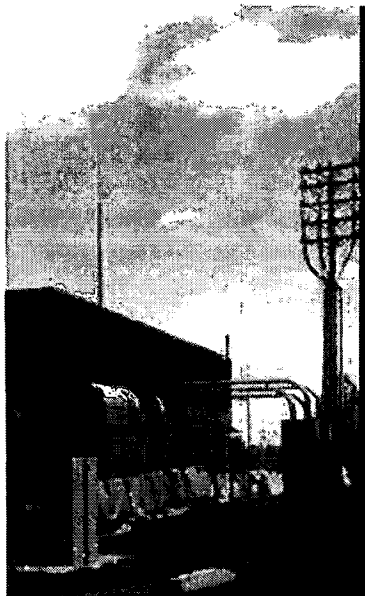
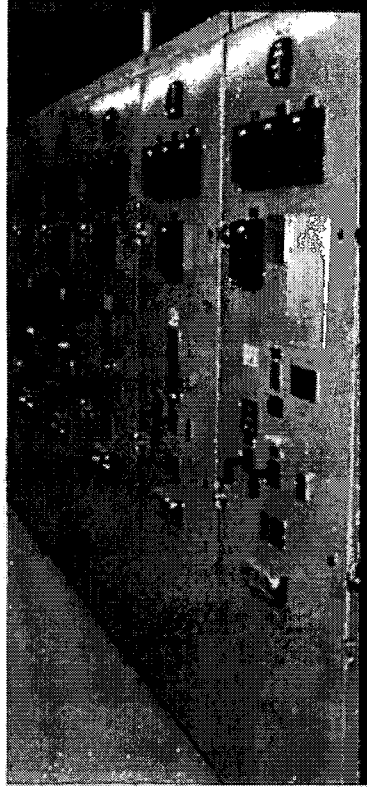




Qualifications Proposal for

Design Services and Design Services During Construction for Advanced Electrical Contract

Passaic Valley Sewerage Commission

20 December 2017

CONTACT INFORMATION:
Dominick A. Lecchiuzzo, P.E.
Black & Veatch New York LLP
489 Fifth Avenue, Fourteenth Floor
New York, NY 10017
(646) 779-8340 | LecchiuzzoDA@bv.com

BLACK & VEATCH

BLACK & VEATCH

BLACK & VEATCH CORPORATION
489 FIFTH AVENUE, 14TH FLOOR, NEW YORK, NY 10017
+1 804-426-8356 | TaralloS@bv.com

December 20, 2017

Mr. Gregory A. Tramontozzi, Executive Director
Passaic Valley Sewerage Commission
Main Training Center
600 Wilson Avenue
Newark, New Jersey 07105

Subject: Design Services and Design Services during Construction for Advanced Electrical Contract

Dear Mr. Tramontozzi,

Please find enclosed one original and five copies of our proposal for the Design Services and Design Services during Construction for Advanced Electrical Contract.

Black & Veatch is committed to Passaic Valley Sewerage Commission (PVSC) and to meeting your objectives for this important resiliency project. We are pleased to present a proposal that is compliant with the Request for Qualifications and Proposals and is responsive to PVSC's desire to upgrade the WWTP's electrical power distribution system that can support and integrate with the new standby power generation system and be implemented prior to commissioning the standby power generation facility and stormwater pumping stations. Our team's industry-leading electrical expertise for wastewater treatment facilities and electrical utility substations combined with our extensive knowledge of your facility will ensure that PVSC will receive a well-designed and **reliable** electrical power distribution system.

PVSC expects over 300 contractors on-site during the peak construction period of the resiliency program. Successful delivery of the program will require a **trusted partner** with **specialized expertise** to efficiently deliver the Advanced Electrical Contract for the integration of the program's two largest construction projects.

Our team's extensive experience in electrical power distribution, knowledge of wastewater treatment systems, and long history of delivering successful construction projects to PVSC and other municipal clients will ensure that PVSC and the Program Management Joint Venture (JV) will have a clear path from concept design to commissioning and operation.

We will ensure that PVSC and the Program Management JV meet the goals and objectives of this Advanced Electrical Contract project and will provide the required support in coordinating the electrical requirements of the new Standby Power Plant and Stormwater Pumping Stations. For this purpose, we are planning to utilize the same staff from the Standby Power Plant project where needed to expeditiously and efficiently coordinate the designs of both projects. This approach would minimize risk, lower design cost, and increase efficiently transfer knowledge between the two projects efficiency.

Black & Veatch and CDM Smith offer PVSC and the Program Management JV our fully committed team of experienced professionals with the specialized expertise to successfully deliver this important project on schedule and on budget.

We look forward to the opportunity to serve you.

Very truly yours,

Black & Veatch Corporation

Steve Tarallo
Project Director

Domenick Loschiavo
Project Manager

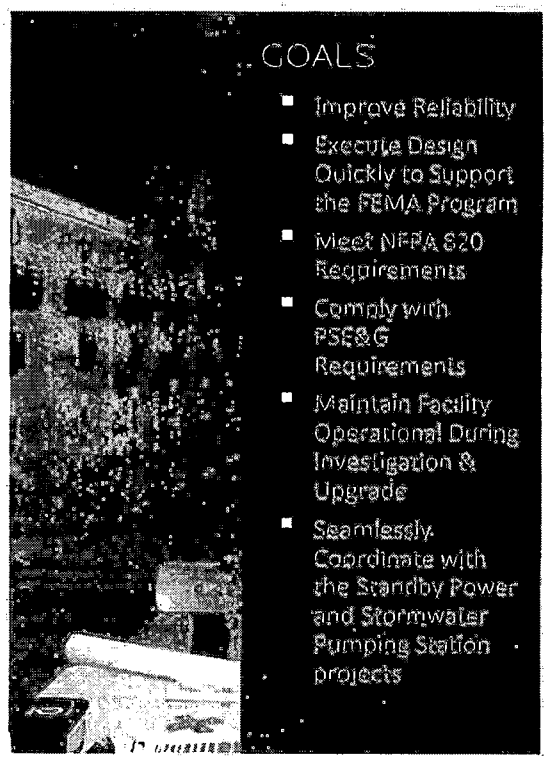
Contents

List of Tables

LIST OF FIGURES

Executive Summary

The Passaic Valley Sewerage Commission (PVSC) wastewater treatment plant (WWTP) was flooded in 2012 by a tidal surge from Newark Bay as a result of Superstorm Sandy. The storm also caused a loss of power supply to the WWTP from Public Service Electric & Gas (PSE&G). This major flooding event and loss of power from the electric grid resulted in PVSC losing control of its treatment processes. In addition, PVSC could not provide biosolids management and liquid waste acceptance services to municipal and industrial entities in New Jersey and New York. In response to this catastrophic event, PVSC is undertaking a multifaceted program to protect the facility against major flooding up to a 500 year storm. As part of the program, an upgrade/expansion to the WWTP Electrical Distribution System will be designed to support the WWTP from the various electrical power sources (PSE&G Utility Service and Standby Power Plant). We will work collaboratively with PVSC to develop a Design that meets the Project Goals and succinctly defines the agreed-upon project scope, schedule, and budget.

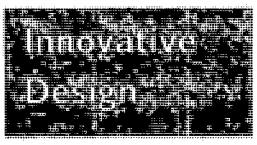


The Right Expertise

Black & Veatch brings the right expertise for this project with a project team that has successful experience with WWTP electrical system upgrades. Our current work with PVSC (Standby Power Generation Facility) and past projects with similar local municipalities that include returning and improving the existing electrical system to service at NYC DEP North River WWTP after the engine fire of 2011, as well as large scale electrical design projects such as the North River WWTP Cogeneration & Electrification program. Our team members have the experience highlighted in this proposal as well as experience working for PSE&G in designing upgrades for their electrical distribution facilities. This knowledge will guide our project team for any issues and tasks associated with PSE&G. The staff presented on this project are the same that made these other projects a success. As such we understand the requirements of critical outside stakeholders and Authorities Having Jurisdiction (PSE&G, NJDEP and the NJDCA). We have performed similar work to the scope of this project at North River WWTP for the Emergency Response and Cogeneration Contracts and at NYC DEP Oakwood Beach WWTP for Contracts OB-136 and OB-134. These Electrical Upgrades involve the design and construction of a new Electrical Service Entrance, compliant with Con Edison's EO-2022 specification for High Tension Service, the replacement of Medium Voltage switchgear, 480V motor control centers, and step-down distribution transformers, electrical equipment upgrades as well as NFPA 820 and Authority Having Jurisdiction (AHJ) coordination. These past project efforts are identical scope items to this Advanced Electrical Contract. Our experience and ongoing power generation project at PVSC make Black & Veatch the best partner for PVSC and AECOM+HDR Joint Venture.

Worldwide Leader in Water and Power: In addition to our local NYC experience, Black & Veatch is recognized as a worldwide leader in both the wastewater and power industries. Our high rankings in power (No.2 by Engineering News-Record [ENR]), mechanical, electrical, and plumbing (No. 1 by Consulting-Specifying Engineer) power transmission and distribution (No. 4 by ENR), and wastewater treatment (No. 6 by ENR) demonstrate our industry leading expertise. We provide depth of electrical expertise and specialty expertise in all the required service areas and have supported medium voltage substation and electrical distribution improvement projects all around the world.

Black & Veatch has assigned our experienced professionals to the Advanced Electrical Contract who have completed many similar electrical improvement projects in addition to the aforementioned projects for other municipalities, **delivering timely high-quality work with an emphasis on safety, planning and reliability.**



Innovative thinking is how real improvement and advancement is made. Our proposal team brainstormed innovative ways to execute the Advanced Electrical Contract, to help PVSC meet all of the goals and objectives put forth in its Request for Proposal (RFP).

Idea #1 outlines the use of 3D Laser Scanning technology to accurately as-built the existing spaces. Utilizing laser scanning technology to document real time as-built conditions will avoid any clashes during construction and provide the Owner a realistic viewing of the constraints and finish product. The output of laser scanning is the base for developing a BIM project. Employing laser scan as-builts is more efficient and accurate than working from outdated 2D drawings.

Idea #2 considers the use of pressurized vestibules to prevent the passage of combustible gases between the proposed Switchgear E electrical room and hazardous process spaces and resolve some of the plant's potential National Fire Protection Association (NFPA) 820 compliance issues. Black & Veatch has developed and implemented this pressurized vestibule concept for other wastewater facilities and received very positive feedback from municipalities and Authorities Having Jurisdiction.

Idea #3 offers a Technical Memorandum to evaluate the use of Intelligent Medium-Voltage Switchgear specific to this facility. Intelligent equipment can monitor power usage, among other attributes, allowing PVSC to align its sustainability and energy conversation goals with Plant Operations.

Idea #4, similar to Idea #3, offers an upfront investigation to the feasibility to relocate the Air Handling Units (AHU) that serve the Sludge Thickener Facility. These AHUs currently occupy the space identified for Switchgear "E" and specifically the existing HVAC duct that spans the two units would be above the new switchgear. This investigation will be done soon after NTP so that proper planning with PVSC can be performed ahead of/parallel to the Concept Report Validation Task to keep the project on schedule.

Idea #5 improves the constructability to install Switchgears "N" and "S" at their respective spaces. We have identified the need to remove two of the four associated transformers to permit the installation approach outlined in the BODR. In lieu of reinstalling vintage transformers, we recommend that new be provided. The only additional cost to PVSC is the transformer itself.

Idea #6 is not so much of an innovative idea, but rather an added value concept for PVSC. The Standby Power Plant will bring one set of new electrical feeders to the modified Switchgear "A" as part of Phase 1 work. However, the BODR requires separate new feeders from the Standby Power Plant to the new Switchgear "A" under Phase 2. It would be in PVSC's best interest to have the Standby Power Plant project to include conduit in the already planned buried ductbank for the Phase 2 feeders. This will reduce the overall construction cost as trenching and ductbank installation only occur once requiring only new cable to be pulled.

MEETING PVSC REQUIREMENTS

Section IV of the Request for Qualifications and Proposal (RFQ/RFP) lists the selection evaluation criteria. Table 1 provides a cross-reference with the sections of our proposal and the RFQ/RFP criteria and demonstrates that the Black & Veatch team meets or exceeds PVSC's criteria. The capabilities summarized in Table 1 provide a solid foundation for helping PVSC and the JV make the decisions that will result in efficient delivery of a technically sound, cost-effective and reliable electrical power distribution system.

Table 1 RFQ/RFP Criteria

RFQ/RFP CRITERIA	PAGE
Technical Competence	**5**
The background, professional qualifications, education and training of the Respondent and its staff to fully understand and deal with the requirements of the project.	5-12
The Respondent's qualifications specifically pertaining to the scope of work outlined in this RFQ/RFP.	5-12
The Respondent's execution of the requirements and procedures as set forth with the RFQ/RFP.	5-12
Geographical location of the Respondent's offices and key personnel.	13
Experience	**15**
The Respondent's familiarity with the work, requirements, and procedures of PVSC, including if applicable, PVSC's prior experiences with the Respondent.	17
The Respondent's prior experience with Public Entities and/or Governmental Agencies.	17
The ability of the Respondent to demonstrate its experience (and the experience of its staff) with the design of Electrical Distribution Systems with a minimum capacity of 10 years of prior experience.	16, 18-22
The Respondent must demonstrate a verifiable history of successful projects, similar in size and scope to that proposed.	18-22
Project Approach/Schedule	**23**
The Respondent's proposed technical approach to meet the requirements and objectives of the RFQ/RFP.	24
The Respondent's proposed schedules, drawing list, & outline specifications.	44
The Respondent's summary of Total Manday Estimate (Attachment G).	Required Forms

Switchgear Building Extension Rendering

THIS PAGE LEFT INTENTIONALLY BLANK.

Technical Competence

INTRODUCTION

Black & Veatch, as prime consultant, will manage the Advance Electrical project from its New York City, Kansas City, Missouri, and Raleigh, North Carolina offices and will have overall responsibility for the successful execution of this project. Our project partner, CDM Smith, is highly qualified and well-respected firm with significant relevant New Jersey and PVSC experience.

The Black & Veatch/CDM Smith team brings specialized and relevant qualifications to best serve PVSC. In this section of our proposal, we have focused on our team's credentials to provide professional engineering services for the design and construction of medium voltage electrical equipment, particularly those at the 13.8kV level. More detailed information on our qualifications can be found in the Experience section of this proposal.

BLACK & VEATCH QUALIFICATION

Our team features NYC-based leadership and professionals who have demonstrated a strong commitment to providing high quality professional engineering services to PVSC. Our team consists of proven leaders and a team of specialists in wastewater treatment plant electrical engineering that has familiarity of the electrical system at PVSC.

