction Safety & Health

YEARS OF EXPERIENCE
22

EDUCATION
Master of Science
Environmental Engineering
Purdue University
2001

Bachelor of Science
Civil Engineering
Valparaiso University
2000

HONORS/AWARDS
First Place, AWWA ACE 2006 (Toronto, Ontario) Poster Session
2002 Indiana Section AWWA Leo Bessozi Youth Delegate

Mr. Atassi is a senior project manager and senior project engineer specializing in drinking water treatment and distribution and energy efficiency/system optimization. With more than 22 years of experience, he has worked on all phases of water treatment projects, including pilot testing, distribution system modeling, corrosion control, master planning, water quality compliance issues, energy efficiency analysis/planning, design, and construction phase services. He has worked on a wide range of projects from $5,000 studies to over $1 billion capital improvement projects. He oversees water and wastewater projects in Illinois, has managed over 100 projects in the Midwest, and brings tremendous experience working with water/wastewater utilities. He will work closely with our team to ensure schedule and budgets are met and that the City is satisfied with our work. Additionally, he has the authority to guarantee CDM Smith's commitment to this project and can bring in additional resources as needed.

Water System Expansion West Group, Lake County, Illinois. Project Director: Mr. Atassi is overseeing CDM Smith's West Group expansion project to new member communities for Central Lake County Joint Area Water Agency (CLCJAWA). This includes his facilitation of monthly technical committee meetings with the new members having recently completed the route study phase. The expansion project involves extending the CLCJAWA transmission pipeline system with approximately nine miles of 10- to 24-inch piping and a delivery structure for each community.

Springbrook Water Reclamation Center (WRC) Facility Plan and Ultraviolet (UV) Disinfection Facility Design, Naperville, Illinois. Project Director: Mr. Atassi served as the Project Director for the evaluation of infrastructure at the Springbrook WRC. This evaluation assessed 250+ assets to develop a prioritized capital improvement plan (CIP). A key need was identified to rehabilitate the facility's chemical disinfection system. Mr. Atassi also directed the design of the 26-mgd UV disinfection facility.

Wastewater Treatment Plant (WWTP) Upgrade, Geneva, Illinois. Project Director: Mr. Atassi served as project director for the study, design, and construction phase services of the WWTP improvements for compliance with new phosphorus limits, as well as improved operations at the plant.

Wastewater Treatment Plant (WWTP) Improvements, Oswego, Illinois. Project Principal: Mr. Atassi is responsible for a variety of services for Fox Metro WRD, including construction management services for digester complex improvements, an arc flash study, and electrical and HVAC task order to address issues at the North WWTP and the Orchard Road pump station.

Woodridge and Knollwood WWTPs, DuPage County, Illinois. Project Director: Mr. Atassi is overseeing the design and construction for the $21M WWTP upgrades.

Water System Expansion, Central Lake County, Illinois. Project Manager: Mr. Atassi is currently leading the system expansion for CLCJAWA and facilitating monthly technical committee meetings with the new members. He is also overseeing the route study for the North Group communities and leading the evaluation of alternatives to serve the Village of Volo.

Filtration Study, Rock Island, Illinois. Project Manager: Mr. Atassi managed an evaluation of the existing Rock Island's WTP filtration facility and new underdrain and media alternatives. He also led pilot testing of different filter media options for the new filters. Mr. Atassi is currently leading the design of new filters with new underdrain system and dual media (anthracite and sand). He also worked closely with Illinois Environmental Protection Agency (IEPA) on the pilot testing protocol for the media.

John F. Donovan WTP Improvements, Kankakee, Illinois. Mr. Atassi served as lead project engineer and later as the project manager for the 22-mgd WTP improvements project, which included replacing high and low service pumps, evaluation and replacement of two existing clarifiers, valve replacement, flood proofing improvements, new engine generation facility, and upgrades for the electrical system at the WTP. Filter improvements included upgrades with the filter media, filter-to-waste system, underdrain

evaluation, etc. Mr. Atassi was also responsible for handling IEPA and Illinois Department of Natural Resources permits for the improvements.

Project Director, Water System Expansion North Group, Lake County, Illinois. Mr. Atassi oversaw CDM Smith's evaluation for potential for developing a complete water system for 13 communities in northern Lake County, including a new 55-mgd water treatment plant (WTP) and more than 55 miles of transmission system piping and pumping stations with an estimated capital cost estimate of $280 million. CDM Smith performed route selection, preliminary hydraulics, design criteria development, and capital cost estimating. This project would have doubled the size of CLCJAWA's water system and provided multiple benefits to its redundancy, reliability, and economies of scale. CDM Smith was also asked to conduct an investiga-tion focused on system-wide improvements required to increase capacity based on the capacity assessment results.

Design of Water Treatment Plant Expansion and Upgrade, Rend Lake Conservancy District, Illinois. Senior Project Engineer: Mr. Atassi led the design effort for the upgrade and rehabilitation of four solids contact clarifiers and eight gravity filters and the design of new powdered activated carbon (PAC) system and carbon dioxide system. Filter upgrades include a new filter-to-waste system, new settled and filtered water piping, new air scour system and the addition of a second backwash pump.

Electrical Improvements and Generator Design, Wilmette, Illinois. Project Principal: CDM Smith was contracted to perform the detailed design for the Wilmette WTP electrical improvements based on the recommendations of our previous study and conceptual report. As project principal, Mr. Atassi oversaw our design, which included replacement of the main switchgear, two new 1,000-kliowatt (kW) standby engine-generators, and five new MCCs. The new main switchgear and standby diesel engine-generators are being designed for a closed-transition transfer to provide a seamless transfer back to utility power following a loss of power event. The project also includes a new building to house two diesel engine-generators, building addition for a new electrical room housing the new main switchgear and three new MCCs, and modifications to the existing electrical room and existing lunch room to construct a new smaller electrical room for two new MCCs and a new 400-horsepower (hp) variable frequency drive (VFD) for one of the high-lift pumps

Pipe Loop Testing, DuPage Pumping Station, Elmhurst, Illinois. Mr. Atassi served as project manager and lead project engineer on the pipe loops pilot testing program at the DuPage Water Commission. Testing involves different strategies for corrosion control and minimizing deposition formation in the distribution system.

Energy Efficiency Aeration System Improvements, Valparaiso, Indiana. Project Manager: Mr. Atassi managed the design of aeration city improvements at Valparaiso's WWTP. The design includes VFDs, blower impeller modifications, and new premium efficiency motors. This project was funded by the Indiana Office of Energy Development.

Water Treatment Plant (WTP) Improvements, Highland Park, Illinois. Mr. Atassi served as the project manager for the construction of the $38 million Highland Park's WTP Improvements project (30 mgd). This retrofit project was completed within schedule and budget. In addition to a new filtration facility retrofitted within the existing plant, the project also included new raw water pumps, chemical feed facilities, and clearwell improvements.

Ultraviolet (UV) Disinfection Improvements at White River North and Fall Creek WTPs, Indianapolis Water (now Citizens Water), Indiana. Project Manager and Senior Project Engineer: Mr. Atassi managed the construction of Indy's White River North 32-mgd UV facility and Fall Creek's 40-mgd UV Facility. He led design oversight and procurement of the UV reactors to meet the Long Term 2 Enhanced Surface Water Treatment Rule *(LT2ESWTR)* deadline. For the Fall Creek WTP, Mr. Atassi prepared UV procurement documents and evaluated subcontractor proposals based on cost and non-cost factors. Both projects were completed on time and below budget.

NATHANIEL W. CASSITY, PE, BCEE

PROFESSIONAL ENGINEER
Wisconsin: 35946
Illinois: 62062820
Michigan: 6201067118
Iowa: P24675

PROFESSIONAL DESIGNATION
Board Certified Environmental Engineer

YEARS OF EXPERIENCE
24

EDUCATION
Master of Science
Civil and Environmental Engineering
University of Wisconsin – Madison
1999

Bachelor of Science
Civil and Environmental Engineering
University of Wisconsin – Madison
1997

PROFESSIONAL ASSOCIATIONS
Water Environment Federation

Wisconsin Wastewater Operators' Association

American Academy of Environmental Engineers

AWARDS
2021 ACEC Minnesota Engineering Excellence Grand Award and Grand Conceptor Award, Project Manager: St. Cloud Nutrient Recovery and Reuse (NR2), St. Cloud, Minnesota.

2020 ACEC Illinois Engineering Excellence Special Achievement Award, Lead Process Engineer: Preparing for the Future: Upgrades at Aux Sable, Joliet, Illinois

2020 ACEC Illinois Engineering Excellence Judges Choice Award, Lead Process Engineer: Preparing for the Future: Upgrades at Aux Sable, Joliet, Illinois

2004 ACEC Wisconsin Engineering Excellence Best in State Award, Wastewater Treatment Plant Upgrade and Expansion, Ripon, Wisconsin

2004 American Society of Civil Engineers Wisconsin Section Engineering Achievement Award, Wastewater Treatment Plant Upgrade and Expansion, Ripon, Wisconsin

PRESENTATIONS
"A Tale of Two Aeration Upgrades," WWOA, October 2021

"Activated Sludge and BNR Process Control, Hands –On in the Real World, WEFTEC, October 2020

"Biosolids Handling Case Studies," WWOA, June 2020

"Process Control," WWOA, June 2020

Mr. Cassity has 24 years of experience as a wastewater process engineer. He has performed numerous evaluations and designs for wastewater facilities, including primary and secondary treatment, advanced treatment, disinfection, odor control, and the handling, treatment, and disposal of biosolids. Mr. Cassity specializes in process modeling using BioWin and GPS-X process simulators. Recent projects include detailed design and evaluations of biological nutrient removal, facility planning, and capacity studies.

Grit Removal and RAS Pumping Preliminary Design for Springbrook WRC, Naperville, Illinois. Project Manager: Preliminary engineering project determining the most cost-effective technologies for grit removal and RAS pumping at SWRC's 22.5-mgd North Plant. Following selection, prepared preliminary design drawings and a preliminary construction cost estimate for a combined grit removal and RAS pumping facility.

Nutrient Removal Evaluation for Springbrook Water Reclamation Center, Naperville, Illinois. Evaluated alternatives to modify the activated sludge system for the 26-mgd facility for biological phosphorus removal and biological nutrient removal. Evaluated alternatives to replace the aging tertiary sand filtration system with a new cloth media filtration process or membrane filtration process. The process alternatives were modeled using the BioWin process simulator.

Phosphorus Removal Pilot Studies and Planning Evaluation for Springbrook Water Reclamation Center, Naperville, Illinois. Project Engineer: Completed a small scale pilot study and a full scale pilot study evaluating low level phosphorus removal for the 26-mgd Springbrook WRC. Evaluated biological phosphorus removal, chemical phosphorus removal, and add-on tertiary filtration utilizing a small scale membrane pilot unit provided by Koch Membrane Systems. Chemical phosphorus removal was further evaluated by conducting a full-scale pilot study on SWRC's 4-mgd South Plant dosing ferric chloride. The results of the pilot studies along with results from two special monitoring and sampling programs were used to develop a full plant model for SWRC using the BioWin process simulator. Upgrade alternatives were modeled and a phosphorus removal planning memorandum was prepared summarizing the findings and providing conceptual descriptions, design parameters, capital costs, and annual operating costs for each alternative.

Tertiary Filter Evaluation, Springbrook Water Reclamation Center, Naperville, Illinois. Project Manager: Engineering evaluation to determine the condition of eight buried steel sand filters. Evaluation included a structural assessment including ultrasonic testing of steel structures, weld inspections, and coating inspections. Evaluation also included an operational assessment of the pumps, blowers, valves, and piping in the system. The evaluation report summarized the findings of the assessment and provided conceptual alternatives for upgrading or replacing the filters and associated equipment.

Tertiary Filter Renovation Design, Springbrook Water Reclamation Center, Naperville, Illinois. Project Manager: Designed activities to retrofit two buried steel filter vessels with new internal filtration equipment and sand media. Other design activities included replacing all pneumatically actuated valves for eight filters, installing VFD drives for the existing backwash pumps and air scour blowers, and constructing a pre-engineered fiberglass reinforced plastic electrical building to house the new VFDs, PLC, and electrical equipment.

Biosolids Thickening and Aeration Improvements Engineering and Design, Springbrook Water Reclamation Center, Naperville, Illinois. Lead Process Engineer: Preliminary engineering and final design of digestion thickening and aeration upgrades to the aerobic digesters, including preparation of technical memoranda for aeration upgrades and thickener upgrades, and final design of aeration and thickening upgrades. Investigated blower technologies that included multi-stage centrifugal, single-stage centrifugal, positive displacement, and high-speed centrifugal. Led the design of a high-speed centrifugal blower building with six 250-hp units.

PRESENTATIONS (continued)

"Smarter Plant and Smaller Energy Bills: New Upgrades at the GCDC District WRRF 3," Michigan WEA Wastewater Administrators Conference, Frankenmuth, MI, January 2020

"Utility of the Future, The Continued Journey at St. Cloud, MN" Michigan WEA Conference, Boyne Falls, Michigan, June 2019

"Activated Sludge and BNR Process Control: Hands-On in the Real World," WEFTEC, New Orleans, Louisiana, October 2018

"Sustainability Focused Facility Planning – A Community Specific Approach," Michigan WEA Conference, Boyne Falls, Michigan, June 2018

"Utility of the Future, One City's Journey," Michigan WEA, Frankenmuth, Michigan, January 2018

"Optimization in Practice: Case Studies from NEW Water's Phosphorus and TSS Optimization Plans'" WWOA, Madison, WI, October 2017

"Activated Sludge and BNR Process Control: Hands-On in the Real World," WEFTEC, Chicago, Illinois, October 2017

"Advances in Wastewater Treatment Technology," Michigan WEA Conference, Boyne Falls, Michigan, June 2017

"Advanced Aerobic Digestion Techniques: Naperville, IL, CSWEA, St. Paul, Minnesota, May 2017

"Optimization in Practice: NEW Water EBPR & TSS," CSWEA, St. Paul, Minnesota, May 2017

"Wyoming Clean Water Plant – Energy Efficiency Implementation," MWEA Process Seminar, East Lansing, Michigan, October 2016

"Activated Sludge and BNR Process Control: Hands-On in the Real World: Oxidation Reduction Potential at East Bank WWTP, Jefferson Parish," WEFTEC, New Orleans, Louisiana, September 2016

"Planning for the Future: Battle Creek's Approach to Upgrading its Secondary Treatment Processes," IWEA Conference, Champaign, Illinois, 2016

"Your Bugs Are Doing Better Than You Think," Iowa WEA Conference, Council Bluffs, Iowa, 2016

"Choices to Address Filamentous Growth," MWEA Process Seminar, East Lansing, Michigan, 2015

"Process Changes with Impact," MWEA, East Lansing, Michigan, 2015

"Your Bugs Are Doing Better Than You Think," Wastewater Operators Association, Wisconsin Dells, Wisconsin, 2015

Primary Clarifier Rehabilitation, Holland, Michigan. Lead Engineer: Donohue was retained by the City of Holland to provide planning, design, and construction phase services for improvements to its wastewater treatment facility. The project focusses on the rehabilitation of the facilities four existing covered primary clarifiers. Design includes: the condition assessment of the clarifier concrete; evaluation of the aluminum covers and structural elements; recommended rehabilitation methods; and design and specification of the rehabilitation approach.

Aeration System Evaluation, Metropolitan Water Reclamation District of Greater Chicago, Cook County, Illinois (2015). Technical Advisor and Quality Review: Completed an evaluation of the existing aeration systems to determine what equipment and control modifications are required to optimize the energy consumption at Stickney WRP. Used SIMBA# modeling software to develop an advanced model of the biological system and controls. Estimated capital costs and energy savings for evaluating project payback. Managed internal project schedules and budgets and attended project coordination meetings with the client.

Blower Upgrade, Kenosha, Wisconsin. Project Manager: The Kenosha Water Utility (KWU) provides water and wastewater service to more than 100,000 people in the greater Kenosha Metropolitan area. The wastewater treatment plant (WWTP) has a rated average day flow capacity of 28 mgd and currently treats an average daily flow of 23 mgd. Donohue provided evaluation, design, and construction services for the upgrade to replace two existing 250 HP rotary lobe blowers with two dual core 500 HP turbo blowers. The new blowers are sized to cover full operation from low to peak loading at the facility. Donohue also provided the controls integration services to automatically control the blowers for dissolved oxygen setpoint control.

Tertiary Filtration and Service Water Improvements Project, NEW Water, Green Bay, Wisconsin. Project Manager for design of tertiary filtration using cloth media disc filters to achieve future TSS and phosphorus limitations. The eight filter system was designed for an average and peak flow of 10 and 57.3 mgd, respectively. The design also included replacement of the service water system, which included a new service water pumping system, hydropneumatic tank, and automatic strainers. The service water pumping system consisted of a skid with five variable speed pumps with a total capacity of a firm and total capacity of 800 and 1,000 gpm, respectively. The design also included replacing most (i.e., 3,000 feet) of the Facility's service water yard piping, service water piping within two of the process buildings, and seal water connections to 16 pumps fed by the service water system.

Low Level Phosphorus Removal Project, Fox River Water Pollution Control Center (FRWPCC), Brookfield, Wisconsin. Project Manager for the design of the low level phosphorus removal system for FRWPCC to achieve the future 0.075 mg/L phosphorus effluent limit. The low level phosphorus removal system included four cloth media disc filters and chemical conditioning (i.e., rapid mix, coagulation, and flocculation) with a coagulant and polymer. The system had a capacity of 31.2 mgd. The design included provisions to use the existing deep bed filters as backup filters.

Primary Clarifier Rehabilitation Project, Fox River Water Pollution Control Center (FRWPCC), Brookfield, Wisconsin. Project Manager for the design of the rehabilitation of two primary clarifiers at FRWPCC. The rehabilitation included replacement of the mechanism motor and gear reducer; rebuild of the drive assembly; replacement of the centerwell, weirs, and scum baffles; and addition of wall-mounted launder troughs, scum beach, and dual skimmer assemblies. The design also included a ladder and platform to access and maintain the new launder troughs.

Des Plaines Water Reclamation Facility, Lake County Department of Public Works, Illinois. Lead Process Engineer: Design and construction services upgrades to the 16-mgd facility. Work included design of mechanical fine screen facility, aeration upgrades, and a new final clarifier.

WILLIAM L. MARTEN, PE, BCEE

PROFESSIONAL ENGINEER
Wisconsin: 25191

PROFESSIONAL REGISTRATION
Board Certified Environmental Engineer – American Academy of Environmental Engineers (Water/Wastewater Engineering)

Wisconsin: Grade IV Certified Wastewater Operator #05552

YEARS OF EXPERIENCE
44

EDUCATION
Master of Science
Civil/Environmental Engineering University of Wisconsin - Madison
1984

Bachelor of Science
Civil/Environmental Engineering University of Wisconsin - Madison
1982

PROFESSIONAL ASSOCIATIONS
Water Environment Federation

- WERF Project Subcommittee QA/QC Reviewer: "Wastewater Treatment Anaerobic Digestion Foaming Prevention and Control Methods" (Current)
- WEF Plant Operations and Maintenance Committee
- Municipal Wastewater Treatment Design Committee Wet Weather Treatment Subcommittee
- Residuals & Biosolids Committee
- Municipal Resource Recovery Committee

Central States Water Environment Association

Wisconsin Wastewater Operators Association

American Society of Civil Engineers

AWARDS
2021 George F. Bernauer Award from Wisconsin Wastewater Operators Association for Outstanding Contributions in Wastewater Treatment Technology in the State of Wisconsin

2017 ACEC Wisconsin Engineering Excellence Best of State Award, Lead Process Engineer: Eau Claire WWTF-Resilient, Robust, Sustainable, Eau Claire, Wisconsin

2014 ACEC Wisconsin Engineering Excellence Best of State, Process Engineer: Wastewater Treatment and Energy Recovery Facility, Bush Brothers & Company, Augusta, Wisconsin

Life Membership – Wisconsin Wastewater Operators Association, 2013

Mr. Marten's expertise includes planning, designing, starting up, analyzing, troubleshooting, and auditing wastewater treatment systems, and developing and delivering both training and operations and maintenance (O&M) manuals for such systems. He is Donohue's Practice Leader for Wastewater Biological Processes and Nutrient Removal. Mr. Marten has experience working in the municipal and industrial wastewater treatment fields. This experience includes the following:

- Managed and led planning, evaluation, design, startup, training and troubleshooting evaluations and services at small, medium and large wastewater treatment facilities,
- Managed capacity evaluations to confirm/change rated capacity at several wastewater treatment plants
- Conducted process and operations reviews to solve compliance problems at numerous municipal and industrial wastewater treatment plants
- Managed a 15-mgd wastewater treatment plant in Maine, operated a 50-mgd wastewater treatment plant in Wisconsin, and taught a wastewater treatment operator certification course in California

Northeast Plant (NEP) Facility Planning, Urbana & Champaign Sanitary District, Illinois. Senior Wastewater Process Engineer & Operations Specialist: Operational input in developing facility plan development for the 14-mgd average flow Northeast Plant to meet future population growth and anticipated Illinois wastewater treatment regulations for the next 20 years. The investigation includes 20-year projected flows and loadings, hydraulic profile and bottleneck analysis, collection system interconnection model and operational strategies, whole plant BioWin process modeling, operational impact evaluation of Southwest Plant biosolids on Northeast Plant digestion, and UV disinfection evaluation. A key element of the project will involve assessing the plant's two parallel biological treatment trains (activated sludge and rock trickling filters) and nitrification towers to determine the most cost- and process-effective biological treatment strategy for the future. In addition, the project will evaluate chemically enhanced primary treatment to divert carbon to the plant's anaerobic digesters, thus lowering secondary biological treatment loadings while increasing biogas production potential. The project team will make use of the BioWin process simulator, calibrated based on results from two plant sampling campaigns (cold and warm weather), to compare and evaluate a number of secondary treatment alternatives.

