



Manoj Yegnaraman, PE

Manoj Yegnaraman is a vice president and chief instrumentation and control (I&C) engineer with over 20 years of experience. His expertise includes project management, Supervisory Control and Data Acquisition (SCADA) master planning, and I&C engineering during all phases of water and wastewater projects.

Manoj was the Director for the International Society of Automation's (ISA) Water Wastewater Industry Division and served as its Board Member for almost a decade. He is also a core committee member of ISA's upcoming global standard for SCADA Systems – ISA112, since its inception in 2016.

He serves as Carollo's National Discipline Performance and Quality Manager and is responsible for aligning Carollo's discipline groups (structural, architectural, general mechanical, pumping system mechanical, building services, electrical, programming, and I&C) with Carollo's strategic and annual goals.

SCADA MASTER PLANNING

> **Project manager for the Utility-Wide SCADA Master Plan, City of Odessa, Texas.** The project resulted in Carollo recommending six major automation upgrade tasks, totaling about \$34M in construction costs, to meet the City's I&C goals. These tasks were included under the City's Water Treatment Plant Rehabilitation and Miscellaneous Upgrades Project Phase III. The Master Plan also resulted in Carollo establishing I&C/SCADA standards for the Utilities Division. Specific tasks included core SCADA upgrades, wired and wireless communications backbones, HMI upgrades at the existing water treatment plant and water reclamation plant, and utility-wide PLC upgrades. The City will use AVEVA (previously Wonderware) Systems Platform for Utilities SCADA along with AVEVA InTouch HMI at the individual treatment facilities. The upgrade will also include PLC improvements and new PLCs, for a total of about 60 Schneider Electric Modicon M580/M340 PLCs. A SCADA Master Plan report was provided at the end of this task that included details on the specific upgrade recommendations with priorities and cutover plan. In addition, the report included an I&C/SCADA standards

document for the City's Utilities Division. Responsibilities included managing the schedule and budget and acting as a liaison between the City's utility division and Carollo's engineering division.

> **Project manager for the SCADA Master Plan, Polk County Utilities (PCU), Florida.** The project included producing a Trihedral VTScada SCADA/HMI framework for PCU, which spreads across 2,600 square miles. Specific responsibilities included developing operator access, communications backbone, software applications, cyber security, SCADA system architecture, and control system standardization. A SCADA Master Plan was provided at the end of the project. Responsible for managing the schedule and budget and acting as a liaison between PCU, the project's prime consultant, and Carollo's engineering and programming groups.

> **Lead I&C engineer for the Integrated Facilities Master Plan, Clark County Water Reclamation District, Nevada.** Performed the EI&C condition assessment for the owner's central plant and several other remote facilities. The project involved a review and update of flow projections and identifying treatment facilities needed to process



EDUCATION

MS Electrical Engineering,
University of Alabama,
Huntsville, 2005

BE Instrumentation and
Control Engineering,
University of Madras,
India, 2004

LICENSES

Professional Engineer,
Texas, Colorado,
Alabama, Missouri, South
Carolina, Mississippi,
Kentucky, North Carolina,
Georgia

Control System Engineer,
California, Nevada

CERTIFICATIONS

PROFIBUS PA Network
Engineer, 2012

PROFIBUS DP Network
Engineer, 2011

PROFESSIONAL AFFILIATIONS

International Society of
Automation

2021 and 2022 Director,
Water and Wastewater
Industries Division

Core committee
member, ISA112 SCADA
Standard, since its
inception in 2016

Senior Member since
2001

Records Holder, National

AWARDS

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these flows. With a focus on maximizing the use of existing capital facilities, this Integrated Facilities Master Plan considered process optimization, condition assessment, operations and maintenance manual updates, and phased planning for the District's seven wastewater treatment facilities.

INSTRUMENTATION AND CONTROL – WATER TREATMENT

> I&C/SCADA design manager for the Water Treatment Plant Rehabilitation and Miscellaneous Upgrades Project, including implementation of Utility-wide SCADA Master Plan, City of Odessa, Texas.

This \$85 million project includes upgrades to the City's existing water treatment plant, associated electrical, instrumentation, HVAC, structural, and process mechanical improvements, as well as utility-wide SCADA-HMI-PLC upgrades at the water treatment plant, water reclamation plant, and 40 remote sites. The City will use AVEVA (previously Wonderware) Systems Platform for utilities SCADA along with AVEVA InTouch HMI at the individual treatment facilities. The project will also include the following: PLC upgrades and new PLCs for approximately 60 Schneider Electric Modicon M580/M340 PLCs; cellular and radio communication between all facilities, remote sites, central SCADA, and disaster recovery locations. Responsibilities included scope, budget, and schedule management for the I&C design team; establishing a pre-negotiated scope and fee for sole-sourced automation equipment; and coordination with the City's utilities/IT divisions and the rest of the project team.

> **Project manager for the John F. Kubala Water Treatment Plant Filter Process Control Upgrades, City of Arlington, Texas.** This project included the replacement of 21 existing PLCs with

Schneider Electric Modicon M340 PLCs and integration with the existing GE Proficy iFix HMI. The individual local operator interfaces on the filter consoles were replaced with wireless access via Microsoft Surface tablets using GE Proficy Webspaces inside the filter console gallery. The project also involved the replacement of an Allen-Bradley PLC-5 control panel for the existing air scour blower with a new panel containing two Schneider Electric Modicon M340 PLCs. Responsibilities included managing the scope, budget, and schedule of this project and coordinating with the Owner and the design team.

> **Lead I&C engineer for the following Wylie Water Treatment Plants Chemical Systems Evaluation and Design Projects: Phase 1A, 1B, and Phase 2, North Texas Municipal Water District, Texas.** Evaluation responsibilities included instrumentation, controls, and SCADA system analysis for most of the chemical systems at each water treatment plant. Instrumentation recommendations were provided to completely automate chemical system monitoring and control. SCADA recommendations were provided to have standardization/consistency in graphics between the four water treatment plants. Responsible for designing SCADA and I&C systems for the four water treatment plants. Additional specific duties included instrumentation design for chemical storage tanks, transfer pumps, day tanks, metering pumps, and application points. The project tasks also included the design of new Rockwell Automation Allen-Bradley ControlLogix PLCs for automatically monitoring and controlling the new and modified chemical systems and integration with their existing Rockwell Automation FactoryTalk View SE SCADA/HMI system.

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> **Lead I&C engineer for the Wylie Water Treatment Plant IV Expansion from 140 mgd to 210 mgd, North Texas Municipal Water District, Texas.**

Provided I&C design services for the expansion of an existing Water Treatment Complex from 140 mgd to 210 mgd. This project utilized Schneider Electric Modicon M340/M580 PLCs with Unity Pro programming software. The new PLCs was integrated with the existing Rockwell Automation FactoryTalk View SE HMI/SCADA System. I&C design was provided for flocculation, sedimentation, filters, ozone, and various pump stations.

> **Lead I&C engineer for the Tarrant County Water Supply Project Treatment Plant Improvements, Trinity River Authority, Texas.** This project included I&C design for chemical system HVAC improvements, security camera systems, a high-service pump VFD, and raw water pump station modifications. Motorola-based PLCs will be utilized and will integrate with the existing GE iFix HMI/SCADA System.

> **Lead I&C/network engineer for the Southern Delivery System Water Treatment Plant and Finished Water Pump Stations Design-Build, Colorado Springs Utilities, Colorado.** This project involved constant coordination with the Utilities' IT and security personnel to provide infrastructure and planning based on their needs. The field instrumentation utilized PROFIBUS DP and PA networks; the low-voltage motor control centers and RTD pump monitoring utilized a DeviceNet network; the stand-alone reduced voltage soft starts and variable frequency drives for each of the finished water pumps and backwash pumps utilized an EtherNet/IP network; and the pump vibration monitoring utilized SKF's proprietary serial protocol and was tied into the existing vibration database with SKF

analytics software for smart vibration monitoring. Allen-Bradley ControlLogix PLCs were used for the process and HVAC PLCs, and they were integrated with Rockwell Automation FactoryTalk View SE HMI. In addition, most of the Field DTMs and Comm DTMs were certified by FDT. Developed I&C design; system-wide and plant-wide network design, including field networks, PLC networks, and a SCADA network; and engineering services during construction.

> **Lead I&C engineer for the Robert W. Goldsworthy Reverse Osmosis Expansion and New Supply Wells, Water Replenishment District of Southern California.** Project responsibilities included performing the complete HMI/SCADA, network, and I&C design for the facility. Provided I&C for the new train and wells, replacing the existing SCADA system with the new Schneider Electric Wonderware Systems Platform, replacing the existing Allen-Bradley PLC-5 controller with a new redundant ControlLogix PAC system, and adding two new CompactLogix PLCs for the supply wells.

> **Lead I&C engineer for the Concentrate Reduction Facilities Project, Chino Basin Desalter Authority, California.** The project involved the addition of an energy recovery turbine, pellet reactors, clarifiers, filters, RO trains, sludge handling, and a chemical system. The control system utilized several redundant, new Emerson ControlWave PACs with MODBUS TCP communication protocols for monitoring and controlling the different processes. The PACs connect to a new Iconics GENESIS64 HMI/SCADA system and integrate with an existing Iconics GENESIS32 HMI/SCADA system via a 1-Gbps fiber optic ring network. The PACs handle 1,164 I/O for the new facility. Project tasks consisted of designing the complete HMI/SCADA, I&C,

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network, and security system for the facility.

> **Lead I&C engineer for the 2015 Water Supply Improvements Project, South Island Public Service District, South Carolina.** This project consisted of building two aquifer storage recovery wells at different locations with pumping for recovery/recharge and appurtenances, including sodium hypochlorite injection, monitor wells, and HVAC. I&C was provided at each site, and a wireless 900 MHz unlicensed radio system was utilized for communication between the various sites. The project also involved an overall SCADA and telemetry upgrade to reduce the polling cycle time by changing wireless serial protocol to wireless Ethernet protocol and by reprogramming the PLCs at each location to poll their sites instead of polling from a central location. The water treatment network utilized Allen-Bradley ControlLogix PLCs and EtherNet/IP Protocol, and the wastewater treatment network utilized Schneider Modicon Quantum/Momentum PLCs and Modbus TCP Protocol. Performed the I&C and wireless radio system design and was involved in the engineering services during construction.

> **Lead I&C engineer for the Jefferson Street Water Treatment Plant Process and Electrical Upgrades, City of Laredo, Texas.** This project involved process and electrical upgrades to the existing plant and increasing the capacity to 65 mgd. Completed I&C design for the plant upgrades, updating instrumentation, installing new GE Rx3i PACs, network cabinets, and the GE Proficy SCADA system.

> **Electrical I&C engineer for the Griswold Water Purification Facility Filter-to-Waste System Design, City of Aurora, Colorado.** Implemented a filter-

to-waste design for 14 existing filters. Designed electrical plans, instrumentation, and controls for the system.

> **Electrical I&C engineer for the Water Treatment Plant Air Scour System, City of Bellingham, Washington.** The project entailed implementing an air scour system for six existing filters. Designed electrical plans, instrumentation, and controls for the air scour blowers and electric actuators.

> **Lead I&C engineer for the Chino Desalter Expansion – Phase II Design, Western Municipal Water District of Riverside County, California.** The project scope included the addition of two new reverse osmosis trains, cartridge filters, and a decarbonator. Involved in the I&C design for the new trains and processes. Designed two Emerson ControlWave PACs and valve networks with two Rotork Valve Master Stations in redundant configuration. Provided engineering services during the construction period, including submittal reviews, coordinating with the programmer and contractor in answering requests for information, and developing as-built/record drawings.