Domenick Loschiavo, our Project Manager, is the Project Manager on our current PVSC assignment for the Standby Power Plant and was one of the lead engineers to electrically restore the North River WWTP after the 2011 engine fire and Superstorm Sandy flooding. Domenick has managed both electrical and process based projects. His boots on the ground hands-on experience, leadership capabilities, and technical expertise make him the ideal candidate to lead the technical team and successfully manage this project to deliver on time and within budget, the high-quality product PVSC deserves.

Nick Salem, our Design Manager, has an electrical engineering background and is currently working with Domenick and Andrew as a Senior Electrical Engineer on the PVSC Standby Power Plant project. Nick was the Design Manager for our highlighted NYC DEP Contract NR-44 Riverbank State Park Power Feed project which involved a new electrical service entrance for the park, separating it from the North River WWTP. Nick led a multidiscipline team that executed the same features required of this project for Switchgear Building W and Substation No. 1 building expansion.

No project learning curve with Black & Veatch

Our core team of Domenick Loschiavo, Nick Salem, Andrew Truman, Tom Laustsen, and Earl Tast (pictured above) has upgraded various WWTP power distribution infrastructures, while keeping critical equipment on-line and functional. Design solutions include the redistribution of critical loads, and use of temporary motor control centers, as well as construction of new infrastructure and equipment.

Andrew Truman, our Senior Electrical Engineer with almost two decades of electrical engineering experience, our NFPA 820 expert, has been the Lead Electrical Engineer for multiple design projects at various wastewater facilities including electrical power distribution upgrades. Andrew is currently involved with PVSC's Standby Power Plant project as he is responsible for the 5kV medium-voltage electrical design. He has an extensive electrical background that spans utilities throughout North America and voltages up to 33kV.

Allen Gardner, is one of our experienced Senior Electrical Engineers and will lead the Transient Stability Study task required by the RFQ/P. Allen is currently involved with the 13.8kV electrical power distribution and generator selection for PVSC's Standby Power

Generation Facility project. Allen has intimate knowledge with PVSC's electrical distribution model with his work coordinating the ETAP file for large motor starting associated with selecting the right generator to support PVSC's WWTP. As close coordination between the Standby Power Plant and Advanced Electrical Contract is a must for the success of both projects, Allen is the right person to execute this critical activity.

These experienced professionals know the local Power Utility requirements and have a reputation for being **responsive, collaborative, and quality-focused.** To be successful, the design for the Advanced Electrical Contract requires proactive and detailed coordination with all project stakeholders. Our team has extensive experience with this and will carefully coordinate with PSE&G and the Authorities Having Jurisdiction. **PVSC will be well served by the locally accessible and world class technical expertise of Black & Veatch.**

TEAM STRUCTURE

Our team was carefully selected to include New York/New Jersey-based leadership and professionals who are committed to serving PVSC. The Black & Veatch team is supported by a strong team of specialized technical experts that is fully committed to executing the project under a fast-track, risk-mitigated design, and construction implementation approach.

Strong leadership supported by highly experienced technical staff is required for this important project. The success of the Advanced Electrical Contract will require dedicated, collaborative team members all focused on the timely delivery of the project. The sooner the project is delivered to PVSC, the sooner the facility will be supported by the other FEMA Projects. To achieve these objectives, **we selected an experienced leader and technically proficient Project Manager, Domenick Loschiavo, who has worked on fast-track designs involving critical timing and integrating equipment procurement with the design.** Domenick will have overall responsibility for the project. He will be supported by highly experienced Design Managers **Nick Salem, Earl Tast**, and **Tom Laustsen** and Construction Manager, **Joe Stromwall.**

As shown on Figure 1 and the organization chart on Figure 2, we are proposing a streamlined organizational structure designed to ensure effective project delivery through accessibility, collaboration, and accountability. To make this a successful project and to meet the proposed schedule, our dedicated leads will be aligned with the PVSC and Program Management JV lead engineers and permitting specialists. One of the benefits to integrating the Permitting, Design & Constructability, and Commissioning & Startup teams with PVSC and the Program Management JV is to allow design decisions to be made early, "locking in the design." With the design locked in by all stakeholders, rework and redesign is minimized saving time and money by collaborating on ideas, concepts, and preferences whenever they come up. Every level of our team will be available to PVSC and the Program Management JV. We have demonstrated our ability to effectively apply our expert resources and provide innovative and high quality engineering services on previous electrical power distribution projects for operating WWTPs. The Advanced Electrical Contract project requires up front and detailed coordination with outside stakeholders to be successful. Our team will carefully coordinate with PVSC Operations, PSE&G and the NJDEP as well as the other ongoing FEMA Resiliency projects. Close collaboration between the Stormwater Pumping Station Engineer and Standby Power Plant Engineer is required. This coordination will be simplified with the Black & Veatch team as we are currently executing the procurement of the power generation equipment and the Standby Power Generation Facility design. The Black & Veatch team will always be responsible to PVSC and will always be accountable in its execution of the professional services we provide. PVSC will be well served by ensuring that the locally accessible, worldwide expertise of Black & Veatch is available to support its need.

ACCESSIBILITY, COLLABORATION AND ACCOUNTABILITY
A TEAM STRUCTURE DESIGNED FOR EFFICIENT PROJECT DELIVERY

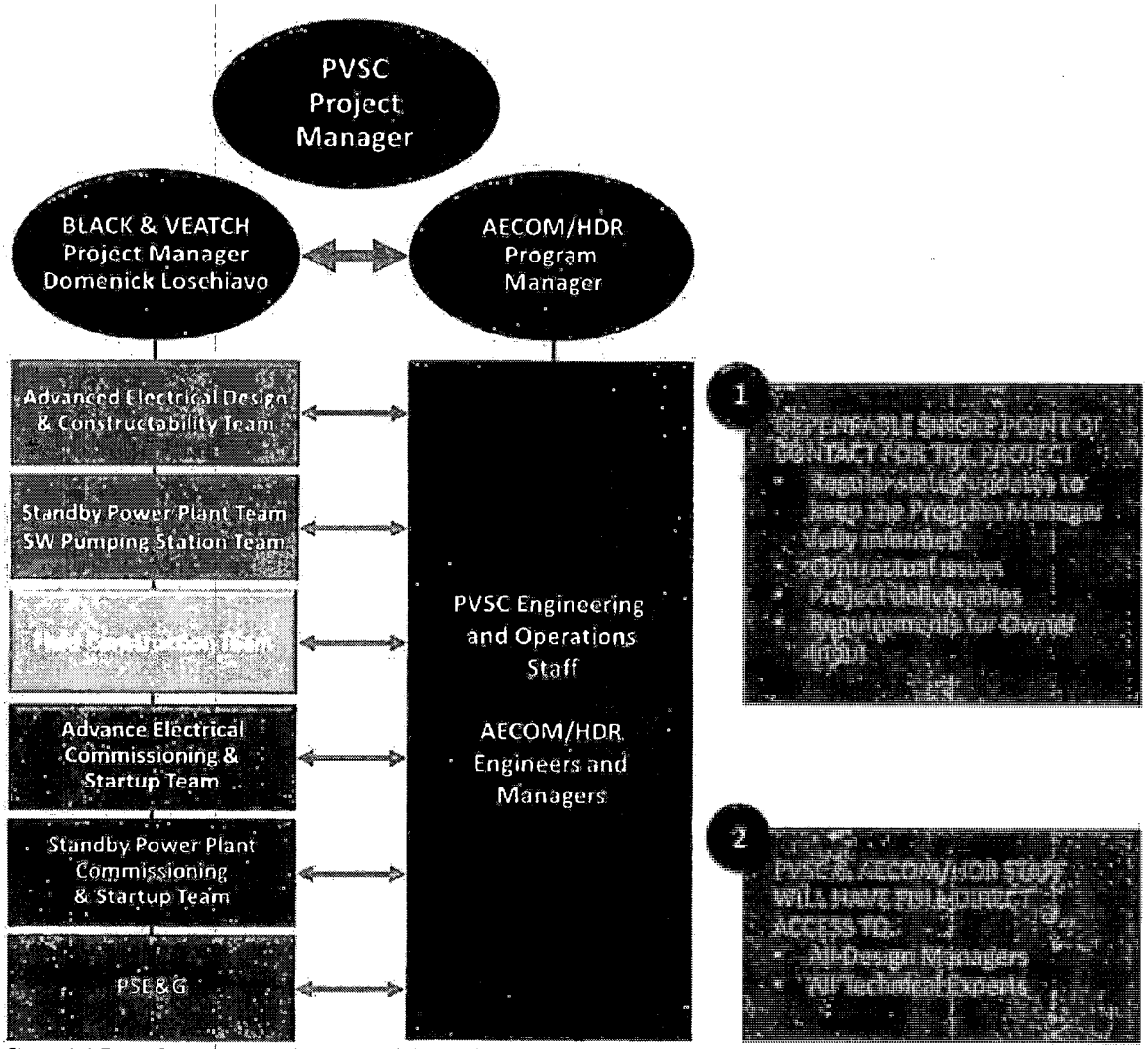


Figure 1 A Team Structure Based on Accessibility, Collaboration and Accountability

TEAM ORGANIZATION CHART

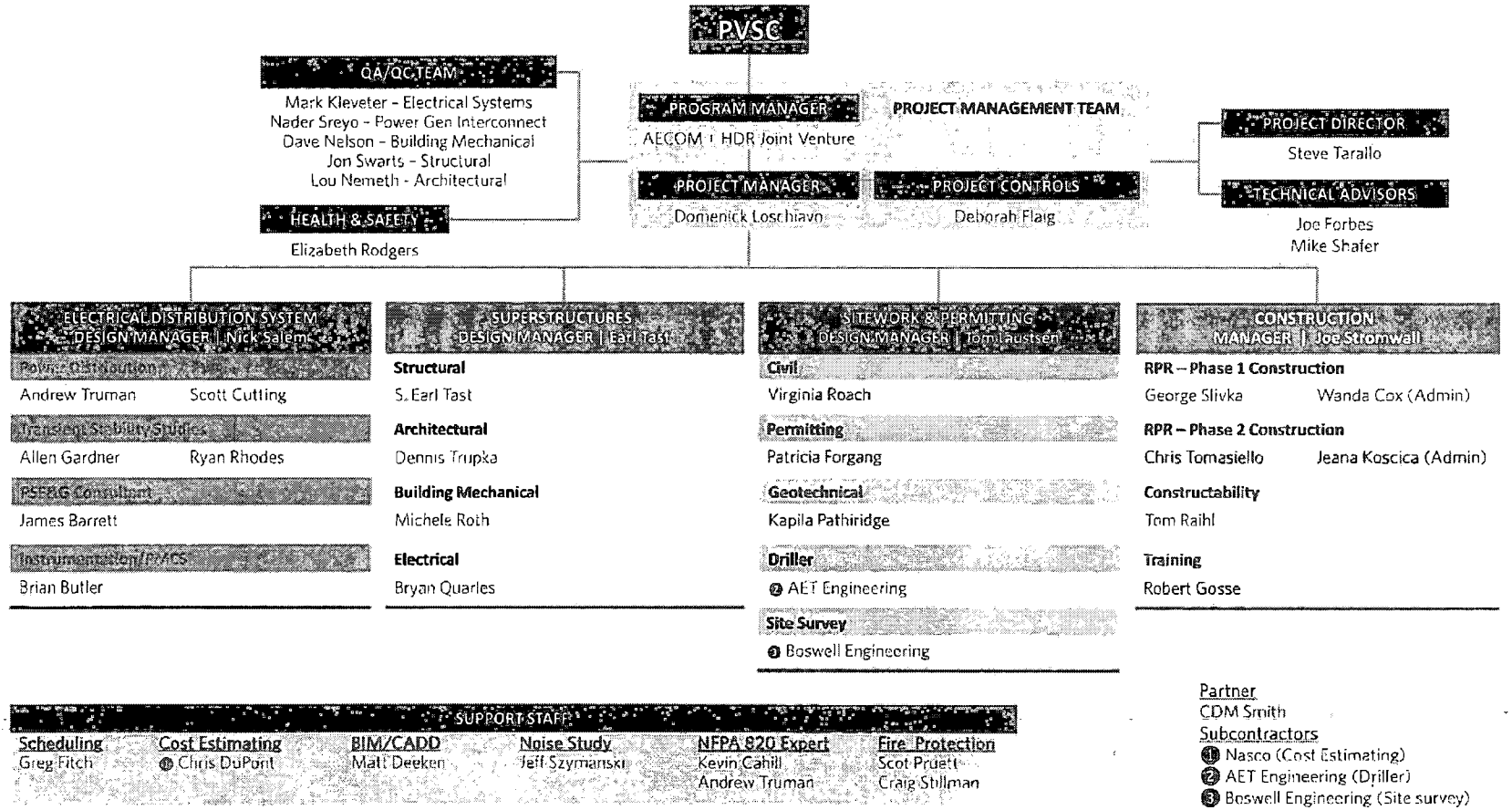
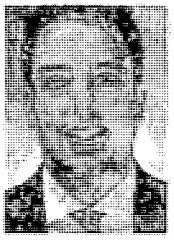


Figure 2 Organizational Chart

KEY STAFF QUALIFICATIONS

Our team members bring qualifications that are specific and unique to delivering electrical power distribution system to a large wastewater treatment plant. Our tem members' experience with PVSC and execution of other similar projects for local, national and global clients ensures that our team fully understands the project requirements and has firm grasp of every facet of the scope of work.

The following pages describe the specific attributes of our key team members. Resumes for all team members are included in Appendices under Resumes.



Years of Experience
17

Registration
PE - NJ, NY, MA

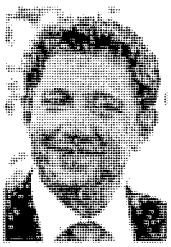
Office Location
New York, NY

Domenick Loschiavo, PE | Project Manager

Domenick has designed and managed infrastructure projects for large municipalities across the east coast and Australia. Currently he is supporting PVSC as the Project Manager for the detailed design of the 34MW Standby Power Generation Facility. Prior to the SPGF project, he has worked on several NYC DEP projects at the North River WWTP and led the Black & Veatch design team for the North River Cogeneration & Electrification project. As part of the North River Reconstruction project, Domenick was on site for three years, during that time was involved with the electrical repairs, and developed the concept of a temporary 480V MCC starter panel to support the replacement of the damaged electrical equipment in the dedicated Electrical Room while the WWTP remained in operation. These experiences position Domenick to effectively manage executing the design for this power distribution project.