Long Range Capital Improvements Plan, Danville Sanitary District, Illinois. Senior Operations Specialist: Operational input into the development of a strategic plan to address critical infrastructure upgrades required to meet current and future domestic and industrial loads and anticipated Illinois wastewater treatment regulations for the next 20 years at the 24-mgd peak wastewater treatment plant. The investigation included 20-year projected flows and loadings, nitrification performance evaluation and impacts due to industrial loading, NFPA 820 compliance evaluation relative to digestion facilities, operations assistance in development of a wasting calculator, resulting in Sludge Volume Index (SVI) improvement from 400 down to 80. The result of the capital improvement process is the development of a $48M capital plan that includes the conversion of the facility to a membrane bioreactor (MBR) treatment process to provide a more robust treatment system to accommodate the facility's industrial loads and provide adequate nitrification in the event of industrial slug loads. In addition, the existing anaerobic digestion process will be converted to an autothermal aerobic digestion (ATAD) process to provide better solids destruction, removal of ammonia from the digested sludge side streams, and a Class A biosolids product.

Effluent Phosphorus Compliance Evaluations, Multiple Communities. Project Manager/Lead Process Engineer/Senior Review Engineer: Multiple projects focused on optimizing phosphorus removal performance of existing facilities and evaluating alternative improvements for a number of WWTPs faced with new, more stringent (0.075-0.100 mg/L) water quality based effluent phosphorus limits. Facilities range in size from 0.4 mgd to >15 mgd, some making use of chemical phosphorus removal and others a combination of enhanced biological phosphorus removal with chemical treatment for polishing or sidestream treatment.

AWARDS (continued)

2011 ACEC Wisconsin Engineering Excellence Best of State, Lead Process Engineer: Facility Planning to Meet Permit Limits, Superior, Wisconsin

2011 ACEC Wisconsin Engineering Excellence State Finalist, Lead Process Engineer: Eau Claire Removes Toxicity and Improves Pumping, Eau Claire, Wisconsin

2010, 2008 & 2006 - Outstanding Leadership and Dedicated Service Awards – Wisconsin Section Central States Water Environment Association

PAPERS

"Low Cost Activated Sludge Optimization – A Superior Approach", The Clarifier, WWOA Quarterly Magazine, February 2016

"Challenging the limits of technology," Water Environment & Technology Magazine, January 2015, Vol. 27, No. 1

"What every Operator should know about Biological Nutrient Removal," Water & Technology Magazine, October 2014, Vol. 26, No. 10

"International Standard Units for Water and Wastewater Processes," WEF Manual of Practice No. 6, 2011

"Wastewater Treatment Plant Upgrades in Grafton, Wisconsin", Water Environment & Technology Magazine, May 2010, Vol. 22, No. 5

"Maximizing Wet Weather Treatment Capacity", a series of 5 articles published in sequential issues of The Clarifier, Wisconsin Wastewater Operators Association from late 2004 through early 2006

"Nutrient Removal: One Size Does Not Fit All", Water Environment & Technology, October 2004, Vol. 16, No. 10

"Double Take", Water Environment & Technology, August 2004, Vol. 16, No. 8

SELECTED PRESENTATIONS

"Wausau Waterworks WWTP – Innovation in the Midst of Change," WWOA Annual Conference, October 2022

"From RBCs to BNR Activated Sludge: 6 Years of Learning at the Eau Claire WWTP", with Craig Hendrickson/Eau Claire, WWOA Annual Conference, October 2021

"A Roller Coaster Tour of Nitrifications," Indiana WEA Core Conference, March 2021; WWOA Annual Conference, October 2020

"The Challenges of Change; from RBCs to BNR Activated Sludge at Whitewater," WWOA Annual Conference, October 2018

"Optimizing Bio-P: A Whole Plant Perspective," Illinois WEA Conference, March 2016; Iowa WEA Conference, June 2016

Primary Filtration Project for the Four Rivers Sanitation Authority (FRSA) (formerly Rock River Water Reclamation District), Rockford, Illinois. Senior Operations Specialist: With aging infrastructure and in anticipation of more stringent nutrient effluent limits, FRSA is looking into increasing its secondary treatment capacity by improving the primary treatment processes. This project increased the plant's secondary treatment capacity by improving performance of the primary treatment process step, replacing four existing primary clarifiers with four (4) AquaPrime cloth media filtration units that will ultimately treat 60 mgd. Effluent from the primary filters blends with effluent from existing primary clarifiers for secondary treatment. The primary filter facilities include a gravity thickener to thicken the backwash and waste solids from the filters to 1.5% to 2.5%, followed by an existing gravity belt thickener for additional thickening (5% to 6%) prior to anaerobic digestion. Based on onsite pilot study, results indicated that the primary filters are capable of removing than 70% COD and more than 80% TSS from primary influent. Additional biogas production is also produced.

Facility Planning and Design of Plant Improvements, Eau Claire, Wisconsin. Lead Process Engineer: Facility planning and design of wastewater pump station and treatment plant improvements. The plan developed a phased approach to help the City cost-effectively and reliably meet new effluent ammonia limits in the short term, while maintaining an aging RBC treatment system that is nearing its capacity and useful life limits, with a second phase aimed at replacing the RBCs with a nitrifying activated sludge system and performing anaerobic digestion and other facility upgrades several years down the road, allowing the City to fiscally plan for funding this major expansion. Led design of several key plant improvements including biological phosphorus removal activated sludge, anaerobic digestion heating and mixing improvements, and struvite mitigation provisions related to digestion and downstream solids handling processes. Mr. Marten then led startup of the new facilities and ongoing operational assistance.

Wastewater Treatment Plant Upgrade, La Crosse, Wisconsin. Senior Process Engineer and Operations Specialist: Design to improve phosphorus removal for new permit limits and to enhance safety, reliability, energy efficiency, solids-processing, and solids-reuse capacity. Improvements include, among others, installation of a new fine screen; upgrades to the Primary Solids Pumping System; upgrades to the existing aeration basins to convert them from A2O to a more efficient MUCT system for enhanced biological phosphorus removal; full diffuser replacement in aeration basins; replacement of existing blowers with high efficiency turbo blowers; reconfiguration of all interior and exterior aeration piping; final clarifier mechanism refurbishment; conversion of existing chlorination channel into chemical mixing tanks for the phosphorus removal filtration system; installation of rotating disc filters for phosphorus removal; installation of an Orege system, which is a newer technology for solids thickening to supplement the gravity thickeners and replace the existing GBT as the primary thickening unit; installation of a new digester heating system including new recirculation pumps and heat exchangers; mixing upgrades to all four anaerobic digesters; installation of a new biogas piping and a waste gas burner; installation of a new BFP for thickening anaerobic solids prior to the belt dryer; installation of a new belt dryer for solids drying, including required appurtenances such as new boiler and heat exchanger system for dryer heating, a dust control system, an odorous air control system, a solids storage silo and load-out, and a storage silo nitrogen purge system; installation of a new biogas treatment and compression system; installation of a new heat and power cogeneration engine; full facility electrical utility upgrade converting from three utility feeds to a single utility feed; upgrade of building hydronic heating systems using heat generated by the dryer; and an NFPA 820 evaluation review and necessary upgrades.

Wastewater Treatment Plant Facilities Planning, Design and Startup, Wausau, Wisconsin. Lead process engineer and operations specialist through facility planning for major rehab/upgrade of this 15 mgd plant, followed by senior design review engineer/operations specialist during design of upgrades. Currently coordinating and assisting plant and control systems staff in startup of key unit processes as they become available. Upgrade included major modifications to activated sludge system (addition of selectors, new aeration basin flow patterns and high flow/step feed capabilities, new aeration blowers, new sludge thickening, dewatering and drying facilities, and other plant-wide improvements.

WILLIAM C. MCCONNELL III, PE, BCEE

PROFESSIONAL ENGINEER
Pennsylvania
Rhode Island
Massachusetts
Virginia
Connecticut

PROFESSIONAL DESIGNATION
Board Certified Environmental Engineer (BCEE), American Academy of Environmental Engineers and Scientists

YEARS OF EXPERIENCE
32

EDUCATION
Bachelor of Science
Civil Engineering
Brown University
1990

PROFESSIONAL ASSOCIATIONS
Water Environment Federation

Mr. McConnell is a senior environmental engineer with more than 32 years of experience in the planning, design, operation, and construction of wastewater and water treatment facilities. He specializes in wastewater treatment process design and operations for biological nutrient removal (BNR), and he is focused on helping facilities to achieve cost-effective BNR by optimizing the use and efficiency of existing assets. Mr. McConnell also tracks technology advancements in the field and balances the implementation of innovative approaches with the need for reliability and conservatism. He has contributed to many related publications and served as the Task Force Chair and contributing author for the Water Environment Federation's Manual of Practice No. 37 *Operation of Nutrient Removal Facilities*. Mr. McConnell has held several technical leadership positions in CDM Smith and is currently the firm's Water Reclamation North Discipline Leader.

Comprehensive Wastewater Management Plan for the City of New Bedford, Massachusetts. Project Technical Leader and Wastewater Process Engineer: Mr. McConnell is serving two roles in the ongoing development of a Comprehensive Wastewater Management Plan (CWMP) for the City of New Bedford. As the project technical leader, he has overall responsibility for the technical approaches and development of the CWMP. He is also the lead process engineer and is responsible for evaluating treatment alternatives to enable the City's treatment plant to successfully meet its discharge permit for the 20+ year planning horizon. The plant will be required to achieve nitrogen removal in the future, and a key aspect of the evaluation is to determine ways to optimize operation of the treatment systems to achieve nitrogen removal at minimal capital cost.

Phosphorus Reduction Upgrade, Waterbury, Connecticut. Technical Reviewer: Mr. McConnell provided technical review for the design of a phosphorus-reduction upgrade project for the 27-MGD Waterbury, CT Water Pollution Control Facility (WPCF). The project includes a new tertiary cloth filtration process using the "Mega-Disk" system and chemical systems for phosphorus removal, a new intermediate pumping station and hydraulic improvements to enable the plant to comply with its new phosphorus limit.

Wastewater Treatment Plant (WWTP) Design, Littleton, Massachusetts. Technical Reviewer: Mr. McConnell served as a technical reviewer and specialist for the design of a new WWTP for Littleton, Massachusetts. The plant will be comprised of membrane bioreactors (MBRs), with up-front fine screening and subsequent UV disinfection, prior to groundwater discharge. Mr. McConnell is completing technical review services at several progress milestones during the design, and is providing technical advice as needed.

Various Wastewater Treatment Plant (WWTP) Design Projects. Technical Reviewer: In his role as Water Reclamation Discipline Leader, Mr. McConnell regularly serves as a technical review committee (TRC) member and technical specialist reviewer for ongoing WWTP design projects. Among those recent projects not specifically identified elsewhere are: 1) the Cargill Friona WWTF upgrade (2.3-MGD Bardenpho); 2) the JEA Southwest Water Reclamation Facilities (WRF) Expansion (16-MGD oxidation ditch); 3) the Punta Gorda WWTP (4-MGD oxidation ditch); and 4) the Sister Grove RWWRF (16-MGD A2O).

Maxson Wastewater Treatment Plant Upgrade, Memphis, Tennessee. Technical Reviewer: Mr. McConnell provided technical review for the design of upgrades to the 90-MGD Maxson WWTF, which include a new headworks building, replacement of the aeration tanks' coarse-bubble air diffusion system with new fine-bubble membrane diffusers, a new return-activated sludge (RAS) aeration tank, upgrades to the plant's six media biotowers, two new secondary clarifiers and a new disinfection system using peracetic acid (PAA). Mr. McConnell was a lead process engineer in the project's original planning evaluation, alternatives comparison and project development phase, and transitioned to a technical review role during the final design phase of the project. Construction of the resultant upgrades to the Maxson wastewater treatment facility are underway.

Wastewater Treatment Plant (WWTP) Upgrade, Kingston, Massachusetts. Technical Reviewer and Process Expert: This project included expansion of the plant's sequencing batch reactor (SBR) process to double plant capacity, as well as improvements to the aeration and solids-processing systems.

Contract No. 2, Design of Solids Processing Improvements, Fall River, Massachusetts. Mr. McConnell is the project technical leader for the design and construction of solids-processing improvements at the Fall River WWTF. The improvements include an upgrade of the WWTF's gravity thickeners and sludge storage tanks, and new gravity-belt thickeners, belt filter presses, truck loading facilities, odor control and an expansion of administrative spaces. Mr. McConnell developed solids loading design criteria at the onset of the project and as PTL, oversaw the technical completion and delivery of the final design drawings and specifications.

Wastewater Treatment Plant Design/Build (D/B) Project, Joint Base Lewis-McChord, Washington. BNR Process Designer: Mr. McConnell led the process design for the design and construction of a new 4.4-MGD WWTP to serve Joint Base Lewis-McChord. The plant, which was commissioned in late 2016, was required to achieve a process effluent total inorganic nitrogen (TIN) concentration of 3 mg/L. During the design, Mr. McConnell was responsible for the BNR components of the project, including the bioreactors, secondary clarifiers, blowers and supplemental carbon system. He provided technical guidance and support during commissioning to achieve the plant's effluent TIN limit.

Clarifier and Flow Splitter Design, Bucklin Point Wastewater Treatment Facility (WWTF), East Providence, Rhode Island. As the project technical leader, Mr. McConnell was responsible for the ongoing design of secondary clarifier and RAS pumping systems improvements at the Narragansett Bay Commission's Bucklin Point WWTF. Improvements were required to provide continued reliable process operation during sustained periods of peak flow resulting from a planned upstream CSO storage tunnel. The upgrades included two new 110-foot diameter clarifiers and an approximately 15-MGD RAS pump station. Mr. McConnell developed the initial process design criteria at project start, and as PTL, is overseeing the technical completion and delivery of final design drawings/specifications.

UV System Evaluation and Design, Bucklin Point Wastewater Treatment Facility (WWTF), East Providence, Rhode Island. Mr. McConnell is the project technical leader for the study of alternatives and design of effluent ultraviolet (UV) disinfection improvements at the Narragansett Bay Commission's Bucklin Point WWTF. These improvements are required to replace the plant's outdated UV system, and improve process reliability and efficiency going forward. The new UV system will be rated for a peak flow of 46 MGD. Mr. McConnell is overseeing the technical completion and delivery of the final design drawings and specifications.

Loch Sheldrake WPCF Upgrade, Fallsburg, New York. Mr. McConnell served as lead practitioner and technical reviewer during the design of the upgrade at the Lock Sheldrake WPCF. The plant was upgraded from a rotating biological contactor (RBC) to a new membrane bioreactor (MBR) plant, to meet the plant's effluent requirements for total nitrogen and phosphorus (TN/TP). The project also includes a new headworks process and new chemical feed systems. Construction and startup of the plant upgrade project was completed in 2019.

Ballasted Flocculation Tertiary Process, Bristol, Connecticut. Mr. McConnell served as lead practitioner and technical reviewer during the recent design of the 38-mgd tertiary ballasted flocculation and UV disinfection facility upgrade at the Bristol, CT WPCF. The plant is required to comply with an effluent phosphorus limit of 0.1 mg/L, and Mr. McConnell served in these senior process engineering roles for vendor pre-selection of the ballasted flocculation process and UV equipment and through the development of the design documents. Construction for the project was completed and the upgrade commissioned in 2017.

GLEN T. DAIGGER, PH.D., PE, BCEE, NAE

PROFESSIONAL ENGINEER
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Arizona: 47312

PROFESSIONAL DESIGNATION
Board Certified Environmental Engineer, American Academy of Environmental Engineers and Scientists

YEARS OF EXPERIENCE
40+

EDUCATION
Ph.D.
Civil Engineering
Purdue University
1979

Master of Science
Civil Engineering
Purdue University
1975

Bachelor of Science
Civil Engineering
Purdue University
1973

PROFESSIONAL ASSOCIATIONS
Member of the National Academy of Engineering

Former President of the International Water Association, Providing Broad International Perspective

DISTINGUISHING QUALIFICATIONS
Widely Recognized International Expert with Broad Experience in Water Management

More Than 40 Years Practical Experience, Including Senior Vice President at Major International Engineering Firm

Actively Involved with Over 300 US and International Water Resource Recovery Facilities Ranging in Size From < 1 to >1,500 MLD

Widely Published Author

Holder of Eleven Patents

Dr. Daigger is President and Founder of One Water Solutions, LLC, a professional services firm serving the water sector. Strategic advice and technical analysis of water solutions which protect public health and the environment while delivering added value to the communities and industries served are provided. A strong foundation in science and engineering, coupled with broad and diverse experience, provides the basis for these services. Dr. Daigger is also Professor of Engineering Practice at the University of Michigan. Some select examples of Dr. Daigger's experience illustrate how these features are translated into client benefits.

Biological Phosphorus Removal. Dr. Daigger has been a leader developing and implementing biological phosphorus removal technology since the mid 1980's. Beginning with the Fayetteville, AR and VIP, Norfolk, VA facilities in the 1980's, he has designed and optimized numerous additional benchmark biological phosphorus removal facilities since. His experience ranges from systems incorporating a wide variety of mainstream and sidestream anaerobic and fermentation zones, and includes separate fermentation of primary sludge to produce volatile fatty acids (VFA's) for feed to mainstream anaerobic zones and separate return activated sludge (RAS) fermentation systems. His classic textbook on biological phosphorus removal summarizes current understanding of the relationship between wastewater characteristics (the proportion of VFA, other readily biodegradable organic matter, and particulate and colloidal organic matter) with sizing and configuration of anaerobic zones to produce sufficient VFA's relative to the phosphorus that needs to be removed. Some additional signature facilities include the Lethbridge, AB, Canada wastewater treatment plant based on a step feed configuration, the Rock Creek and Durham facilities for Clean Water Services, Hillsboro, OR, and the Green Bay, WI Metropolitan Sewerage District.

Biological Nitrogen Removal. Dr. Daigger has extensive experience implementing treatment systems to achieved effluent total nitrogen (TN) concentrations less than 3 mg-N/L. Significant examples include the 384 mgd Blue Plains (District of Columbia) Advanced Wastewater Treatment Plan, 70 mgd Alexandria, VA AlexRenew, 52 mgd Noman Cole Water Pollution Control Plant (Fairfax County, VA), 12 mgd Broad Run Water Reclamation Plant (Loudon Co., VA), 9.6 mgd Tahoe-Truckee Sanitation Agency (Truckee, CA), and the 8.4 mgd Gippsland Water Factory (Victoria, Australia). Several of these facilities regularly produce effluents with TN concentrations of 2 mg-N/L or less, including the Broad run and Gippsland facilities.