INSTRUMENTATION AND CONTROL – WASTEWATER TREATMENT

> **El&C design manager for the Northeast Regional Water Reclamation System Expansion Plant Expansion, Phase 3 (4 to 12 mgd) at the Doe Branch Water Reclamation Plant, Upper Trinity Regional Water District, Texas.** This project is currently towards the end of the design phase and includes the following major processes: influent lift station/screening, grit removal, aeration basins, blowers, secondary clarifiers, RAS/WAS, dewatering, UV, effluent box, plant electrical building, generators, ventilation alarms in accordance with the

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NFPA 820 requirement, associated electrical, instrumentation, controls, and HVAC improvements. This facility utilizes Schneider Electric Modicon Programmable Logic Controller (PLC) hardware with Schneider Electric EcoStruxure PLC software for the automatic plant control system. This project will add fiber optic infrastructure, five new Modicon M580 PLCs with Remote I/Os (RIOs), several vendor-furnished master control panels, and individual vendor control panels to the existing plant.

> **Lead I&C engineer for the Rowlett Creek and Duck Creek Wastewater Treatment Plants Biosolids Improvements and Odor Control Abatement, City of Garland, Texas.** Two new Allen-Bradley-based PLCs (ControlLogix) were designed and integrated with the existing Wonderware Intouch SCADA system. The centrifuge and blower packaged control systems were integrated with the new PLCs via the EtherNet/IP communication protocol. The new PLCs were added to the existing fiber-ring network. Specific project duties included providing I&C design for all process upgrades.

> **Lead I&C engineer for the Las Vegas Street Wastewater Treatment Facility Biological Nutrient Removal Upgrades, Colorado Springs Utilities, Colorado.** The EI&C portion of this project included providing instrumentation and Allen-Bradley-based PLC systems for aeration and mixed liquor recycle pump upgrades. Fieldbus systems included EtherNet/IP, MODBUS TCP, and/or PROFIBUS DP for the I&C system. Direct duties involved acting as a liaison between the Owner and the discipline I&C engineer.

> **Lead I&C engineer for the Missouri Wastewater Treatment Facility Improvements Final I&C Design and**

Influent Pump Station, City of Belton, Missouri. The project team made improvements to the SCADA system by installing a new Rockwell Automation FactoryTalk SCADA system and replacing the old main control board with an Allen-Bradley ControlLogix PLC. They also provided two more Allen-Bradley CompactLogix PLCs with operator interfaces for IPS and Headworks, Allen-Bradley Remote I/Os for monitoring an existing motor control center (MCC), and the hardware needed for the SCADA and network. Allen-Bradley Device Level Ring (DLR – EtherNet/IP) was provided for the main PLC at the wastewater treatment facility. The IPS pumps and other starters in the new MCCs communicated over EtherNet/IP to the plant control system. Specific responsibilities included automating the existing wastewater treatment facility with a new SCADA system and providing I&C design for a new IPS and headworks building.

> **Lead I&C engineer for the Duck Creek Wastewater Treatment Plant Sludge Transfer Station, City of Garland, Texas.** The project consisted of a new sludge pump station, a new electrical building, and integration with the existing Wonderware SCADA system. The pump package system also included control panels with SCADApack 32 RTUs and Maple System HMIs. Developed fiber and copper interconnection diagrams between various fiber patch panels and managed Ethernet switches. Created detailed P&IDs, specifications, control strategies, control schematics, and instrumentation installation details.

> **Project manager for the Birmingham Wastewater Treatment Plant Effluent Disinfection – Phase II, City of Kansas City, Missouri.** This project included the addition of one new A-B ControlLogix PAC and using wireless Ethernet radio for

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communication with the main water plant. I&C design included selecting and sizing the instruments and control system for a RAS pump station, existing secondary clarifiers, a new chlorination system including sodium hypochlorite storage and feed system, and a new dechlorination system including sodium bisulfite totes and feed system. A wireless interface was provided between the existing Transdyn SCADA system at the main water plant and the Birmingham Wastewater Treatment Plant. Responsible for managing the scope, budget, design, and programming, as well as engineering services during construction. Additional tasks included developing P&IDs, control descriptions, control schematics, and installation details.

> **Lead I&C engineer for the Headworks and Emergency Outfall Improvements, Union Sanitary District, California.** The project involved adding two new screw conveyors, washer compactors, and a new relay panel with hardwired logic. The project also focused on monitoring the existing hydrogen peroxide system, monitoring and controlling the emergency outfall system, and adding a new duplex dechlorination feed system for calcium thiosulfate solution and miscellaneous equipment, including sump pumps and drain pumps. Responsible for developing I&C bid documents, including P&IDs, control descriptions, and reviewing control schematics and installation detail drawings.

> **I&C engineer for the PAR 1085 South Secondary Improvements, Metro Wastewater Reclamation District, Colorado.** This wastewater treatment plant expansion includes a primary effluent pump station, six aeration basins, three Centrate and RAS re-aeration basins, RAS/WAS pump stations, an ammonia and sodium hypochlorite

system, four 2,000-hp blowers, and secondary clarification. The project entailed eight ABB DCS and eleven A-B PACs with FactoryTalk View SE, ME, and RSView software. The I/O list contained 9,000 soft I/O points. Developed a detailed I&C system design, smart P&IDs, network and analog loop drawings, SCADA block diagrams, fiber patch panel and Ethernet switch pin-out and connection diagrams, DCU I/O and network wiring diagrams, detailed panel layouts with BOM, control descriptions, and I&C specifications. Designed vibration monitoring systems and various networks made up of Profibus DP and PA, DeviceNet, Modbus TCP, Modbus RTU, EtherNet/IP, and ControlNet, which included network routing and connection diagrams; documented installation requirements; and networked with CCTVs, smart MCCs, VFDs, power monitors, and FDT-approved instruments. Direct duties also involved submittal review, factory acceptance testing, and start-up plan for fieldbus networks as part of the engineering services during construction.

> **I&C engineer for the 2013 Headworks and HVAC Upgrades – Phase 4D Design, South Valley Water Reclamation Facility, West Jordan, Utah.** Involved in the modification/addition of I&Cs for bioreactors, solids handling, and HVAC.

> **Lead I&C engineer for the Flamingo Water Resource Center South Secondary Treatment Facility (formerly known as the Central Plant) Phase 2 Expansion, Clark County Water Reclamation District, Nevada.** Responsibilities included instrumentation and control engineering design for this \$110 million secondary wastewater treatment project. The 40-mgd facility expansion included four aeration basins (Aeration Basins 13–16) and secondary clarifiers, one blower building, one

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electrical building, one RAS pump station, and two storm-water diversion structures with pump stations. Project highlights included a state-of-the-art aeration system, flexible biological nutrient removal configuration, and high-efficiency secondary clarifier EDIs. The project also consisted of eight new A-B ControlLogix PACs with approximately 2,000 hard-wired I/O points. The PACs, RIOs, workstations, I/O servers, and historian servers were connected on a high-speed Gbps network. Provided engineering services during the four-year construction period, such as submittal reviews, performing factory acceptance testing for the four Turblex blowers, coordinating with the Owner and Contractor in answering requests for information, witnessing field testing for all programmable controllers and instruments, and developing O&M manuals and as-built/record drawings.

> I&C engineer for the Water Reclamation Center Expansion – Phase II Design, City of Wentzville, Missouri.

The project scope included secondary wastewater treatment with the addition of a new aeration basin, final clarifiers, sludge pumps, blowers, and an HVAC system. Responsibilities included I&C design and construction phase services.

INSTRUMENTATION AND CONTROL – INFRASTRUCTURE

> Project manager for the Birmingham Mid-Range Pumps Replacement, City of Kansas City, Missouri. This project consisted of the addition of two pumps with VFDs; a new Allen-Bradley ControlLogix PLC was designed to monitor and control six pumps (two existing, two new, and two future); and a new 900 MHz unlicensed FHSS was designed between this facility and the Birmingham Wastewater Treatment Plant. In addition, the

Birmingham Pump Station was integrated with the existing Transdyn Dynac HMI/SCADA system. Responsibilities included managing the budget, schedule, and I&C engineers, SCADA, and radio system design.

> Lead I&C engineer for the Richardson Spring Creek Lift Station Upgrades, North Texas Municipal Water District, Texas. This project involved the demolition of the existing lift station electrical equipment and the addition of a new electrical building. The electrical building was designed to have new electrical equipment and a PLC control panel. A Modicon M340-based PLC was designed. The radio system was upgraded to replace the existing radio with a GE MDS SD9 licensed radio and was installed inside the new PLC control panel. The lift station monitoring and controls were integrated with the existing FactoryTalk View SE SCADA system at the remote Wilson Creek Regional Wastewater Treatment Plant.

> Lead I&C engineer for the Hendricks, Milmo, and Lyon Water Booster Pump Station Improvements and 3 mg Elevated Storage Tank Design-Build, City of Laredo, Texas. This project consisted of performing construction services for reviewing SCADA/I&C shop drawings and coordinating with the contractor during construction.

> Project engineer for the Southern Delivery System Raw Water Pump Stations Design-Build, Colorado Springs Utilities, Colorado. This project included plant network design such as field instrumentation utilizing PROFIBUS DP and PA networks; low voltage motor control centers and RTD pump monitoring, which utilized the DeviceNet network; medium voltage VFDs for each of the eight 2,500 hp pumps (in each

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pump station), which utilized the EtherNet/IP network; and pump vibration monitoring, which utilized SKF's proprietary serial protocol and tied into the existing vibration database with SKF analytics software for smart vibration monitoring. Allen-Bradley ControlLogix PLCs were used for the process PLCs, and Allen-Bradley CompactLogix PLCs were used for the HVAC PLCs. Additionally, most of the field DTMs and comm DTMs were certified by FDT. Performed I&C design, SCADA network design, and engineering services during construction for each of the Juniper, Williams Creek, and Bradley Pump Stations.

PUBLICATIONS/PRESENTATIONS

- > Yegnaraman, M., Smalling, C., and Ajami, A. "The Journey of a Utility-Wide Control System Upgrade: Collaboration Can Do Some Amazing Things!" Workshop presented at ACE23, Toronto, ON, Canada, June 10–14, 2023.
- > Yegnaraman, M., and Dickinson, D. "From Innovation to Implementation via Automation for Real World WW Applications." Workshop presented at the Water Environment Federation Technical Exhibition and Conference, New Orleans, LA, October 8–12, 2022.
- > Yegnaraman, M. "The Much-Awaited Solution to Consistency, Enhanced O&M, and Efficiency for Water Utilities – ISA112 SCADA." Workshop presented at ACE22, San Antonio, TX, June 12–15, 2022.
- > Ganesan, K., and Yegnaraman, M. "Surge Protection Devices: Feeling lonely, please think about me!" Workshop presented at the International Society of Automation Water/Wastewater and Automatic Controls Symposium, Bethesda, MD, August 7–9, 2018.
- > Yegnaraman, M., Norman, A., and Martin, J. "Implementation of Automation Projects Based on a SCADA Master Plan." Workshop presented at the International Society of Automation Water/Wastewater and Automatic Controls Symposium, Orlando, FL, August 4–6, 2015.
- > Yegnaraman, M., and Luker, O. "SCADA Control System Master Planning and its Benefits." Workshop presented at the Water Environment Association of Texas – North Texas Section February Seminar, Dallas, TX, February 16, 2016.
- > Yegnaraman, M., Norman, A., and Martin, J. "Benefits of a SCADA Master Plan Framework for Utilities." Workshop presented at the International Society of Automation Water/Wastewater and Automatic Controls Symposium, Orlando, FL, August 4–6, 2015.
- > Yegnaraman, M. "Fieldbus for Process Measurement and Control." Workshop presented at the Rocky Mountain Water Environment Association Professional Wastewater Operator Seminar, Estes Park, CO, October 19, 2012.
- > Yegnaraman, M. "Advancements in Instrumentation and Control-Fieldbus Technology." Paper presented at the 85th Annual Water Environment Federation Technical Exhibition and Conference, New Orleans, LA, September 29–October 3, 2012.
- > Yegnaraman, M. "Smart Valves and Instruments." Workshop presented at the California Water Environmental Association Annual Conference, Sacramento, CA, April 17–20, 2012.
- > Yegnaraman, M., Shtessel, Y. B., and George, M. A. "Microcantilever Sensors Using Second Order Sliding Mode Control." Paper presented at the American Control Conference, Minneapolis, MN, June 14–16, 2006.
- > English, J., Shtessel, Y. B., Yegnaraman, M., and George, M. A. "Microcantilever Sensor via Second Order Sliding Mode Control," Paper presented at the

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Nanotechnology Conference and Trade Show, Boston, MA, May 7–11, 2006.