Relevant Projects

- Passaic Valley Sewerage Commission Standby Power Plant
- North River WWTP Co-Generation and Electrification Project
- North River WWTP Emergency Response and Reconstruction
- North River WWTP Riverbank State Park Power Feed



Years of Experience
13

Registration
PE - NJ, NY, MD; LEED® AP

Office Location
New York, NY

Nicholas Salem, PE | Power Distribution Design Manager

Nicholas specializes in electrical design and field services related to NYC wastewater treatment plants and NYC schools dealing with both low- and medium-voltage power distribution systems. He has led the coordination efforts with Consolidated Edison Company of New York for multiple NYC DEP projects and co-authored the NYC DEP Standard Operating Procedure on the review and approval process for both Con Edison and the NYC Electrical Advisory Board. Nick is the resident electrical engineer in New York City working out of our local office.

Relevant Projects

- Passaic Valley Sewerage Commission Standby Power Plant
- North River WWTP Co-Generation and Electrification Project
- North River WWTP Riverbank State Park Power Feed
- Oakwood Beach WWTP EO-2022 Electrical Upgrades
- Oakwood Beach WWTP Power Distribution Improvements
- Ward's Island WWTP Grit Chamber Motor Failure Analysis

Years of Experience
16

Registration
PE - Electrical: OR, NV, NJ, KS

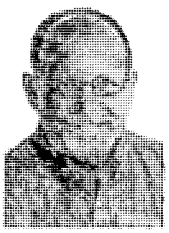
Office Location
Kansas City, MO

Andrew Truman, PE | Lead Electrical Engineer

Andrew has internally recognized expertise in electrical design in corrosive and hazardous areas. He is a member of the National Fire Protection Association (NFPA) and has often been called upon to represent Black & Veatch. Andrew has extensive electrical design experience for numerous wastewater clients. He is responsible for the design of the new 4.160kV switchgear used to integrate the new Cogeneration Engine Generators with the existing NYC DEP North River WWTP electrical power distribution system. Andrew has been responsible for Distribution Studies that include short circuit analysis, load flow, protection coordination and arc-flash hazard and risk assessment for other projects.

Relevant Projects

- Passaic Valley Sewerage Commission Standby Power Plant
- North River WWTP Co-Generation and Electrification Project
- Oakwood Beach WWTP Power Distribution Improvements
- City of Olathe Cedar Creek WWTP Expansion Project



Years of Experience
32

Registration
PE – NY, MN, KS, OK

Office Location
Kansas City, MO

S Earl Tast, PE | Superstructures Design Manager

Earl has over 30 years of experience as a civil and structural engineer. The majority of his work has been involved with structural design of heavy civil projects focusing primarily on numerous water and wastewater treatment facilities. He has been the lead structural engineer on all Black & Veatch projects at North River and Oakwood Beach WWTPs. Specifically he was responsible for all flood protection measures and superstructure and foundation design of the Riverbank State Park Power feed and Oakwood Beach Electrical Service Entrance buildings.

Relevant Projects

- North River WWTP Riverbank State Park Power Feed
- North River WWTP Cogeneration and Electrification Design
- Oakwood Beach WWTP EO-2022 Electrical Upgrades
- Oakwood Beach WWTP Power Distribution Improvements

Years of Experience
25

Registration
PE – NJ, NY, PA

Office Location
Edison, NJ

Tom Laustsen, PE | Civil Works & Permitting Design Manager

Tom Laustsen has 25 years of experience in design and construction of soil and groundwater remediation systems; water and wastewater treatment plants; landfill caps; sitework and mechanical systems; underground and aboveground storage tanks; construction services; storm sewer, water main, and force main design; data collection and analysis; and treatment system installation, operation, and maintenance. He has worked on a variety of environmental and hydrological engineering projects in the areas of hazardous waste, wastewater, water, solid waste, and water resources.

Relevant Projects

- Passaic Valley Sewerage Commission Standby Power Plant, Newark, NJ
- PVSC Pumping Station
- PVSC Sludge Pipeline Improvements
- PVSC Waste Activated Sludge Pumping Station Upgrade

Years of Experience
32

Registration
PE – NY, PA

Office Location
New York, NY

George Slivka, PE | Resident Project Representative

George Slivka is a Senior Engineering and Construction professional with over 37 years of diversified experience in project management, construction management, electrical engineering, mechanical engineering, and field construction inspections. He is a licensed Professional Engineer with dual degrees – Electrical Engineering as well as Mechanical Engineering. Projects included emergency generation facilities, municipal wastewater treatment plants, municipal water treatment plants, power plants, industrial facilities, and manufacturing plants. He possesses broad skills and experience in plant construction, start-up and commissioning, field construction MEP, in-plant high-voltage electrical distribution facilities, SCADA systems, pumping stations, HVAC systems, boilers, vessels, process equipment, chemical feed systems, and process piping.

Relevant Projects

- City of Waukesha | Waukesha WWTP; Waukesha, WI,
- McDowell Creek WWTP, Expansion to 12MGD; Charlotte, NC
- City of Fayetteville | Noland WWTP Assessment; Fayetteville, AK
- Fargo Membrane WTP and Improvements; Fargo, ND

PERCENTAGE OF TIME TO BE SPENT ON THE PROJECT

The table below provides the information requested on page 31 of the RFQ/RFP.

Table 2 Percentage Of Time To Be Spent On The Project

NAME	FIRM	PROJECT ROLE	% OF OVERALL TIME DEVOTED TO THE PROJECT (ALL PHASES)
Stephen Tarallo	Black & Veatch - Water	Project Director	1%
Domenick Loschiavo	Black & Veatch - Water	Project Manager	15%
Joseph Forbes	Black & Veatch - Water	Technical Advisor	1%
Michael Shafer	Black & Veatch - Water	Technical Advisor	1%
Joe Stromwall	Black & Veatch - Water	Construction Manager	5%
George Slivka	Black & Veatch - Water	Resident Engineer	85%
Wanda Cox	Black & Veatch - Water	Project Support	42%
Debbie Flaig	Black & Veatch - Water	Project Controls	1%
Gregory Fitch	Black & Veatch - Water	Project Controls	5%
Nick Salem	Black & Veatch - Water	Design Manager	20%
Andrew Truman	Black & Veatch - Water	Electrical Engineer	35%
Scott Cutting	Black & Veatch - Water	Electrical Engineer	25%
Bryan Quarles	Black & Veatch - Water	Electrical Engineer	55%
Electrical Engineer III	Black & Veatch - Water	Electrical Engineer	35%
Electrical Engineer IV	Black & Veatch - Water	Electrical Engineer	35%
Mark Kleveter	Black & Veatch - Water	QA/QC - Electrical	9%
Brian Butler	Black & Veatch - Water	I&C Engineer	10%
Sr. I&C Engineer	Black & Veatch - Water	QA/QC - I&C	2%
Dennis Trupka	Black & Veatch - Water	Architect	2%
Sr. Architect	Black & Veatch - Water	Architect	15%
Lou Nemeth	Black & Veatch - Water	QA/QC - Architect	5%
Kevin Cahill	Black & Veatch - Water	HVAC	1%
Michele Roth	Black & Veatch - Water	HVAC	15%
Dave Nelson	Black & Veatch - Water	QA/QC - HVAC	2%
Earl Tast	Black & Veatch - Water	Structural Engineer	15%

Table 2 Percentage Of Time To Be Spent On The Project

NAME	FIRM	PROJECT ROLE	% OF OVERALL TIME DEVOTED TO THE PROJECT (ALL PHASES)
Structural Engineer	Black & Veatch - Water	Structural Engineer	25%
Jon Swarts	Black & Veatch - Water	QA/QC - Structural	5%
Amiel Middelmann	Black & Veatch - Water	Civil Engineer	8%
Thomas Raihl	Black & Veatch - Water	Constructability	2%
CAD Technician	Black & Veatch - Water	Technician	15%
Sr. CAD Technician	Black & Veatch - Water	Technician	20%
Matthew Deekan	Black & Veatch - Water	BIM Coordinator	5%
Kimberly Piepmeier	Black & Veatch - Water	EH&S Manager	1%
Shawn Sparrow	Black & Veatch - Power	Project Manager	1%
Nader Sreyo	Black & Veatch - Power	QA/QC - Electrical	1%
Allen Gardner	Black & Veatch - Power	Electrical Engineer	5%
Ryan Rhodes	Black & Veatch - Power	Electrical Engineer	8%
James Barrett	Black & Veatch - Power	PD Section Head	1%
Jeff Szymanski	Black & Veatch - Power	QA/QC - Noise Study	1%
Scot Pruett	Black & Veatch - Power	Fire Protection	5%
Craig Stillman	Black & Veatch - Power	Fire Protection	1%
Ezra Blackwell	Black & Veatch - Power	Noise Engineer	2%
Eric Dein	Black & Veatch - Power	QA/QC - Fire Protection	1%
Tom Laustsen	CDM Smith	Project Manager	5%
Virginia Roach	CDM Smith	Civil Engineer	5%
Patti Forgang	CDM Smith	Permit Manager	5%
Kapila Pathridge	CDM Smith	Geotechnical Engineer	5%
Christopher Tomasiello	CDM Smith	Resident Engineer	56%
Jeana Koscica	CDM Smith	Project Support	32%
Robert Gosse	CDM Smith	Startup Specialist	10%
Edward Hiney	Nasco	Chief Estimator	2%
Chris DuPont	Nasco	Cost Estimating	10%
William Bauer	Nasco	Estimator	5%
Audrey Hiney	Nasco	Jr. Estimator	2%

PROJECT TEAM LOCATION

With more than 11,000 professionals worldwide, 4,000 in North America, and 150 within 50 miles of the PVSC service area, Black & Veatch offers leading experience in the market segments we serve. Our single integrated global workforce allows us to deploy optimal multidisciplinary teams from around the world quickly and efficiently.

Founded in 1947, CDM Smith is an employee-owned global consulting engineering, construction, and operations firm with annual revenues over $1.3 billion. CDM Smith currently employs over 5,000 specialized personnel in 125 offices in the United States and abroad.

Such robust resources allow CDM Smith to respond decisively and effectively to its clients and to take on a wide range of projects. As shown in the graphic below, project team leaders are based in New York/New Jersey and Raleigh, North Carolina and are supported by the global and local resources of Black & Veatch and CDM Smith.

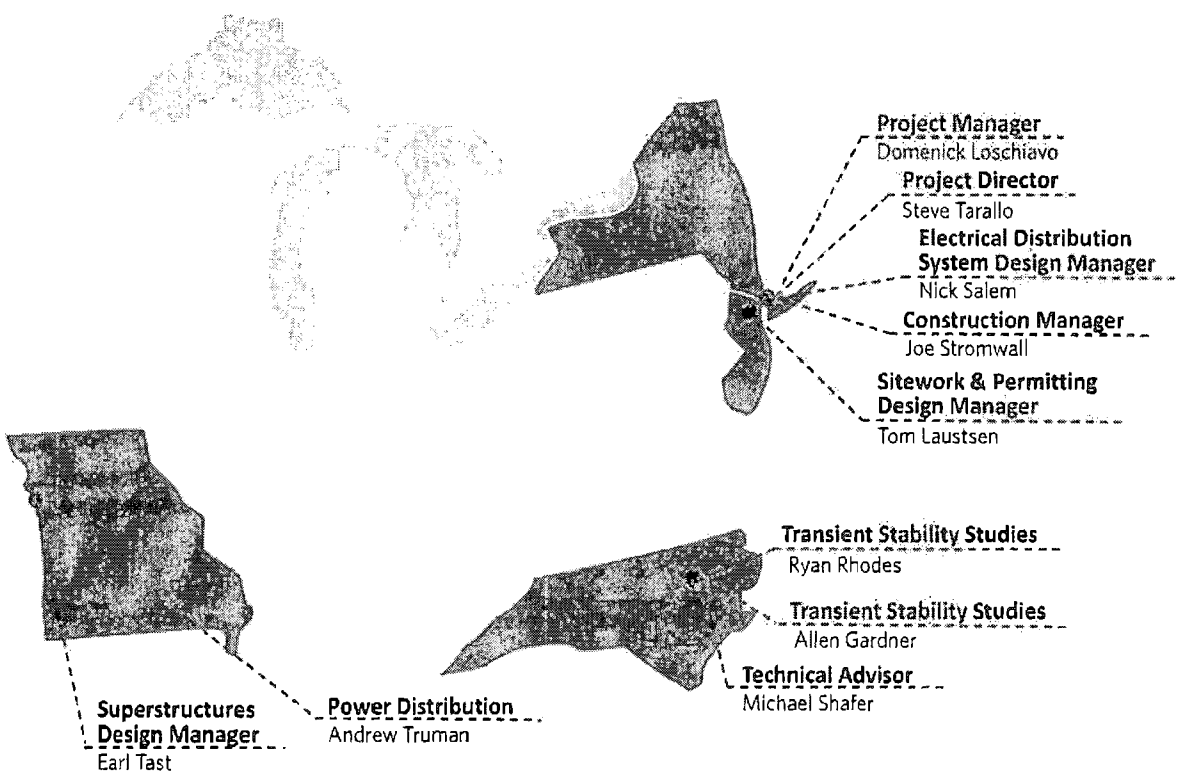


Figure 3 Project Team Location Map

THIS PAGE LEFT INTENTIONALLY BLANK.

Experience

RELEVANT EXPERIENCE

Black & Veatch has performed the proposed Advanced Electrical Contract scope of services at other municipal facilities and on other projects worldwide. We are a leader in engineering and construction specializing in infrastructure development for water, wastewater, reclaimed water, environmental engineering, energy and information technology. We provide full-service engineering including program management, studies, design, procurement, construction management, asset management, information technology, distributed control systems, commissioning, and security systems. This knowledge base is how we can bring together a group with the diverse experience and capabilities needed to provide the safest and most economical solutions to many engineering challenges.

Black & Veatch brings unequalled experience and qualifications to the design and design services during construction for the PVSC Advanced Electrical Contract project. The following sections illustrate how the Black & Veatch/CDM Smith team will provide the following to PVSC:

- Strong, relevant experience in every aspect of the scope of work.
- Extensive experience designing electrical systems for wastewater treatment facilities.
- Extensive experience with PSE&G electrical substation projects and electrical service requirements.
- Extensive experience with medium voltage electrical equipment.
- A long, successful history delivering quality designs to PVSC and other municipal agencies.

OUR TEAM IS POSITIONED FOR SUCCESS

Our Team provides PVSC with the requisite knowledge, experience and depth of resources to successfully tackle each aspect of this Advanced Electrical Contract project. Our Team seamlessly joins the skills and resources of Black & Veatch with the proven capabilities of our specialty subconsultants, ensuring that PVSC will receive the most well-rounded, high-quality, and multifaceted services for the Advanced Electrical Contract.