Process Innovations. Dr. Daigger is widely known for the wastewater treatment process innovations he is responsible for developing and translating into practice. These include biological nutrient processes such as the VIP process and the step feed biological nitrogen and phosphorus removal process. He developed, demonstrated, and translated to practice the basic approach to optimizing nitrification and biological nitrogen removal in Hybrid biofilm and suspended growth processes such as trickling filter/activated sludge, integrated fixed film activated sludge (IFAS), and more recently the Nuvoda process. These same principals apply to the membrane aerated biofilm reactor (MABR) as incorporated into activated sludge systems which he is pioneering. He was an early adopter of the membrane bioreactor (MBR) process, helping to enable the early installations that established MBR as a practical alternative and defining standard engineering practice. His work with chemical phosphorus removal has defined the state-of-the-art, which is critical as plants strive to achieve limit of technology performance. His work with aerobic digestion has defined the current state-of-the art, including cyclic aeration to maintain pH and reduce energy costs and temperature control through pre-thickening.

Sidestream Treatment. Dr. Daigger has significant and varied experience with the management and treatment of solids handling sidestreams, particularly those arising from the dewatering of anaerobically digested sludge. He was the lead process engineer for implementation of the sidestream treatment system at the 72 mgd at the Alexandria Renew Enterprises (ARenew) facility in Alexandria, VA. The first of its kind in North America, it uses the Demon partial nitritation/anammox process to pre-treat the centrate from centrifuge dewatering of anaerobically digested primary and waste activated sludge. In service for several years now, it has routinely active its design

objectives. Dr. Daigger served as senior consultant for conversion of the Sharon sidestream pre-treatment system at the 275 mgd Wards Island treatment plant for the New York City (NYC) Department of Environmental Protection (DEP). He recently served as senior consultant for the evaluation of sidestream pre-treatment options for the Region of Halton, Ontario, Canada 10.6 mgd Skyway Water Pollution Control Plant. He has been involved in similar evaluations at many locations, including Chino, CA and Tulsa, OK.

Process Development and Full-Scale Testing. Dr. Daigger has been engaged in field investigations to characterize and optimize existing wastewater treatment plants and to conduct full-scale and pilot-scale studies throughout his career. One notable example is his service as senior reviewer for upgrade of the 1,400 MLD Blue Plains Advanced Wastewater Treatment Plant to biological nitrogen removal. The demonstration utilized the fact that the existing nitrification system was design as two trains that could be operated separately. Thus, temporary modifications to allow one of the two halves of the plant to operate in a nitrogen removal mode were made and a two-year long investigation was conducted using the other half of the plant as a control train, resulting in a 1,400 MLD full-scale demonstration. As Chair of the New York City (NYC) Nitrogen Technical Advisory Committee (NTAC) over a 12 year period he participated in demonstration projects at many of NYC's treatment plants. Some other examples include the 640 MLD Duffin Creek and 217 MLD Highland Creek Water Pollution Control Plants in the Toronto area, the 48 MLD Lethbridge, AB Wastewater Treatment Plant, 150 MLD VIP Plant, Norfolk, VA, and the 265 MLD ARenew Water Resource Recovery Facility, Alexandria, VA.

PROJECT HIGHLIGHTS

Portland, Oregon, Bureau of Environmental Services (BES). Has served as senior consultant for improvements to the BES Columbia Boulevard Wastewater Treatment Plant (WWTP) secondary treatment system for more than 20 years. Originally constructed as a complete mixed activated sludge system which experienced severe sludge bulking problems, in the 1990's the facility was converted within the existing bioreactor volume to a plug flow configuration with an initial anoxic selector. While this conversion improved sludge settleability, further improvements were implemented in the early 2010's to increase the peak wet weather capacity of the secondary system. This was accomplished again within the existing bioreactor volume by adding further flexibility to operate in step feed and sludge reaeration modes under wet weather conditions, and to adjust the anaerobic selector configuration as needed. Extensive evaluation of the existing relatively shallow square (squircle) peripheral feed secondary clarifiers were conducted, including field testing and computational fluid dynamic (CFD) analysis. Extensive modifications to the return activated sludge (RAS) system to thoroughly blend the individual RAS streams to allow the facility to operate as a "single" biological process rather than eight parallel systems were also implemented. These modifications allowed the reliable peak wet weather capacity to be increased from approximately 100 mgd to as much as 140 mgd. Dr. Daigger also provided significant process support to staff during the first wet weather season of operation.

Clean Water Services, Hillsboro, Oregon. Dr. Daigger has provided a wide range of planning, design, and operational assistance services to Clean Water Services since 1983 at their Rock Creek, Durham, and Hillsboro Advanced Wastewater Treatment Facilities. An innovative approach to facility planning facilitated management of capital investments during periods of high growth. The ultimate development of the plant site (for example, to 110 mgd for Rock Creek) was regularly updated and remained the guiding vision for the facility. At the same time, the specific details of plant upgrades over shorter time periods (5 to 10 years) were defined, consistent with the ultimate development plan. This approach provided the flexibility to manage shorter term (5 to 10 years) capital investments while ensuring that the facilities implemented are consistent with long-term facility needs. A "building block" approach to facility layout anticipated potential future treatment requirements and technology changes, thereby providing the flexibility to meet future requirements and capitalize on the opportunities created by emerging technologies.

New York City Department of Environmental Protection (NYCDEP). For a 12-year period beginning in the mid-1990s, Dr. Daigger served as Chair of the NYCDEP Nitrogen Technical Advisory Committee (NTAC). Composed of seven international experts in nitrogen control from wastewater and water conservation, the NTAC provided guidance, technical review, and advice to the NYCDEP on both their applied research program (PO-55) and the overall development and implementation of their BNR program. Formed initially as a requirement of a consent order, due to the value provided the NTAC continued to serve the NYCDEP for many years following completion of the requirements set forth in the consent order. This assignment also provided Dr. Daigger with the opportunity to become intimately familiar with the NYCDEP, including its plants, personnel, and operating procedures and cultures. During this period Dr. Daigger also served as a member of the Advanced Wastewater Treatment Technical Advisory Committee, providing similar services to the NYCDEP through this vehicle. Following this Dr. Daigger served as technical advisory for PO-88, the continued NYCDEP nitrogen control research activities. He has also participated in numerous evaluations of the New York City plants that are being upgraded to provide nitrogen reductions to the Upper East River and Jamaica Bay, including a recent evaluation of further nitrogen reduction options that could be implemented following completion of the current planned upgrades. Served as senior advisory for a project examining a broad range of options for the Rockaway WWTP. Most recently he has served as Technical Advisory for replacement of the existing SHARON® Demonstration Facility at the 275-mgd Wards Island WWTP with a Moving Bed Biological Reactor (MBBR) process which utilizes deammonification reactions made possible by the anammox microorganisms to treat the majority of the centrate flows produced by the dewatering facility at the WWTP.

ARenew, Alexandria, Virginia. Strategic advisor to Alexandria Renew (ARenew) since 1992, This 72 mgd Water Resource Recovery Facility (WRRF) has been rehabilitated and sequentially upgraded to meet stringent Chesapeake Bay discharge standards of 8 mg/L Total Nitrogen (TN) and then 3 mg/L TN while maintaining consistent compliance with stringent effluent Total Phosphorus (TP) requirement of 0.18 mg/L. A building block approach, similar to that used with the Clean Water Services facilities, facilitated sequential upgrade of the facility which is located on a highly constrained site in downtown Alexandria, VA. More recently, a Master Plan for further improvement to the facility anticipated potentially more restrictive future effluent standards while achieving increased sustainability. This Master Plan identified a side-stream partial nitritation/Anammox facility which is currently in start-up (first purpose-built facility in North America), resulting in substantial energy and supplemental carbon addition savings. Further application of partial nitritation/Anammox to the mainstream process is being implemented. In all, more than $500M in capital improvements have been successfully implemented. Most recently served as Technical Advisor for update of the existing long-range plan to anticipate future more restrictive regional biosolds management options.

Fairfax County, Virginia. Has served the Fairfax County, VA Water Authority since the early 1990's, with specific focus on the Noman M. Cole, Jr. Pollution Control Plant (NMCPCP). In the early 1990's developed a plan to allow expansion of the NMCPCP to 67-mgd at a cost significantly lower than other options using the step-feed biological nutrient removal process. Subsequently served as senior consultant for design, construction, and start-up of these facilities. Served as senior consultant on a number of master plans for the NMCPCP, most recently helping to identify opportunities to upgrade the existing incineration process at the facility, including the addition of energy recovery.

Akron, Ohio, Water Reclamation Facility (WRF). Served as senior consultant to upgrade secondary treatment system from 110 mgd peak wet weather flow to nearly 280 mgd by improving existing shallow secondary clarifiers (100 foot-diameter, 10 and 12 feet deep) and converting to step feed. An initial investigation, consisting of process modeling of the secondary treatment system and computational fluid dynamics (CFD) was followed by full-scale testing which documented capacity improvements. One of the existing six treatment units at the WRF was modified, and an extensive two-year testing program testing program was conducted to determine the total peak wet weather secondary treatment capacity achievable.

KAM P. LAW, PH.D., PE, ENV SP

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PROFESSIONAL CERTIFICATION
Envision™ Sustainability Professional (ENV SP) Institute for Sustainable Infrastructure, 2015

YEARS OF EXPERIENCE
28

EDUCATION:
Ph.D.
Civil and Environmental Engineering
University of Nevada, Reno
2020

Master of Science
Project Management
Northwestern University
2004

Master of Science
Environmental Engineering
University of Kansas
1995

Bachelor of Science
Civil Engineering, University of Kansas,
1992

PROFESSIONAL ASSOCIATIONS
Illinois Water Environment Association

Illinois Association of Wastewater Agencies

Water Environment Federation

PAPERS
"Sustainability of centralized phosphorus recovery from sewage sludge ash," J. Clean. Prod, 2020

"Reclaimed phosphorus commodity reserve from water resource recovery facilities – a strategic regional concept towards phosphorus recovery," Resour. Conserv. Recycl. 150, 2019

"Phosphorus recovery by methods beyond struvite precipitation," Water Environ Res. 90, 840-850., 2018

"Effects of Nitrogen and Phosphorus Supply Condition on Nutrient Limitation for Hexadecane Biodegradation in Soil Systems," coauthored and submitted to Water, Air, Soil Pollution, February 1998

"Application of Variable Nutrient Supplies to Optimize Hydrocarbon Biodegradation," Bioreclamation of Recalcitrant Organics, 1995

PRESENTATIONS
"Design Considerations for the First Primary Filtration Facility in Illinois," Illinois Wastewater Professional Conference, Springfield, Illinois, April 2022

Ms. Law is a licensed professional engineer and project manager with 27 years of experience in planning and design for all aspects of water resource recovery facilities from replacement, expansion, and construction of new facilities to investigation of operational problems using process modeling software programs. Kam is also Donohue's Practice Leader for *Wastewater Innovations*, where she is responsible for guiding Donohue teams and our clients in efforts to effectively employ and implement innovative and emerging technologies and practices.

Whole Plant Process Modeling Updates and Hydraulic Modeling at the 1,400-mgd Stickney Water Reclamation Plant, Cook County, Illinois. Task Manager: A Stickney whole plant process model using GPS-X was developed in 2013. Since then, process modifications have been taken place at Stickney. To name just a few, Stickney has implemented an enhanced biological phosphorus removal process, a phosphorus recovery facility, gravity thickening and fermentation for the primary sludge, and the WASSTRIP process that will enhance the phosphorus recovery.

New 370-mgd Canoas Wastewater Treatment Plant (WWTP) Secondary Treatment and Complementary Works, Bogota, Colombia. Process Model Specialist: A detailed design of Phase I (primary treatment) and the conceptual design of Phase II (secondary treatment) and Phase III (tertiary treatment – nutrient removal) were completed in 2016 by others. As part of this project, we were to complement the existing Phase I detailed design documents and to bring the Phase II conceptual design to a detailed design level. Design consideration for Phase III with nutrient removal were took into account during the Phase II design. BioWin, a process modeling software, was used for the project.

MCC1, Blower and RAS Improvements Project, Yorkville-Bristol Sanitary District (YBSD), Illinois. Project Manager and Process Lead: This project includes miscellaneous improvements for YBSD. The MCC1 was installed in 1970s and has reached the end of its useful life. In addition to in-kind replacement, YBSD took this opportunity to evaluate the location where MCC1 should be located and to consolidate MCC1 with MCC6. The current RAS are recycled by airlift pumps which share the same blowers as the main process blowers. Due to the difficulties in controlling the air distribution, YSBD was desirous of separating the air supply between the RAS airlifts and the liquid treatment. As part of the evaluation, RAS airlifts vs. submersible pumps, and turbo blower replacement of the existing centrifugal blowers were also evaluated for a more operator-friendly and energy-efficient blower system for now and into the future. For the MCC1 and the blower replacement, bases of design were developed as part of the project.

Dillman Road Wastewater Treatment Plant Upgrade and Expansion Project, Bloomington, Indiana. Process Quality Reviewer: The City of Bloomington Utilities (CBU) Dillman Road Wastewater Treatment Plant (WWTP) has reached 90 percent of its 15 million gallon per day (mgd) National Pollutant Discharge Elimination System (NPDES) permitted capacity. A 20-year Facilities Plan was prepared to assist in the evaluation, scheduling and coordination of the various wastewater improvements. The Facilities Plan recommended increasing the NPDES permitted annual average capacity from 15 million gallons per day (mgd) to 20 mgd and peak flow capacity from 30 mgd to 40 mgd to meet 20-year flow projections. It is also recommended to replace select process equipment, electrical and mechanical systems due to age and condition. Plant upgrade included aeration blowers and diffusers replacement, aerobic digester blowers and diffusers replacement, a new tertiary disk filter, and non-clog pumps.

Headworks Pump Station Renovation, West Chicago, Illinois. Project Engineer: Project included a headworks pump station renovation at the 7-mgd facility, with peak flow of up to 21 mgd, including replacing screw pumps with new pre-rotation immersible pumps, and piping modifications.

Anthony Ragnone Wastewater Treatment Plant – Phase IB improvements, Genesee County Drain Commission, Michigan. Design Engineer: Responsible for replacing the bar screens and slide gates in the pump station and headworks improvements, including

PRESENTATIONS (continued)

"An Alternative Strategy for Effluent Total Phosphorus Discharge Reduction," New Jersey Water Environment Association Annual Conference, Atlantic City, New Jersey, May 2019

"Using Process Model for Optimizing Nitrogen Removal in Conventional Activated Sludge Plant," New Jersey Water Environment Association Annual Conference, Atlantic City, New Jersey, May 2019

"Turning Lemons into Lemonade: Conversion of a Conventional Activated Sludge System into an Enhanced Biological Phosphorus Removal System for High Strength Waste Management," WEF Nutrient Symposium, Raleigh, North Carolina, June, 2018

"A Case Study of Converting a Conventional Activated Sludge System into an Enhanced Biological Phosphorus Removal System via a Public/Private Partnership," New Jersey Water Environment Association Annual Conference, Atlantic City, New Jersey, May 2018

"A Strategic Regional Phosphate Reserve: The Future of Phosphorus Recovery," Nevada Water Environment Association Annual Conference, Spark, Nevada, April 2018

"Embracing the Future: MWRDGC's Approach to Energy Neutrality through Whole Plant Modeling," Illinois Water Professional Conference, Springfield, Illinois, April 2017

"Alternative Phosphorus Recovery from Sidestreams in Water Resource Recovery Facilities – Beyond Struvite," Illinois Water Professional Conference, Springfield, Illinois, April 2017

"Transformation of a Century-Old Utility into the Utility of the Future," WEFTEC, New Orleans, Louisiana, September, 2016

"Roadmap Toward Energy & Chemical Optimization Through the Use of Mainstream Deammonification at Enhanced Nutrient Removal Facilities," WATERCON, Springfield, Illinois, March 2014

"Seven Years and Counting - Biological Phosphorus Removal at the Southwest Treatment Plant of the Urbana & Champaign Sanitary District," WATERCON, Springfield, Illinois, March 2013

"Design Considerations in Using Deep Bed Downflow Denitrification Filters and Moving Bed Bioreactor for Post Denitrification in Achieving Limit of Technology," Central States Water Environment Association Annual Meeting, St. Charles, Illinois, May 2012

"Sidestream Treatment Overview," WATERCON, Springfield, Illinois, March 2012

the addition of a new grit removal system and replacing the existing coarse bubble diffusers with fine bubble diffusers.

Various Stages of Facility Plan Updates, Plant Rehabilitation and Modification Projects, Urbana & Champaign Sanitary District, Illinois. Project Engineer and Deputy Project Manager: Involved with the various facility plan updates (Phase I, II, and III) and subsequent plant rehabilitation and modification projects for the Urbana & Champaign Sanitary District since 1999. As a project engineer, Kam was responsible for the biosolids consolidation component of the 1999 facility plan updates for the Northeast Treatment Plant (NEP) and the Southwest Treatment Plant (SWP). Biosolids consolidations included biosolids blending, anaerobic digesters mixing, gas system modification, centrifuge dewatering, sludge pumping, and piping modifications. Additional responsibilities included hydraulic evaluation at the NEP and assisted in the SWP biological phosphorus removal conversion. Based on recommendations from the 1999 facility plan, SWP went through a major "face lift", while the focus for NEP was in biosolids handling (Phase I and II). Five years later, UCSD embarked another facility plan update in 2005. During that time, Kam was the Deputy Project Manager responsible for updating the facility plans for both NEP and SWP, with main focus on improvements at the NEP. Additional duties included evaluation of the unit processes, plant treatment capacity, and nutrient removal technologies at the NEP. Recommendations from the 2005 facility plan resulted in a new headworks facility, retrofitting tertiary sand filtration with cloth media disk filtration, upgrading the anaerobic digestion complex including conversion of a secondary digester to a primary digester and a new sludge transfer tank for digested sludge equalization at the NEP (Phase III). At the end of the Phase III construction at NEP, Kam also took on the responsibility on updating the Operation and Maintenance Manual for the NEP.

Phosphorus Removal Feasibility Study for the Calumet Water Reclamation Plant (WRP), Metropolitan Water Reclamation District of Greater Chicago, Illinois. Project Manager: The Calumet WRP is owned and operated by the District. Due to the severe eutrophication (hypoxic zone) in the Gulf of Mexico, the District is facing a progressively more stringent limits on effluent Total Phosphorus (TP). For the Calumet WRP, a feasibility study was conducted to evaluate technologies and the capital and operation and maintenance costs associated with TP removal to 1.0 mg/L, 0.5 mg/L, 0.3 mg/L, and 0.1 mg/L effluent limits. Among the many challenges that Calumet is facing, carbon deficiency is one that adversely impacts the potential for Calumet to implement biological processes for phosphorus removal. Therefore, a preliminary study on processes to increase carbon internally at the WRP is being conducted. Process simulation software, GPS-X, will be used for process evaluation purposes. Ms. Law was in charge of the project, overseeing the execution and deliverables to make sure the project is on time and within budget.

Development of Phosphorus Removal Feasibility Studies for the Hanover Park and Lemont Water Reclamation Plants (WRPs), Metropolitan Water Reclamation District of Greater Chicago, Illinois. Project Manager: Hanover Park WRP and Lemont WRP are owned and operated by the District. Due to the severe eutrophication (hypoxic zone) in the Gulf of Mexico, the District is facing a progressively more stringent limits on effluent Total Phosphorus. The feasibility studies included two parts. The first part was to evaluate and optimize the existing operation so that to achieve as much phosphorus removal as possible with the least capital investment. Potential influent phosphorus load reduction was considered for the domestic and industrial standpoint. The second part of the study was to evaluate treatment technologies for the WRPs to meet a 1.0 mg/L, 0.5 mg/L, and 0.1 mg/L effluent TP limits and the life cycle costs associated with the modifications. With the Utility of the Future in mind, the District prefers to achieve phosphorus removal via biological means to the extent possible. Therefore, feasibility studies was focused on enhance biological phosphorus removal (EBPR) technologies. Consideration included struvite buildup potential and biosolids dewaterability impacts due to EBPR implementations. Process simulation software, GPS-X, was used as part of the evaluation. Ms. Law was in charge of the project, overseeing the execution and deliverables to make sure the project is on time and within budget.