- > Yegnaraman, M. "Sliding Mode Control for Microcantilever Sensor." Technical Report, University of Alabama, April 2005.
- > Yegnaraman, M. "Analysis of Microcantilever Chemical Sensor." Technical Report, University of Alabama, April 2005.
- > Yegnaraman, M. "Microcantilever Chemical Sensors." Poster presented at the American Society of Mechanical Engineers, Nanomechanics: Sensors and Actuators Conference, Knoxville, TN, May 16–18, 2005.
- > Yegnaraman, M. "Control of Constrained Nonlinear Systems." Technical Report, University of Alabama, December 2004.
- > Yegnaraman, M. "Fieldbus for Process Control." Madras Institute of Technology, India, 2004.
- > Yegnaraman, M., and Srishailan, T.V. "Remote Sensing Technology & Smart Transducer Interface." University of Madras, India, 2002.

Patents:

- US11440828B2
- US20210024396A1

Publications:

Authored or co-authored over 30 technical publications and one paperback covering various water and wastewater treatment disciplines, including:

- Supercritical Oxidation of PFAS wastes
- Thermal treatment of PFAS contaminated sludge
- Advance dewatering process and scalping dryer for autogenous combustion of digestion sludge
- Organics diversion strategy and energy production at municipal resource recovery facilities
- High solids thermal hydrolysis
- Anaerobic digestion of municipal and industrial sludge
- Acid - gas phase co-digestion of HSW
- High strength and high solids anaerobic digestion
- Waste to energy conversion technologies



Mr. Viswanathan is Vice President and Head of Municipal and Industrial Solutions at 374Water, a global cleantech, social impact company whose mission is to preserve a clean and healthy environment that sustains life. He spearheads the commercialization and business development of the Supercritical Water Oxidation technology.

Mr. Viswanathan has 25 years of work experience in our industry. He has been involved in all aspects of the water and wastewater treatment and served in roles ranging from pilot plant engineer, research and development, product management and technical sales.

Key Experience:

2022 - **Vice President, Solutions**, 374Water, Durham, NC

- Responsible for business development in private and public municipal markets
- Pioneering efforts to support solutions based on Supercritical Water Oxidation

2016 to 2022 - **National Sales Manager**, Biosolids & Bioenergy, VEOLIA, Cary, NC

- Successfully introduced Veolia's first Ecrusor™ organics extractor, and BioThelys™ THP systems to the US/North American market
- Diversified use of BioCon™ ERS thermal oxidation for PFAS destruction
- Led research efforts in addressing emerging contaminants in municipal sludge
- Responsible for generating over \$583 million dollars in sales pipeline over 5 years

2013 to 2016 - **Group Manager**, Biosolids Group, SUEZ, Richmond, VA

- Responsible for managing Suez's biosolids portfolio for US and Canada.
- Increased sales of non-thermal products in North America by 6% annually since 2013.
- Participate in national and international conferences as key biosolids business developer.
- Assist in determining bid strategy.
- Managed a group of technical sales engineers, application engineers and product managers to support internal and external sales representatives.

2010 to 2013 - **Product Manager**, Biosolids Group, SUEZ, Richmond, VA

- Increased market shares for advanced anaerobic digesters by 50%.
- Diversified use of digester mixing technology to water management applications.
- Deployed solar drying technology into the North American market.

2008 to 2010 - **Principal Engineer**, Biosolids Group, SUEZ, Richmond, VA

- Championed technical sales and developed market for advanced anaerobic digestion technology nationally, and increased sales for digester mixer technology internationally.
- Assisted in preparation of product related sales tools such as product bulletins and media.

- Biological nitrogen removal from wastewater
- Multi stage biofilters for low total nitrogen applications
- Oxygen transfer efficiencies in activated sludge utilizing plastic media for attached growth
- Biological aerated filter cell management to minimize energy utilization of facilities
- Lithium chloride tracer testing in CSTR and plug flow reactors
- High rate clarifiers for spent backwash treatment
- Surrogate measurements to aid drinking water monitoring

2006 to 2008 - **Senior Research Engineer**, Research Development & Industrialization Group, SUEZ, Richmond, VA

- Responsible for transfer of Integrated Fixed-Film Activated Sludge (IFAS) technology to the US market; developed detailed design models for applications including IFAS and Moving Bed Biological Reactor (MBBR).
- Assist in developing new Ultrafiltration Membrane for the US market; developed test protocols in collaboration with engineering team; oversight of construction and commissioning of pilot plant units.
- Developed new Biological Nutrient Removal (BNR) Filter Technology to address low total nitrogen requirements for Chesapeake Bay watershed applications.
- Championed Stage-Gate Project Management with accountability throughout the "New Technology" RDI Cycle.
- Managed technology transfers to various business units within organization.
- Developed intellectual property, internal invention disclosures and patents.
- Managed process box to strengthen technical expertise of the organization; developed detailed design models.

2002 to 2006 - **Research Engineer**, Research Development & Industrialization Group, SUEZ, Richmond, VA

- Lead the research team involved in optimization of innovative physical-chemical and biological technologies.
- Supervised transfer of Dissolved Air Flotation (DAF) Technology to the US market, developed new saturator nozzles to minimize differential pressure loss and diversified technology to nutrient removal applications in wastewater.

2000 to 2002 - **Pilot Plant Engineer**, Research Development & Industrialization Group, SUEZ, Richmond, VA

- Designed and developed testing protocols, programs and implemented start-up and optimization of pilot plant units.
- Provided support for regulatory approval process and served as a liaison with federal, state, and universities addressing contemporary environmental issues via pilot scale testing.

1999 to 2001 - **Master of Science in Environmental Engineering**, Syracuse University, Syracuse, NY

- Advisor: Dr. Raymond D. Letterman.
- Research: Inter-instrument agreement of commercially available turbidimeters used in the water industry. Scholarship sponsored by U.S. Environmental Protection Agency (EPA) and Water Research Foundation (Formally AWWARF).

1993 to 1997 - **Bachelors of Engineering in Environmental Engineering**, University of Mysore, Mysore, India

- Advisor: Dr. K. S. Lokesh Kaggere.
- Research: Applied recycle and reuse principles to optimize waste management within a plywood manufacturing industry. Studied adsorption characteristics of acid impregnated and activated sawdust to develop and construct reactors for the removal phenols from industrial wastewater.



YEARS OF EXPERIENCE
21

YEARS WITH TYLIN
8

EDUCATION
MSc. in Hydraulic Engineering and River Basin Development; UNESCO-IHE, Delft, The Netherlands; Full Scholarship from the "Netherlands Fellowship Program", 2008

BSc. in Civil Engineering; Pontificia Universidad Javeriana, Bogotá D.C, Colombia, 2004

LICENSE
Civil Engineer: Colombia (Reg. No. 25202-110984 CND)

AFFILIATIONS
Water Environment Federation (WEF)
Asociación Colombiana de Ingeniería Sanitaria y Ambiental

Alejandro Montes

Mr. Alejandro Montes is an Associate of TYlin and the current Office Director at Greeley and Hansen Colombia, with 21 years of professional experience in the fields of stormwater/wastewater drainage, wastewater treatment and river engineering. For 8 years he served as technical advisor for the Bogotá Water Utility, Empresa de Acueducto y Alcantarillado de Bogotá EAAB-ESP, focused in the planning, procurement and management of urban drainage and sanitary infrastructure projects. He has worked as a specialized consultant in hydrology, hydraulics and sediment transport, with extensive knowledge in water systems computational modeling. In his years with the firm, Alejandro has served as project manager, and design engineer in numerous projects in Colombia, Ecuador and the United States of America, including wastewater treatment plants, sewage systems, pumping stations and combined sewer overflow studies.

PROJECT EXPERIENCE

EMAPAG-EP, Construction Management of the 112 MGD Los Merinos Wastewater Treatment Plant, Progreso Pumping Station and Progreso PS – Wastewater Treatment Plant Los Merinos Force Main | Guayaquil, Ecuador

Project Specialist

Los Merinos WWTP is designed for an average flow rate of 4.9 m³/s (112 MGD) in the wet season and 4.0 m³/s (91 MGD) in the dry season. The plant includes: (i) Pretreatment (Aerated Chamber, Screening Chamber, Sand Trap Vortex type, sand classifiers), (ii) Primary Water Treatment (three rapid mixing units, two Pre-aeration and flocculation tanks, four primary clarifiers of 58 m diameter, modification to Guayacanes-Samanes lagoons and chlorine contact tank), (iii) Disinfection with NaClO, (iv) 2400 mm Outfall, (v) Sludge Treatment (two Gravity Thickeners, two Fine Screens, three Digesters 10,300m³ each, six band presses) and (vi) System Odor Control (2) consisting of activated carbon filters and dispersion chimney. Responsibilities include technical advice on the flow and hydraulics component of the plant, schedule and cost control, support during meetings with the client, report preparation and QA/QC reviews.

Interagua, Evaluation Study of the Wastewater Treatment and Odor Control System of the Guayacanes - Samanes Wastewater Treatment Plant | Guayaquil, Ecuador

Project Specialist

In recent months, Interagua has received several complaints about problems of bad odors from the Guayacanes – Samanes WWTP, they have carried out studies and improvements to the treatment system and odor control and although the odor problems have reduced, the discomforts and complaints of the population continue. The study evaluated the efficiency of the measures implemented in the treatment of wastewater and in the control of odors from the plant. During the study historical data of flow, wastewater quality, and odor emissions were analyzed together with the improvements performed at the plant to understand the impact in the treatment performance. The hydraulic capacity of the plant, the efficiency of the treatment system and its improvements and operational changes, and the efficiency of the odor control measures, were analyzed chronologically in search of have an opinion of the current system and provide the results of the evaluation as conclusions. The final report was aimed at determining the efficiency of the actions implemented for the efficiency of the treatment system, and the avoiding/mitigation of the odor emanation from the plant. Responsibilities include technical advice on the flow and hydraulics component of the plant, support during meetings with the client, report preparation and QA/QC reviews.

Consortium Aktor, Aqualia Infraestructuras y CASS Constructores y Cía. (Consortium), Performance Evaluation for Digester Mixing System at El Salitre Wastewater Treatment Plant | Bogotá, Colombia

Project Manager/Technical Coordinator

The El Salitre WWTP Upgrade and Expansion Construction Project is bringing the plant to a treatment capacity of 7.1 m³/s (160 MGD). The plant includes eight (8) new digesters of 33.50 m (110 feet) in diameter and 15.0 m (50 feet) in total height, the useful volume of the digesters is 13,717.7 m³ (3 MG). Currently, three (3) of the 8 digesters are built, these three digesters are ready for commissioning. The project consists of assisting the Consortium in the start-up of the digesters to determine the active volume of mixing based on the mixing capacity. The project involves development of a methodology to implement a tracer study in one anaerobic digester and verify the performance of the mixing system to achieve the specified performance criteria: 1) Minimum active volume of 90 percent is achieved under normal operating conditions and 2) the total solids concentration within the anaerobic digester will not vary by more than 10 percent when the solids concentration in the digester is at least 3 percent dry solids by weight (TS). Responsibilities include overall project management, interaction with the client, coordination with different design disciplines, and QA/QC reviews.