BLACK & VEATCH TEAM STRENGTHS

- Strong knowledge of the WWTP's electrical distribution system gained through the pre-engineering effort included with our proposal.
- Each Technical Lead has direct experience with designing and implementation of similar scope as the AEC project.
- In-depth knowledge of Key Stakeholder Requirements, especially concerning MOPO, design methodology of "No Single Point of Failure" and PSE&G.
- Proven success in executing and implementing Electrical Engineering concentrated designs for other major municipal agencies.
- Collaborative partnership with PVSC and the AECOM+HDR Program Manager.
- The Engineer of Record for the Standby Power Generation Facility, promoting ease of transfer knowledge between the two projects.
- Deep understanding of EH & S issues, with proven experience utilizing "Prevention through Design" methods.
- Deep understanding of compliance issues, specifically NFPA 820 as our team members have brought existing facilities into NFPA 820 compliance.

Table 3 Similar Projects Completed by Black & Veatch

SIMILAR PROJECTS COMPLETED BY THE BLACK & VEATCH TEAM	[illegible]	ELECTRICAL SYSTEM DESIGN	POWER SYSTEM CONSTRUCTION	ELECTRICAL UTILITY SUPPORT COORDINATION	CONSTRUCTION MANAGEMENT
North River Emergency Response | NYCDEP	■	■	■		
North River Electrification and Cogeneration | NYCDEP	■	■	■	■	
North River Riverbank State Park Power Feed | NYCDEP	■	■	■	■	
Oakwood Beach EO-2022 Electrical Upgrades | NYCDEP	■	■	■	■	■
Oakwood Beach Power Distribution Improvements | NYCDEP	■	■	■		
Cedar Creek WWTP | Olathe, KS	■	■	■	■	■
Cox Creek WRF | Annapolis, MD		■		■	
Variable Frequency Drive (VFD) Failure Evaluation		■			
Tallman Island Switch Gear Failure Evaluation | NYCDEP		■			
Wards Island Emergency Generators Constructability Review | NYCDEP		■			
East Side WTP | Dallas, TX	■	■	■	■	■
Orange County Water District, CA	■	■	■	■	■
Lake Townsend WTP | City of Greensboro, NC	■	■	■	■	■
Mitchell Pump Station | City of Greensboro, NC	■	■	■	■	■
SJWD WTP Optimization | SJWD Water District – Duncan, SC	■	■	■		■
Table Rock/North Saluda WTP | Greenville Water System, Greenville, SC	■		■	■	■
Pelham WWTP | WCRSA, Greenville, SC	■	■	■	■	■
Northwest WTP | Winston Salem Utilities, Winston-Salem, NC	■		■	■	■
Lower Reedy WWTP | WCRSA, Greenville, SC	■	■	■	■	■
Rocky River Regional WWTP | WSACC, Concord, NC	■	■	■	■	■
2400V Switchgear and Motor Controller Replacement - River Intake Pumping Station | Kansas City, MO	■	■	■		■
North Mecklenburg WTP | CMU, Charlotte, NC	■		■	■	■
Northside WWTP Improvements and Expansion | City of Kinston, NC	■		■		■
McDowell & Mallard Creek WWTPs | CMU, Charlotte, NC	■	■	■	■	■
Engine Generator Project | Bloomington, IN	■	■	■	■	■
McCarrons WTP Electrical System Reliability and Optimization | PRWS St Paul, MN	■	■	■	■	■
Electrical Equipment Replacement - Big Blue WWTP | Kansas City, MO	■	■	■	■	■
2400V Switchgear and Motor Controller Replacement - Cosme WTP | City of St. Petersburg, FL	■	■	■	■	■
4160V Switchgear and Motor Controller Replacement | Johnson County, KS	■	■	■		■
Standby Power - CAP Water Treatment Plant | Mesa, AZ	■		■	■	■
Northwest WWTP | Cobb County Water System, Marietta GA	■	■	■	■	■

PVSC EXPERIENCE

Black & Veatch/CDM Smith Team has recently been engaged by PVSC to provide engineering, DSDC, construction management and permitting services for design and construction of a stand-by power plant consisting of three combustion turbines to produce a minimum of 34 MW for interconnection with the WWTP's existing electrical distribution system. The project is in the initial phase of providing due diligence in the evaluation of background information and initiation of the pre-procurement phase to position the project for success in meeting PVSC's goals and objectives as the project moves into the design phase. Close coordination between the design of the Advanced Electrical Contract and final configuration of the standby power plant is critical to the success of both projects. Our team is committed to both projects, and as such we will provide PVSC a seamless transition of information as key staff from PVSC, AECOM+HDR JV and Black & Veatch/CDM Smith Teams will be involved in both projects.

Additionally, CDM Smith has provided engineering services to PVSC since 1981. CDM Smith has a firm understanding of the PVSC wastewater treatment and collection system through many years of work on PVSC projects. Currently, CDM Smith is working with Greeley and Hansen, LLC on preparing an integrated Long-Term Combined Sewer Overflow (CSO) Control Plan for the combined sewer communities PVSC serve.

OTHER MUNICIPAL/AGENCY EXPERIENCE

With over 11,000 professionals worldwide, Black & Veatch is ranked the 11th largest employee-owned company in the United States. Black & Veatch has been serving municipalities for over 100 years and currently serves over 10,000 clients. Our global project base consists of more than 100 countries on six continents. Black & Veatch is conducting 6,300 active projects globally at any one time.

Regional municipal agency clients include the following (partial list):

- Two Bridges Sewerage Authority
- New York City DEP
- Westchester County, New York
- City of Meriden, Connecticut
- City of West Haven, Connecticut
- Massachusetts Water Resources Authority
- City of Bridgeport, Connecticut
- Suez Environment
- Boston Water and Sewer Commission
- City of Danbury, Connecticut
- Philadelphia Water Department.
- Passaic Valley Water Commission

CDM Smith has been instrumental in helping to establish and support regional authorities throughout New Jersey and across the country. It uses its expertise to help authorities better serve the public interest. Since its formation in 1947, CDM Smith has been providing engineering services to the Linden Roselle Sewerage Authority (LRSA). CDM Smith has been awarded authority engineer contracts (general and special) with the Joint Meeting of Union and Essex Counties, the Lambertville Sewerage Authority, and the Joint Meeting of Madison and Chatham, as well as work with the Township of Parsippany-Troy Hills.

The following pages contain descriptions of projects perform by Black & Veatch that have elements similar to the services required for the Advanced Electrical Contract project. These projects demonstrate both design and construction services capabilities for electrical improvements at operating treatment facilities. Our Project Manager, **Domenick Loschiavo**; Electrical QC Manager, **Mark Kleveter**, Design Managers, **Nick Salem** and **Earl Tast**; and Electrical Engineering Lead, **Andrew Truman**, performed work on these contracts.

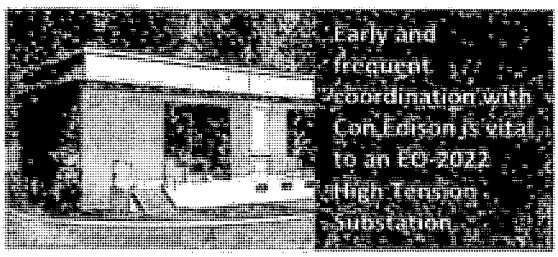
ELEMENTS HIGHLIGHTED IN THE FOLLOWING PROJECTS THAT ARE SIMILAR TO THE ADVANCED ELECTRICAL CONTRACT PROJECT INCLUDE THE FOLLOWING

- Coordination with electrical utilities.
- NFPA 820 and National Electrical Code (NEC) compliance evaluations.
- Minimization of plant operation disruptions.
- Constructability reviews with focus on safety, particularly associated when working on medium-voltage facilities.
- Design Services During Construction.
- Team continuity from planning through design and construction.
- Plant reliability improvements.

EXAMPLE PROJECTS

Oakwood Beach WWTP EO-2022 Electrical Upgrades (OB-136-DES-CM)

NYCDEP | New York, NY



OB-136 includes the design and installation of a new electrical 33kV to 4.16kV substation to replace the existing electrical service entrance equipment. During Facility Planning, Black & Veatch evaluated the new building construction techniques and distribution transformer technologies utilizing technical memoranda to gain stakeholder input before proceeding to the basis of design report. Con Edison and the NYC EAB required the primary switchgear be upgraded to 33kV high-tension service to meet the latest version of Con Edison's EO-2022 specification. Early and frequent coordination with Con Edison has been instrumental to the project's success. In addition to meeting with Con Edison, Black & Veatch collaborated with DEP's NYC Public Design Commission (PDC) to match the building's architectural look with PDC's expectations, streamlining the approval process.

The new Electrical Service Building will receive two (2) primary service feeders from Con Edison, each capable of powering the entire WWTP. Through use of the existing distribution switchgear's Main-Tie-Main arrangement, Black & Veatch developed detailed construction sequencing that will allow the Construction Contractor to energize the new service without any loss of power to the WWTP, a benefit to DEP as there will be no loss in plant operation.

Role: Prime - Facility Planning, Detailed Design, Bid Phase Services, Construction Management

Contract Value: $3,569,790 Fee, $15M Construction

Period of Service: June 2013 - Present

Relevance

- Con Edison EO-2022 High Tension Substation
- Electrical Service Entrance Equipment
- Electrical Service Entrance Building
- Construction Sequencing
- Power Transformers FEMA Flood Evaluation
- NYC Public Design Commission
- Medium Voltage Switchgear
- Electrical Ductbank Routing and Investigation
- Maintenance of Facility Operations
- Remote Monitoring of Equipment

SUCCESS

- **Safety:** No safety related incidents.
- **Quality:** Implemented Black & Veatch's QA/QC protocols throughout design.
- **Schedule:** Black & Veatch is working diligently to help DEP meet the dates agreed upon in their MOU with Con Edison.
- **Budget:** Black & Veatch has kept the design costs within the City's budget.

LESSONS LEARNED FROM CHALLENGES AND PROBLEMS

- **Challenges and Problems:** Con Edison of Staten Island consistently missed deadlines in delivering documents critical to Black & Veatch's design.
- **Lessons Learned:** Utilizing NYC DEP upper management to influence Con Edison to meet deadlines is sometimes necessary to hold the project schedule.

CLIENT REFERENCE

KEY TEAM MEMBERS

Mark Kleveter
Project Manager

Domenick Loschiavo
Civil Engineer

Nick Salem
Design Manager

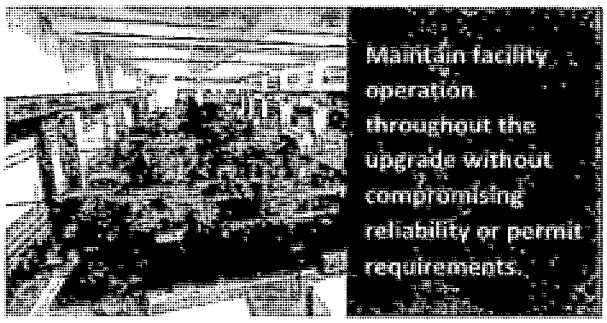
Andrew Truman
Electrical Engineer

Earl Tast
Structural Engineer

PROJECT 2

North River WWTP Cogeneration & Electrification (NR-COGEN-DES)

NYCDEP | New York, NY



The Cogeneration and Electrification Project will provide 15 megawatts (MW) of generating capacity on site for plant processes. The project was also undertaken to improve plant reliability; reduce operating cost; reduce the plant's greenhouse gas (GHG) emissions; and comply with air permit requirements. Related project elements include:

Engine generators rated at a minimum of 3.0 MW at 4,160 volts (V); the units will be designed to operate together through an electrical synchronization bus that will parallel with the operation of the Con Ed power feed.

Design includes synchronizing the existing four electrical feeds with the cogeneration units within the facility's existing substation which steps down the 13.2kV services to 4.16kV.

New electrical rooms are being furnished to distribute the 4.16kV critical generator power. The electrical distribution design adopts a "no single point" of failure concept and complete redundancy is provided for critical operation equipment.

Developed 4D schedule to maintain plant operations during construction without any reduction in redundancy, treatment capacity or operability.

Led coordination with the Authority Having Jurisdiction, Con Edison, the NYC Electrical Advisory Board, the FDNY, requiring permitting of life safety systems.

Role: Prime – Facility Plan review, Detailed Design, Bid Phase Services, Construction Phase Services

Contract Value: $22,692,656 Fee, $250M Construction

Period of Service: June 2013 to Present

Relevance

- Con Edison Coordination
- EO-2022 Compliance
- Maintenance of Facility Operations
- NYC Public Design Commission
- FEMA Flood Evaluation
- Medium Voltage Switchgear
- 480V MCCs and Switchgear
- Construction Sequencing
- NYC Electrical Advisory Board
- NFPA 820 Compliance

SUCCESS

- **Safety:** No safety-related incidents
- **Quality:** Followed Black & Veatch Quality Plan
- **Schedule:** Black & Veatch has supported DEP in meeting all consent order dates
- **Budget:** Detailed design was successfully executed within the agreed-upon budget between DEP and Black & Veatch
- **Prevention through Design:** Implemented the first PtD process for DEP through each of the 6 Construction Contracts – Received recognition from DEP EH&S.

CLIENT REFERENCE

KEY TEAM MEMBERS

Domenick Loschiavo
Deputy PM

Mark J. Kleveter
Electrical Engineer

Nicholas Salem
Electrical Engineer

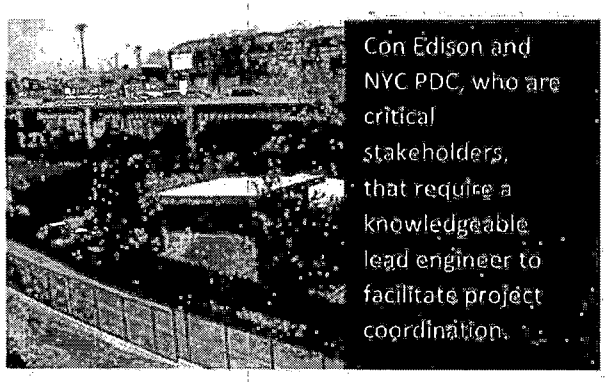
Andrew Truman
Electrical Engineer

Earl Tast
Structural Engineer

PROJECT 3

North River WWTP – Riverbank State Park Power Feed (Advanced Contract of NR-COGEN-DES, NR-44)

NYCDEP | New York, NY



The Riverbank State Park (park) resides on the roof of the North River WWTP and obtains its power from the WWTP main 4.16kV switchgear. In 2010, the New York Power Authority prepared a high-level study to separate the park's electrical service from WWTP's 4.16kV switchgear. Black & Veatch conducted a comprehensive preliminary design to bring the concepts developed in the NYPA study to a Basis of Design level. We then designed a new Electrical Service Entrance (ESE) for the park, separating it from North River WWTP. The ESE consists of: new PDC approved building, low voltage service and service switchgear and design of Con Edison underground utility vault. Once constructed, the park will gain a more reliable electrical supply dedicated to loads at the park independent of the plant.