ERIC T. STAUNTON, PH.D., PE

PROFESSIONAL ENGINEER
New Hampshire

YEARS OF EXPERIENCE
9

EDUCATION
Ph.D.
Environmental Sciences and Engineering,
University of North Carolina – Chapel Hill
2014

Bachelor of Science
Chemical Engineering
University of Florida – Gainesville
2009

PROFESSIONAL ASSOCIATIONS
New England Water Environment Federation
Member of the Student and Young Professional Committee
Water Environment Federation

Dr. Staunton is an environmental engineer with 9 years combined experience in academia and consulting covering an array of disciplines within the wastewater industry. His experience is focused on facilities planning, whole plant process modeling, solids processing, nutrient removal, and chemical feed systems. He is also co-author of Chapter 14 of Water Environment Federation Manual of Practice No. 8 "Suspended-Growth Biological Treatment."

Plant 2, Wichita, Kansas. Process Modeling Lead: Dr. Staunton is the lead process modeler for the Wichita, KS BNR upgrade This 42 mgd design flow facility is currently in design to upgrade from Primary treatment + Trickling Filters + Nitrifying Activated Sludge to Primary Treatment + 5-stage Bardenpho suspended growth process for biological nitrogen and phosphorus removal. This project is ongoing.

Thickening Centrifuge Replacement Project, Passaic Valley Sewerage Commission (PVSC), Newark, New York. Process Modeling Lead: The PVSC is expanding their thickening centrifuges to better handle peak sludge flows from their gravity thickeners prior to stabilization in one of the last remaining, and largest, Zimpro processes in the nation. Traditional engineering analysis resulted in needed electrical upgrades that exceeded project budget. Dr. Staunton expanded an existing BioWin model to include the impacts of Zimpro on plant operations and created a whole plant model. The improved model was used with two distinct datasets of 'better' and 'worse' performing periods. The improved analysis saved tens of millions by demonstrating that lower capacity pumps (with associated lower cost electrical gear) could successfully meet project needs.

Ft. Myers, Florida. Process Modeling Lead: Dr. Staunton lead a team of process models to size new aerators for the City of Ft Myers Central and South advanced wastewater treatment processes. These two 5-stage Bardenpho oxidation ditch plants utilize surface aeration and the dynamic modeling used for this project was better in line with field observations than the prior analysis based on hand calculations which increased the level of confidence in the analysis by the Owner.

Township of Parsippany-Troy Hills Wastewater Treatment Plant (WWTP), Parsippany-Troy Hills, New Jersey. Project Engineer: As part of pending stricter Permit limits, Dr. Staunton developed a dynamic BioWin process model for the Township's 16 mgd WWTP to increase nitrogen removal through the step feed process and implement biological phosphorus removal. Special sampling was performed to characterize the influent wastewater and assess process changes on meeting effluent permit limits.

Confidential Client, Pascoag, Rhode Island. A food and beverage manufacturer's business had grown to the point where wastewater flow was exceeding the permitted 100,000 gpd on some production days. Dr. Staunton evaluated the sequencing batch reactor for biological nitrogen and chemical phosphorus removal to assess the system's ability to handle additional flows. The assessment included ancillary equipment and considered biological kinetics, key equipment capacities, and operating set points.

Side-Stream Treatment Evaluation, Charlotte, North Carolina. Lead Process Engineer: The McAlpine Creek WWTP is expanding the biosolids handling process to include the thermal hydrolysis pretreatment process upstream of existing anaerobic digesters and receive sludge from neighboring plants. Process modeling by others has shown that the increased nitrogen load from the upgraded solids handling process will adversely impact biological phosphorus removal in the mainstream process and recommended side-stream nitrogen removal. Dr. Staunton lead a team of process engineers to evaluate side-stream nitrogen removal options including mass and energy balances, development of PFDs, site plans, and planning level CAPEX/OPEX.

Loch Sheldrake Wastewater Treatment Plant Upgrade and Expansion Phase IIb, Fallsburg, New York. Lead Process Engineer: The Town of Fallsburg contracted CDM Smith to design an upgrade of a 0.35-mgd rotating biological contactor to a 0.56-mgd membrane bioreactor. Dr. Staunton evaluated and designed chemical feed systems for supplemental carbon, supplemental alkalinity, chlorine disinfection, dechlorination, and

chemical phosphorus removal to a discharge permit of 0.1 mg/L. Dr. Staunton also designed new positive displacement aeration blowers and piping.

Facilities Plan, New Bedford, Massachusetts. Project Engineer: For this project, Dr. Staunton evaluated 'decentralized treatment' options to reduce nitrogen load from industrial users to the overloaded New Bedford WWTP. Options for decentralized treatment included membrane bioreactors, sequencing batch reactors, and dissolved air flotation depending on treatment objectives and the dominate nitrogen species. Currently, Dr. Staunton is evaluating upgrades to the WWTP considering the impacts of decentralized treatment and aiding the plant in meeting strict nitrogen discharge limit. Evaluated upgrades include conventional activated sludge using a modified Ludzack-Ettinger process, 4-stage Bardenpho, IFAS, biologically active filter, or MBR. The evaluation also includes impacts of enhanced primary treatment and tertiary treatment.

Confidential Client, Wallingford, Connecticut. Lead Process Engineer: Dr. Staunton developed a pretreatment technique for the removal of soluble non-reactive phosphorus for a chemical manufacturing client in Connecticut. The proposed process, aggressive chemical oxidation, was tested using a lab protocol developed by Dr. Staunton at the CDM Smith Research & Testing Lab.

Comprehensive Regional Wastewater Master Plan, Great Lakes Water Authority, Detroit, Michigan. Project Engineer: As part of the CS-036 Comprehensive Regional Wastewater Master Plan, Dr. Staunton performed mass balances around the 1,700 mgd Great Lakes Water Authority Water Reclamation Facility and evaluated the capacity of each unit process including: two influent pump stations, rectangular and circular primary clarifiers, high purity oxygen activated sludge, secondary clarifiers, gravity thickening, dewatering, and incineration. He's evaluating grit removal options at both pump stations including primary sludge degritting, aerated grit improvements, vortex grit, and Headcell™ grit removal systems. As part of the MasterPlan, Dr. Staunton developed a complex dynamic biosolids energy simulation tool for GLWA with a focus on anaerobic digestion, system energy input and output, biosolids drying, and phosphorus recovery to help move the largest treatment facility in the United States towards resource recovery.

South Fallsburg Wastewater Treatment Plant, Fallsburg, New York. Technical Reviewer: Dr. Staunton reviewed the disinfection calculations, plans, and specifications for an upgraded disinfection system consisting of bulk sodium hypochlorite and tote sodium bisulfite with challenging chemical metering pump applications due to site constraints and a wide range of chemical demand.

Philadelphia Water Department Southwest Water Pollution Control Plant Aeration Study, Philadelphia, Pennsylvania. Project Engineer: The Philadelphia Water Department owns and operates the Southwest Water Pollution Control Plant, a 460-mgd high purity oxygen (HPO) facility. After 37 years of operation, the existing splash aerators have exceeded their useful life and are in need of replacement. Dr. Staunton identified six alternatives to rehabilitate or replace the aerators and performed all calculations for sizing the new equipment using HPO as the oxygen source. Dr. Staunton developed a two-phase mass transfer model to evaluate the transfer of oxygen and nitrogen from and to the headspace. Dr. Staunton selected equipment, developed new layouts, and wrote the final report to recommend an upgrade that would save almost $1.5 million dollars over the 20-year equipment life.

Wastewater Treatment Facility Improvements, Ayer, Massachusetts. Project Engineer: The Town of Ayer contracted CDM Smith to evaluate improvements to their 5.2-mgd wastewater treatment facility. Dr. Staunton evaluated the tertiary system consisting of filter feed pumps, cloth disk filters, and ultraviolet disinfection. The evaluation consisted of hydraulic and process calculations that concluded the tertiary system was undersized to disinfect the projected flow while meeting redundancy requirements. Dr. Staunton developed new equipment layouts and project capital costs meet disinfection requirements as flows continue to increase in the Town.

MARK E. ALLEN, PE

PROFESSIONAL ENGINEER
Washington
New Mexico
New York
Colorado

CERTIFICATIONS
Construction Documents Technologist, Construction Specifications Institute

YEARS OF EXPERIENCE
27

EDUCATION
Master of Science
Civil Engineering/ Hydraulics
University of Iowa
1996

Bachelor of Science
Civil Engineering
University of Iowa
1994

PROFESSIONAL ASSOCIATIONS
American Society of Civil Engineers
ASCE Hydraulic Structures Committee (Secretary)
Rotodynamic Pumps for Pump Intake Design Standard (ANSI/HI 9.8) Committee
Rotodynamic Pumps for Pump Piping Standard (ANSI/HI 9.6.6) Committee

Mr. Allen is a senior hydraulic engineer with more than 27 years of experience in the design, evaluation, and/or modification of hydraulic structures and is a nationally recognized leader in this field. His depth of knowledge with respect to fluid flow and its interdependence with conveyance structures and equipment offers him invaluable insight in the identification of key design parameters whose importance may normally be overlooked and/or underestimated. Mr. Allen's experience covers a very broad range of service areas, which includes the hydraulic design and operation of water supply, water/wastewater treatment and flood relief pump stations; hydraulic conveyance design for water and wastewater treatment facilities; hydraulic design of raw water intakes complete with debris/trash minimization strategies and handling provisions; hydraulic design and operation of fish bypass/exclusion facilities; and the design of other specialized hydraulic structures such as spillways, energy dissipators, drop shafts, siphons, etc. His expertise is frequently utilized through quality assurance and technical reviews for hydraulic designs produced by CDM Smith offices nationwide.

Westside Wastewater Treatment Facility Effluent Disinfection Design, Kansas City, Missouri. Mr. Allen served as senior technical reviewer on the effluent disinfection project which included study, design, and construction phase services. The project posed an interesting challenge to the design team due to the limited head available within the existing hydraulic profile to drive flow through the disinfection process. The hydraulic profile from the clarifiers through the new disinfection basin and to the plant outfall was developed using the Visual Hydraulics software by Innovative Hydraulics. Mr. Allen also used separate spreadsheet calculations to validate portions of the Visual Hydraulics model and perform sensitivity analyses to ensure that the disinfection process could fit within the existing plant profile.

Wastewater Treatment Plant Modifications, Upper Blackstone Water Pollution Abatement District, Millbury, Massachusetts. Senior Hydraulic Engineer: Mr. Allen was responsible for the hydraulic design of the Phase II WWTF Improvements, which included modification of the existing aeration system to a biological nutrient removal (BNR) system, conversion from mechanical to fine-bubble diffused aeration, modifications to six final settling tanks and the construction of two new tanks, flow distribution improvements, new chemical feed facilities, plant-wide odor control and supervisory control and data acquisition (SCADA) integration. Mr. Allen was also responsible for evaluating the current treatment paths to determine the possible existence of hydraulic bottlenecks, non-uniform treatment train flow splits, and poorly performing flow splitter structures.

Grafton Wastewater Treatment Plant Improvements, Grafton, Massachusetts. Senior Hydraulic Engineer: Mr. Allen was responsible for detailed hydraulic grade line calculations for the existing facility and assisted the design team in implementing an expansion to the existing treatment processes. Additionally, disk filters, and an open channel UV treatment system, were added to the end of the treatment process. Mr. Allen aided in the detailed design of the UV system, leading the design of flow conditioning features within a limited building footprint to ensure optimum flow distribution across the lamps and therefore optimal treatment performance by the system.

Marine Corps Base Camp Pendleton, Tertiary Treatment Plants Design and Construction, Oceanside, California. Mr. Allen provided senior technical oversight and review of hydraulic profile calculations for the Northern Regional Tertiary Treatment Plant (NRTTP) and Southern Region Tertiary Treatment Plant (SRTTP). The WWTFs included SBRs for secondary treatment followed by equalization facilities and filtration. The calculations were performed using spreadsheet templates that computed friction and form losses between hydraulic control points (e.g., weirs, wet wells, other) of the treatment processes.

GCA Bayport Facility Projects, Pasadena, Texas. Mr. Allen served as a technical reviewer for projects at both GCA's Bayport and Washburn Tunnel facilities. Projects included the clarifier, disinfection improvements and improvements to the pump station at Bayport, the Washburn Tunnel PAA disinfection pilot and CMAR design and delivery of improvements.

Munster Wastewater Treatment Plant Expansion and Consolidation, St. Bernard Parish, Louisiana. Mr. Allen provided senior technical review for the St. Bernard Parish Wastewater Consolidation Program in which the Munster WWTP was expanded to an average daily capacity of 15 mgd and a peak capacity of 50 mgd. The expansion consisted of the design of influent and effluent pump station capacity upgrades, new headworks, new aeration basins, two new final clarifiers, RAS/WAS facilities, new digesters and associated yard piping. Tasks included design modifications to the existing aerated grit chambers to operate as a solids contact tanks upstream of an existing high rate clarifier.

North Texas Municipal Water District: South Mesquite Creek Regional Wastewater Treatment Plant Expansion, Mesquite, Texas. Lead Hydraulic Design Engineer: Mr. Allen led the hydraulic design of an 8-mgd expansion to 33-mgd that included the design of a new grit removal system; expansion of influent pumping, primary and secondary clarification and associated sludge pumping, filtration, effluent metering, and solids handling; rehabilitation and expansion of the activated sludge and aeration systems and the Solids Handling Building. The design offered several challenges given the limited driving head available throughout the plant as well as the need to maintain various process train flow splits at the peak 2-hour flow. The complexity of the calculations dictated that customized spreadsheet calculations be used to compute the hydraulic profile through the expanded plant.

Marlborough Easterly Wastewater Treatment Facility Improvements, Marlborough, Massachusetts. Mr. Allen conducted senior technical review of the hydraulic profile calculations for the $55M Marlborough Easterly Wastewater Treatment Facility Improvements project. The improvements included a new headworks facility as well as several process modifications to existing treatment basins. The profile was developed using the Visual Hydraulics software by Innovative Hydraulics.

Design and Design Services During Construction for the Hutchinson River Disinfection Facility, New York City Department of Environmental Protection (NYCDEP), New York. Mr. Allen served as a senior hydraulic designer for various aspects of the Hutchinson River Disinfection Facility. The facility is hydraulically complex because of the limited head available to drive the flow through the system that includes floatables control, chlorination chemical injection/mixing, dechlorination chemical injection/mixing, and backflow prevention (tide gates). The project is currently in the planning stages in which the base design of the facilities is being developed. Future work will include CFD and/or physical modeling of select system aspects to ensure proper hydraulic performance of the system.

Shoal Creek Pump Station Improvements, City of Kansas City, Missouri. Mr. Allen served as a hydraulic engineer for the design and construction of a $5M LEED Gold-certified permanent booster pump station to meet the capacity and pressure system needs in the Kansas City's northland area during high demand periods. The new pumping station replaces a small temporary pump station to provide redundant and reliable water service. The project includes a new building to house four 350-hp split-case centrifugal pumps for 18-mgd capacity. The facility also includes a drive-through maintenance bay, a bridge crane, and a separate electrical room. The project included confirmation of the water system modeling, surge analysis, pump system evaluation and design. The new pump station incorporated connection for portable emergency power generation and reserved room for future expansion. The pump station will communicate with two storage tanks and the water treatment system through radio.

Loudoun Water Treatment Plant, Loudoun Water, Virginia. Senior Technical Reviewer: Loudoun Water selected CDM Smith to perform preliminary engineering, final design, and construction administration of the new 20 mgd water treatment plant (WTP), with the ability to expand to 40 mgd in the future. The WTP design includes preoxidation, rapid mixing, flocculation, sedimentation, intermediate ozone, biological filtration, and UV disinfection, as well as clearwells and a high service pumping station. Mr. Allen is responsible for senior technical review of the plant hydraulic profile calculations as well as several of the chemical feed/mixing systems.

ALEXANDRA T. DOODY, PE, LEED®AP

PROFESSIONAL ENGINEER
Texas: 12812
Massachusetts

PROFESSIONAL DESIGNATION
Leadership in Energy and Environmental Design (LEED®) Accredited Professional

YEARS OF EXPERIENCE
16

EDUCATION
Master of Science
Civil & Environmental Engineering
Stanford University
2007

Bachelor of Science
Chemistry
Rice University
2006

Bachelor of Science
History
Rice University
2006

PROFESSIONAL ASSOCIATIONS
Water Environment Federation
- Member, Municipal Resource Recovery Design Committee, 2016 – present
- Member, MRRDC Phosphorus Removal Work Group, 2019 – present

Ms. Doody is a project technical leader and process specialist with 16 years' experience in water reclamation process and mechanical design, wastewater process modeling and biosolids management. She is also a subject matter expert in nutrient removal for water reclamation facilities. She has been involved in the optimization, upgrade and expansion of numerous existing facilities both in warm and cold weather climates, as well as designing several greenfield treatment facilities to facilitate future expansion. She takes pride in listening to her client's needs and producing high quality deliverables.

Plant 2 A2O Improvements, Wichita, Kansas. Wastewater Process Specialist and Biological Nitrogen Removal (BNR) Design Lead: Ms. Doody is leading the process evaluation and preliminary design of BNR upgrades to the City of Wichita's Plant 2, which is rated for 54 mgd and must undergo a substantial capital project to convert from the current process consisting of trickling filters followed by nitrifying activated sludge. Ms. Doody is overseeing all aspects of the BNR part of the design (with a construction value of approximately $80 million), including intensive wastewater sampling for characterization of two separate influent streams from different collection systems, site-specific calibration and validation of a BioWin model for the facility, development of a detailed 365-day long dynamic influent BioWin itinerary for evaluation of various process upgrade alternatives to evaluate their ability to comply with the facility's annual average TN and TP limits, and simulation of various BNR process upgrade alternatives including innovative technologies such as simultaneous nitrification/denitrification, fermentative ("sidestream") EBPR, sidestream total nitrogen removal prior to recycling to the head of the facility.

BioWin Calibration On-Call Services, Colorado Springs, Colorado. Wastewater Process Modeling Specialist: Ms. Doody provided technical assistance to Colorado Springs Utilities on sampling procedures, BioWin model calibration best practices, and recommendations for calibration of the Springs Utilities' BioWin models for the Las Vegas St WRRF and the JD Phillips WRRF which use A2O processes to meet Colorado's Regulation 85 nutrient requirements for Total Phosphorus (TP) and TIN.

Sister Grove Water Resource Recovery Facility, North Texas Municipal Water District. Process Modeling Lead for a new 16 mgd greenfield biological phosphorus removal wastewater treatment facility (WWTF), Ms. Doody led the BioWin process modeling for the new A2O BNR treatment system, including intensive sampling and calibration of the model based on the influent characteristics of the existing WWTF that will be sending a portion of its flows to the new facility. Ms. Doody has also served as a technical resource and reviewer for the secondary treatment process team, advising on aeration system design and control, including use of ammonia-based aeration control (ABAC). This facility is under construction and is projected to be commissioned in 2023.

Upper Blackstone Clean Water, Wastewater Treatment Facility Nutrient Upgrade, Phase A Improvements, Millbury, Massachusetts. Ms. Doody was project engineer and task manager for bioreactor upgrades at Upper Blackstone, including improvements to the most open valve (MOV) aeration system and installation of new hyperbolic mixer/aerators at the end of the aerobic zone. These improvements were recommended to improve BNR process control, improve energy efficiency, and reduce operator labor associated with maintaining DO set points with manual valves. She led the aeration system upgrades, which included BioWin™ modeling and spreadsheet process calculations and preparation of the contract drawings and specifications. For the MOV improvements, Ms. Doody evaluated four types of automated control valve (DeZurik high performance butterfly valves, Egger Iris diaphragm valves, Binder square diaphragm valves, and Binder jet control valves), several MOV control strategies, as well as the capabilities of different blower manufacturers and system integrators to implement the new MOV automation scheme. The MOV upgrades were started up in winter 2019.