Passaic Valley Sewerage Commission Sewer District, Parallel Interceptor Routing Analysis in the Framework of the Regional Long-Term Control Plan for Managing Combined Sewer Overflows | New Jersey, USA

Project Manager

PVSC serves 1.5 million people in 48 municipalities in parts of Bergen, Essex, Hudson, Passaic and Union counties. Eight of the municipalities in the treatment district have combined sewer systems (CSS). The CSS municipalities within the PVSC District include Bayonne, East Newark, Harrison, Jersey City, Kearny, Newark, North Bergen and Paterson. The Regional LTCP was submitted to the NJDEP in September 2020 and compiled the results of the nine individual Selection and Implementation of Alternative Reports (SIARs) into a regional CSO control alternative for the PVSC Treatment District. The LTCP included the proposed construction of a parallel interceptor to capture 85% of the CSOs and direct them to the PVSC WRRF. The objective of the project is to provide additional detail to the parallel interceptor control strategy, by means of a routing analysis to better define the interceptor's size and preferred route, technical design requirements, property needs, potential community impacts, permit requirements, construction methods and cost. The overall goal of this routing analysis is to develop a Level 4 construction cost opinion and further define a portion of the contingencies. Responsibilities include overall task management and coordination with subconsultants, technical advisory to the project team, support during meetings and presentations with the owner, and QA/QC reviews.

Empresa de Telecomunicaciones, Agua Potable y Alcantarillado (ETAPA), Determination of Flow of Non-Residual Water that Enters the Sanitation System (Inflow and Infiltration) | Cuenca, Ecuador

Project Specialist

The project consists of an inflow and infiltration study and involves review of existing information; determination of the variation in the concentration of contaminants in the wastewater entering the Ucubamba WWTP to determine its level of dilution; an extensive water quantity and quality analysis of wastewater at the Ucubamba WWTP and at five (5) pilot watersheds for the quantification of the illicit flow and infiltration into the sewage system; explorations to determine the water table and soil composition; inspection of 50 km of pipeline to verify conditions and operation; and, development of strategies to reduce the entry of non-residual water into the sewer system. Responsibilities include technical advice on the hydrological component of the I/I study, support during meetings with the client, report preparation and QA/QC reviews.

Consortium Tractebel GWK GmbH and HVM Engineers Ltd. (HTA Consortium), Bello Wastewater Treatment Plant Odor Control Technical Opinion | Medellin, Colombia

Project Manager / Technical Coordinator

Through a group claim filed before the civil court of the Bello Jurisdiction, a lawsuit was filed against the HTA Consortium in its role as designer and advisor during the construction, commissioning, and first year of operation of the Bello WWTP. The claim mentions alleged engineering errors that have temporarily given rise to offensive odors in the area surrounding the plant. The project consists of providing a third-party expert technical opinion on the odor control design in the Bello WWTP. The scope includes review and evaluation of documents related to the contractual obligations of the HTA Consortium (design phase and advice during construction), specifically in relation to the odor control systems in the Bello WWTP; analysis of the diligence of the HTA Consortium in the evaluation of the alternatives and the technical recommendations given on the odor control systems, with the aim of avoiding/mitigating the problems of odor emanation from the plant; evaluation of the impact that the designs of the odor control systems and the advice provided by the HTA Consortium may have presented during the construction and commissioning of these odor control systems versus the bad odors emanated from the plant; and, presentation of a technical opinion report (in Spanish) including additional or complementary findings or comments. Additionally, the consultancy includes the accompaniment to the HTA Consortium to present the results of the technical opinion in a hearing before a court (presentation to be made in Spanish). Responsibilities include overall project management, coordination with different design disciplines, interaction with the client, report preparation and QA/QC reviews.

Empresa de Acueducto y Alcantarillado de Bogotá EAAB-ESP, Detailed Design of the 370 MGD (16 m³/s) Canoas Wastewater Treatment Plant | Bogotá, Colombia

Project Manager/Technical Coordinator

Greeley and Hansen was selected in joint venture with Integral S.A. (local Colombian consultants) to provide a complete definition of the detail engineering designs of the Canoas Wastewater Treatment Plant, in all components associated with the secondary biological treatment and disinfection. The secondary treatment facilities designed include a completely automated activated sludge step-feed aeration process, secondary clarification, and chlorine disinfection. As currently planned, the associated solids train include sludge thickening, sludge pre-dewatering, thermal hydrolysis process (THP), anaerobic digestion (AD), biosolids dewatering, beneficial utilization of biosolids and a Biogas Co-generation facility. The designs will complement the detailed design of primary treatment works, carried out by a previous consultant, which in turn will allow to make a public invitation for the construction and commissioning of the entire plant, aiming to meet the effluent quality requirements established by the local authorities. Responsibilities included the overall project management, coordination of the entire project team (including different design disciplines from our partner firm), technical advice on the hydraulic component of the plant design, interaction with the client, report preparation and QA/QC reviews.

Aguas Nacionales EPM S.A. E.S.P, Report on the dispute brought by the Consortium "Aguas de Aburrá – HHA" on aspects of the Bello Wastewater Treatment Plant Design | Medellin, Colombia

Project Manager / Technical Coordinator

Greeley and Hansen was selected by Aguas Nacionales EPM, through a direct-hire assignment, to provide professional engineering services in order to review the documents of the "controversy over designs and engineering" and prepare a technical opinion. Responsibilities included the overall project management, coordination of the entire project team (including different design disciplines and subconsultants), interaction with the client and their legal team, report preparation, QA/QC reviews and accompaniment to present the results of the technical opinion in a hearing before the Controversy Solution Committee (presentation to be made in Spanish).

Empresa de Acueducto, Alcantarillado y Aseo de Bogotá EAB-ESP, Preliminary Design of the 826 MGD (36.2 m³/s) Canoas Wastewater Pump Station and Associated Structures | Bogotá, Colombia

Project Manager / Technical Coordinator

Development of design alternatives and preliminary design documents of the selected scheme. Preparation of technical documents for procurement of the detailed design and construction (design-build) of the pump station facilities. Responsibilities included the overall project management, coordination of the entire project team (including different design disciplines and subconsultant), technical advice on the hydraulic component of the pump station preliminary design, interaction with the client, report preparation and QA/QC reviews.

Empresa de Acueducto, Alcantarillado y Aseo de Bogotá EAB-ESP, Bogotá River Sanitation Program | Bogotá, Colombia

Technical Advisor

Responsible for activities related with the development of trunk sewer infrastructure and other main hydraulic structures. Advisory in the planning, procurement and execution of projects associated with the city's main drainage system and sewage networks, including project setup, design reviews, hydrodynamic modeling of trunk sewer networks and open channels, as required for the development of these mentioned projects.

Empresa de Acueducto, Alcantarillado y Aseo de Bogotá EAB-ESP, Bogotá River Flood Defense and Hydraulic Rehabilitation Project and its Interaction with the City's Main Drainage Network | Bogotá, Colombia

Technical Advisor

Technical advisory in the development of the Bogotá River Megaproject in close collaboration with the Regional Environmental Authority (CAR). Responsible for the fulfillment of the hydraulic engineering component of projected infrastructure (including trunk sewer tunnels, pumping stations and treatment plant headworks). Responsible for the implementation of the Bogotá River hydrodynamic model to study the influence of projected river interventions on the city's main drainage system. Review of hydraulic designs for new trunk sewer infrastructure. Participation in different interinstitutional committees for the procurement of funds and follow-up of projects related with the restoration of the Bogotá River.

Municipality of Girardot for ACUAGYR S.A. E.S.P, Feasibility Study Aimed to Defining the Wastewater Treatment System | Colombia

Project Engineer

Development of hydrological studies to determine design flows for the trunk sewer system and treatment plants in the municipality of Girardot. Hydraulic analysis for the pre-design of conduits and preliminary treatment structures.

Empresa de Acueducto, Alcantarillado y Aseo de Bogotá EAB-ESP, Study, Analysis, and Processing of Hydrological and Meteorological Data Produced in the Gaging Stations | Bogotá, Colombia

Project Engineer

Review and update of rating curves for the processing of hydrometric information and development of technical reports regarding the analysis and processing of hydro-meteorological data.

Empresa de Acueducto, Alcantarillado y Aseo de Bogotá EAB-ESP, Study and Review of the IDF / PDF Curves for City of Bogotá and its Surroundings | Bogotá, Colombia

Project Engineer

Analysis and characterization of storms in the city of Bogotá and its surroundings, for the review and update of IDF/PDF design curves, incorporating the information available until the year 2003.

Interagua, Development of detailed designs for the construction of a sludge treatment plant for process effluents generated by the 317 MGD "La Toma" drinking water treatment complex | Guayaquil, Ecuador

Project Specialist

The water treatment plants of the La Toma complex produce around 1.2 million m³/day (317 MGD) of water for human consumption, production that serves the city of Guayaquil. Within the treatment process, sludge is generated from clarifier purges and filter washing. Currently, these sludges are not treated prior to discharge into the Daule River. Interagua needs to define and detail the treatment train for the effluents from the 4 water treatment plants of the La Toma complex (3 existing and 1 to be built) and achieve compliance with the applicable environmental regulations. Responsibilities include technical advice on the flow and hydraulics component of the plant, schedule and cost control, support during meetings with the client, report preparation and QA/QC reviews.

Empresa de Acueducto, Feasibility Analysis to Determine the Transition Scheme for the 228 MGD (10 m³/s) Tibitoc Wastewater Treatment Plant, Following the Close-out of a 20-year Private Concession Contract, | Bogotá, Colombia

Project Manager/Technical Coordinator

Analysis of the technical feasibility to support other financial, economic, legal and regulatory studies, in order to identify and define the most appropriate scheme for the operation transition of the Tibitoc Wastewater Treatment Plant, following the close-out of an extended private scheme. Responsibilities include overall project management, report preparation, interaction with the client, and QA/QC reviews.



Catherine B. Earp, PE

Senior Water Resources Engineer



Catherine Earp brings 20 years of water resource engineering experience involving transportation drainage, hydrologic and hydraulic modeling, floodplain mapping, drainage and flood relief design and permitting efforts. She served for seven years in Florida Department of Transportation’s Central Office Drainage Group.

Ms. Earp’s AtkinsRéalis experience includes:

District 3, State Road 61, Wakulla County, Florida Dept. of Transportation, Chipley, FL. AtkinsRéalis Project Manager for FPID 450896, widening of State Road 61 from 2 to 4 lanes including drainage, signalization, structures, and lighting components. **Duration:** 12/23-present.

District 3, Drainage Continuing Services Contract, Florida Dept. of Transportation, Chipley, FL. AtkinsRéalis Project Manager for providing on-call permit review support, database work, flood resilience projects and general drainage assistance. **Duration:** 06/2021-present.

District 3, State Road 20 PD&E Study, Florida Dept. of Transportation, Leon County, FL. Supported the project’s WATERSS effort through data collection and analysis, stakeholder coordination and vetting of regional watershed opportunities. **Duration:** 02/2023-7/2024.