Black & Veatch developed a detailed scope of work for a NYC DEP Job Order Contractor to investigate the existing electrical ductbanks that predate the WWTP. By proving these ductbanks are able to accept new cables, the project is saving DEP substantial construction costs and schedule, as two new parallel ductbanks (1 mile in length with an 80-foot vertical riser) will not have to be installed.

Role: Prime – Preliminary & Detailed Design, Bid Phase Services, Construction Phase Services

Contract Value: $1,708,146 Fee, $13.7M Construction

Period of Service: June 2013 - Present

Relevance

- Con Edison Low Tension Substation
- Utility Coordination
- Electrical Service Entrance Equipment
- Electrical Service Entrance Building
- Job Order Contractor Coordination
- NYC Public Design Commission
- Electrical Ductbank Routing and Investigation
- Maintenance of Facility Operations
- Remote Equipment Monitoring

SUCCESS

- **Safety:** No safety-related incidents
- **Quality:** Black & Veatch's QA/QC protocols
- **Schedule:** Met all project milestones
- **Budget:** Black & Veatch worked with DEP to complete the design within a fair and reasonable budget

LESSONS LEARNED FROM CHALLENGES AND PROBLEMS

- **Challenges and Problems:** Black& Veatch relied on a study conducted by an outside entity to prepare the scope of work for this project
- **Lessons Learned:** Proper planning and evaluation of alternatives with project stakeholders early in the life of the project are critical to project success

CLIENT REFERENCE

KEY TEAM MEMBERS

Domenick Loschiavo
Design Manager

Nicholas Salem
Design Manager

Mark Kleveter
Chief Electrical Engineer

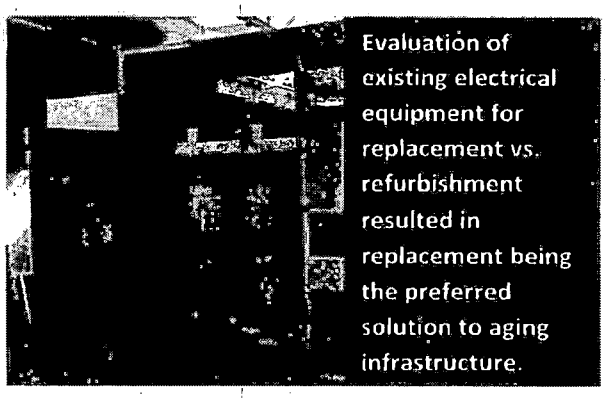
Andrew Truman
Electrical Engineer

Earl Tast
Structural Engineer

PROJECT 4

Oakwood Beach WWTP – Power Distribution Improvements (OB-134-DES)

NYCDEP | New York, NY



Black & Veatch conducted a detailed electrical distribution equipment assessment of the WWTP's 4.16kV Switchgear, power transformers and 480V MCCs to identify all electrical distribution equipment in need of repairs and/or replacement. With the assistance of DEP electricians, Black & Veatch's assessment consisted of internal and external inspections. An NFPA 820 and NYC Electrical Code review was performed that resulted in an assessment of the facility's compliance with current codes and standards.

Black & Veatch's assessment took a holistic approach to declassify the existing spaces by utilizing various combinations of physical separation barriers, purged and pressurized spaces, and continuous ventilation. A preliminary memorandum was transmitted to FDNY on June 23, 2015 summarizing the NFPA 820 non-compliance issue and detailing our conceptual pressurized vestibule solution.

Due to the additional design scope necessary to provide DEP a fundamentally sound and code compliant facility, DEP is required to advertise the project for detailed design due to the financial limitations of Task Order Black & Veatch is currently working under. The detailed design of the project is required to be re-advertised due to funding. Black & Veatch is eagerly waiting for the RFP to propose on this work.

Role: Prime – Facility Planning

Contract Value: $2,942,944 Fee, $26.6M Construction

Period of Service: June 2014 – June 2016

Relevance

- Electrical Distribution System Reconstruction
- 4.16kV Switchgear and 480V MCC Evaluation
- NFPA 820 Compliance Evaluation
- FEMA Flood Evaluation
- Construction Sequencing
- FDNY Coordination
- Use of Pressurized Vestibules
- Maintenance of Facility Operations
- Power Transformers

SUCCESS

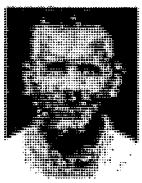
- **Safety:** No safety related incidents
- **Quality:** Black & Veatch's QA/QC protocols
- **Schedule:** Met all project milestones
- **Budget:** Planning Phase remained within City's budget

LESSONS LEARNED FROM CHALLENGES AND PROBLEMS

- **Challenges and Problems:** The NFPA 820 evaluation resulted in the need to modify existing spaces and add pressurized vestibules outside of the projects base scope of services.
- **Lessons Learned:** Our Facility Planning efforts resulted in additional work above the base scope of services. This project exemplifies DEP's new approach to separate facility planning from detailed design.

CLIENT REFERENCE

KEY TEAM MEMBERS



Mark Kleveter
Project Manager

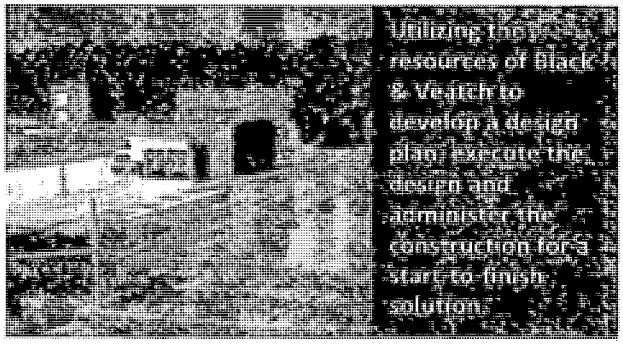
Nicholas Salem
Design Manager

Andrew Truman
Electrical Engineer

Earl Tast
Structural Engineer

5 Cedar Creek WWTF Phase 1 Improvements

City of Olathe | Olathe, Kansas



The City of Olathe, Kansas hired Black & Veatch to conduct a preliminary design study for expansion and upgrade of their Cedar Creek WWTP. A preliminary design study evaluated numerous options for the plant and its replacement electrical system. The study resulted in a five-phase plan to meet current and potential regulations as well as projected increased flows and system loads.

For Phase 1, Black & Veatch completed the design of the plant expansion to increase the treatment capacity and provide nutrient removal capabilities. As part of the expansion, the plant's existing low-tension electrical service was replaced and upgraded to a new high-tension service at 12.47kV. The electrical service terminated at new 15kV service entrance switchgear which conformed to the requirements of the local electrical utility, Kansas City Power and Light. The service was stepped down to 4.16kV and distributed around the new and existing site via new 5kV metal-clad switchgear backed by a 2 MW engine-generator. Step-down transformers located at key locations throughout the expansive site provided utilization power for new, existing and future facilities at the plant. The electrical system is designed with the capability to expand with the future phases of construction planned for this facility.

Role: Prime – Preliminary Design, Design, Construction Phase Services

Contract Value: $35M Construction

Period of Service: 2008 - 2012

Relevance

- Upgraded 15kV utility service and switchgear
- New 5kV distribution switchgear
- Standby synchronizing engine-generator
- Pre-design study
- Design of new electrical service for expanded plant
- Construction contract administration and support

SUCCESS

- **Safety:** Designed for the future safety of the plant, taking into account operational safety concerns (prevention through design). Held safety workshops with the owner at various stages of design.
- **Quality:** Implemented Black & Veatch's QA/QC protocols throughout design and construction. Black & Veatch resident engineer and inspectors were on-site throughout construction to confirm materials and quality of construction.
- **Schedule:** Design was completed on schedule. Third party contractor extended the construction schedule slightly.
- **Budget:** Constructed within City's budget.

LESSONS LEARNED FROM CHALLENGES AND PROBLEMS

- **Challenges and Problems:** A delay was encountered during construction with the electric utility due to confusion of responsibility regarding the electrical metering installation
- **Lessons Learned:** Early and proactive coordination with the local electrical utility can drastically reduce the severity and duration of coordination issues during construction, whether anticipated or unforeseen

CLIENT REFERENCE

KEY TEAM MEMBERS

Mark J. Kleveter
QA/QC

Andrew Truman
Electrical Engineer

Project Approach/Schedule

This section describes our complete understanding of the technical issues related to this project, provides our innovative ideas that will ensure successful completion of the work, and details our proposed method for delivering a high-quality project that is on schedule and within budget. We have identified key project challenges and specifically tailored our approach to ensure that each of those challenges is met effectively. Our team fully understands the project goals and the complexities of upgrading an electrical power distribution system within a wastewater treatment environment and will use our expertise to efficiently deliver the design and implement this time sensitive project.

PROJECT UNDERSTANDING

Superstorm Sandy wreaked devastation throughout New Jersey, including in the PVSC service area. In particular, it created major flooding that incapacitated the PVSC WWTP for several weeks. In response, PVSC is undertaking a multifaceted program to protect the facility against major flooding events up to a 500 year storm. This project will be implemented in advance of and support the other projects as part of the FEMA Resiliency program. The Advanced Electrical Contract project is a critical piece to allow the WWTP to maintain full operation for any power outage or storm event.

The BODR prepared by the Program Management JV established the necessary facilities and design criteria for the project, including a completely redundant 13.8kV electrical distribution system that effectively provides every major secondary unit substation with two independent power feeders from separate buses upstream, each capable of powering the entire connected load on its respective switchgear. Most importantly, it provides the provisions required for PVSC to connect their new Standby Power Plant and Stormwater Pumping Stations, which are both active design contracts at this time. The **Black & Veatch team is the Engineer of Record for the PVSC Standby Power Plant and thoroughly understand how critical of a design this Advanced Electrical Contract is.** Without the proper phasing of this work, the overall design intent of the Advanced Electrical Contract will be difficult to achieve.

The largest hurdle for this Advanced Electrical Contract to overcome is the short circuit ratings of the existing 13.8kV electrical distribution equipment, which will be exceeded once the PSE&G substation upgrade is completed and the new Standby Power Plant is connected. The BODR has laid out a two phase approach that will allow the Advanced Electrical Contract to proceed without putting the existing electrical distribution equipment at risk. Our engineers have reviewed this planned approach in detail and understand that in order to safely and properly complete the reconstruction of the electrical distribution system, the PVSC WWTP must always have a second redundant source of power connected, capable of powering all critical plant loads. As we approach the scope of work that replaces primary distribution Switchgear "A", we recognize that as each bus section is taken out of service for replacement, we are effectively taking out that respective utility power feed acting as the plant's redundant power source. Therefore, the Standby Power Plant must be properly connected to the Switchgear "A" bus that remains in service to act as the second source of power for the WWTP. During the interim period where the new Standby Power Plant is connected to the existing Switchgear "A" (750MVA rating) along with the upgraded PSE&G Power Utility Feeders, the new Standby Power Plant will only be permitted to operate in a restricted manner until the existing electrical distribution system is reconstructed with adequate short circuit rated equipment (1000MVA rating).

Black & Veatch is extensive work on the PVSC Electrical Distribution System as part of the Standby Power Plant design, allows us to understand the permitted modes of restricted operation that will allow the Standby Power Plant to operate, in combination with the upgraded PSE&G Power Utility Feeders without putting the existing electrical distribution system at risk. As part of our pre-engineering effort included with our proposal, we offer a high level view of those various restricted modes of operation as we understand them. **The Black & Veatch team has run power studies on these various operating scenarios using our working ETAP model of the PVSC electrical distribution system:**

Baseline Case (the problem): When the WWTP is transitioning from normal power to standby power or vice versa, there will be a "closed transitioning" period where the standby power plant feeders are paralleling with the power utility feeders. This closed transitioning period can last for up to 5 minutes (per the BODR), which is required to maintain the WWTP in operation and remain operational when transitioning power sources between the Standby Power Plant and the PSE&G Substation. When both standby power plant feeders parallel with both utility feeders, the available short circuit current that could potentially appear if a fault were to occur, would significantly exceed the 750MVA rating of the existing electrical distribution equipment. The 750MVA rating can withstand a rating of approximately 30.4kA when operating at 13.8kV. When 2 standby power plant feeders parallel with 2 PSE&G utility feeders, the available short circuit current can exceed 40kA, which would damage the existing Switchgear "A" and downstream equipment.

Restricted Operation Mode 1 (unsafe condition): We continued to evaluate varying restricted operating scenarios to determine which restricted modes of operation would permit the closed transition period to safely take place prior to the electrical distribution system 1000MVA rated equipment upgrade (Phase 2). We concluded that regardless of how we varied the quantity of standby power plant feeders and power utility feeders operating in parallel, as long as the tie-breaker in the new standby power plant or the tie-breaker in Switchgear "A" remained closed, the available short-circuit current exceeds the 750MVA (30.43kA) rating of the existing equipment.

Restricted Operation Mode 2 (safe condition): When we analyzed scenarios with the tie-breakers open in both the standby power plant switchgear and Switchgear "A", we started to see that we could effectively split the WWTP's electrical distribution system down the middle and allow the closed transition paralleling period to take place without exceeding the 750MVA rating of the existing electrical distribution equipment. This mode of restricted operation essentially parallels all 4 feeders, but does so by paralleling 1 standby power plant feeder with 1 power utility feeder on each side of the medium voltage tie-breakers. Our working PVSC ETAP model confirmed that when we parallel 2 standby power plant feeders with 2 power utility feeders with the medium voltage tie-breakers open in the power plant switchgear and Switchgear "A", the available short circuit currents would not exceed 24kA.

As demonstrated, our intimate knowledge of the operational constraints that the detailed design of the Advanced Electrical Contract must overcome, makes us the ideal partner with PVSC and AECOM+HDR JV for this critical project.

Our team has identified a number of critical challenges that must be effectively addressed to ensure a successful project, including the following:

- Accelerated implementation schedule; the sooner the modifications to Switchgear A is implemented, the sooner the Standby Power Plant and Stormwater Pumping Stations can protect the WWTP from a future power outages and storms.
- Finalization of the combustion turbine equipment so that the Transient Stability Study can be performed and design efforts can be focused on the specific needs of the power distribution system.
- High Quality, detailed and site-specific bidding documents to minimize construction delays.
- Initiating permit applications and pre-meetings for new permits early in the design process.
- A formal constructability review from construction professionals experienced in construction of similar electrical distribution facilities to identify strategies to construct facilities on the proposed site.
- A construction and implementation plan to maintain plant operations.