The MOV Phase A improvements, paired with online analyzers (nitrate, ammonia, phosphate, pH and TSS) that were installed as part of an effluent quality optimization program, have provided all the tools required to incorporate ammonia-based aeration control (ABAC).

Highway 84 Wastewater Improvements – Lift Station Expansion and Force Main, Waco, Texas. Project Technical Lead: Ms. Doody has served as project technical lead for expansion of the existing Church Road lift station from 1,100-gpm to 2,800-gpm, including installation of a new 1.5-mile long HDPE forcemain discharging to a new 2800-gpm intermediate lift station which will give the City flexibility to pump either to an existing force main or to a new 2.0-mile long HDPE force main discharging to an alternate location that has more interceptor capacity in the near term. The Church Road lift station wet well was expanded to ultimately accommodate a future flow of 7,800 gpm, thus giving the City the ability to continue expanding the lift station in stages. Ms. Doody led the design of the lift station improvements and also assisted with master planning evaluations to determine the optimal approach to phased lift station expansion to accommodate growth in the service area.

Taylor Dairy Road Water Campus Preliminary Design, St. Lucie County, Florida. Wastewater Process Specialist and WRF Design Lead: Ms. Doody led the process evaluation and preliminary design of a 2 mgd greenfield advanced wastewater treatment facility that will be collocated on a water campus designed to serve new development in St. Lucie County. Ms. Doody oversaw all aspects of the WRF conceptual design from the headworks through disinfection and reclaimed water storage, as well as BioWin model calibration and simulation of BNR alternatives, ultimately leading to a recommendation to implement a 4-stage Bardenpho process that will enable the County to meet its nutrient goals of 3 mg/L TN and 1 mg/L TP.

Hillsborough County, Florida. Wastewater Process Specialist: Ms. Doody evaluated alternatives for expansion of two site-constrained 5-stage Bardenpho BNR activated sludge treatment facilities, including addition of a fifth bioreactor, incorporation of IFAS, and incorporation of BioMag magnetite-ballast. Ms. Doody developed the design criteria and coordinated with vendors for sizing the IFAS and BioMag retrofits. For the fifth bioreactor alternatives, Ms. Doody evaluated the potential capacities that could be gained by adding a 5th bioreactor using BioWin modeling, and developed conceptual expansion drawings for the purposes of estimating construction cost. The three alternatives were compared on a life cycle cost basis, as well as with respect to constructability and operability.

Charles River Pollution Control District Phase C Wastewater Treatment Facility (WWTF) Improvements, Medway, Massachusetts. Ms. Doody served as the project engineer for the $18 million Phase C improvements of the District's WWTF, which is designed for 5.7 mgd average daily flow and 20 mgd peak hourly flow. Ms. Doody's responsibilities for the planning phase of the project included establishment of design flows and loads for the District through the year 2035; development and evaluation of alternatives for upgrades to the secondary and tertiary treatment systems to allow the District to meet new, highly stringent total phosphorus limits (0.1 mg/L TP during the summer months); development and evaluation of alternatives for the District's solids handling process; and development of recommendations for equipment rehabilitation/replacement to improve reliability throughout the 20-year planning period. Among other tasks, Ms. Doody conducted process modeling of the proposed A/O process using BioWin software, including a sensitivity analysis on the proposed design configuration.

River Sampling and Wastewater Treatment Plant Biological Treatment Assessment, Ayer, Massachusetts. Project Manager: The Town of Ayer contracted with CDM Smith to perform BioWin modeling of the town's wastewater treatment plant as a follow-on effort to a 10-year capital improvements plan. Ms. Doody is providing project oversight and management for this project, which includes river sampling for metals to allow for a re-assessment of NPDES permit requirements; development of projected flows and loads to the WWTP; BioWin calibration and simulation; process/mechanical evaluation of the aeration system, sludge thickening, and ancillary facilities related to biological treatment; evaluation of permit compliance for a 0.2 mg/L TP limit in conjunction with aluminum, copper and lead limits; and refinement of the Town's capital improvements plan.

DONOHUE

BROOKE N. KENNY, PE

PROFESSIONAL ENGINEER
Illinois: 062070597

YEARS OF EXPERIENCE
9

EDUCATION
Bachelor of Science
Civil Engineering
South Dakota State University
2014

PROFESSIONAL ASSOCIATIONS
Illinois Water Environment Association

Ms. Kenny is a professional engineer with experience in potable water and wastewater treatment planning, design & construction, Consent Decree negotiations, Long Term Control Plan development, and program management. She has led or contributed to detailed collection system and plant hydraulic calculations, preparation of testing protocol, preliminary design development, CAD design, Civil 3D modeling, Revit modeling, CSO regulator capacity analysis, design of chemical dosing system, field stress testing, leading tasks and project teams, coordination between disciplines, preparation of detailed design drawings and specifications, development of opinion of probable cost, development of bid documents, QA/QC, bidding assistance, and construction coordination.

Chemical Phosphorus Removal Facilities, Lafayette, Indiana. Project Engineer: Project included a ferric chloride feed system design for 52 mgd plant consisting of storage tanks, recirculation pumps, and chemical dosing pumps to dose two grit tanks and six aeration tanks with proper amounts of ferric chloride to meet effluent phosphorus limitations. Designed large containment storage area capable of containing ferric chloride from three large storage tanks in the event of an emergency, sized two recirculation pumps and nine chemical dosing pumps. Calculated detailed hydraulics to determine pipe diameters, headloss and friction loss through ferric chloride recirculation system. Prepared final design drawings and specifications, specifically focusing on yard piping to application points and containment area design. Coordinated detailed design with other disciplines. Managed coordination of construction with all disciplines, reviewed submittals and conducted intermediate and final site walk through.

CHP Improvements Project, Benton Harbor St. Joseph, Michigan. Lead Project Engineer: Project included replacement of influent pumps and sludge recirculation pumps. In addition to pump replacement, design included the addition of combined heat and power system consisting of new generators and heat exchangers.

Hammond, Replacement of Plant No. 2 Flocculation and Sedimentation Collection Equipment, Hammond, Indiana. Lead Project Engineer: Project included replacement of tube settlers, horizontal paddle wheel flocculators, sludge collection equipment and removal of rapid mixers to be replaced with in-line static chemical mixers.

Great Lakes Water Authority, Springwells Yard Piping Replacement, Detroit, Michigan. Lead Project Engineer: Replacement of yard/header pipi at the Springwells Water Treatment Plant. Project consisted of complex phasing of yard piping replacement to maintain service to all surrounding communities. Phasing considerations included installation of PRVs and line stops throughout the system to maintain service to both the high pressure zone and intermediate pressure zone. In addition to yard piping and header piping replacement, the project consisted of a conditions assessment of all on site drains and sewers including the singular outfall pipe to the plant. Hydraulic calculations were completed on the plant outfall to determine capacity and develop a plan for rehabilitation.

Brush College Road Utility Relocation, Decatur, Illinois. Task Lead: Water main relocation phasing and modeling memorandum. Work included a phasing plan for the relocation of two water mains along brush college road to one larger diameter water main. A technical memorandum was prepared for the City to present a phasing plan that minimizes or eliminates the need for water shut down during construction. The technical memorandum was used to present modeling scenarios for the City to analyze.

Jefferson Avenue Transmission Mains Assessment and Improvements Project, Detroit Water and Sewerage Department, Michigan. Project Engineer: Project included analysis of (3) critical potable water transmission mains located along Jefferson Avenue which is scheduled to undergo significant roadway improvements. The transmission mains were constructed between 1875 and 1915 and were considered beyond their design life. These pipelines were considered at high risk of being damaged both during and after construction. Hydraulics of these transmission mains were assessed to determine if

abandonment of any portion is feasible. Options for rehabilitation or replacement were evaluated to determine the most cost effective and reliable path.

Great Lakes Water Authority, Chemical Systems Condition Assessment, Detroit, Michigan. Project Engineer: Evaluation of chemical storage tanks for rehabilitation/ replacement memorandum. The project consisted of an evaluation memorandum for chemical storage tanks that have reached 20 years in age, considered to be the end of useful life. Options for rehabilitation or replacement were evaluated based on the age of the tank and the corrosive nature of the chemical housed in that tank. A comprehensive plan for tank evaluation, repair, and replacement was developed for 20-year time frame. The plan considered costs, useful chemical storage tank life, and construction constraints.

Great Lakes Water Supply Program, Water Supply Pumping Station and Booster Pumping Station, Waukesha, Wisconsin. Task Lead: The City of Waukesha (City) currently obtains water from the Waukesha Water Utility (WWU) who owns a system of groundwater extraction wells that convey groundwater for treatment and then to the distribution system. The purpose of this Program is to transition the City's water supply from groundwater to Lake Michigan water at a net zero water balance with the Lake Michigan watershed. This multi-year, multi-million dollar program included planning, design, and construction of an anticipated 45-miles of transmission and force mains, a Water Supply Pumping Station, a Water Booster Pumping Station, a Return Flow Pumping Station, outfall facilities, water supply connections, a water reservoir, associated chemical feed facilities, and distribution system improvements. Project elements included program management, a route study, permitting, steady state and transient hydraulic modeling of new infrastructure, water quality analyses and distribution system modeling in InfoWater to prepare the distribution system for the new water supply connection, preparation of Contract Documents, preparation of opinions of probable cost, and coordination between disciplines and subconsultants.

Consent Decree Negotiation and Regulatory Assistance Project, Great Peoria Sanitary and Sewage Disposal District, Illinois. Project Engineer: Project included negotiations related to the consent decree proposed to address the GPSD's wet weather control program improvement program. The project includes negotiation of CD and permitting issues with USEPA (Region 5 and headquarters) and Illinois EPA. The negotiation program includes coordination of technical evaluations of the District's collection system, remote wet weather treatment facilities, and wastewater treatment facility (60 mgd secondary treatment capacity and 94 mgd wet weather treatment capacity). The negotiations address the District's compliance with state and federal CSO control program requirements and the modifications needed to incorporate the final requirements into the Districts NPDES permit. Other project tasks included wastewater treatment plant flow maximization, future process/nutrient control needs, financial assessment and affordability analysis, and incorporation of sustainable design elements.

R. ERIC COMPTON, PE

PROFESSIONAL ENGINEER
Illinois
California

YEARS OF EXPERIENCE
27

EDUCATION
Master of Science
Environmental Engineering
University of Illinois
1995

Bachelor of Science
Environmental Engineering
University of Illinois
1995

Bachelor of Arts
Liberal Arts/Engineering
Wheaton College, Illinois
1992

PROFESSIONAL ASSOCIATIONS
Water and Environment Federation

Mr. Compton has 27 years of experience as a consulting design engineer, including the roles of project manager, design manager and process task leader, with projects completed primarily in the following areas: wastewater treatment plants, water/wastewater pump stations and conveyance, and site improvement engineering (water distribution, sanitary sewers, and storm drainage systems).

Interim Solids Improvements, Geneva, Illinois. Project Technical Leader: Mr. Compton managed the design of solids system pumping and flow measurement improvements – replacing return activated sludge pumps, waste activated sludge transfer pumps, and adding four flow meters to solids transfer lines.

Wastewater Treatment Plant Improvements – Phase 2, Mt. Orab, Ohio. Project Technical Leader: Mr. Compton managed the design of a new activated sludge basin, additional secondary clarifier, new UV disinfection system, effluent flow meter, and appurtenant items.

De Pere Wastewater Treatment Facility UV Disinfection System Expansion, De Pere, Wisconsin. Design Manager/Process Engineer: Contract Value: $39,000 (Construction - $3.2M). For the Green Bay Metropolitan Sewerage District, Mr. Compton led the detailed and preliminary design of a new UV disinfection system to replace existing disinfection systems and expanding the capacity for an average 9.8 million gallons per day (MGD) and 21 MGD peak flows. The new disinfection and flow measurement equipment was installed within the existing chlorine contact chamber and had tight hydraulic constraints with limited available head between the existing effluent filters and outfall. For the design, a detailed hydraulic profile was developed and used to set the UV system effluent weirs and evaluate flow measurement options. Construction needed to be completed within a seven-month window when effluent disinfection was not required; construction was completed on schedule in time for the 2014 disinfection season.

Primary Settling Tanks and Grit Removal Facility General Services During Construction, Metropolitan Water Reclamation District of Greater Chicago, Illinois. Project Manager: This $228 million construction project at the Calumet Water Reclamation Plant (WRP) was completed in 2011. Mr. Compton became CDM Smith's project manager in mid-2010 for this joint venture project, while also serving as process task leader for CDM Smith designed facilities. CDM Smith was responsible for reviewing and approving process, architectural, electrical, instrumentation, and plumbing submittals and requests for information (RFIs). As project manager, he reviewed all documentation, verified completion of quality control (QC) checks, managed change order cost estimates, attended construction meetings, and completed project financial tracking and invoicing. Construction documentation was managed using Autodesk Constructware©.

New Preliminary Treatment Facilities at Stickney and Calumet WRPs, Metropolitan Water Reclamation District of Greater Chicago, Illinois. Project Engineer: Mr. Compton served directly under CDM Smith's project manager/process task leader, leading preliminary process design for the 155-ft primary clarifier tanks at the Calumet WRP and associated sludge and scum handling facilities. Preliminary design included an equipment evaluation and manufacturer workshop process that incorporated experience, preferences and requirements of District engineering and maintenance and operation staff. Extensive evaluation and comparison of drive mechanism types was completed in the interest of meeting District objectives of uniformity, reliability, and life cycle optimization.

Ten Mile Creek Regional Wastewater System, Plant 1 Diffused Aeration and Blower Building No.3, Trinity River Authority, Ferris, Texas. Project Engineer: CDM Smith designed the conversion of Plant 1 at the 24 MGD Ten Mile Creek wastewater system from surface to diffused aeration. Mr. Compton managed the technical design aspects of the diffused aeration system, capable of handling foul air for odor control, including new multi-stage centrifugal blowers with adjustable frequency drives and inlet throttling valves, a new blower building, and the aeration piping and membrane diffuser system.

Plant 2 Biological Nutrient Removal Improvements, Wichita, Kansas. Odor Control Process Lead: Mr. Compton is leading the odor control evaluation and process design for the upgrade to Plant 2 (capacity of 38 MGD). The evaluation included two rounds of odor sampling to capture representative and worst-case (warm weather) odors, air dispersion modeling utilizing sampled odor units for various plant sources and considering multiple treatment scenarios, alternatives evaluation considering capital and operating costs, and advancement of selected alternative. Odor control facilities include biofilters, biotrickling filter, ammonia scrubber, and dispersion fans.

Ringsend Wastewater Treatment Works Extension, Dublin, Ireland. Project Engineer: Mr. Compton served as project engineer for the 500,000 population equivalent (PE) expansion of the 1.64 million PE Ringsend Wastewater Treatment Works in Dublin, Ireland. CDM Smith is the owner's representative, guiding the planning, design, construction, and commissioning phases of the design-build project. Mr. Compton's primary responsibility was thoroughly evaluating the existing solids processing system and planning expansion needs, requiring completion of mass and energy balances for the complex system that includes rotary drum thickeners, pre- and post-dewatering centrifuges, thermal hydrolysis process (Cambi), anaerobic digestion, and thermal drying.

Upper Liffey Valley Regional Sewerage Scheme, Extension to Osberstown Wastewater Treatment Plant – Stage 3, Kildare County, Ireland. Project Engineer: Mr. Compton managed the technical aspects of multiple wastewater pump stations and coordinated field work, routing, and design of sewer rising mains and gravity lines throughout the Upper Liffey Valley catchment (Eastern Kildare County). Project included two new pump stations, plus extensive rehabilitation/expansion at three existing stations, and over 20 kilometres of new or replaced rising mains and sewers.

Southwest Water Resource Facility Expansion to 16 mgd, JEA, Jacksonville, Florida. Mr. Compton was the process lead for the Headworks Facility, which included a biotrickling filter for odor control with the future option to add polishing with carbon adsorption. The Headworks is a complete new concrete structure with flow measurement, screening with perforated plate screens, screening processing with compactors, vortex type grit tanks, grit pumping and processing with classifiers, and flow mixing and splitting to multiple biological treatment units (included CFD hydraulic modeling of the structure).

Sister Grove Regional Water Resource Recovery Facility Headworks Design (Peak Flow 64 mgd), North Texas Municipal Water District, New Hope, Texas. Process Engineer: Mr. Compton designed a new headworks facility consisting of mechanical screening, screenings washing and compacting, belt conveyance, stacked tray vortex grit separators, grit pumps, and grit classifiers.

Wastewater Treatment Plant Expansion, Kingston, Massachusetts. Process Engineer: Mr. Compton designed an expansion of the solids processing facilities as a part of the expansion of the sequencing batch reactor facility (0.7 mgd). A new gravity belt thickener (GBT) was added within a building expansion. The existing GBT was refurbished and relocated to the building expansion. The working included aerated sludge storage tanks, double disc sludge transfer pumps, filtrate storage, washwater pumps, and all instrumentation and controls.

Wastewater Treatment Facility (WWTF) Expansion, Becker, Minnesota. Project Engineer: CDM Smith designed the expansion of the City of Becker, Minnesota, WWTF from 0.40 MGD to 1.55 MGD (domestic treatment train). Mr. Compton evaluated various process and equipment alternatives and designed selected alternatives for ultraviolet disinfection and effluent aeration treatment processes.

Wastewater Reclamation Plant Expansion, Tahoe-Truckee Sanitation Agency, Truckee, California. ($46 million construction). Design Engineer: Mr. Compton designed a grit removal detritus tank and grit removal and processing equipment, pressure filter addition (dual media filter) and filter gallery modifications, and ammonium sulfate tank containment.

DONOHUE

JASON C. EDWARDS

YEARS OF EXPERIENCE
23

EDUCATION
Bachelor of Science
Electrical Engineering and Communication Technology
ITT – Technical Institute
2013

Associate's Degree
Electrical Engineering and Computer Electronics and Engineering Technology
ITT – Technical Institute
2011

AWARDS
2020 ACEC Illinois Engineering Excellence Special Achievement Award, Controls Engineer: Preparing for the Future: Upgrades at Aux Sable, Joliet, Illinois

2020 ACEC Illinois Engineering Excellence Judges Choice Award, Controls Engineer: Preparing for the Future: Upgrades at Aux Sable, Joliet, Illinois

Mr. Edwards experience includes five years of electrical engineering experience and almost 20 years in electrical assembly, start-up, and maintenance. Knowledge in programmable logic controller (PLC/HMI) control systems and ladder logic language for RS Logics 5000, Connected Components Workbench, Factory Talk View, Jmobile, and Siemens TIA Portal Software. Designed controls and automaton systems with PLCs, HMI, VFDs, and various other instrumentation. He has conducted factory testing and configuration of controls and automation systems.

Eastside Wastewater Treatment Plant Phosphorus Removal and Improvements, Joliet, Illinois. Worked on the creation of start-up and process control documentation.

Kenosha WWTP Aeration Blower Improvements, Kenosha, Wisconsin. Lead I&C Design Engineer: Process control integration up to high-speed turbo blowers with master control panel.

Jackson Park Stormwater Pump Station Replacement, Wyoming, Michigan. Lead I&C Design Engineer: Upgrade of the stormwater pump station. Developed instrument specifications and process control functional description for packaged system vendor to meet city operational requirements.

Missouri American Water Company Cedar Hill Wastewater Lagoon Upgrades, Cedar Hill, Missouri. Lead I&C Design Engineer: Lagoon aeration upgrade, ammonia monitoring, and installation of thermally regulated nitrification reactor for ammonia removal.

WWTP Secondary Treatment System Upgrades, Battle Creek, Michigan. Work at the WWTP to integrate updates to existing PLC-based control systems into City's SCADA system.

Genesee County Drain Commissioner District 3 - Water Resource Recovery Facility 2020 RAS Splitting & Aeration Control Improvements Linden, Michigan. Lead I&C Design Engineer: Activated sludge aeration control and energy usage improvements allowing the Owner to use real-time ammonia monitoring to provide more precise control over the activated sludge system. These upgrades included replacement and addition of automated valves, instrumentation probes, and analyzers as well as multiple modes of operation programming. The RAS improvements included a new RAS splitter box and TSS probes to allow the Owner to modulate RAS flow based on influent flowrate and monitor MLSS to improve process control.