Roadway Design Office, Drainage Support Services, Florida Dept. of Transportation, Central Office, Tallahassee, FL. Senior engineer responsible for providing technical support for the FDOT Central Office Drainage Section. (ongoing)

Office of Environmental Management, Florida Dept. of Transportation, Central Office, Tallahassee, FL. Senior engineer responsible for providing technical support for the FDOT Office of Environmental Management Office. (ongoing) Special assignments include developing the WATERSS Process Guidebook and training, co-author of the upcoming Resiliency Chapter and general PD&E Manual Updates, including a rewrite of Chapter 11 - Water Resources.

Hydraulics Unit, North Carolina Department of Transportation, Raleigh, NC., Senior engineer responsible for providing technical support to the NCDOT Hydraulics Unit and co-author of the recently published hydroplaning assessment policy and tools. (ongoing)

Client Manager for Walton County Public Works, Walton County, FL. Ms. Earp manages and designs drainage and transportation design projects involving roadway/intersection improvements, pavement design, storm sewer and French drain within a confined urban right-of-way with utility, maintenance of traffic, permitting and constructability challenges. **Duration:** 08/2021-present.

Ms. Earp served as panel member for NCHRP 15-55, *Guidance to Predict and Mitigate Dynamic Hydroplaning on Roadways*. The main objective of this research

Total years of experience

20

Years with firm

5

Education (Heading)

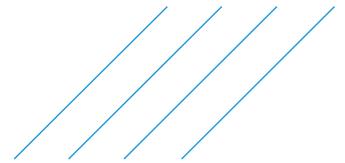
B.S., Engineering, University of Florida, 2003

Registrations/licenses

Professional Engineer
Florida 70877, 2009

Catherine B. Earp, PE

Senior Engineer



was to further the science and develop guidance to better predict and mitigate hydroplaning potential on roadways.

Prior to joining AtkinsRéalis, M. Earp's experience included:

Assistant State Drainage Engineer, Florida Department of Transportation, FL.

- Co-authored the design guidelines for hydroplaning risk assessment and lead the interdisciplinary team that created the hydroplaning analysis software.
- Developed design guidance on two-dimensional hydraulic modeling and participated as state representative to FHWA EDC Initiative to integrate into standard design practice.
- Managed the development of FDOT's innovative Watershed Approach to Evaluating Regional Stormwater Strategies (WATERSS) to promote an approach to collaborative stormwater management.
- Initiated the industry team to develop the standard specification and design approach for articulating concrete block, fabric formed concrete and gabion block mattresses.
- Served as the DOT's Director on the UCF Stormwater Academy, an environmental policy and research center for the development of policy on stormwater management.

Key Experience

Co-author of the WATERSS Process Guidebook for FDOT and delivered training to FDOT, regulatory partners and consultant community. The Guidebook integrates the pursuit of innovative stormwater management into FDOT's production phases. (2020 – ongoing)

Co-author of the North Carolina Department of Transportation hydroplaning policy, procedures, the Hydroplaning Assessment Tool (HAT) and the Hydroplaning Mitigation Selection Guide. (2020 – ongoing)

Co-authored and trained on the Hillsborough County Green Infrastructure Manual providing selection, design, and maintenance guidance on green infrastructure suitable to the region. (2022 – 2024 published)

Co-authored the new Resilience chapter of the FDOT PD&E Manual, creating FDOT's approach to identifying and documenting resilience measures in PD&E, Design, Construction, and Maintenance Phases. (2024 - ongoing)

Publications

Atkins Journal, 2023, *Advancements to Hydroplaning Risk Assessment*

Presentations

- *WATERSS Statewide Workshop*, Florida Dept. of Transportation, 2021.
- *North Carolina Dept. of Transportation Hydroplaning Policy, Analytical Tool Development, and Mitigation Strategies*, National Hydraulics Engineering Conference, 2022.
- *WATERSS Process Training*, Florida Dept. of Transportation, 2023.

COREY WILLIAMS, PE



Board and Advisory Appointments

- WEF Trustee
- Imagine H2O Advisor
- Board of Directors, Kando
- Strategic Advisor, Daupler

Highlights of Career Impact

- Co-Founder of Water and Wastewater CIO, CFO, CIP, and CEO Forums
- Author of more than 75 papers and trade publication articles
- Co-author of multiple Water Environment Federation Manuals

Leadership

Competencies:

- Executive Leadership & Operations Management
- Strategic Planning & Execution
- Turnaround & Organization Change
- Risk Management & Strategic Decision-Making
- Business Growth Initiatives & Strategy
- Mergers & Acquisitions

Education

- BS, Civil Engineering
Kansas State University
- Professional Engineer:
Kansas

Relevant Experience

President and CEO, SmartCover

January 2021 – Present

Serve as President and CEO of SmartCover, a leading sewer IoT and data analytics company. As the principal executive, I oversee all aspects of the business, including strategic direction, team leadership, product innovation, partner development, financial oversight, and operational management. I am deeply committed to fostering a high-performance culture built on transparency, collaboration, and accountability. By driving clear communication across all levels of the organization and aligning strategy with disciplined execution, SmartCover has achieved record-breaking performance during my tenure.

President and CEO, Optimatics

October 2012 – January 2021

Served as President and CEO of Optimatics, a provider of advanced genetic algorithm software for the water industry. As the principal executive, I led the entire business operation, driving strategic planning while also holding direct responsibility for sales leadership and business development. Through disciplined execution and alignment across teams, Optimatics achieved 30% year-over-year sales growth, successfully transitioned to a full Software-as-a-Service (SaaS) model, expanded its global sales footprint, and secured multiple rounds of venture funding. Under my leadership, the company was acquired by Suez in September 2018.

Vice President, Inflection Point Solutions

January 2005 – October 2012

Served as Founder, Vice President, and General Manager of Inflection Point Solutions (IPS), a software development and management consulting firm serving the water industry. I led the company through transformative growth, including a ninefold increase in personnel and a 400% revenue expansion. My responsibilities spanned sales leadership, software implementation oversight, and strategic direction of the firm's technology consulting practice. I was also the key escalation point for complex strategic and technical challenges during customer engagements. During my tenure, I led the acquisition of more than five specialized software and consulting firms within the water sector. I continue to hold a minority ownership stake in the company.

Department Head and Senior Director, Black & Veatch

January 1992 – January 2005

Served thirteen (13) years at Black & Veatch, a national engineering firm, with the last seven (7) years as leader of the firm's 35-member Utility Information Systems Department. During that time, received numerous awards from Black & Veatch, including Top Sales and Outstanding Department Performance.

CHANGYOON JUN, Ph. D. Candidate

Environmental Engineering
 University of Michigan
 1661 McIntyre Street, Ann Arbor, MI, 48105
 Email: cyjun@umich.edu
 Phone: (734) 780-6655

RESEARCH INTERESTS

With a unique problem-solving capacity developed through a blend of rigorous academic training and extensive industry experience, and grounded in both research and practical expertise, the following areas are prioritized:

- **Energy/Resource Neutral:** Focused on energy and resource savings and recovery in wastewater treatment plants, leveraging engineering fundamentals and advanced statistical analysis.
- **Optimized Operations:** Development of a collaborative hybrid system optimization algorithm that integrates deterministic models with a reinforcement learning framework.

EDUCATION

2020 – Present	Ph.D. Candidate in Environmental Engineering <ul style="list-style-type: none"> - University of Michigan, Ann Arbor, MI (Advisor: Glen T. Daigger)
2020 – Present	M.S Statistics <ul style="list-style-type: none"> - Dual degree program in University of Michigan, Ann Arbor, MI
2016 – 2018	M.S Environmental Engineering <ul style="list-style-type: none"> - University of Michigan, Ann Arbor, MI (Advisor: Glen T. Daigger)
2003 – 2011	B.S Environmental Engineering <ul style="list-style-type: none"> - University of Seoul, Seoul, South Korea

PROFESSIONAL EXPERIENCE

2014 – 2018	LG-Hitachi Water Solution Co., Ltd., South Korea <ul style="list-style-type: none"> - Project Manager in municipal/industrial wastewater, waste incineration, and renewable energy projects
2013 – 2014	Rothwell Watertech Co., Ltd. , South Korea <ul style="list-style-type: none"> - Co-founder, Manager for process engineering and proposal.
2011 – 2013	Kukdong Construction & Engineering Co., Ltd., South Korea <ul style="list-style-type: none"> - Assistant in project develop team
2010, Mar.-Aug.	Dongbu Engineering Co., Ltd. , South Korea <ul style="list-style-type: none"> - Intern in bioreactor engineering

RESEARCH EXPERIENCE**Research Projects**

2020 – Present	Data-Driven Air Scouring Optimization of Membrane Bioreactor (MBR) System <ul style="list-style-type: none"> - Supported by Fibrecast Ltd. - Role: Lead Graduate Researcher, University of Michigan
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- Task: Developed an air scouring optimization algorithm for a full-scale MBR system based on data analysis, empirical model development, pilot plant experiments, and advanced statistical tools, including machine learning algorithms.
- 2020 – 2022 Biological Phosphorus Removal Modeling in High Purity Oxygen (HPO) Process
- Supported by Great Lakes Water Authority (GLWA)
 - Role: Lead Graduate Researcher, University of Michigan
 - Task: Modeled the liquid stream of a non-EBPR activated sludge system and identified the causation of biological phosphorus removal (bio-P) using batch experiments and data analysis.
- 2016 – 2018 Establishment of Smart Platform for Water-Energy Self-Sufficient Island
- \$4.4 million project supported by the National Institute of Energy Technology Evaluation and Planning, South Korea
 - Role: Project Manager, LG-Hitachi Water Solution Co., Ltd.
 - Task: Organized and managed a sustainable water project for remote areas, overseeing proposal preparation, bidding, and the integration of a containerized desalination system, solar power generation, and Energy-Saving Storage (ESS) systems.
- 2013 – 2014 Biological Nutrient Removal Process in Wastewater Treatment for Developing Countries
- In-house R&D by Rothwell WaterTech Ltd., South Korea
 - Role: Process Engineer, Rothwell WaterTech Ltd.
 - Task: Conducted research and development to design a modular, adaptable biological nutrient removal system using vertical steel pipe modules instead of concrete-based structures.
- 2011 – 2012 Development of a Flexible and Scalable Wastewater Treatment Process Adaptable to Economic Development Stages
- \$17.3 million project supported by Ministry of Environment of Korea, South Korea
 - Role: Assistant Engineer, Kukdong Construction & Engineering Co., Ltd.
 - Task: Assisted in project organization, proposal preparation, bidding, and participated in process conceptualization, design, and construction at a test site.