TECHNICAL APPROACH

The BODR's proposed improvements to the existing electrical distribution system will enhance operability and reliability of the existing equipment. Our project team's in-depth knowledge of electrical power distribution systems, expertise with power generation integration and commitment to safety and quality put us in a position to fully plan for and address these critical project issues. Our plan technical approach to execute this project include the following:

Preliminary Design

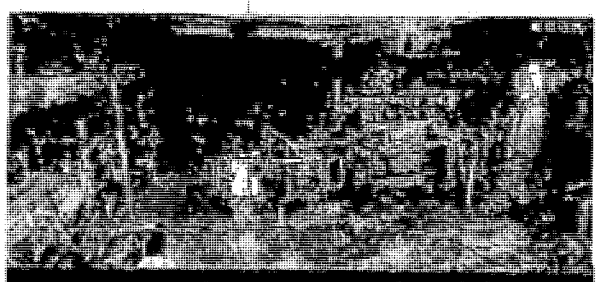
We have included preliminary design as an upfront subtask under the Design phase (Task 3). The preliminary design phase includes activities that need to be done early and are those that support the Phase 1 and Phase 2 design packages. These activities include: Site and Utility Surveys, 3D Laser Scanning of the existing spaces as described in the following paragraphs, executing the Transient Stability Study and performing baseline

Electrical Power Distribution Studies of the current power distribution configuration. The BODR requires a Power Distribution Study as part of the final design, but we feel it would be PVSC's best interest to document the current configuration & settings of the electrical equipment as the gear is constantly being "tweaked" to keep up with the demands of the WWTP. In addition, this will provide the opportunity to perform any diversity analysis of the electrical equipment and be able to interview PVSC Electrical Engineers and Plant Staff.

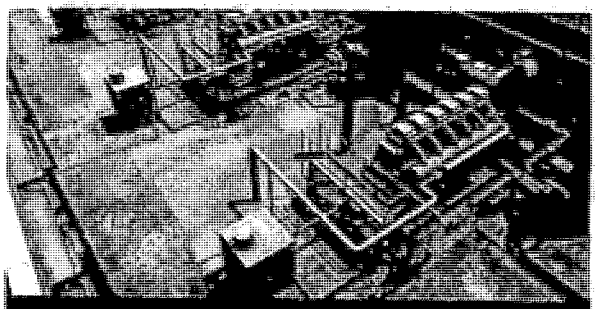
Black & Veatch understands the concern and need to complete the design with alacrity. One Innovative Idea to kick-off design sooner and minimize potential construction change order delay claims is to start with Excellent As-Built Information. On multi-discipline infrastructure rehabilitation projects, it is critical to have accurate and up-to-date as-built information for the existing facilities. In general, we have found that older water/wastewater facilities that have undergone multiple upgrades, existing paper as-built record drawings can be notoriously unreliable. When combined with poor records for buried utilities, the stage is set for major Contractor claims and costly change orders during construction.

INNOVATIVE IDEA

Black & Veatch's recommended Innovative Idea solution to this problem is to produce 3D laser scans of exposed infrastructure. Our 3D Laser Scans can be extracted to create the base BIM background in Revit minimizing effort to recreate the space from 2D drawings.



Laser scan image from which dimensions can be scaled accurately.



3D Laser scanning develops high quality images with accurately scaled dimensions.

We also plan to execute the Transient Stability Study during our defined preliminary design phase. The Transient Stability Study is important as it directly relates to the new Power Generation System to be installed at the facility. Power Generation Systems are often subjected to transients (relatively large disturbances) on the electrical distribution system they are supporting. These disturbances can be attributed to transients such as an abrupt decrease in electrical load, a loss of a portion of generation, or a fault in the distribution system. The proposed Standby Power Generation Facility will be designed and provided with protective devices to guard the equipment from damage due to theses disturbances (faults) on the WWTP's electrical power distribution system. As such, these protective relays will shut down the operating Combustion Turbine Generator, thus reducing capacity of available backup power.

The Transient Stability Study will expand on the motor starting analysis and utilize the same ETAP model file that was updated as part of the Standby Power Plant BODR Validation Task. We assume this file represents the current configuration of the WWTP, baring the RFQ/P requirement to update the model with new Switchgears "E" and "W" plus the modifications in Switchgears "N" and "S". The Transient Stability Study will evaluate the ability of the Standby Power Plant to recover from such faults that may occur downstream of Switchgear A.

For short circuit disturbances at the Standby Power Plant, a fault will be applied to all medium voltage busses and one low voltage bus. The low voltage bus to be analysing will be the one with the least amount of impedance between the low voltage bus and the medium voltage bus that is supplying power to the respective step-down transformer. The transient stability analysis will include identifying critical fault clearing time, checking generator rotor angle stability and assessing system stability margin.

We consider this activity one of the critical items to be done early, as by understanding the results sooner, PVSC will have more options and flexibility to rectify any issues the study may uncover. The study is limited to the analysis and does not include any design or implementation of any mitigation methods. Once the study is complete, the results will be shared with PVSC and mitigation methods to rectify any issues found will be collaboratively discussed. We will start the study soon after the Standby Power Plant generator is selected. **Allen Gardner** will lead this effort and is the right choice as he is the Engineer responsible for the generator selection. Having Allen executing this work puts the Black & Veatch Team ahead of schedule as compared to another entity.

Executing the Transient Stability Study is dependant upon the selection of the Combustion Turbine Generators and will be initiated once the Vendor for the Equipment is selected as part of the Standby Power Plant project. Our initial goal as part of the Transient Stability Study work is to confirm the withstand rating of existing Switchgear A with the selected Combustion Turbine Generators to support our validation effort. This is the most important item to check early on as it will identify the Standby Power Plant operating restriction(s) and the confirmation to execute the Phase 1 Switchgear A work approach presented in the BODR.

We offer an additional task to be done under the preliminary design phase. This task will be done ahead of the RFQ/P required Concept Report Validation Task to gain time in the project schedule for this time sensitive contract. Switchgear "E" is to be located within the Sludge Thickening Building and is "sandwiched" between two HVAC Air Handling Units and vertically restricted due to the associated large ductwork. To permit the best possible equipment layout and conform to the National Electrical Code (NEC) for no obstructions above the Medium-Voltage equipment, we will vet out the concept to move these Air Handling Units to the building roof and reroute the ductwork accordingly. We feel having an upfront specific task for this congested space sooner benefits PVSC in meeting their goals for the project.

Concept Report Validation

The Concept Report (Basis of Design Report as published with the RFQ/P) defines the project including the size of the electrical equipment, the installation location and the footprint of new electrical buildings and rooms. In accordance with the RFQ/RFP, the new electrical switchgear is not subject to change and our initial review of the BODR indicates that the new switchgear is appropriately rated. Additionally, we concur with the Main-Tie-Tie-Main requirement for each piece of new equipment. This configuration will permit the Installation Contractor to energize sections without loss of power to the WWTP as well as aiding PVSC to perform maintenance on the gear. During the Concept Report Validation phase, we will review the background data of the BODR to understand in detail the project drivers that led to these decisions to allow us to build upon the current basis of design. Any identified deficiencies or improvements will be documented in a Supplemental Basis of Design Report.

Coordination with Project Stakeholders

We will begin project coordination with PVSC, AECOM+HDR JV and the Standby Power Plant & Stormwater Pumping Station project teams prior to finalizing the BODR Validation Report (and if requried the Supplemental Report) to receive their input and consensus on key project issues. Black & Veatch will be self-representated for the Standy Power Plant project as similar staff will be involved with both projects. Having similar satff between the two proejcts for key aspects benefits PVSC due to the efficiency our team brings with the transfer of knowldege between the two projects while providing the right amount of coordination effort.

Nick Salem has coordinated similar activities with electrical utility providers, specifically Consolidated Edison of New York out of Black & Veatch's NYC office that include design standard integration and interconnection agreements. Additionally, he supported the NYC DEP in co-authoring their Standard Operation Procedure on obtaining electrical design approvals from Con Edison and the NYC Electrical Advisory Board. Also, **James Barrett** has extensive design experience with PSE&G. James has executed PSE&G projects from Black & Veatch's Raleigh, NC office and understands the intricacies of PSE&G requirements. James will support . Nick regarding PSE&G interaction and the two will put their knowledge and experience for PVSC in working with PSE&G.

Maintenance of Plant Operations During Construction

PVSC can be assured a Plan will be completed that will be thorough and complete so that continuous operation of the plant is maintained. We will work with plant staff to incorporate specific features of the recommended equipment that will allow PVSC flexibility to respond to issues related to maintenance of plant operation during construction.

The BODR outlines a holistic approach to keep the facility in operation by outlining two phases of construction. Specifically, Substation No. 1 that houses Switchgear A will undergoe two phases of work. Phase 1 will permit tie-ins for the Power Plant and Stormwater Pumping Stations with the Power Plant supporting the WWTP as the second source of power during the expansion of Switchgear executed under Phase 2.

The BODR also outlines an approach to replace the existing electrical switchgear in halves so that the downstream process equipment can remain in operation. We concur with this approach and have executed many projects in this manner. Our planned constructability reviews, led by **Tom Raihl**, will highlight any difficulties and issues to install the equipment as desired. To permit this installation approach, we expect one to two of the existing transformers adjacent to Switchgears N and S will need to be removed to create adequate access to place the new sections into the dedicated space as shown in the BODR drawings.

Constructability of Replacing Switchgears "N" & "S"

INNOVATIVE IDEA

The existing electrical rooms housing Switchgear "N" & "S" are situated at the north and south ends of the Sludge Heat Treatment Facility. The electrical rooms have limited open floor space, which will make rigging of the new and demolished Switchgears "N" & "S" very difficult. Black & Veatch has performed similar transformer evaluations for similar vintage transformers at other WWTPs and recommend that these transformers, which are beyond their life expectancy, be replaced as part of this Advance Electrical Contract to provide PVSC with simplified construction sequencing and maintenance of plant operations during construction.

Black & Veatch performed a preliminary constructability review of the existing electrical rooms that house Switchgears "N" and "S" in the Sludge Heat Treatment Facility and offer those findings and suggested alternatives as part of this proposal. Switchgear "N" and Switchgear "S" are similar in both physical size and arrangement. They are 13.8kV double ended switchgears that feed 4.16kV double ended switchgears through step-up transformers that reside in the same electrical rooms as the existing Switchgears "N" & "S". The existence of these four step-up transformers in the same electrical room as each switchgear will make it very difficult to remove the demolished sections of the existing switchgears. Rigging in the new switchgears will be even more of a challenge depending on how the shipping splits are specified and manufactured. The spaces in-between the existing step-up transformers are not open spaces, as they have wire-ways and conduit chases residing between the transformers.

In order to allow for proper rigging of the demolished and new switchgear sections, the existing transformers would need to be temporarily removed and then reinstalled. Due to the redundancy of the existing electrical distribution system, temporarily removing some of the transformers will not have an effect to maintain the WWTP during construction as downstream electrical and process equipment will still be in service.

Transformers T-9A, T-9B, T-10A, T-10B, T-11A, T-11B, T-12A, and T-12B are 3750kVA, 13.8kV-4.16kV, ventilated dry-type transformers that were manufactured in December of 1979 (nameplate information obtained from site). Black & Veatch has evaluated life expectancies of similar transformers for other Wastewater Treatment Plant power distribution improvement projects and found that the average life expectancy of dry-type transformers is approximately 35 years. With a manufactured date of 1979, the eight existing transformers that share the electrical rooms with Switchgears "N" and "S" are nearing 40 years old and have surpassed their life expectancy. While these transformers could potentially serve PVSC well for an extended time period, temporarily removing them for rigging of the Switchgears being replaced and then reinstalling them could add costly change orders to the project if not handled delicately and even then there is significant risk. Our proposal includes the level of effort to replace these transformers.

ADDED VALUE

As and Added Value to PVSC, our scope includes the design of new transformers for Switchgears N and S.

By replacing these transformers from the start of detailed design, PVSC will benefit from a simplified construction sequence and maintenance of plant operations during construction. In addition, all work in the electrical rooms housing Switchgears "N" and "S" will be complete and PVSC will not have to deconstruct and reconstruct these rooms in a future contract to replace these transformers, providing a long-term benefit and value to PVSC.

Permitting

The Black & Veatch team takes a proactive approach when it comes to permitting of all our clients' construction projects, has a thorough understanding of what permits are necessary, prepares complete and thorough permit application submittals that expedite agency reviews, and has excellent working-relationships with agency review staff, all with the goal of agency delivery of the necessary permits and approvals on-time for our clients to move into construction as soon as possible.

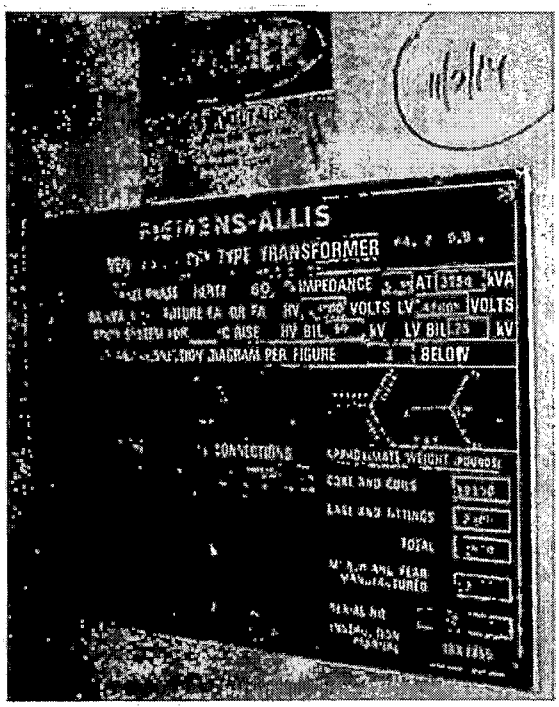


Figure 5 Typical Dry Type Transformer Nameplate

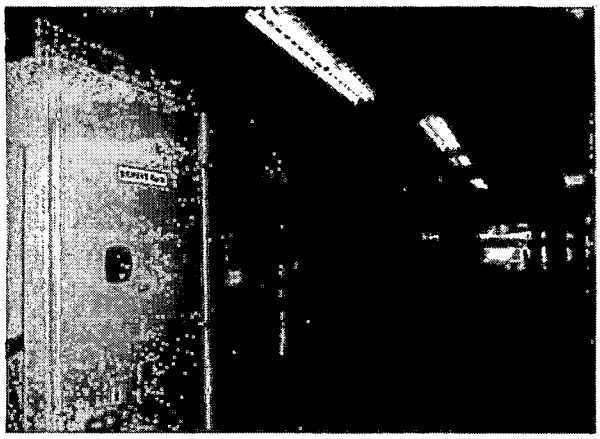


Figure 4 Typical Arrangement of Switchgears "N" & "S" (left) and their Associated Stepdown Transformers (right)

Our team understands that timely and successful permitting of PVSC's advanced electrical project is paramount to staying ahead of or on the desired overall program schedule. Project permitting services to obtain those permits or approvals for the advanced electrical contract, that PVSC has not already obtained, are included in our scope of work.