Wausau Drinking Water Treatment Facility, Wausau, Wisconsin. Lead I&C Design Engineer: For a new drinking water treatment facility. Clean water treatment project, including design for raw water well upgrades, new administration building, new treatment building, new high service pumping, new clearwells, and finished water distribution system control and monitoring. Water treatment includes volatile organic compound (VOC), air stripping, iron and manganese removal, gravity filtration, Anion exchange, and chemical treatment. Design specifications for new network, PLC, and CADA integration. The capital budget for this project approximately $40 million.

ACS Group/Cumberland – New Berlin, Wisconsin. Electrical Engineer II: Designed controls and automation systems with PLC, HMI, and other devices for size reduction in the plastics industry. Created drawing/schematics (AutoCAD Electrical) packages and maintained complete BOM's. Designed and verified Estop and Zero speed safety circuits. Worked on NPD for size reduction manufacturing. Designed, built, and conducted factory testing of the control enclosure prototype for T50 Granulators.

Evoqua Water Technologies - Waukesha, Wisconsin. Electrical Engineer: Designed controls and automation systems with PLC, VFD, and various other instrumentation for wastewater treatment systems. (AutoCAD Electrical). Knowledge of NEC, UL, and CE standards to panel designs. Wrote PLC and HMI programs for wastewater treatment systems using RS Logix and TIA Portal. Configured automation Ethernet networks. Conducted factory testing and configuration of controls and automation systems.

APRIL RICKETTS, PE, CPD, LEED® AP BD+C

PROFESSIONAL ENGINEER
Alaska
Arizona
California
Hawaii
Idaho
Illinois
Indiana
Iowa
Michigan
Minnesota
Montana
Nevada
Ohio
Oregon
Wisconsin
Washington

PROFESSIONAL DESIGNATION
LEED® AP BD+C
ASPE Certified in Plumbing Design

YEARS OF EXPERIENCE
28

EDUCATION
Bachelor of Science
Mechanical Engineering
Washington State University
1995

PROFESSIONAL ASSOCIATIONS
American Society of Plumbing Engineers
- Legislative Committee
- Technical and Research Committee
- Past Chapter President (2017-2019), Chicago Chapter of ASPE

American Society of Heating, Refrigerating and Air Conditioning Engineers
- TC 9.2 Committee Member

Society of American Military Engineers
- Past Post President (2019-2021), Chicago Post of American SAME

Ms. Ricketts has 28 years of experience in the design of Building Mechanical systems for multiple facility types, including HVAC (heating, ventilation, and air conditioning) and plumbing designs for water and wastewater treatment plants; booster pump stations; laboratories; as well as various other facility types. She also has experience in the design of central plants, air/water distribution systems, pump witness testing, assessments, and green building design.

Wastewater Treatment Plant (WWTF) Improvements, Geneva, Illinois. Mechanical Engineer: Ms. Ricketts oversaw the design for the HVAC improvements at the return activated sludge (RAS)/waste activated sludge (WAS) pumping station, grit/blower building, and raw sewage pumping station at the Geneva WWTF. The HVAC design included electric unit heaters, packaged air handling units and makeup air units, and exhaust fans for the approximate 3,400 square footage of renovation.

Wastewater Treatment Facility (WWTF) Improvement Project, Urbana, Ohio. Mechanical Engineer: Ms. Ricketts prepared the HVAC and plumbing design for various buildings at the WWTF, including a new administration building (3,100 sf), a headworks building (2,700 sf), a ultraviolet (UV) disinfection building (2,900 sf), a Vactor building (2,200 sf), an RAS/WAS pump building (1,200 sf), as well as renovation in an existing operations building and blower building. Building mechanical systems included gas-fired makeup air units, wall-mounted exhaust fans, unit heaters, and central air handling units. Plumbing systems included domestic and protected water systems, natural gas, and sanitary waste/vent systems.

Woodridge-Green Valley Wastewater Treatment Plant (WWTP) and Knollwood Wastewater Treatment Plant (WWTP) Electrical Infrastructure Improvements, DuPage County, Illinois. Mechanical Engineer: Ms. Ricketts oversaw the HVAC and Plumbing designs for improvements at the Woodridge-Greene Valley and Knollwood wastewater treatment plants (WWTPs). HVAC improvements at the Woodridge-Greene Valley WWTP included replacement of a drywell ventilation system at an existing building with a newer one meeting current Code requirements. The new HVAC system included an air conditioning unit, supply fan and exhaust fans, and ductwork modifications. HVAC and Plumbing improvements at the Knollwood WWTP included changes to repurpose a generator room into an electrical switchgear room. This included demolition of a diesel-fuel fired generator fuel piping, storage tank, cooling system, exhaust, and plumbing drain/vent systems. New work included the design for new split system air conditioning systems to serve the switchgear room.

WTP Electrical Improvements, Wilmette, Illinois. Mechanical Engineer: Ms. Ricketts is overseeing the design of the HVAC, plumbing, and fire protection for the renovation work at the Wilmette WTP. Renovation at the main plant includes modifying existing HVAC and plumbing systems and providing new systems to accommodate offices spaces, lunchroom, library, and electrical rooms. A new generator building, which will include new ventilation fans and louvers as well as diesel fuel piping, will also be added. Fire protection systems included preparing performance drawings for wet and dry automatic sprinkler systems.

Treated Water Storage Replacement, Evanston, Illinois. Mechanical Engineer: Ms. Ricketts oversaw the HVAC and plumbing design associated with an Electrical VFD Room at the City of Evanston WTP. The VFD room, which was converted from an existing garage space, included air conditioning and ventilation systems, and relocation/rerouting of existing plumbing systems currently located in the garage.

Water Treatment Plant (WTP), Piqua, Ohio. Mechanical Engineer: Ms. Ricketts prepared the plumbing design, fire sprinkler performance spec, and assisted on the HVAC for the water treatment, administration, and pump buildings at the new WTP. The site consisted of a 7,200-square-foot (sf) chemical building, a 22,000-sf filter/administration building, two pump stations, and a utility tunnel. The mechanical design included hydronic heating with a hot water boiler system and hot water unit heaters, makeup air units, and exhaust fans. Areas in the filter/administration building are served with packaged rooftop air handling units having DX cooling and hot water heating coils. Plumbing design included

domestic and protected water systems, tempered water for emergency shower/eyewashes, natural gas, laboratory, and sanitary waste/vent piping systems. Fire protection design included preparing performance specification and drawings for a wet sprinkler system for the Chemical building.

Water Treatment Plant (WTP) Improvements Project, Highland Park, Illinois. Mechanical Engineer: Ms. Ricketts provided mechanical support and submittal reviews in the construction phase of the Highland Park WTP Improvement project. The design included HVAC and plumbing design for the water treatment, administration, and pump buildings at the new WTP. The mechanical design included a gas-fired desiccant style dehumidification air handling unit to serve the pipe gallery, steam boiler system and radiators, natural gas unit heaters, makeup air units, and exhaust fans. Electric rooms were served with packaged rooftop air handling units having DX cooling and gas heat. Plumbing design included domestic and protected water systems, tempered water for emergency shower/eyewashes, natural gas, and sanitary waste/vent piping systems. The existing natural gas piping was upsized so serve new and existing equipment.

South Lake Water Treatment Plant (WTP), Georgetown, Texas. Mechanical Engineer: Ms. Ricketts is preparing the HVAC and plumbing designs for a new WTP. The new plant will include a dewatering building, process treatment structure, chemical facility, electrical building, storage building, and administration building. The mechanical design will include electric unit heaters, supply fans, and exhaust fans. Areas in the administration building will be served with a variable air volume (VAV) air handling unit with VAV terminal boxes. Plumbing design will include domestic and protected water systems, tempered water for emergency shower/eyewashes, sanitary waste/vent piping systems, and deionized water. Fire protection design will include preparing performance specifications and drawings for a wet sprinkler system at the Administration Building.

Fridley Filter Plant Rehabilitation, Minneapolis Water Works, Minnesota. Mechanical Engineer: Ms. Ricketts prepared the HVAC and plumbing designs for the renovation of the existing filter building and addition of a new blower/electrical rooms at the plant. The new mechanical systems will consist of a gas-fired makeup air unit, exhaust fans, and intake hoods for the filter gallery, fans at the pipe gallery, replacement of steam unit heaters, a new air conditioning unit at the Electrical Room, and unit heaters at the blower room. The new plumbing will consist of rerouting roof drains/piping at the filter gallery, installing new roof drains/piping at the blower/electrical rooms, and routing plumbing and sanitary to a new Operator's Coop.

West Group Water System Expansion Delivery Structures, Central Lake County Joint Action Water Agency, Lake Bluff, Illinois. Mechanical Engineer: Ms. Ricketts oversaw preparation of the HVAC and Plumbing design for typical domestic water delivery structures/vaults at three sites. Designs included ventilation exhaust fans, dehumidifiers, unit heaters and sump pumps.

Low Service Pump Variable Frequency Drive (VFD) Improvements, Racine Water Utility, Wisconsin. Mechanical Engineer: Ms. Ricketts prepared the HVAC design for a ventilation system to serve new low lift service pump equipment at the Racine Water Utility plant. The new ventilation system included intake air louvers and rooftop exhaust fans, controlled by a space temperature sensor, to remove excess heat dissipated by the process equipment.

Pumping Station #7 Boiler Replacement, Minneapolis Water Works, Columbia Heights, Minnesota. Mechanical Engineer: For the Minneapolis Water Works, Ms. Ricketts oversaw the HVAC design for the replacement of an existing fuel-oil fired steam boiler system with a new natural gas-fired hot water hydronic system for the existing Pumping Station #7. The new boiler system included a condensing boiler system with base-mounted pumps, hydronic accessories, replacement of unit heaters, and updated HVAC controls. New natural gas service was routed to the building to serve the boiler system.

BRANDON J. DIFFENDERFER, SE

PROFESSIONAL STRUCTURAL ENGINEER
Illinois

CERTIFICATIONS
Confined Space Entry Protocol

YEARS OF EXPERIENCE
16

EDUCATION
Bachelor of Science
Civil Engineering
Bradley University
2007

Bachelor of Science
Civil Engineering
Bradley University
2005

PROFESSIONAL ASSOCIATIONS
American Institute of Steel Construction
Structural Engineer's Association of Illinois

Mr. Diffenderder is a structural engineer with 16 years of experience in structural analysis, design, and condition assessment. He has structural experience in the investigation, repair, and rehabilitation of existing structures including water and wastewater facilities, parking garages, high-rise residential, and final effluent outfall structures. His responsibilities include analyzing and designing facilities, tanks, and other miscellaneous structures, condition assessment and repair of existing structures, and managing construction engineering services, including shop drawing and submittal review, responding to Requests for Information (RFI), and preparing addendums related to the contract documents. Brandon has experience with AutoCad, REVIT, STAAD.Pro, RISA, and ETABS analysis tools, and Oculus Rift VR and Hololens immersive technologies.

Main Pump Station Backup Power Generation, Chicago, Illinois. Structural Engineer: Mr. Diffenderfer served as the lead structural engineer for the design of a new backup power generation facility for the Northwest Suburban Municipal Joint Action Water Agency (NSMJAWA) Main Pump Station. The two new 4.16kV diesel engine generators and 4.16kV generator paralleling switchgear were procured prior to the award of the construction contract. This project included a new prefabricated metal building to house the new two generators and paralleling switchgear, with additional space to accommodate a future third diesel engine generator. The project also included modifications to the existing 4.16kV main switchgear to provide an automatic transfer control system for the new engine generators.

Structural Inspection Decatur Water Treatment Plant (WTP), Decatur, Illinois. Project Engineer: Mr. Diffenderfer was the structural engineer responsible for the condition assessment for the structures at the Decatur WTP South Plant, including Primary and Secondary Clarifiers, pipe galleries, filter building, nitrate building, reservoir, and raw water intake structure. He used visual and audible methods to inspect the structures and mapped deficiencies on drawings. The results of the inspection were summarized in a pdf, and CDM Smith will prepare recommendations and a cost estimate.

Design and Construction Administration of WRF Improvements Project, Avon Lake, Ohio. Lead Structural Engineer: Mr. Diffenderfer led the structural design for this short-term improvements project ($34M) at this 6.5-mgd WRF. Design features included a new headworks facility complete with raw sewage pumping, screening, and headcell grit removal; new return activated sludge and waste activated sludge (RAS/WAS) pumps; primary settling tank upgrades; aeration system upgrades; modifications to existing final settling tanks; a new final settling tank; ultraviolet (UV) disinfection system upgrades; one gravity thickener and pump building to pump thicken alum sludge; sludge dewatering system modifications including new screw presses, pumps, and ancillary equipment; sludge storage tank improvements; a plant-wide control system; and major renovations to the Administration/Control Building.

Wastewater Treatment Facility (WWTF) Improvements, Geneva, Illinois. Mr. Diffenderfer served as the project structural engineer responsible for developing the details and specifications to upgrade the blower building, bioreactor trains, RAS/WAS and raw water pumping stations and the clarifier tanks. Before the design of the structures, an investigation was performed that included visual and audible sounding to determine the condition of the concrete and equipment inside the tank including the painted steel bridge, rotating mechanism, scum collector, and launder. Design included modifying the existing structures to accommodate changes and updates to the new processes.

Wastewater Treatment Plant (WWTP) Upgrade and Expansion, Piqua, Ohio. Mr. Diffenderfer served as the project structural engineer responsible for coordinating the design between multiple structural engineers and developing the details and specifications for the $38 million WWTP upgrade and expansion. Upgrades included modifying the aeration basin to an aerobic digester, modifying the chlorine contact tank to UV treatment, and rehabilitation of the outfall structure. Plant expansion included new headworks building, oxidation ditches, secondary clarifier tanks, and a solids handling

building. New structure designs included cast-in-place concrete tanks and retaining walls, masonry buildings with concrete substructures, and pre-engineered metal buildings.

Wastewater Treatment Facility Improvements Project, Urbana, Ohio. Mr. Diffenderfer served as a project engineer providing structural engineering services during construction for a new WWTF. He coordinated construction drawings with the contract documents, including managing field changes with new equipment and coordinating changes with multiple disciplines. He also reviewed and responded to RFIs, reviewed shop drawings, and coordinated change orders. He was responsible for multiple site visits to coordinate concrete repairs necessitated by contractor deficient work, reviewed the concrete masonry wall and cast-in-place concrete repairs performed by the contractor, and coordinated with the resident engineer to ensure that repairs followed the recommended procedures.

Structural Inspection Bloomington Water Treatment Plant (WTP), Bloomington, Illinois. Mr. Diffenderfer was the structural engineer responsible for the condition assessment for the tanks and buildings at the Bloomington WTP, as well as coordination of the multidiscipline team responsible for the WTP inspection. The team inspection tasks consisted of the treatment facility including filters and chemical areas, clarifiers, maintenance shop, reservoirs, and several ancillary structures for visible signs of deterioration. He recorded and mapped cracks, spalls and delaminations, or other structural concerns through visual and audible inspections. The results of the inspection were summarized, and CDM Smith prepared recommendations and a cost estimate for the client.

Project Engineer, Structural Inspection of Decatur Water Treatment Plant, Decatur, Illinois. Mr. Diffenderfer was the structural engineer responsible for the condition assessment for the structures at the Decatur WTP South Plant, including Primary and Secondary Clarifiers, pipe galleries, filter building, nitrate building, reservoir, and raw water intake structure. He used visual and audible methods to inspect the structures and mapped deficiencies on drawings, which were used to prepare recommendations and a cost estimate for the client.

Enhanced Nutrient Removal Activated Sludge Tank Modifications at the Norman M. Cole Jr. Water Pollution Control Plant, Fairfax, Virginia. For a previous employer, Mr. Diffenderfer served as the project engineer providing design services for the 48-inch-diameter stainless steel air pipe. He coordinated client requests and managed site restrictions to route the 220-foot-long air main from the plant's blower building tying into an existing underground air main. The supports were spaced to allow for maximum efficiency of the 48-inch-diameter pipe while accounting for gravity and wind loads, thrust forces, and thermal expansion of the pipe. Mr. Diffenderfer managed construction services during the project, including shop drawing and submittal reviews, and RFI responses.

Activated Sludge Train Rehabilitation, Southside Wastewater Treatment Plant, Tulsa, Oklahoma. For a previous employer, Mr. Diffenderfer served as the project engineer responsible for the analysis and design of the single-story blower building, which consisted of a concentrically-braced steel frame and H-pile supported foundation. The facility included a 20-ton bridge crane and five blowers supported on independent pile-supported foundations. He designed the secondary clarifier upgrade to replace steel troughs with precast, which connected to existing concrete corbels. Mr. Diffenderfer managed construction services, including shop drawing and submittal review, and responded to RFIs.

Tafilah WWTP, Tafilah, Jordan. Project Engineer: Mr. Diffenderfer was responsible for the analysis and design of the Solids Handling Building and site retaining wall as part of a new wastewater treatment plant in Jordan. The Solids Handling Building was a 2-story concrete structure designed using the British Standard building code and the Uniform Building Code for seismic loading and detailing. The site retaining wall was designed to resist soil loads for a maximum height of 9 meters (30 feet). Building from previous projects, he was able to locate several pieces of process equipment within the structure.

MICHELLE L. MADRID, PE, CFM

PROFESSIONAL ENGINEER
Illinois: 62070476
Iowa: P25561

ADDITIONAL CERTIFICATION
Certified Flood Plain Manager (2020)

YEARS OF EXPERIENCE
11

EDUCATION
Bachelor of Science
Civil Engineering
University of New Mexico
2012

PROFESSIONAL ORGANIZATIONS
Water Environment Federation
Member, Students and Young Professionals Community Service Project Committee (2019-Present)

Illinois Association for Floodplain and Stormwater Management

American Public Works Association, Chicago Metro Chapter

American Public Works Association, New Mexico Chapter
Secretary (2017-2018)
Member (2013-2018)

AWARDS
2022 ACEC Illinois Engineering Excellence Special Achievement Award, Civil Engineer: Eastside WWTP Phosphorus Removal Project, Joliet, Illinois.

PRESENTATIONS
"Utility Asset Management Planning," New Mexico Municipal League, 2017

Ms. Madrid is a civil engineer with experience providing a variety of engineering services to public and private clients for water distribution, sanitary sewer collection, drainage/flood control, and site design projects. Primary areas of experience include drainage analysis and design, site development, and sewer collection system replacement/rehabilitation. Her software proficiencies include HEC-HMS, HEC-RAS, AutoCAD Civil 3D, Bentley MicroStation, Autodesk Storm and Sanitary Sewer Analysis Model, EPA SWMM, Bentley CulvertMaster and FlowMaster, and ArcMap.

Eastside Wastewater Treatment Plant Phosphorus Removal and Expansion, Joliet, Illinois. Civil Design Engineer: Prepared civil drawings for new paving, grading, fencing, and site piping. Project includes the design of a new administration building, and miscellaneous plant and equipment upgrades. Coordinated with other disciplines, prepared technical specifications, prepared construction cost estimates, assisted in preparation of required documentation for project permitting.

Edgar Lakes Pump Station Rehabilitation, Illinois Department of Natural Resources, Modoc, Illinois. Drainage and Civil Design Engineer: Completed hydrologic/hydraulic analysis using HEC-HMS for an interior drainage pump station along the Kaskaskia River in Modoc, Illinois. Effort also included an alternatives evaluation for rehabilitation of two 66-inch culverts and three 36-inch force mains that convey stormwater from the interior side of the levee to the Kaskaskia River. Documented study results in a preliminary design report, and developed preliminary design drawings for civil site improvements using AutoCAD Civil 3D.

Conceptual Design for Wausau Drinking Water Treatment Facility, Wausau, Wisconsin. Civil Engineer: Developed conceptual renderings using AutoDesk Infraworks for two design alternatives. The first alternative involved expansion of the existing water treatment facility, and the second alternative consisted of a new facility at a new site. The renderings were used at public meetings to help facilitate citizen input and ultimately owner selection of a preferred alternative. Also developed preliminary site layout and grading plans for the selected alternative, which was to construct a new treatment facility.