Peer-Reviewed Journal Articles

- [2] **Jun, C.**, Aghasadeghi, K., & Daigger, G. T. (2024). Optimizing Air Scouring Energy for Sustainable Membrane Bioreactor Operation by Characterizing the Combination of Factors Leading to Threshold Limiting Conditions. *Membranes*, 14(3), 58. <https://doi.org/10.3390/membranes14030058>
- [1] **Jun, C.**, Norton Jr, J., Khan, M., Wiley, C., Busch, A., & Daigger, G. T. (2023). Diagnosing and characterizing the mechanisms of biological phosphorus removal at the Great Lakes Water Authority (GLWA) water resource recovery facility (WRRF). *Water Environment Research*, 95(7), e10903. <https://doi.org/10.1002/wer.10903>

Conference Presentations

- [4] **Jun, C.**, Aghasadeghi, K., & Daigger, G. T., Optimizing Air Scouring Energy for Sustainable Membrane Bioreactor Operation by Characterizing the Combination of Factors Leading to Limiting Condition, IWA World Water Congress & Exhibition 2024, Aug. 11st-15th 2024
- [3] **Jun, C.**, Aghasadeghi, K., & Daigger, G. T., Optimizing Air Scouring Energy for Sustainable Membrane Bioreactor Operation by Characterizing the Combination of Factors Leading to Limiting Condition, 2024 Membrane Technology Conference by AMTA-AWWA, Mar. 4th-7th 2024

- [2] **Jun, C.**, Aghasadeghi, K., & Daigger, G. T., Dimensional Analysis to Establish Relationships Between Energy Input and Solid Removal for Particle Separation (MBR) Membranes, The 10th International Water Association Membrane Technology Conference & Exhibition for Water and Wastewater Treatment and Reuse, Jul. 23rd-26th 2023
- [1] **Jun, C.**, Khan, M., Willey, C., Blackburn, L., & Daigger, G. T., Data Driven Diagnosing and Improving Biological Phosphorus Removal at the Great Lakes Water Authority (GLWA) Water Resource Recovery Facility, 2022 Water Environment Federation's Technical Exhibition and Conference (WEFTEC), Oct. 10th-12nd 2022

HONORS AND AWARDS

Mayor's Award Certificate of Appreciation "Successful Accomplishment of The Public-Private Partnership on Establishment of Energy Storage System (ESS) in Jungnang Sewage Treatment Plant, The Largest and Biggest Sewage Plant in Korea" Seoul Metropolitan Government, Korea, Mar. 2018

The Best Employee Award in 2017, LG-Hitachi Water Solutions Co., Ltd, Dec. 2017

The Best Employee Award in 2015, LG-Hitachi Water Solutions Co., Ltd, Dec. 2015

The Best Employee Award, Kukdong Construction & Engineering Co., Ltd, Jun. 2012

The Best New Employee Award, The Wongjin Group, Feb. 2011

CERTIFICATIONS

Certification of Qualification "Water Quality Environmental Engineer", Human Resources Development Service of Korea, Sep. 2010

Certification of Qualification "Civil Engineer", Human Resources Development Service of Korea, May 2010

Certification of Qualification "Soil and Aquifer Environmental Engineer", Human Resources Development Service of Korea, Dec. 2009

E-Test Professional 1st Grade (The verification of utilizing Word, PowerPoint, and Excel programs), Samsung SDS multi-campus, Feb. 2007

COMPETENCES

Programming Language: Matlab, Python, and Program R

Engineering Software: SUMO (WWTP modeling), MINTEQ, MS Project, and AutoCAD

Language: English and Korean

Other: MS Office

PROFESSIONAL PROJECT EXPERIENCES

- [33] Floating Solar Photovoltaic (PV) Power Generation Plant on Lake Sapgyo, Korea, Korea Rural Community Corporation, Sep. 2017 - Mar. 2018
- [32] Energy Storage System (ESS) in Nanji Sewage Treatment Plant, Korea, City of Seoul, Sep. 2017 - Mar. 2018
- [31] Magnitude ESS in LG Display Factory in Paju, Korea, LG Display, Aug. 2017 - Mar. 2018
- [30] ESS system in Sihwa Industrial Complex Power Plant, Korea, GS Power, Oct. 2017 - Dec. 2017
- [29] The Expansion of Bongdam Sewage Treatment Plant, Korea, City of Hwaseong, Jul. 2017 - Sep. 2017
- [28] ESS in Jungnang Sewage Treatment Plant, Korea, City of Seoul, May 2017 - Mar. 2018
- [27] ESS in LG Electronics Factory in Gumi, Korea, LG Electronics, Feb. 2017 - Jun. 2017
- [26] Rehabilitation of Y Sewage Treatment Plant, Korea, City of Yeoncheon, Feb. 2017 - May 2017

- [25] Rehabilitation of Wastewater Treatment Plant of ChongKunDang-Bio Factory in Ansan, Korea, ChongKunDang-Bio, Jan. 2017 - May 2017
 - [24] Water-Energy Self-Sufficient Island in Mekong River Region, Vietnam, Korea Science and Technology Ministry, Oct. 2016 - Mar. 2018
 - [23] The Expansion of Ganghwa Sewerage Treatment Plant, Korea, Korea Environment Corporation, Aug. 2016 - Dec. 2016
 - [22] Wastewater Treatment Plant in National Industry Complex (East Side), Korea, Ministry of Environment of Korea, Aug. 2016 - Dec. 2016
 - [21] Process Water Treatment and Wastewater Treatment of Pocheon Combined Heat & Power Plant, Korea, GS E&C, Mar. 2016 - May 2016
 - [20] Bandar-Abbas Reverse Osmosis (RO) Water Desalination Plant Project, Iran, Asia Water Development Engineering Company, Jan. 2016 - Nov. 2016
 - [19] Paju Sewage Treated Water Recycling Plant, Korea, City of Paju, Dec. 2015 - Dec. 2017
 - [18] Procurement M/F System for Treated Sewage Recycling Plant, Korea, GS E&C, Oct. 2015 - Jul. 2016
 - [17] The Expansion and Process Modification of Jinwi Sewage Treatment Plant, Korea, City of Hwaseong, Feb. 2015 - Aug. 2015
 - [16] Process Water Treatment and Wastewater Treatment for Anyang Combined Heat & Power Plant, Korea, GS Power, Mar. 2016 - May 2016
 - [15] Procurement of RO System for LG Chemical Filtration Factory in Cheongju, Korea, LG Chemical, Oct. 2014 - Nov. 2014
 - [14] Process Water Treatment and Wastewater Treatment of KLPE Plant, Kazakhstan, LG Chemical KLPE, Jul. 2014 - Sep. 2015
 - [13] Process Water Treatment and Wastewater Treatment Plant of LG Chemical 5AA Factory in Yeosu, Korea, LG Chemical, Apr. 2014 - May 2014
 - [12] Yeosu Sewage Treated Water Recycling Plant, Korea, City of Yeosu, Mar. 2014 - Nov. 2015
 - [11] Waste to Energy Plant in Chuncheon, Korea, City of Chuncheon, Mar. 2014 - Jun. 2015
 - [10] Feasibility Study for Rehabilitation of Juliaca Sewage Treatment Project, Peru, Funded by Korea Plant Industries Association (KOPIA), Jan. 2014 - Mar. 2014
 - [9] Feasibility Study for The Rehabilitation of Water Treatment Plant and The Improvement of Water Supply in Central-Java, Indonesia, Funded by Korea Environmental Industry Technology Institute (KEITI), Sep. 2013 - Mar. 2014
 - [8] Feasibility Study for Water Supply on Balongan Refinery Plant Project, Indonesia, Funded by Korea Environmental Industry Technology Institute (KEITI), Feb. 2013 - Sep. 2013
 - [7] Rehabilitation for F Sewage Treatment Plant, Colombia, City of Funza, Feb. 2013 - Apr. 2013
 - [6] Manizales Sewage Treatment Plant, Colombia, City of Manizales, May 2012 - Jan. 2013
 - [5] Waste to Energy Plant in Asan, Korea, Korea Environment Corporation, Feb. 2012 - Jul. 2012
 - [4] Pocheon Sewage Treated Water Recycling Plant, Korea, City of Pocheon, Jun. 2011 - Dec. 2012
 - [3] Umbulan Metropolitan Water Treatment Plant and Supply System, Indonesia, East Java Province, May 2011 - Jan. 2013
 - [2] Palembang Sewage Treatment Plant, Indonesia, Palembang Province, May 2011 - Jan. 2013
 - [1] Westonaria Sewage Treatment Plant, South Africa, Westonaria Province, Mar. 2011 - Apr. 2012
-

REFERENCES

Glen T. Daigger, PhD

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Civil and Environmental Engineering
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E-mail: jykoo@uos.ac.kr

Daniel Jackson, PE

Principal/Senior Vice President

Mr. Jackson offers experience with collection system planning programs, sanitary sewer evaluation studies, water and sewer rehabilitation design, collection systems design, hydraulic capacity analysis, master planning, and construction inspection/management. He has also worked with clients to develop programs to meet regulatory mandates, assisted in consent decree negotiations with the DOJ, and brings a strong knowledge base with municipal maintenance/management.

RELATED PROJECT EXPERIENCE

SECAP Update and Collection System Master Plan, Little Rock Water Reclamation Authority, Arkansas—Project Director. Led a multi-year, consent-driven initiative to eliminate SSOs in compliance with a Consent Administrative Order (CAO). Managed a comprehensive update of the existing SECAP, including overseeing flow monitoring efforts (86 meters/9 rain gauges) and the development of a detailed InfoWorks hydraulic model (7.4 million LF all-pipe/32 lift stations). Directed the analysis of future flow requirements based on current and projected population data, as well as the performance and capacity evaluations of 3 WWTPs and their lift stations. Developed prioritized improvement plans, balancing efficacy, risk, and costs to guide phased system upgrades.

CMOM Program Development, Temple, Texas—Project Director. Engineering consulting to development the tenets of a CMOM program adhering to guidelines stipulated by the EPA Administrative Order. Services included developing a structured plan for management of the wastewater collection system to optimize system performance including a roadmap for condition assessments and rehabilitation, and recommendations for operation improvements.

SECAP and Friars Creek Assessment, Temple, Texas—Project Director. Comprehensive, systemwide evaluation of the collection system to eliminate SSOs in compliance with an EPA administrative order. Services included field condition inspections flow monitoring (36 meters/8 rain gauges) and construction of a systemwide hydraulic model—2.3M LF of gravity sewer, 88,000 LF of force main, 29 lift stations, and 2 WWTPs—to evaluate capacity issues and prioritize basins for condition assessments based on I/I. She has managed complex programs and provided creative and pragmatic results to several Consent Driven programs across EPA Region 6.

Citywide Sewer Study and Rehabilitation Program, Hot Springs, Arkansas—Project Director. Citywide sewer study to identify I/I and develop mitigation solutions. A complex, systemwide hydraulic model was constructed (2.3M LF/3,300 grinder pumps) to assess system performance, evaluate alternatives, and develop prioritized rehabilitation recommendations. Services included flow monitoring (65 flow meters/15 rain gauges), flow data analysis, manhole inspections (12,082), smoke testing (1.9M LF), dye testing (391 setups), and NASSCO CCTV review (170,000 LF). Design and construction inspection services repaired, replaced, upsized, and rehabilitated 5,500 manholes, 22,000 LF of gravity sewer, and 10,000 LF of force main.



EDUCATION

BS—Civil Engineering (Texas Tech University, 2002)

EXPERIENCE

23 years

REGISTRATIONS

PE—Arkansas #13978

PE—Texas #102137

CERTIFICATIONS

OSHA 10-Hour Safety Certification #30-003173557

4-Hour Work Zone Traffic Control

Confined Space Entry and Rescue

TECHNICAL PRESENTATIONS

“Success in Little Rock’s 20-Year Consent Administrative Order Program” 2024 - EPA Region 6 CMOM Workshop

“Bridging the Gap: Bringing Data Transparency in a Citywide Condition Assessment,” 2022 - WEF Collection Systems Conference

“Successful Removal from a CAO - The Hot Springs Story,” 2018 - AWW & WEA

“Asset Management for Collection Systems,” 2017 - AWW & WEA

MEMBERSHIPS

Water Environment Association of Texas

Water Environment Federation



Kevin Alspach, P.E.

Asset Management Lead

Kevin has extensive knowledge of condition assessment, inspection, cleaning, and rehabilitation of both gravity and pressure pipes. His design experience includes multi-million-dollar inspection and rehabilitation programs across the Nation using a balance of Automated Defect Recognition technology and human verification. Further, Kevin has extensive experience modeling inspection data to assess the benefits of site-specific intervention and remaining useful life of the sewers on a “stick-by-stick” basis.