The Black & Veatch/CDM Smith team will be responsible for assisting PVSC with obtaining the outstanding permits and approvals that will be necessary to construct the proposed advanced electrical project.

Based on the PVSC's Advanced Electrical Contract – Basis of Design, May 2017, prepared by the program management team, Section 4 of this document discusses permitting and approvals as follows:

- Zoning - PVSC has indicated that it is exempt from zoning requirements.
- Construction Activity - construction and demolition activity, excluding emergency work, have limited hours and there are construction noise limits to adhere to.
- Interconnection Application and Agreement with PSE&G - coordination with PSE&G and the designer of the Standby Generating Facility in designing the proposed electrical modifications, and design will facilitate the approval of the interconnection application and agreement between PVSC and PSE&G

The Black & Veatch/CDM Smith team reviewed the land use issues associated with the proposed new or expanding substation locations.

Switchgear "A" Building Expansion: 1,064 square feet Disturbance of Existing Pavement

Switchgear "W" New Building: 1,500 square feet Disturbance of Lawn Area

Switchgear "E" New Room: 1,254 square feet of No Land Use Disturbance

Due to their small sizes, the proposed outdoor work areas do not exceed NJDEP's stormwater management thresholds (one-quarter acre new impervious or one acre total disturbance); thus, stormwater management design is not anticipated to be necessary. In addition, regarding NJDEP Division of Land Use Regulation (DLUR) rules, we note that Switchgear E is located within NJDEP's coastal program jurisdiction; however, since this substation is located indoor there is no DLUR coastal permit issue. To the west, both Switchgear A and Switchgear W are both outside of the NJDEP's coastal program jurisdiction however both are location within the DLUR flood hazard area (FHA). The proposed work would appear to qualify for the FHA permit-by-rule 9 – general construction activities in a tidal flood hazard area; given that, no DLUR permitting paperwork is anticipated to be required. This will be re-visited during project design.

In addition, the total amount of disturbance associated with the two outdoor locations appears to be below the threshold for Soil Erosion and Sediment Control (SESC) plan certification of 5,000 square feet). However, given the other separate ongoing earth-disturbance projects at the site, if a SESC plan certification is deemed to be necessary or is desired by PVSC, the Black & Veatch team will prepare the application and submit the documentation to the Hudson-Essex-Passaic Soil Conservation District.

For the Advanced Electrical Contract, New Jersey Department of Community Affairs (NJDCA) plan review is applicable because NJDCA requires review of all electrical substations. The Black & Veatch team will provide NJDCA plan review and engineering services. These services will include arranging and attending a pre-application meeting with NJDCA, preparing a NJDCA plan review submittal, utilizing the NJDCA's ePlans Electronic Plan Review System during the plan review process, responding to plan review comments, and at the end of the project, our team will print, sign and seal the required drawing sets for submission. PVSC will pay all NJDCA filing fees.

The Black & Veatch team further assumes the following are not applicable to this project based on prior PVSC permitting experience; local site plan reviews of PVSC projects are not conducted, certificate of occupancy due to no occupancy spaces, fire safety/protection permit since it will be included in performance contract for the Installation Contractor to be responsible for, NEPA Environmental Assessment/FONSI and the NJDEP Federal Consistency Determination were already conducted for the PVSC program which includes this advanced electrical project, NJDEP-DLUR permitting is not needed and was clarified in Addendum #1 question 4 on pages 9 and 10, stormwater/SWPP is not necessary for this small-sized project. However, as the project design is further developed, if there is a need for these or other additional permits or existing permit modifications, this need will be identified by our team for PVSC in conjunction with a contract amendment.

In addition, included in this task, the Black & Veatch team will provide design documents to the construction contractor to obtain its Uniform Construction Code permits. Our team will also provide design documents to PVSC in support of NJ State Comptroller review, as well as NJDEP/NJEIT funding program review.

After the submittal of documents to the NJDEP/NJEIT funding program, we will utilize the NJEIT funding allowance line item to continue to provide NJEIT funding assistance as necessary to respond to agency review comments and as requested by PVSC/ program manager.

Independent Reviews

The 30 percent design phase is the optimum time to solicit independent feedback on the design. It is early enough in the design phase to be able to adjust course with minimal impact to the design schedule and budget. It is appropriate to have an independent third-party value engineering review as required by the RFQ/RFP, and our design team will participate.

In addition, we are proposing a formal constructability review be conducted at the 30 percent design stage. As a design-build contractor working in both the power generation and wastewater treatment industries, we have many construction professionals on staff who are familiar

with all of the construction challenges facing your power distribution project. Our professionals know the importance of developing a plan in which documents are coordinated and ready for bid, and potential change orders and claims have been identified and mitigated. Construction personnel will visit the site to gain a better understanding of the constraints that will impact foundations, construction crane placement, laydown, and storage. Minimizing the impacts to the surrounding roads and unloading facility will be key to achieving a successful project installation. The team will review the drawings, specifications, estimate, and schedule and provide input on all aspects of the project that relate to constructability, bid ability, permitting, site conditions, and coordination with and among agencies, utilities, and stakeholders. When constructor-oriented input is incorporated into contract documents, the result is a clear, biddable, buildable project.

Detailed Design

Following the value engineering and constructability reviews, the design scope will be set, and we will proceed into detailed design. Two parallel design paths will be taken that will result in two separate construction contracts, Phase 1 and Phase 2. The first includes Phase 1 which will detail the modifications to Switchgear A as well as the construction of new Switchgears N, S, E and W. The Phase 1 contract will allow the required modification to Switchgear A to begin sooner and provide the facility the redundant power sources it needs than would with a single construction contract concept. Phase 2 work will include the building expansion of Substation No. 1 as well as the installation of new Switchgear A sections as shown in the BODR. The building expansion is an independent task and can be constructed under Phase 2 concurrent with the modification to Switchgear A under Phase 1. The building expansion would include the installation of the new switchgear halve that it would be housing, expediting the final arrangement of this gear giving PVSC full operational capacity of the new Standby Power Plant, lifting the operational restrictions under the modified/temporary setup.

Basis of Design Report Validation

- Identify performance characteristics that are required.
- Identify deficiencies.
- Document all validation activities.

30 Percent Design Review Milestone Deliverable Quality Reviews

- 30 percent submittal will be checked by disciplines, and the quality review checklists will be completed by each discipline.
- Construction cost estimate representing this stage of the design will be included.
- The 30 percent design review to "lock in the design" will be held 4 weeks following the submission of the complete 30 percent design submittal.
- Participate in value engineering workshops.
- Hold a constructability review workshop.

60 Percent and 90 Percent Design Review Milestone Deliverable Quality Reviews

- The 60 percent and 90 percent submittals will have been subjected to internal quality control within our team, and the appropriate quality control checklists will have been completed.
- Construction cost estimate representing this stage of design will be included.
- The first review workshop will be held after submittal of the document. This workshop will allow our team to present the design to PVSC and the Program Management JV and help focus the review effort on critical areas.
- After the Program Management JV completes its review and submits comments to our team, a second workshop can be held to discuss and resolve the comments submitted.

The detailed design of the Advanced Electrical Contract will progress at a good pace, allowing for ample review time and PVSC and Program Management JV input into the design process. It will include 60 percent and 90 percent review submittals as well as monthly design progress meetings.

Discipline Specific Design Approach

The following sections outline some specific features of our design approach that are in addition to the requirements of the RFQ/P and the Concept Report.

Site Layout and Materials

Although the project involves upgrades to existing or providing new electrical gear in five areas, only two of the areas will require any civil site design work. These are Switchgear W and Switchgear A. Switchgear W is the construction of a new facility. Switchgear A is an addition to an existing facility. The remaining switchgear work is within existing facilities and it is not anticipated any civil site work is required in these areas. The basis of design report (BODR) identified that Switchgear W would be located to west of the Supernatant Treatment Plant (STP). The extension to Switchgear A would be to the east of the existing building.

We will utilize the services of Boswell Engineering to prepare the site survey which will be used as the basis for all site plans. The survey will be provided in PVSC datum (NAVD88 + 100).

Minimal maintenance landscape plantings will be provided with any remaining disturbed areas to be loamed and seeded upon project completion.

Pavements, depending on location, will be constructed of either concrete or asphalt, and all curb will be concrete and match existing where appropriate. Materials and methods of installation will be in accordance with the State of New Jersey Highway Specification, New Jersey Department of Transportation, Standard Specifications for Road and Bridge Construction, Latest Edition and the United Facilities Guide Specifications, Latest Edition.

The management of stormwater runoff generated from the project will be coordinated with other projects. Grading and downspout discharges will be coordinated with those projects. Infiltration of excess runoff is not anticipated nor included in the design. Water and sanitary service is not required as these electrical spaces are normally not staffed full time.

Geotechnical Program and Foundation Design

The geotechnical program will include drilling a total of two borings (one at each of the proposed superstructure locations; Substation No. 1 and Switchgear "W") to a depth of approximately 100 feet below ground surface. The program also includes laboratory testing on select soil/rock samples.

These two borings will be drilled in accordance with ASTM D1586 and advanced to bedrock to identify subsurface conditions in area. Composite drill cuttings will be tested for select contaminants before the disposing them in an off-site facility. Soil and bedrock samples will be collected for physical testing. A geotechnical data report (GDR) will be prepared which will include all relevant information collected from the field and laboratory testing program. Our team assumes that no hazardous material sampling and testing will be performed (according to the clarification provided in Item 9 of Clarification 1 to the RFQ/P).

At this time, we anticipate that the new structures will be supported on driven or drilled piles. High capacity piles driven to bedrock is anticipated to be the most cost-effective pile foundation option for the project with the understanding that vibrations during pile driving may need to be abated. During the design stage, three pile types will be analyzed.

Electrical Design

Our team is familiar with the vast tunnel system that connects the remote facilities of the PVSC WWTP. We have walked not only the tunnels, but the pipe galleries below your sludge thickening facility, as well as the lower levels of your other buildings. We know how valuable the real estate is within your tunnels and plan to utilize existing conduits whenever possible and effectively locate new conduits in the most logical locations to allow access to existing equipment, instrumentation, and other devices. We will utilize your tunnels, pipe galleries, and basements to route our new conduits to the fullest extent possible. From there we will design a below grade concrete encased electrical ductbank system to get our power feeders to your new remote structures such as the New West Electrical Building, the Future Northeast Pumping Station, the Future Southeast Pumping Station, and the Future West Pumping Station. It is our plan to route the new cable bus from the new PSE&G step-down transformers to the new Switchgear "A" using below grade concrete encased electrical ductbank as well.

QUALITY DESIGN DOCUMENTS

- Advanced contract NR-46 as part of the New York City DEP North River WWTP cogeneration and electrification project received nine bids with a spread of less than 5 percent for the three lowest bids, and the Project has less than 0.2% Change Order Value for this $20M contract.
- Cogeneration & Electrification contract NR-38 received four bids with a spread of less than 5% between the two low bids for this $200M contract.

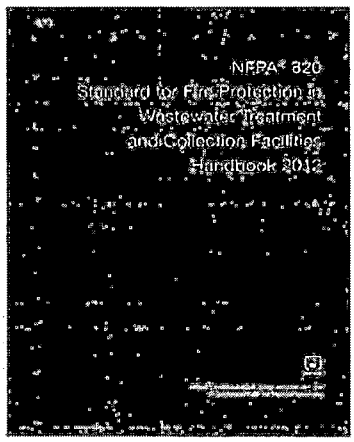
TECHNICAL DRAWINGS FOR THIS PROJECT ARE NOT REPRINTED HERE DUE TO SIZE

Corrosive and Potentially Hazardous Environments

INNOVATIVE IDEA

Black & Veatch has already begun conceptualizing solutions to contain corrosive environments that my spread from adjacent process areas to the new and existing electrical rooms. Should it be necessary, our conceptual solutions also meet the intent of NFPA 820 – Standard for Fire Protection in Wastewater Treatment and Collection Facilities.

Utilizing our existing knowledge of the various PVSC WWTP facilities, as well as existing facility drawings, Black & Veatch has already begun the BODR validation process. While the Sludge Thickening Facilities look to be compliant with NFPA 820 – Standard for Fire Protection in Wastewater Treatment and Collection Facilities (NFPA 820), we look forward to having a chance to evaluate compliance with this important standard in more detail to ensure that all existing and new facilities are adequately protected. During our preliminary evaluation, we noticed that there may be existing corrosive environments that could potentially spread to the new and/or existing electrical rooms from adjacent process areas. One example of this potential hazard exists within the Sludge Thickening Building. Corrosive Hydrogen Sulfide (H_2S) gas originating from the open sludge channel in the Flow Distribution Room Central could potentially make its way to the new Electrical Room that houses the new Switchgear "E" located on the floor below by traveling through Stair Tower No. 6 or the elevator shaft. Another similar situation to pay close attention to exists at the existing electrical rooms housing new Switchgear "N" and "S". Both existing electrical rooms "N" & "S" are located adjacent to the Zimpro process area, which generates an environment that is both very hot and very humid. Currently, the only separation between the Zimpro process environment and the existing electrical rooms is an uninsulated glass wall with two swinging doors. Containing these potentially hazardous environments and keeping them out of the critical electrical rooms will significantly increase the life expectancy and reliability of your electrical distribution equipment, as well as promote a much safer working environment for your staff.



As indicated on Figures 6, 7, and 8, Black & Veatch suggests a pressurized vestibule and/or stairwell solution that will contain the harmful corrosive environments within their source process space and out of your new and existing electrical rooms. In addition, should our detailed NFPA 820 Compliance evaluation discover any non-compliance issues such as lack of "physical separation between classified and unclassified areas, our pressurized vestibule solution is also NFPA 820 compliant. "Physical separation," as defined by NFPA 820, requires that there be no openings such as windows or doors that could permit the transmittance of hazardous gases. This situation often exists in wastewater treatment plants in process areas such as sludge thickening, aeration and final settling tank buildings, and sludge storage tank structures. More often in older treatment plant, areas that currently house the electrical distribution equipment are not suitable for the existing electrical installations, since the presence of combustible gases is possible because of the lack of "physical separation."