Sanitary Sewer Modeling and Capacity Analysis, Lake County, Illinois. Project Manager: This project includes sewer modeling and capacity analyses for over 25 miles of interceptor sewer across four service areas throughout Lake County, including several lift stations. Sewers were evaluated for existing capacity issues, and performance under future loading conditions using population projections from community development plans and the Chicago Metropolitan Agency for Planning (CMAP). Effort included alternatives analysis and development of construction cost opinions. Responsible for budget, schedule, and work coordination. Performed manhole inspections and GPS locates, assisted in development of construction cost opinions, and provided technical assistance and review.

Tremont Basin Sanitary Sewer Interceptor Replacement, Davenport, Iowa. Project Manager / Civil Engineer: Design for abandonment 30-foot deep interceptor sewer that primarily runs through private property, and installation of a new interceptor sewer with improved accessibility and shallower depths. Prepared technical memorandum evaluating three potential routes for the new sewer alignment, and responsible for the design of the selected route.

CSO 054 Equalization Facility, Fort Wayne, Indiana. Civil Design Engineer: Developed civil construction drawings and specifications for a 100,000 gallon combined sewer overflow tank and associated duplex lift station. The tank, consisting of a 9 ft span x 9 ft rise reinforced concrete box culvert, is located beneath a residential street already crowded with utilities. A unique challenge on this project involved achieving the required volumetric capacity and hydraulic operation of the equalization tank, while accommodating connections to existing gravity sewers and minimizing utility relocations. Provided design for the relocations of water, sanitary sewer, and storm sewer lines required for construction of the equalization tank, as well as design of the lift station site and roadway reconstruction.

Dawn Estates Lift Station Replacement, Middlebury, Indiana. Civil Design Engineer: Design and bidding assistance services for a duplex lift station replacement, including minor site improvements including grading and paving for maintenance access.

Pump Station 202 Improvements, Davenport, Iowa. Project Manager: Installation of a gas powered emergency back-up generator, new control panels, and pump repairs. Managed schedule, budget, and work coordination, and provided bidding assistance and construction related services.

Route 1 Water and Sewer Extension, Hoopeston, Illinois. Civil Design Engineer: Responsible for developing the design and preparing construction drawings for water and sewer line extensions to serve a new development on Illinois State Route 1 in Hoopeston. Project includes coordination with the Illinois Department of Transportation (IDOT) for utility construction permits within IDOT right-of-way.

Ridgecrest Drive Sanitary Sewer Abandonment Design Analysis Report, Albuquerque Bernalillo County Water Utility Authority, New Mexico. Civil Engineer: Prepared report detailing design alternatives for the abandonment of approximately 1,400 LF of sanitary sewer. The existing sanitary sewer ran through backyards and beneath residences, making maintenance of the line difficult. Reviewed CCTV inspections and coordinated manhole survey to determine existing sewer configuration and service connections, and to evaluate condition of existing sewer lines to accept flow from the line to be abandoned. Communicated with residents regarding sewer services and dye testing to further identify connections.

Coors and Arenal Sanitary Sewer Interceptor Rehabilitation, Albuquerque Bernalillo County Water Utility Authority, New Mexico. Project Manager and Design Engineer: This project includes abandonment an existing 48" reinforced concrete pipe sanitary sewer, and an open trench installation of new 48" diameter Hobas pipe sanitary interceptor sewer within a major arterial roadway owned by the New Mexico Department of Transportation (NMDOT). Provided direction to junior staff for drafting and completion of construction drawings. Coordinated with client/owner and NMDOT to receive approval for construction in the NMDOT right-of-way.

64th and Bluewater Sanitary Sewer Replacement, Albuquerque Bernalillo County Water Utility Authority, New Mexico. Project Manager and Design Engineer: Design of a 2,075 LF open trench sanitary sewer replacement, including 1,000 LF of water line replacement, pavement replacement grading and design, and erosion and sediment control plans. Project also includes redesign of a 54" diameter storm drain to eliminate a sanitary sewer crossing through a storm drain. Responsible for design and development of construction documents. Ensured client deadlines were met, and coordinated with the City of Albuquerque for approval of the design within the City right-of-way.

Flood Control Project on Midlothian Creek in Robbins, Illinois, Metropolitan Water Reclamation District of Greater Chicago, Illinois. Civil Design Engineer: The goal of this project is to mitigate flooding in the Village of Robbins, Illinois caused by overtopping of Midlothian Creek. The design includes widening the existing Midlothian Creek channel section, adding a wetland flood control pond and park, and adding a diversion channel. Responsible for preparing civil construction drawings, preparing construction cost estimates, and technical specifications. Key civil design items include a new interceptor storm sewer, and new culverts to be installed using micro-tunneling beneath a roadway intersection. The project was awarded a $1M EPA 319 grant for improvements to promote aquatic life and a network of bioswales for pollutant load reduction. Green infrastructure elements incorporated throughout the project, and design collaboration with the community create a facility that will provide multiple benefits in addition to flood control.

SARAH SUTHERLIN, AIA, LEED AP

PROFESSIONAL ARCHITECT
Illinois
Wisconsin

PROFESSIONAL DESIGNATION
LEED AP (Building Design + Construction), USGBC
Registered Energy Professional
City of Chicago

YEARS OF EXPERIENCE
15

EDUCATION
Bachelor of Science
Architecture
Washington University, St. Louis
2008

PROFESSIONAL ASSOCIATIONS
U.S. Green Building Council

Ms. Sutherlin brings 15 years of architectural experience including digital design and fabrication. She is skilled in several advanced design programs including Revit AutoCAD, Rhinoceros, 3Dsmax, and Adobe CC. She utilizes these technologies, along with hand crafts such as sketching, welding and carpentry, to inform and communicate designs. She applies these technologies and methods to inform and coordinate designs with clients, consultants, and contractors.

Multiple Water/Wastewater Treatment Clients, Illinois. Project Architect:

- UV Disinfection Facility Design at Springbrook Water Reclamation Center (WRC), Naperville, IL
- Electrical Improvements and Facility Addition, Wilmette, IL
- Raw Water Intake and Pump Station Design, Sheboygan, IL

Facility Assessment, Joliet, Illinois. Project Architect: Ms. Sutherlin led a high-level assessment of all (50+) city-owned buildings, analyzed existing condition, and prioritized the required/recommended repair and maintenance work over the next 20 years. The project involved field observations, preparation of report with cost estimate recommendation, and development of a facility management database.

Electrical Improvements & Generator Design, Wilmette, Illinois. Architect: CDM Smith was contracted to perform the detailed design for the Wilmette WTP electrical improvements based on the recommendations of our previous study and conceptual report. CDM Smith designed the replacement of the main switchgear, two new 1,000-kW standby engine-generators, and five new MCCs. The new main switchgear and standby diesel engine-generators are being designed for a closed-transition transfer to provide a seamless transfer back to utility power following a loss of power event. Ms. Sutherlin is working on the architectural design of the new building to house two diesel engine-generators, building addition for a new electrical room housing the new main switchgear and three new MCCs, and modifications to the existing electrical room and existing lunch room to construct a new smaller electrical room for two new MCCs and a new 400-hp VFD for one of the high lift pumps.

ForeLight, Inc., Chicago, Illinois. Director of Design: For a previous employer, Ms. Sutherlin developed and prototyped photobioreactor design for a biotechnology startup, working to implement carbon-negative biomanufacturing technology.

Wight & Company, Chicago, Illinois, 2015. Project Architect: For a previous employer, Ms. Sutherlin was responsible for daily design and technical development of architectural projects including historic renovations, adaptive reuse, building renovations, master planning and feasibility studies, and new environmentally sensitive construction. She coordinated project work with owners, consultants, contractors, and municipal agencies.

BCDCOG On-Call Planning and Engineering: Park and Ride, Shelter Design and LCRT Project Oversight and Design Reviews, Berkeley, Charleston and Dorchester Counties, South Carolina. QAQC Architect: Through an On-Call Master Services Agreement, CDM Smith supported regional transit operations and improvement of services through the engineering of the HOP Park and Ride Lot and the Melnick Park and Ride lot in North Charleston, engineering of bus shelters throughout the system, and served as extension of staff for design reviews and project oversight on the Lowcountry Rapid Transit (LCRT) project. On engineering projects, CDM Smith conducted the full project lifecycle from surveying, preparing final designs, and construction phase services. In support of the LCRT project, CDM Smith reviewed environmental and engineering submittals for quality control and compliance with SCDOT and FTA design guidelines. This also included a review of traffic studies and modeling products. Sarah contributed to the success of this project by completing 3rd party estimates and reviews of documents.

IndyGo Red, Indianapolis, Indiana. Architectural Designer: CDM Smith led the planning and design for this first all-electric BRT service in the United States, including the preparation of the FTA Small Starts Application, environmental document, final design

plans, and engineering services during construction. Sarah contributed to the success of this project by specifying materials compliant with Buy America provisions and ensuring quality during construction.

Office Renovation, Massachusetts Water Resources Authority (MWRA), Boston, Massachusetts. Project Designer: Ms. Sutherlin was responsible for the design and technical development of a 130,000-SF interior office consolidation. She designed flexible office space, including open offices, private areas, and collaboration areas with a focus on flexible modern work styles. The project included space planning, material selection, lighting design, furniture selection, and technical design, including phased implementation at three facilities.

Elmhurst Metra Rail Station Alternative Analysis and Phase II Engineering, Elmhurst, Illinois. Design Architect: The project includes the design of a landmark station and site planning to improve connectivity and safety within the central business district. In coordination with City staff, Union Pacific, Metra, IDOT, FHWA (Federal Highway Administration), ICC (Illinois Commerce Commission) and public citizens, CDM Smith is developing a design embraced by all parties involved. Ms. Sutherlin's role includes architectural visioning, and design and technical development of the station. She designed multiple alternatives in distinct architectural styles informed by the existing context of downtown Elmhurst. She works to build consensus amongst all involved parties, using renderings and 3D models to visualize the designs on site for review and consensus by all parties.

Glen Ellyn Metra Rail Station Preliminary Design and Phase I Engineering, Glen Ellyn, Illinois. Design Architect: CDM Smith was selected by the Village of Glen Ellyn to provide analysis, planning, design, and Phase I Engineering services for the village's Metra station and surrounding down-town district. Ms. Sutherlin's work includes developing architectural design alternatives for rehabilitation and new construction alternatives which are compatible with the existing downtown historic district.

SunRunner BRT, Pinellas Suncoast Transit Authority (PSTA), St. Petersburg, Florida. Project Architect: Ms. Sutherlin was responsible for the architectural development of custom shelter and totems for this Bus Rapid Transit (BRT) project. The design process included detailed coordination with owner's branding consultant and art-integrated station elements produced by a local artist. Technical considerations included specifying materials durable within the coastal environment as well as mitigating impacts of the project on habitats specific to that area.

Confidential Corporate Client, Charlotte, North Carolina. Project Architect: Ms. Sutherlin was responsible for the design and technical development of 7-story, 150,000 SF interior office build-out. She designed flexible office space including open offices, private areas, and collaboration areas with a focus on biophilic design. The project included workplace strategy research, space planning, material selection, lighting design, furniture selection and technical design including the implementation of a 3-story green wall feature.

ROBERT J. REID, PE

PROFESSIONAL ENGINEER
Illinois

CERTIFICATIONS
NASSCO PACP
OSHA 10-hour Construction
Confined Space Entry

YEARS OF EXPERIENCE
19

EDUCATION
Bachelor of Science
Civil Engineering
University of Wisconsin – Platteville
2002

PROFESSIONAL ASSOCIATIONS
Order of the Engineer Society
ASCE

Mr. Reid has more than has 19 years of experience in construction services on wastewater, water, and highway projects. He has experience in overseeing construction of wastewater and potable water treatment facilities, city street reconstruction, bridge deck overlay construction, and combined sewer inspection.

Springbrook Water Reclamation Center Facility Plan and Ultraviolet (UV) Disinfection Facility Design and Construction, Naperville, Illinois. Constructability Review, Resident Project Representative: Mr. Reid performed constructability review and value engineering of the design of the 26-mgd UV disinfection facility for the City of Naperville. He is currently serving as RPR during construction.

Wastewater Treatment Plant (WWTP) Upgrade, Geneva, Illinois. Senior Construction Representative: Mr. Reid served as Senior Construction Representative for the construction phase services for the $11M improvements project at this WWTP, which included biological phosphorus removal, electrical upgrades, and new aeration systems.

Modifications to Harker Complex Project, Oak Lawn, Illinois. Senior Construction Representative: Mr. Reid is serving as the senior construction representative for this $11M potable water pump station improvements project. The project entails the replacement of the existing electrical and controls systems, rehabilitation of eight 1-million-gallon (MG) underground reservoirs, electrical room addition, and installation of a 1000-hp pump while maintaining water service to approximately 300,000 people in 12 communities.

Sanitary Sewer and Manhole Inspection and Rehabilitation Project, Village of Oak Lawn, Oak Lawn, Illinois. Senior Construction Representative: Mr. Reid is currently serving as the senior construction representative for this reoccurring (approximately $1M/year) sewer system inspection and rehabilitation project. This work entails the cleaning, CCTV inspection, and rehabilitation (utilizing CIP Pipe Lining) of the sanitary sewer piping along with the associated manholes.

Digester Complex Improvements, Oswego, Illinois. Construction Manager: Mr. Reid is serving as the construction manager and lead resident engineer on Fox Metro WRD's $10M plant improvements. He leads weekly construction meetings, oversees construction, and coordinates daily with the design team.

Modifications at Reich and Harker Complexes and Points of Delivery Project, Oak Lawn, Illinois. Mr. Reid is currently serving as the senior construction representative for this $24M new construction potable water pump station project. The project entails the installation of a complete pump station facility with four 1000 hp pumps on VFDs, a turbine generator, and control room.

Water Treatment Plant (WTP) Improvements Project, Highland Park, Illinois. Mr. Reid served as the senior construction representative for this $36M project. The project entails the demolition of the existing conventional sand filter WTP, and upgrading to a submerged membrane plant. Work included the rehabilitation of nearly the entire facility, utilities and systems while maintaining water service to approximately 60,000 people.

Low Pressure Reverse Osmosis Water Treatment Plant, Western Springs, Illinois. Mr. Reid served as the senior construction representative for this $8M project. The project entailed the demolition of the existing conventional lime softening WTP, and the installation of a reverse osmosis plant while maintaining water service to over 12,000 residents. This project also included the installation of iron removal equipment and the rehabilitation of the entire existing facility.

1964 Filter Addition Rehabilitation, Evanston Water Utility, Illinois. Mr. Reid served as the senior construction representative for this $3.4M project. This project entailed the demolition of the existing clay tile underdrains in six potable water sand filters and installing new plastic underdrains. This project also included the demolition and

replacement of two existing built-up asphalt and concrete plank roofs along with sandblasting and painting the existing structural steel supports.

Electrical Generation Facility and Office/Garage Expansion, DuPage Water Commission, Elmhurst, Illinois. Mr. Reid served as the senior construction representative for this $20M project. This LEED Certified project entailed the installation of four stationary and one portable 5kV standby generators in a 10 MW system, expansion of an existing garage to house the generators and additional office space, construction of a new garage and a covered parking structure. This project is on an existing 185-mgd potable water pumping station with strict security protocols.

Advanced Wastewater Treatment Plant (AWWTP), Rockland County Sewer District No. 1, Hillburn, New York. Mr. Reid served as the resident engineer for this $43M design/build (D/B) project. The project entails the new construction of a 1.5 mgd Sequential Batch Reactor (SBR) train including secondary microfilter membranes, centrifuges, sand filters, site utilities, influent pump station, SCADA system and administration facility. This project also includes a biological inert media odor control structure with activated carbon polishing.

Phase 3 Wastewater Treatment Plant Improvements, Orange County Department of Public Works, Harriman, New York. Mr. Reid served as the resident project representative for this $21M multiple prime project. The project entailed the construction of a new 2-mgd activated sludge train that included site utilities, primary settling, aeration, final settling, tertiary filters, disinfection and administration facility. This project also included the installation of three carbon adsorption odor control units, as well as modifications to existing facilities.

Submerged Membrane Filtration/PAC System Facilities, Racine Water Utility, Wisconsin. Mr. Reid served as assistant construction manager for this $18M project. The project entailed the construction of a submerged membrane facility, powdered activated charcoal (PAC) system, and reservoir upgrades. Duties included construction management services including inspection, materials inspection, review and approval of payment applications, and distribution of submittals for review. Mr. Reid also assisted in conducting progress meetings and served as the owner's representative on site.

Phase 2 Water Treatment Improvements, Central Lake County Joint Action Water Agency, Illinois. Mr. Reid served as assistant construction manager for this $27M project. The project entailed the construction of a new clearwell, residual solids processing facility, two gravity thickeners, UV light disinfection facility, power generation facility, maintenance facility and the replacement of finished water pumps.

Combined Sewer Inspection, City of Milwaukee, Milwaukee, Wisconsin. Field Inspection Manager: Mr. Reid was the field inspection manager for the inspection of approximately 3,300 feet of large diameter combined sewer in the City of Milwaukee. He was responsible for the quality of the inspection and the inspection report where the sewers were given a condition rating.

City Street Reconstruction, Ashland, Wisconsin. Field Inspection Manager: Mr. Reid was the field inspection manager for the reconstruction of two city streets. The reconstruction included the replacement of water mains, storm sewer, sidewalks, driveways, curb and gutter, and asphaltic concrete street surface. He was responsible for measuring and calculating contractor quantities, checking street grades, and inspecting traffic control.

Modifications at Reich and Harker Complexes and Points of Delivery Project, Village of Oak Lawn, Oak Lawn, Illinois. Senior Construction Representative: Mr. Reid is currently the senior construction representative for this $24M new construction potable water pump station project. The project entails the installation of a complete pump station facility with four 1000 hp pumps on VFDs, a turbine generator, and control room.

MARK ANTHONY BATTISTA

PROFESSIONAL ENGINEER
Pennsylvania
Rhode Island
Massachusetts
Virginia
Connecticut

CERTIFICATIONS
30 Hour OSHA Safety,
OSHA 29 CFR 1926 - Confined Space Entry
OSHA 29 CFR 1926 - Excavation
CPR/First Aid

YEARS OF EXPERIENCE
34

EDUCATION
Postgraduate Studies
Construction Management
New York University
1992

Bachelor of Science
Architectural Engineering,
Florida State University/ FAMU Tallahassee
1989

PROFESSIONAL ASSOCIATIONS
Society of American Military Engineers

Mr. Battista is a construction industry professional with over 30 years of experience as a program manager, project director and construction manager. His experience includes heavy civil construction, water and waste water treatment plants, earthwork/wetlands, utilities, roadway/bridge, pump/lift stations, demolition, dredging, marine, design build construction and environmental services.

Mr. Battista's experience includes management of government and commercial construction projects; design build (D/B); contract and change order negotiations; arbitration; claims/insurance settlement issues; subcontract management; design/value engineering; construction cost estimating; cost controls; scheduling; health and safety planning; and QA/QC management. Mr. Battista has a proven history in developing and maintaining strong client relationships through integrity and honesty.

Wastewater Treatment Facility (WWTF) Improvements, Geneva, Illinois. Mark served as the resident engineer for the $11M WWTF improvements, which included biological phosphorus removal, electrical upgrades, new aeration systems.

Wastewater Treatment Plant (WWTP) Improvements, Gary, Indiana. Mark is serving as the construction manager and lead resident engineer for the upgrades at the Gary Sanitary District's WWTP, which include aeration system, grit, and other facility improvements.

Water System Expansion, Central Lake County Joint Action Water Agency, Lake County, Illinois. Mr. Battista is currently serving as a resident engineering representative, focusing on quality control procedures for this project, which has an overall construction budget of $70 million. The project includes the construction of 26 miles of 10-inch to 24-inch water transmission main and appurtenances via open cut and directional drill operations, installation of new air release/butter fly valves with associated underground vault structures, blow-off hydrants, roadway restoration and 6 new delivery structures. The pipelines are being constructed in northern and western locations of Lake County Illinois.