Firm

AECOM

Years of Experience

Total Years: 11

Education

- MS, Civil Engineering, The University of Akron, 2023
- BS, Civil Engineering, The University of Akron, 2016

Registrations

- Professional Engineer: Ohio
- NASSCO Pipeline, Manhole, and Lateral Assessment

Presentations/Papers

- Tapered Liner Emergency Trenchless Rehab of a Large Hole and Void in North Park Brick Sewer – One Water 2024
- Practical Aspects for the Design of Close-fit Liners for Gravity Sewers using ASCE MOP 145 – SCEC 2024
- Rehabilitation of the 105 Year Old Lakewood Interceptor Tunnel with Glass Reinforced Plastic Composite Pipe – UESI Pipelines 2024
- Evaluating ASCE MOP 145 Annular Gap Impact on Existing Standards for Non-Reinforced Cured-in-Place Pipe – 2023 Thesis

Selected Project Experience

California Department of Water Resources Deferred Maintenance Program, Sacramento, CA. Lead Engineer in design and construction inspection of the rehabilitation of over 260 levee pipes with cured-in-place pipe. Lead Engineer responsible for review and quality management of inspection data for over 1,300 pipe penetrations through levees including diver, SONAR, and multi-sensor inspections. The pipes were typically corrugated metal and ranged from 24 to 60-inches in diameter. Additionally, screened data for cured-in-place eligible pipes based on condition assessment.

Small Diameter Cleaning and Inspection, Warren, OH. Lead Engineer in condition assessment and review of inspection data of approximately 100,000 linear feet of small diameter sewers ranging from 8 to 30-inches. The sewer was inspected using traditional CCTV and data was reviewed using Artificial Intelligence from AECOM’s Pipe Insights.

North-South Interceptor Cleaning and Inspection, Warren, OH. Lead Engineer in condition assessment and review of inspection data of approximately 20,000 linear feet of 27 to 78-inch RCP. The sewer was inspected with multi-sensor technology (SONAR/LIDAR/CCTV). Pipe was evaluated using a deterioration model to assess risk of failure to aid in repair recommendations.

Lakewood Interceptor Tunnel Rehabilitation, Lakewood, OH. Lead engineer responsible for condition assessment and design of the rehabilitation the City of Lakewood’s interceptor sewer. The project included preliminary analysis and design of trenchless rehabilitation technologies to line over 20,000 linear feet of 42.5-inch width by 56.5-inch height egg-shaped (48-inch circular equivalent) segmented block interceptor sewer. The sewer was inspected with multi-sensor technology (SONAR/LIDAR/CCTV).

Trunk Sewer Inspections and Surveying, Hyattsville, MD. Lead Engineer responsible for condition assessment and review of inspection data of approximately 15,000 linear feet of AWWA C300 and ASTM C76 low pressure sanitary sewers. The sewer was inspected with multi-sensor technology (SONAR/LIDAR/CCTV) and in some areas, pure SONAR.

Red Run Sewer Condition Assessment, Warren, OH. Lead Engineer in condition assessment and review of inspection data of approximately 30,000 linear feet of 60 to 72-inch CMP, 84-inch segmented block, and 54 to 120-inch RCP. The sewer was inspected with AECOM field crews via walking and handheld camera. Pipe was missing a significant portion of its invert and was evaluated using a deterioration model to assess risk of failure to aid in repair recommendations.

California Department of Water Resources Pool 17 and 18 Embankment and Liner Raise, Pool 20 and 21 Embankment and Liner Raise, CA: Lead Engineer in the assessment and preliminary design of trenchless replacement/rehabilitation of over 30 concrete water mains that cross under the California Aqueduct. The pipes were a combination of gravity (RCP), low pressure (RCP), and high-pressure bar wrapped concrete cylinder pipe (CCP) and contain several bends. Assessment was performed via remote CCTV and preliminary design evaluation included a review of microtunneling, horizontal direction drilling, CIPP, and modified close fit slip lining methods.

Water Main Cathodic Protection Program, Ottawa County, Ohio: Engineer involved in evaluation of Ottawa County's cathodic protection program for their water mains. Included a sensitivity analysis using ASME B31G Level 1 to provide a useful life estimate and assess risk of their ductile iron pipe inventory.

Pine Avenue Sewer Condition Assessment, Warren, OH. Lead Engineer in condition assessment and review of inspection data of approximately 28,000 linear feet of 15 to 48-inches RCP, clay tile, VCP, and brick sewers. The sewer was inspected with traditional CCTV and multi-sensor technology (SONAR/LIDAR/CCTV). Pipe was evaluated using a deterioration model to assess risk of failure to aid in repair recommendations.

Springwells Water Treatment Plant Outfall Rehabilitation, Detroit, MI. Lead Engineer with the alternative evaluation of several rehabilitation methods to renew 810 linear feet of 54-inch diameter brick sewer. The rehabilitation methods consisted of cured-in-place pipe, sliplining, insitu coating (shotcrete), spiral-wound lining, PVC grout in place liner, and bonded FRP liner.

NM6 Emergency Culvert Inspection, Los Lunas, NM. Lead Engineer in condition assessment and recommendation for rehabilitation of an emergency culvert bridge crossing failure located in Los Lunas, New Mexico. The project included evaluated of several trenchless rehabilitation technologies (CIPP, sliplining, spiral wound PVC, and spray on liners) versus open cut replacement of a 54-inch diameter CMP culvert.

South Central Light Rail Extension, Phoenix, AZ. Lead Engineer responsible for condition assessment and recommendations for the rehabilitation of approximately 20,000 LF of storm sewers surveyed as a part of a new light rail system in the downtown area. Also provided design for installing an 84-inch cured-in-place pipe liner.

French Creek Interceptor Rehabilitation Improvements, North Ridgeville, OH. Lead Engineer in condition assessment and review of inspection data of approximately 75,000 linear feet of 24 to 60-inch RCP sewers. The sewer was inspected with pole camera and multi-sensor technology (SONAR/LIDAR/CCTV). Pipe was evaluated using a deterioration model to assess risk of failure to aid in repair recommendations.

Broad Main Pleasant Sanitary Sewer Improvements: North Ridgeville, OH. Lead Engineer responsible for reviewing CCTV data, providing recommendations, cost estimates, bid documents, and construction inspection for cured-in-place pipe lining of approximately 10,000 LF of 8-inch sanitary sewers, cementitious lining of manholes, and open cut point repairs.

2022/2021 Sewer Rehabilitation – Bayberry Area, Seven Hills, OH. Lead Engineer responsible for reviewing CCTV data, providing recommendations, cost estimates, bid documents, and construction inspection for

cured-in-place pipe lining of approximately 6,750 LF of 8-inch sanitary sewers, cementitious lining of manholes, and open cut point repairs.

New Mexico Department of Transportation Culvert Inspection and Condition Assessment, Santa Fe, NM. Lead Engineer in charge of the review and quality management of CCTV inspection data of approximately 60 culverts throughout New Mexico. The pipes were typically corrugated metal and ranged from 24 to 60-inches in diameter (some non-circular). Provided condition assessment and recommendations for rehabilitation of the culverts including an alternative evaluation.

Mound Road Industrial Corridor Technology and Innovation Project, Sterling Heights, MI. Lead Engineer responsible for condition assessment and rehabilitation recommendations for approximately 50,000 LF of storm sewers surveyed as part of installation of an Industrial Corridor. Culverts ranged from 12 to 288-inches in diameter (some non-circular).

ALISEN DOWNEY

205 Van Buren Street #1, Brooklyn, NY 11221 • (203) 430-4215 • alisen.downey@gmail.com

EDUCATION

CUNY-Brooklyn College, Brooklyn, NY

Graduated: May 2020

M.S. in Environmental Science

Thesis: *Soil carbon sequestration in urban afforestation sites in New York City*

University of Connecticut (UConn), Storrs, CT

Graduated: December 2011

Dual degree: B.A. in English; B.S. in Natural Resources–Environmental Conservation

Cumulative GPA: 3.8/4.0, *magna cum laude*

RELEVANT WORK EXPERIENCE

New York City Department of Environmental Protection, Queens, NY

December 2021–Present

Project Manager – Green Infrastructure Capital Planning & Partnerships, Bureau of Environmental Planning & Analysis

- Manages stormwater mitigation programs and contracts pertaining to flood research, GI retrofits, and GI maintenance.
- Oversees contract development, procurement, and day-to-day management, handling numerous ongoing complex contracts at one time; supports other technical, administrative, outreach and engagement, and quantitative duties as needed.
- Writes, designs, and edits program documents and publications, including annual reports, manuals, presentations, and outreach materials; updates design, maintenance and implementation manuals, and standard operating procedures.
- Conducts research, including asset performance analyses, comparative program analyses beyond NYC, reviewing site plans; tracks and reviews reports and deliverables prepared by consultants and contractors.
- Coordinates and engages with intra/interagency teams, public and private property owners, and other stakeholders in NYC across program initiatives, attending meetings, facilitating site visits and inspections, and liaising between groups.
- Manages invoices, budget tracking, subcontractor approvals, and day-to-day coordination with contracting teams.
- Interviews, selects, and supervises graduate and undergraduate interns, providing overall guidance and support.

Research Foundation of CUNY at Brooklyn College, Brooklyn, NY

March 2019–March 2020

Research Scientist – Multi-City Green Infrastructure Rapid Assessment Study

- Managed a team of Urban Water Innovation Network researchers (Brooklyn College, Cary Institute of Ecosystem Studies, University of Arizona), working with Earthwatch Institute and the HSBC Sustainability Training Program to study hydrologic functions of green infrastructure (GI) across 6 North American cities over a 2-year period.
- Wrote and prepared research presentations, reports, and publication materials, as well as developing an improved training protocol for citizen science GI rapid assessments; managed field equipment, sensors, protocols, and documents for events.
- Co-managed, trained, and supervised citizen scientist research events, performing GI rapid assessments across study cities.
- Oversaw data management and preliminary analysis, including standardizing collection methods and conducting QA/QC.

New York Botanical Garden (NYBG), Bronx, NY

February 2015–February 2019

Editorial Assistant – Institute of Systematic Botany

- Responsible for all editorial reviews of scientific manuscripts submitted to the *New Manual of Vascular Plants of the Northeastern United States and Adjacent Canada* project, which will create a wholly revised edition of Gleason and Cronquist’s landmark work on Northeastern flora (in print and online).
- Tracked all submitted treatments through editorial and scientific review processes and handled copyright release forms.
- Conducted species conservation assessments and additional research as needed, and managed project-related web pages.
- Coordinated with contributing authors, serving as the main point of contact for all editorial communications.

PUBLICATIONS

- Downey, A. E., P. M. Groffman, G. A. Mejia, E. M. Cook, S. Sanpinsa, R. Karty, M. I. Palmer, and T. McPhearson. 2021. “Soil Carbon Sequestration in Urban Afforestation Sites in New York City.” *Urban Forestry & Urban Greening* 65: 127342. <https://doi.org/10.1016/j.ufug.2021.127342>
- Meixner, T., A. R. Berkowitz, A. E. Downey, J. Pillich, R. LeVea, B. K. Smith, M. Chandler, N. Gupta, S. Rullman, A. Woodroof, and J. Cherrier. 2021. “Rapid Assessment and Long-Term Monitoring of Green Stormwater Infrastructure with Citizen Scientists.” *Sustainability* 13(22): 12520. <https://doi.org/10.3390/su132212520>
- Mejia, G. A., P. M. Groffman, A. E. Downey, E. M. Cook, S. Sanpinsa, R. Karty, M. I. Palmer, and T. McPhearson. 2022. “Nitrogen cycling and urban afforestation success in New York City.” *Ecological Applications* 32(3): e2535. <https://doi.org/10.1002/eap.2535>

SKILLS AND TRAINING

NYBG Certificate of Botany | Microsoft Office Suite | Adobe Acrobat, InDesign, Photoshop | Esri ArcGIS/Pro | CMS

RESEARCH EXPERIENCE

CUNY-Brooklyn College, Brooklyn, NY

September 2017-May 2020

Thesis: "Soil carbon sequestration in urban afforestation sites in New York City"

- Conducted fieldwork (soil coring) at urban forest restoration sites across New York City, working with MillionTreesNYC.
- Conducted laboratory soil sample processing, both independently and with supervision.
- Comparative analysis, using existing literature and research results, published in *Urban Forestry & Urban Greening*.

CUNY-Brooklyn College, Brooklyn, NY

September-December 2019

Advanced GIS Project: "Future 500-year flood risk assessment for New York City (2020s, 2050s)"

- Conducted a risk assessment of the potential infrastructure damage caused by a 500-year flood in New York City, using spatial analyses in ArcGIS Pro of floodplain projections and land-use distribution maps gathered via raster data.

OTHER WORK EXPERIENCE

Technology Marketing Corporation (TMC), Norwalk, CT

April 2013-February 2015

Digital/Web Editor

- Managed the creation of dynamic online content for specialized technology websites in a fast-paced environment.
- Proposed, assigned, and edited stories for staff writers and freelancers, producing over 60 articles per week.
- Served as a primary contact for editorial program clients and ran weekly conferences with in-house and client teams.
- Wrote original web content, and conducted news research, interviews, and briefings.

Copy Editor

- Edited content for AP style, mechanics and flow, categorizing and posting 65 articles per day.
- Optimized content for SEO and worked with freelancers to increase content quality.

Connecticut Department of Energy & Environmental Protection (DEEP), Hartford, CT

May-August 2011

Source Reduction & Recycling Intern; Part-time

- Conducted greenhouse gas emissions analysis project using EPA Waste Reduction Model.
- Researched recycling methods by web and phone, synthesized results, and wrote related articles for the DEEP website.
- Compiled annotated bibliography of biodegradable and compost-related resources for supervisor's use.

PONO HANSON, P.E., Assoc. DBIA

435 W 44th Street, Indianapolis, IN 46208 | (808) 258-2707 | phanson@brwnald.com

PROFESSIONAL SUMMARY

Over 12 years of engineering experience in the evaluation, planning, design, and construction of infrastructure collection systems in compliance with federal and local regulation. Working knowledge in the application and use of advancing technology and regulation permitting to combat the challenges presented in the nation's aging infrastructure. Proven project delivery for several large multi-million-dollar projects including design-bid-build and collaborative/alternative delivery projects, that were delivered on-time and under budget, exceeding client and internal organizational goals.

Mr. Hanson is passionate about people and providing a work environment allowing staff to succeed in achieving their personal and career goals through his role as a current Supervisor and as a leader in his external organizational involvement. Through his experiences, he has developed strong relations with clients, familiarity working across multiple disciplines and client service teams, managing allocated budgets, and effectively delivering quality products and results while effectively communicating with staff, supervisors, regulators, clients, and the public in an organized, concise, and professional manner.

REGISTRATION

Professional Civil Engineer, District of Columbia, Indiana, Kentucky, Maryland, and Virginia
Associate DBIA

EDUCATION

M.S.E. in Environmental Engineering – Johns Hopkins University, Baltimore, MD

May 2012

B.S. in Civil Engineering – University of Portland, Portland, OR

May 2011

Men's Division I Track and Field

RELEVANT EXPERIENCE:

Brown and Caldwell

September 2015 – Present

DC Water: Glover Archbold Park CMAR Project, Washington, DC

Project Manager. Mr. Hanson served as the Sales leader for this pursuit and was successful in winning the contract. As Project Manager, Mr. Hanson will lead a team of engineers and scientists to collaboratively design a constructible rehabilitation solution through a CMAR delivery method, while also through a NEPA compliance lens and heavy public outreach engagement. This is DC Water's first linear CMAR project, where BC's fee is \$10M for design and construction.

DC Water: Planning Engineering Services for Sewer System, Washington, DC

Project Manager. As part of the PE3S Program, Mr. Hanson is leading the management of DC Water's System/Condition Assessment Program for the inspection of large diameter and local sewer and combined assets to assist in the development and prioritization of future CIP projects. Responsibilities include leading weekly meetings with client staff, coordination efforts between various DC Water departments and external stakeholders, management of DC Water's P6 contract budgets, and management of DC Water consultants and inspection contractors. Mr. Hanson's team's scope accounts for approximately \$1.5M of work annually.

DC Water: Progressive Design Build LZ07 Rehabilitation of MH31, Washington, DC

Deputy Project Manager. Mr. Hanson helped lead weekly collaboration calls with DC Water, Ramboll (Owner's Advisor), and Ulliman Schutte Construction (Contractor) to address the emergency repair of a section of the

Potomac Interceptor located in Fairfax County that ranges in diameter from 54-inch to 66-inch. Responsibilities include project management, inspection and geotechnical investigations, design development, permitting, and engineering services during construction. This project is DC Water's first linear Progressive Design-Build project, with construction anticipated to be completed in Spring 2025. Brown and Caldwell's fee for this project is \$3.7M.

DC Water: Potomac Interceptor LZ04 River Crossing, Washington, DC

Deputy Project Manager. Mr. Hanson is providing engineering and environmental services necessary to complete a Concept Finalization Report (CFR) and National Environmental Policy Act (NEPA) compliance for the rehabilitation of the Potomac Interceptor (PI) between MH-28 and MH-29 at the Potomac River crossing within the proximity of the National Park Service Great Falls Park and C&O Canal Park areas. This critical project is essential in ensuring redundancy in DC Water's Potomac Interceptor and the protection of the surrounding environment and safety of the public. Responsibilities included leading client and stakeholder meetings, project management, and planning and design efforts.

WSSC Water: Article 7 Performance Assessment, Laurel, MD

Project Manager. Under Article 7 of the EPA Consent Decree (CD), it is required to compile a performance assessment of the repair and rehabilitation performed under Article 2 and 6 of the CD program. Mr. Hanson helped lead the project team, in compiling data and processing the result of improvements that were implemented in order to address regulatory issues found within the municipality system. The BOA also includes a clear definition of how well the municipality met the regulatory CD standards in reducing sanitary sewer overflows and basement backups. Mr. Hanson was responsible for developing the compliance templates, data analysis, coordination for public outreach, MDOT, and EPA meetings to present the statistical data gathered.

WSSC Water: Emergency Response Plans for Force Mains, Laurel, MD

Project Manager. Mr. Hanson led the development of Emergency Response Plans (ERPs) for three sanitary sewer force mains located within the utility's service area. In addition to the ERPs, Mr. Hanson assisted in designing a Desktop Exercise Workshop for utility staff to familiarize themselves with the ERP, how to respond to emergency events, as well as standardizing protocol. The success of the Workshop has resulted in the development of an ERP for a 102-inch trunk sewer that eventually feeds into DC Water's system, as well as another Desktop Exercise for staff for this larger and more complicated scenario.

WSSC Water: Clearwater Projects, Laurel, MD

Project Manager. Mr. Hanson helped lead a pilot study as with WSSC Water in the Private Property Infiltration and Inflow (I/I) sector while working in unison with local realtors and developers. As the DC Metro area population continues to grow, local municipalities are faced with system capacity issues, due to the aging water and wastewater infrastructure. Mr. Hanson's responsibilities include the scheduling for field activity and inspection investigations, development of design recommendations, coordination of third parties that include property owners, MDOT, Federal Agencies, developers and realtors, and vocal community members to ensure that proper procedures are followed in order to create and implement a successful program.

Brown and Caldwell Committees/Engagement

Balance and Belonging Council, Member

Brown and Caldwell established the Balance and Belonging Council in 2021 to foster a diverse and inclusive work environment for current and future BC-ers. Mr. Hanson serves on the Council that consists of four BC employees and provides updates to Executive Leadership.

Conveyance Infrastructure Practice, Facilitator

In 2021, Brown and Caldwell rolled out their Technical Practices, where Mr. Hanson serves as the Facilitator of the Conveyance Infrastructure Practice. In this role, he works with BC's National Practice Leader and National Specialty Leaders in growing the practice, making information on successful projects and innovative technology readily available, and as a resource to offices and areas across the company to identify and chase key pursuits.

Hazen and Sawyer

July 2012 – September 2015

WSSC Water: Sanitary Sewer Rehabilitation Program Support BOAs, Laurel, MD

Project Engineer. Consent Decree program (\$17.5M) to provide engineering services for the planning, design, permitting, and rehabilitation of sewer mains, manholes, and service laterals and stream restoration located in residential and environmentally sensitive areas. The project also included the development and implementation of community outreach programs that will provide information to the surrounding communities in the project areas. Mr. Hanson assisted in all aspects of the program including field investigations, design, right-of entry agreements with property owners, regulatory permitting, constructability review, cost estimates, and report preparation. Rehabilitation methods utilized include open cut repair or replacement, trenchless renewal, and manhole repair or replacement.

WSSC Water: Trunk Sewer Inspections and Surveying Laurel, MD

Project Manager. Consent Decree project to identify and reduce inflow/infiltration (I/I) in their sanitary sewer system. Mr. Hanson served as the Project Manager responsible for coordinating work elements including project management; locating, marking, opening, inspecting, and properly closing trunk sewer manholes; inspecting exposed pipes; inspecting stream crossings; documenting and dye testing all exposed sewers for infiltration/exfiltration; and collecting latitude and longitude coordinates for all manholes and exposed sewers located in wooded rights-of-ways, including those sewers less than 15-inches in diameter. Responsible for coordinating engineering services and managing five subcontractors, including review and analysis of all field investigation data and development of rehabilitation recommendations for sewer.

PROFESSIONAL ORGANIZATIONS / AFFILIATIONS

- Water Environment Federation (WEF)
 - Students and Young Professionals Chair (2021-2022)
 - Collection Systems Committee
 - Board Governance Committee
 - WEFTEC Advisory Committee
 - House of Delegates (HOD) Emerging Professionals into Leaders Work Group
- Chesapeake Water Environmental Association (CWEA)
 - Student Chapter Liaison
 - Tri-Association Conference Voting Member
 - Collection Systems Committee

AWARDS

- WEF Outstanding Young Professional Award, 2021.
- CWEA Select Society of Sanitary Sludge Shovelers (5S) Award, 2018.
- CWEA Young Professional of the Year Award, 2016.

PRESENTATIONS

- “Progressive Design Build: How DC Water Used Collaborative Delivery to Make Large Diameter Sewer Rehabilitation Possible” presented at the UESI Pipelines Conference, Calgary, Canada, July 31, 2024.
- “So, You Think You Can Inspect? The Saga of City-Wide Inspections in the Nation’s Capital” presented at the AWWA/WEF Utility Management Conference, Portland, OR, February 14, 2024.
- “A Community built on Balance and Belonging” presented at the Virginia WaterJam Conference, Virginia Beach, VA, September 12, 2024.
- “DC Water’s Linear Progressive Design-Build Project” presented at the CWEA Collection Systems Seminar, Linthicum Heights, MD, December 2, 2021.
- “Baltimore Siphon Rehabilitation: Changing Conditions, Dynamic Solutions” presented at the ASCE Pipelines Conference, Toronto, Canada, July 16, 2018.
- “WSSC Trunkwalk Rehabilitation Program Selection and Development” presented at the Annual Conference Exposition, Boston, MA, June 10, 2014.