Regional Water Systems Improvement Project, Oak Lawn, Illinois. Mr. Battista served as a resident engineering representative overseeing quality control procedures, relating to the installation of a new 60-inch steel transmission main through the village of Oak Lawn. His responsibilities included ensuring that all work performance according to the contract design drawings and specifications. He attended weekly coordination meetings with the client and provided work progress and schedule updates accordingly. He maintained daily communication with the client and design team, to ensure that all concerns were being addressed by the contractor in a timely manner.

Pump Station S-13, Florida Water Management District, Davie, Florida. Senior Construction Manager: For a former employer, Mr. Battista was responsible for all phases of construction, management of project team and all subcontractors. This project involved the refurbishment of three existing pumps and gearboxes, installation/alignment of new owner supplied pump engines, replacement of station ventilation system, fuel system, trash rakes and bridge crane. Construction of new generator building and trash rake control building with new electrical systems including MCC, transfer switches, control panels, RTU and ECC, etc. Install new generators, engine keel cooling system, sheet piling, debris storage facility and underground utilities.

Lakeside Ranch STA North and Pump Station S-650, South Florida Water Management District, Okeechobee, Florida. Group Leader, Construction Management: For a former employer, Mr. Battista was responsible for complete oversight of construction activities, managed team of AMEC engineers, inspectors and administrators to ensure compliance with the construction plans and technical specifications. This project included Construction Management Services during the construction of the Lakeside Ranch Storm Water Treatment Area North (STA) and S-650 Pump Station, located east of Lake Okeechobee and west of SR 710 (Bee Line Highway) on the boundary of Martin and adjacent Okeechobee Counties. The STA will encompass 2,700 acres divided into collection cells, distribution/outlet canals and water control structures. The project also

included improvements for the L-64 and L-63 Canals, involving the excavation of approximately 5,000 linear feet of canal below the control water elevation, partial reconstruction of approximately 4,120 linear feet of the L-64 Canal and replacement of the culvert/road crossing at County Road 15B (structure S-667). In addition, S-650 Pump Station will receive flow from the L-64 Canal and discharge into the Lakeside Ranch STA distribution canal and into three inlet structures. S-650 Pump Station will have a combined pumping capacity of approximately 250-cfs. The construction activities included earthwork, reinforced concrete, structural steel, mechanical, electrical controls, instrumentation, HV/AC, construction of a temporary cofferdam and dewatering.

County Wide Replacement of Sanitary Pump Stations and Force Mains, Miami Dade Water and Sewer Department, Florida. Senior Project Manager: For a former employer, Mr. Battista was responsible for all phases of construction, management of project team and all subcontractors. The project involved the demolition and replacement of 21 existing sanitary pump stations located throughout Dade County, replacement of associated sanitary force main and roadway reconstruction.

Refurbishment of Wastewater Treatment Plant, Cooper City, Florida. Senior Project Manager: Mr. Battista was responsible for all phases of construction, management of project team and all subcontractors. The project involved the demolition and refurbishment of all mechanical, instrumentation, electrical, HVAC, plumbing/containment piping, pumps/motor/filter equipment. Installation of three new 12-inch diameter deep water wells, sanitary lift station, site utilities and reconstruction of existing roadways.

New York City DEP, Forest Avenue Reconstruction, Staten Island, New York. Construction Manager: Mr. Battista was responsible for all phases of construction, design, schedule, budget, management of project team and all subcontractors. Design build project involving the construction of a 5.3-mile section of a new 48-inch PCCP water main and appurtenances, including precast butterfly valve, regulator and air release structures, replacement of existing sanitary, storm and distribution water mains, roadway/sidewalk reconstruction, and traffic signalization.

South Florida Water Management District, Storm Water Treatment Area 3 and 4. Project Director: Mr. Battista was responsible for all phases of construction, management of a staff of 162 employees and all subcontractors. This project involved the construction of a 17,750-acre storm water treatment area, used to remove agricultural contaminants from storm water runoff through the use of aquatic plant life/algae. The 26 square mile project involved blasting/moving 11 million cubic yards of earth/rock to construct the largest man-made wetland in the world. It included multiple tasks involving the construction of 39 miles of levees, 21 miles of canals, 48 reinforced concrete gated structures, control buildings along with electrical, mechanical and instrumentation. In addition, the project included construction of a concrete pumping structure to house two 42-inch pumps, demolition of existing structures/buildings, rebuilding 5 miles of existing roadway and constructing two new pre-stressed concrete bridges.

Miami River Project, Micro Tunnel New 36 inch Water Mains underneath the Miami River, Miami, Florida. Senior Project Manager: Mr. Battista was responsible for all phases of construction, schedule, budget, management of project team and all subcontractors. The project involved the micro tunneling of new 36 inch ductile iron water mains underneath the Miami River to Brickell Key.

Sub-aqueous Repair of Existing 72 inch Steel Outfall, Miami Dade Water and Sewer Department Florida. Senior Project Manager: Mr. Battista was responsible for all phases of construction, schedule, budget, management of project team and all subcontractors. The project involved the sub-aqueous repair of a 5-mile section of an existing 72 inch steel sanitary outfall from Miami to Virginia Key. Work included the installation of 12 inch steel bands welded on the inside of each pipe joint while keeping the sanitary sewer system active. All equipment and material were staged on floating barges. Divers had helmet mounted cameras to facilitate inspections and Quality Control protocols.

JEREMY E. FARRER, PE

PROFESSIONAL ENGINEER
Indiana: PE11500293
Ohio: PE.84611
Illinois: 062073480
Missouri: 2022009026

YEARS OF EXPERIENCE
26

EDUCATION
Bachelor of Science
Electrical and Computer Engineering
Purdue University
1997

Mr. Farrer is a Senior Electrical and Controls Systems Engineer. His experience includes the design of power distribution, lighting, fire alarm, communication and network systems, SCADA systems, and control systems for water, wastewater, stormwater, and building projects. He has also been involved in several electrical studies including short circuit, coordination, arc flash, thermal analysis, and harmonic studies. He has extensive power system experience in low voltage (600V and below) and standby/emergency generator applications as well as experience with medium voltage (up to 35kV).

UV Disinfection Improvements, Springbrook Water Reclamation Center, Naperville, Illinois. Lead Electrical Engineer: Three new 25 mgd UV trains, non-potable pump station, building facility, and flow metering stations as well as lightning protection system.

Downtown WWTP Wet Weather Improvements, Jeffersonville, Indiana. Lead Electrical and Control Systems Engineer: Provided electrical and control design, cost estimating, and construction services to support the upgrade of an existing wastewater treatment facility. The project increased the plant's wet weather capacity from a peak of 10 mgd to 50 mgd. Project included modifications to existing headworks junction box and effluent flume, new chemically enhanced high rate clarifier, new UV system, and new chemical/electrical building, new utility service and new standby diesel generator.

CEG White River Residuals Improvements Phase 2, Indianapolis, Indiana. Lead Instrumentation and Controls Engineer: Upgrades to the White River Water Treatment Plant's Solids Residual Tank (SRT), SRT pump station, mixer tanks, press grinder and feed pumps, and 2 new belt filter presses. Several new PLC panels were required for the project. Project also consisted of SCADA networking, platform, and HMI upgrades and a camera monitoring system for centralized operator control. Separate project included plant-wide fiber optic networking loop improvements.

Bissell Point WWTF Fine Screen, Concrete and Gate Improvements, St Louis, Missouri. Lead Electrical Engineer: Provided power and system design for a new Class I, Division I fine screenings facility that consisted of 5 automated screenings channels, conveyor, washer compactor, and dumpster room. Project also included lightning protection system, fire alarm system, 5kV power circuit relocation, demolition of comminutor building, and several gate actuator replacements.

South Shore WRF Power Study, Milwaukee MSD, Wisconsin. Lead Electrical Engineer: Medium voltage power system assessment and improvement recommendations for the facility's automated medium voltage power control system. Power sources consist of two 35kV electrical utility circuits, four 4.16kV, 925 KW duel fuel gas generators, and one 4.16kV, 1500 KW duel fuel gas generator. Project included review of medium voltage relay protective functions and logic, PLC system logic, utility control modules (UCMs), generator control modules (GCMs), black start capabilities, and system response to unanticipated loss of a power source.

Peak Excess Flow Treatment Facility, Kokomo, Indiana. Lead Electrical and Control Systems Engineer: Provided electrical and control design services. Project includes a new 50 mgd wet weather pump station, two mechanical fine screens, two chemically enhanced High Rate clarifiers, Chemical Building, New Standby Diesel Generator, and other various flow control structures and instrumentation.

Cane Run Flood Control Pump Station, Clarksville, Indiana. Lead Electrical and Control Systems Engineer: Provided electrical and control design services for a new flood control pump station located near the Ohio River in Clarksville. Project involved coordination with City of Jeffersonville, Town of Clarksville, Flood Control District, and the US Army Corps of Engineers. The constructed project pumps the Ohio River flood water back to the river quicker and reduce the amount of flooding of basements and parking lots in the Clarksville/Jeffersonville area.

Blower System Upgrades, Tell City, Indiana. Lead Electrical and Control Systems Engineer: Provided electrical and control design, cost estimating, and construction services.

Project included installation of two new blowers for the aeration tanks at the Tell City Wastewater Treatment Plant.

Portage WWTP Biosolids, Portage, Indiana. Lead Electrical and Control Systems Engineer: Provided electrical and control design, cost estimating, and construction services. Project included installation of new aeration blowers, gravity belt thickener process equipment, new building to house the gravity belt thickener, flow control valves, instruments, networking, and upgrades to aging electrical distribution at plant.

Melbourne Avenue Wet Weather Project, Logansport, Indiana. Lead Electrical and Control Systems Engineer: Provided electrical and control design, cost estimating, and construction services. Project included installation of two 10-foot diameter pipes under the roadway along Melbourne Avenue between Eel River Avenue and 5th Street for CSO Storage and a pump station at 1st and Melbourne Avenue to store and gradually release CSO to Logansport Municipal Utilities Wastewater Plant. Two fine screens were installed at the pump station facility to remove debris from the CSO before storage.

I&C, SCADA and Emergency Power System Improvements, Griffith, Indiana. Lead Electrical and Control Systems Engineer: Provided electrical and control design, cost estimating, and construction services. Project included installation of diesel and natural gas generators at the Town's Water Booster Station, Cline Avenue Pump Station, Stormwater Pump Station and several smaller lift stations. Project also included installation of a new SCADA system using cellular modem radios to centralize the monitoring of the Water and Wastewater facilities. During the course of the project several upgrades were made to local control panels and instrumentation.

Madison Street Stormwater Underpass Improvements, Muncie, Indiana. Lead Electrical and Control Systems Engineer: Provided electrical and control design, cost estimating, and construction services. Project included construction of a 40 foot deep pump station with one set of large submersible pumps and one set of small drain pumps, 750,000 gallon steel storage tank, new underground drainage infrastructure, and various instrumentation and controls. The constructed project eliminated hazardous railroad underpass flooding conditions on Madison Street.

Fire Water System, Cass County, Indiana. Lead Electrical and Control Systems Engineer: Provided electrical and control design, cost estimating, and construction services. Project includes the installation of two Wells, an Elevated Storage Tank, Standby Emergency Power Generators, and Remote Monitoring Systems to serve as Fire Suppression for the Cass County Agribusiness Park.

INAWC Wayne Street Water Treatment Facility, Noblesville, Indiana. Lead Electrical and Control Systems Engineer: Provided electrical and control design, cost estimating, and construction services direct to Owner, Indiana American Water. Project included replacement of three High Service Pumps, upgrading to VFD motor control, and SCADA system integration. Project also included providing a Short Circuit, Coordination, and Arc Flash Study per American Water Corporate Standards.

INAWC Raw Water Wells, Kokomo, Indiana. Lead Electrical and Control Systems Engineer: Provided electrical and control design, cost estimating, and construction services direct to Owner, Indiana American Water. Project included replacement of four Wells, Controls, and Integration at three different well sites in Kokomo, Indiana. Project also included providing a Short Circuit, Coordination, and Arc Flash Study per American Water Corporate Standards.

Water Systems Improvements, Princes Lakes, Indiana. Lead Electrical and Control Systems Engineer: Provided electrical and control design, cost estimating, and construction services. Project included adding VFDs to High Service Pumps, adding VFDs to an existing Booster Station Pumps, and Installation of a New Elevated Water Tank.

PAUL T. DAMON, PE

PROFESSIONAL ENGINEER
Maine

CERTIFICATIONS
Certified Cost Professional
Certificate of Training, MCACES Gold
OSHA 10-hour Construction Safety Training

YEARS OF EXPERIENCE
45

EDUCATION
Bachelor of Science
Civil Engineering
University of Maine
1975

PROFESSIONAL ASSOCIATIONS
Association for the Advancement of Cost Engineering
- Director, New England - Boston Section
- Past President, New England - Boston Section

Water Environment Federation

Mr. Damon has 45 years of experience in estimating, design and construction experience. He has successfully estimated construction jobs ranging in size up to $750 million and estimates for programs that are multiple billions of dollars. His responsibilities include the preparation of conceptual estimates, preliminary design estimates, final design estimates, detailed bid estimates, and change order pricing and negotiating. He evaluates scope and pricing on design-build proposals and provides value engineering services. Mr. Damon has prepared estimates encompassing a wide range of projects involving water supply and treatment facilities, wastewater treatment facilities, water and wastewater pump stations, transportation projects, hazardous waste remediation projects, industrial processing facilities, and solid waste recovery facilities.

Water Pollution Control Facility (WPCF) Upgrade, Ansonia, Connecticut. Chief Estimator: Mr. Damon managed the estimate for an upgrade to the city's WPCF to meet new permit limits for total nitrogen and phosphorus (TN/TP). In addition to replacement of all mechanical equipment, the existing plant was upgraded to a 3.5 million gallons per day (MGD) (12 MGD peak) anoxic/aerobic activated sludge (Bardenpho) process for advanced nutrient removal. New equipment at the facility included screening, pumping and grit removal systems, primary clarifier upgrades, conversion of existing tanks to first and second stage anoxic zones, installation of new oxidation ditches, two new secondary clarifiers and associated sludge pumping, soda ash, coagulant and calcium hypochlorite chemical systems, low pressure-high intensity UV disinfection system, sludge storage tanks and pumping systems, rotary drum thickener, odor control equipment, supervisory control and data acquisition (SCADA) system, and a power distribution system.

Westerly Wastewater Treatment Facility (WWTF) Improvements, Marlborough, Massachusetts. Chief Estimator: Mr. Damon managed the estimating of the preliminary and final design phases of this project. The work included an evaluation and recommendation of plant-wide improvements necessary to meet new NPDES permit limits for phosphorus removal as well as increase the overall plant capacity by more than 50 percent to meet expectations of growth in the service area. Evaluations included a pilot study of various phosphorus removal technologies and a detailed selection process, which ultimately recommended the BluePRO phosphorus removal system. Final design included facilities required to install the phosphorus removal system as well as a new grit and screenings facility, primary and secondary system improvements, conversion to fine bubble aeration, conversion to UV disinfection, replacement and upgrade of all sludge handling facilities including gravity thickeners and belt filter presses, as well as a substantial expansion of the administrative facilities. Plant-wide electrical and instrumentation systems were also replaced as part of this project.

Wastewater Treatment Plant Improvements, Concord, Massachusetts. Lead Estimator: Improvements included a headworks building with fine screen and a new operations building addition to house UV disinfection, rotary drum thickener for thickening waste sludge, the CoMag system (i.e. ballasted flocculation using magnetite) which was pre-purchased by the town for phosphorus removal, and thickened sludge storage and pumping facilities. The design also included: three tertiary lift pumps to pump secondary effluent to the CoMag process; a larger standby generator; the replacement of septage pumps, septage tank diffusers, grit pumps, grit classifiers, alum and caustic storage and feed systems; retrofitting an existing effluent storage tank into a waste sludge storage tank with diffused aeration for mixing.

Three-Phase Wastewater Treatment Plant (WWTF) Upgrade, Brockton, Massachusetts. Mr. Damon has been lead estimator for the construction cost for three-phase upgrade and expansion of the Brockton WWTF, approximating $80 million in project cost. The liquid process train improvements include modifications to the headworks facilities, major modifications to primary clarifiers, aeration basin modifications to mechanical systems, biological nutrient removal (to 5.5 mg/L nitrogen), major improvements to chemical feed systems to remove phosphorus to 0.2 mg/L, blower replacement, effluent clarifier improvements, filter effluent replacement using an innovative cloth filtration system, and disinfection replacement with ultraviolet (UV) treatment. The solids process improvements include new gravity-belt thickening, new centrifuge dewatering, conveyance systems,

polymer storage/feed systems. Other improvements included installation of new electrical, odor control and SCADA systems to support the new systems.

Advanced Wastewater Treatment Plant Upgrade, Boonsboro, Maryland. Lead Estimator: Mr. Damon estimated construction cost for the expansion and upgrade of the wastewater treatment plant. Design of the new treatment facilities included a new headworks building with a mechanically cleaned bar screen, backup manually cleaned bar rack, vortex grit chamber, grit washer/classifier, and a 2.6 million gallons per day peak flow intermediate pumping station with three submersible pumps and force main. Flows from the headworks are conveyed to one of two sequencing batch reactors (SBRs) with retrievable fine bubble diffusers, floating mixer, decanter, and waste sludge pumps. Decanted SBR effluent then flows to a post equalization basin for dampening of peak/decant flows prior to pumping to tertiary filtration. Phosphorus precipitant is added to the SBRs prior to filtration to maximize chemical phosphorus precipitation. Filtered tertiary effluent will flow by gravity to the chlorine contact tank, dechlorination tank, and cascade aeration tank before being discharged to an unnamed tributary to Little Antietam Creek. Waste sludge from the SBR system will be pumped into one of two aerobic digesters for stabilization.

Standby Generator Facility, DuPage County, Illinois. Estimator: Based on our previous electrical study, CDM Smith designed a new Standby Generator Facility to improve the power reliability of the DuPage County Campus and minimize disruptions to County government and services. This included three 4.16-kV (kilovolt), 2,500-kW (kilowatt), diesel engine-generators (with provisions for a fourth engine-generator), 12.47-kV medium-voltage switchgear, 4.16-kV medium-voltage switchgear, and a 10-MVA (megavolt amp) 4.16-kV/12.47kV step-up transformer. The Standby Generator Facility is capable of providing backup power to the buildings through automated controls and switchgear. Mr. Damon led cost estimating activities for the overall project.

Water Treatment Plant Improvements for Central Lake County, Illinois. Lead Estimator: Mr. Damon estimated the construction cost for Phase 2 improvements and expansion of the Central Lake County Joint Action Water Agency's Paul M. Neal Water Treatment Facility in Illinois. The expansion includes a maintenance facility addition, a generator room addition, a second buried reinforced concrete 2-million-gallon clearwell, and a residuals facility. Centrifuges are supported on the second floor of the steel framed residuals building. The residuals facility also includes gravity thickening tanks and backwash equalization tanks.

Standby Generator Facility, Elmhurst, Illinois. Estimator: CDM Smith designed the DuPage Water Commission's new Standby Generator Facility with 10 MW (megawatt) of diesel engine-generator standby power at 4.16 kV to power the existing pumping systems. The project included a procurement phase for the nine 2,500-kW diesel engine-generators used at the DuPage and Chicago DWM's Lexington Pumping Stations. Mr. Damon led cost estimating activities for the overall project.

Standby Generator Design, Highland Park, Illinois. Estimator: CDM Smith designed improvements to upgrade Highland Park's 11 million gallons per day (millions-of-gallons per day) conventional filter water treatment plant (WTP) to a 30 million gallons per day submerged membrane plant. We evaluated the existing electrical equipment and designed a new power distribution system for the upgraded WTP, including new 480-V (volt) switchgear, 480-V diesel engine-generators, switchboards, and MCCs. Additional activities included working with ComEd to coordinate new primary feeders to the WTP and working with engine-generator manufacturers to determine the kW requirements for the standby power system. Mr. Damon led cost estimating activities for the overall project.

Jerome Park Water Treatment Plant, New York City, New York. Cost Estimator: As part of a conceptual construction cost estimate for the 300 million gallons per day Jerome Park water treatment plant, Mr. Damon priced three alternative processes under consideration: direct filtration, ozone/diatomaceous earth, and dissolved air flotation.