The pressurized vestibule approach effectively keeps explosive and corrosive gasses out of electrical rooms located next to adjacent classified process spaces while maintaining personnel access. Vestibules along with ventilation improvements will eliminate hazardous conditions and promote longevity of the new electrical equipment due to keeping its respective environment clean and free of corrosive gasses. It also allows the equipment to be replaced in-kind and in-place, avoiding costly relocation alternatives.

INNOVATIVE IDEA

Black & Veatch has developed a conceptual plan to utilize pressurized vestibules (Figure 8), as a solution to this important issue and has presented this solution to the Authority Having Jurisdiction over other wastewater treatment plant projects.

Pressurized Stairwells and Vestibules

Black & Veatch has completed NFPA 820 compliance evaluations and presented conceptual solutions to NYC DEP's Oakwood Beach WWTP AHJ (Fire Department of New York). Oakwood Beach WWTP lacked "physical separation" between classified and unclassified spaces. Black & Veatch deployed this solution that efficiently provided adequate separation of spaces that stopped the free passage of combustible gases and did so without requiring major modifications to the WWTP's existing egress pathways. It is our opinion that this solution meets the intent of NFPA 820and NFPA 496, and the FDNY has conceptually agreed.

As indicated in Figures 6, 7, and 8 – Preliminary NFPA 820 Compliance Drawings, pressurized vestibules may be utilized in lieu of "physical separation," between the classified spaces and portion of the facilities that were intended to be unclassified.

This solution includes pressurizing stairwells and vestibules, neither of which are electrical enclosures or control rooms as defined by NFPA 496, nor are they covered in NFPA 820-2012. Vestibules are specifically addressed in the NFPA 820-2012 Handbook Appendix Section 3.3.47 of the formal interpretations section, which state:

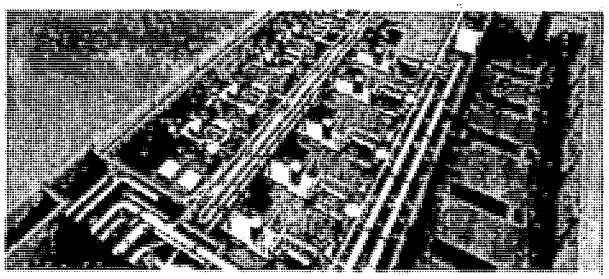
> *"The use of a vestibule with positive pressure to separate areas with different electrical classifications is not specifically addressed in the standard. A design in which positive pressure is used to physically separate two areas with different electrical classifications would need to be approved by the AHJ".*

Black & Veatch is confident that it will obtain approval from the local Authority Having Jurisdiction should it be necessary to implement this solution at the PVSC WWTP for NFPA 820 compliance.

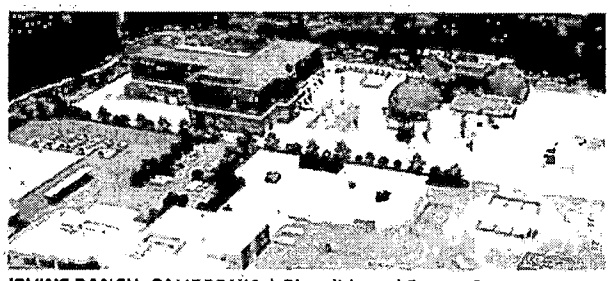
BIM Design

We have successfully delivered design and construction of power plant projects using BIM. Our BIM work facilitates effective general arrangement reviews with the project stakeholders by walking through the "model." This allows a collaborative dialogue between operations and engineering, forcing topics otherwise overlooked to be addressed, for example, equipment maintenance, access, and health and safety/Occupational Safety and Health (OSHA) items. Additionally, BIM permits better constructability review and cost estimating, as the constraints and ease of the work can be visualized.

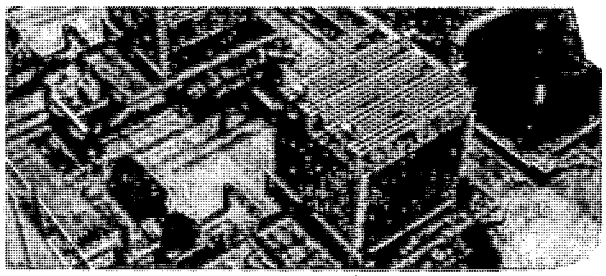
BIM is our standard platform, and our team has extensive project experience executing Revit software as required by Subtask 3.1.2 of the RFQ/RFP. For each of our projects, we utilize Navisworks to showcase the project and perform design reviews. To showcase our BIM capabilities for PVSC on this project, renderings of the new Switchgear W Building and Substation No. 1 expansion are included on the following page.



NEW YORK CITY | NYCDEP North River WWTP – Used 3-D laser scanning with BIM+ to provide as-built information to aid contractors in restoring the facility to pre-fire conditions.



IRVINE RANCH, CALIFORNIA | Biosolids and Energy Recovery Facility – Design in 3-D CADD with Navisworks "virtual walk-through" views used to convey design concepts.



SANTIAGO, CHILE | 50 mgd Desalination Plant – Using intelligent 3-D model information for quantities and estimating, integrated scheduling, and deliverables.

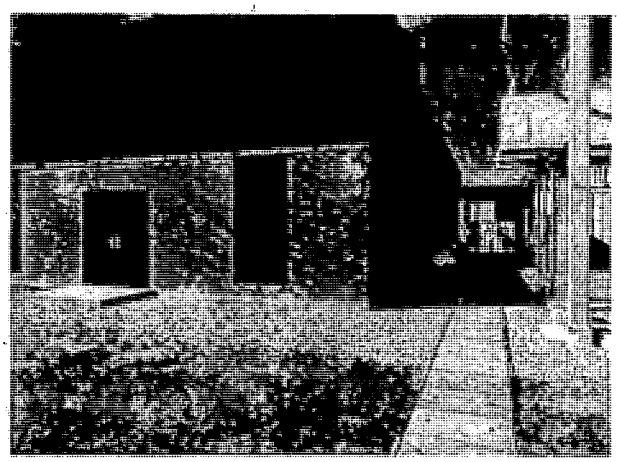


Figure 9 Switchgear Building Extension Rendering

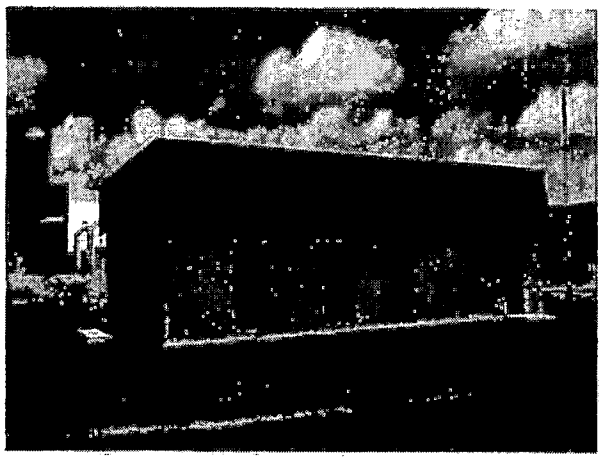


Figure 10 New West Switchgear Building Rendering

APPROACH TO MANAGING THE PROJECT DESIGN

Our approach is based on the team working collaboratively with PVSC and the Program Management JV to deliver exceptional value by producing high quality documents and delivering them on schedule. Our management team's guiding principle is to place the highest value on PVSC's and the Program Management JV's time. This section describes our proposed work plan for the standby power plant project that incorporates the requirements of the Program Management Services Project Management Plan (PMP).

OUR TEAM IS DEDICATED TO PROVIDING QUALITY-FOCUSED ENGINEERING, CONSTRUCTION MANAGEMENT, INSPECTION, AND TESTING SERVICES. WE DO THIS BY THE FOLLOWING:

- Assigning experienced quality team members for the duration of a project, promoting consistency.
- Communicating with the team and our clients so that our commitment to quality meets expectations on each deliverable.
- Following Black & Veatch's established design and quality procedures.
- Providing independent quality reviews and verifications of project deliverables.
- Performing internal audits to achieve compliance with our Quality Management System (QMS).

Our project management approach begins with recognizing that this project will be a collaboration between multiple stakeholders to ensure that PVSC's best interests are served by a successful project. We will anticipate and proactively address issues quickly and efficiently to mitigate risk. Our management team will orchestrate the activities needed to accomplish all the objectives of the Advanced Electrical Contract under the Program Management Services program through a collaborative environment while driving consistent, quality deliverables. This section highlights the key points of our project management approach for the standby power plant project.

- **Providing a Single Point of Contact for the Program Management JV's Project Manager.** We recognize that PVSC expects a dedicated and focused Project Manager to be a single point of contact for the duration of design and construction. Our proposed Project Manager, Domenick Loschiavo, will keep the Program Management JV's Project Manager informed on project status and be fully accountable for resolving any issues related to the management of resources, scope, schedule, and budget. Domenick will bring coordination between the Advanced Electrical Contract and Standby Power Plant projects.
- **Workshop Driven Project Delivery.** Collaboration of project stakeholders at design review workshops will engage all parties and provide an effective means of communication for ideas and understanding of PVSC preferences.
- **Ensuring Full and Direct Access to All of Our Design Managers.** The importance of a collaborative working environment among the Program Management JV and Advanced Electrical Contract team members cannot be overstated. We will establish a culture of collaboration and provide the communication tools to ensure that our team's and PVSC's technical staff can discuss and resolve technical issues freely and openly. The hierarchy of this structure approach is "flat" and efficient, promoting a results-driven collaboration while following an open communication structure.

Managing Schedule and Budget with Advanced Project Controls. Good project management practice starts with a comprehensive PMP. PMP execution will be supported by detailed project controls and advanced monitoring tools.

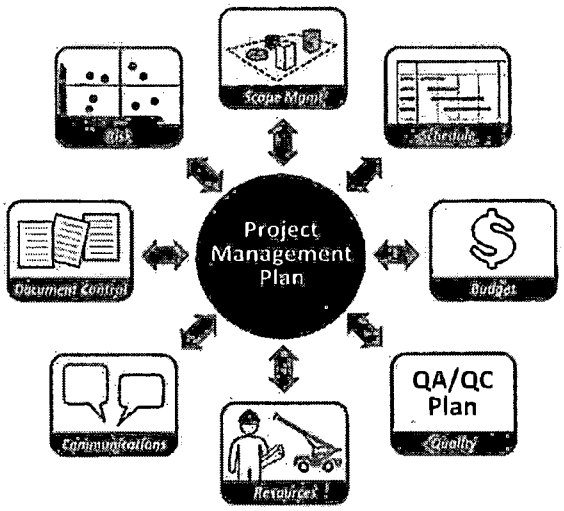


Figure 11 Project Management Plan

Ensuring High Quality Deliverables. Executing QA/QC procedures ensures that proper staff and methods are employed for each of the specific services provided under the contract and that deliverables are high quality. The Quality Management Plan (QMP) will incorporate Section 07 of the Program Management Services PMP into our standard QMP.

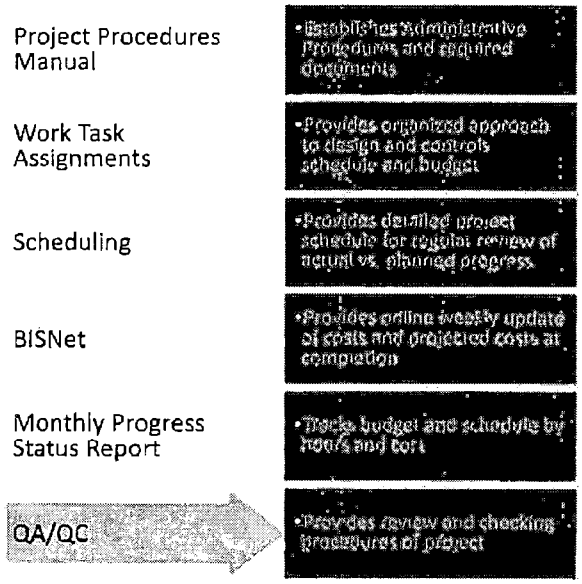
Mitigating Risk. Proactively managing risk avoids costly change orders, delays, and unnecessary burdens on PVSC staff time.

Details on the PMP, project controls, and quality and risk management are provided below.

Preparing a Complete Project Management Plan

Given the specialty work required to execute the Advanced Electrical Contract project (BODR validation, Transient Stability Study, and Phased Construction), planning and coordination is critical. Successful projects meet goals for performance, reliability, timeliness, and budget. At Black & Veatch, we have project management procedures in place to consistently and successfully deliver Electrical Power Distribution projects at wastewater treatment plants such as the medium-voltage switchgear included in this project.

Our quick start activities for the Advanced Electrical Contract project include development of a thorough PMP, in addition to the Project Work Plan (as outlined in Task 2.1 of the Scope of Work), which will adapt to the requirements of the PMP, the Program Procedures Manual, and the PVSC Safety Manual. As shown on the adjacent figure, the PMP incorporates the recognized project management elements of schedule management, quality management, and risk management. Communications and document control will be provided through PMWeb collaboration software.



Black & Veatch's Project Management System equips our management team with the tools and controls needed to deliver a successful project to PVSC.

QUALITY TEAM'S SCOPE OF RESPONSIBILITIES DURING THE DESIGN PHASE:

- Control and verify the design activities, define technical interfaces, ensure that the design meets the specified requirements and verify that the complete design meets all design input requirements
- Create vehicles for input and review by interdisciplinary teams consisting of discipline leads, permitting specialists, operators, and contractors
- Complete comprehensive discipline reviews and checks for functional and technical adequacy of the design
- Maximize protection against design oversights that may adversely affect quality, scheduling, safety, or efficiency of the completed Project
- Control design revisions and ensure that design documents are updated and issued in a timely manner. Ensure complete and secure management and filing of design documents

Meeting PMP Schedule & Budget with Advanced Project Management Controls

Underpinning PMP execution will be Black & Veatch's detailed project controls and advanced monitoring tools. Black & Veatch has executed wastewater projects for more than 100 years. Through this experience, our team has developed a risk-based approach built on proven, highly refined project management/construction management tools and systems.

The adjacent graphic summarizes the tools we employ on projects. These tools keep our managers informed with current, actionable information on project status.

Managing Risk

We intend to manage a risk register for the project to ensure that PVSC and the Program Management JV understand the project risks. The risk register will go hand-in-hand with the schedule and will be updated and discussed monthly. MS Excel will be used initially for developing the risk register.

Managing Our Engineering Fees

We intend to keep PVSC and AECOM+HDR regularly informed of our project budget. Domenick will report schedule and task status to AECOM's Project Manager monthly, and he will compile the information into the master cost-loaded schedule. He will review and approve the resulting project status report that accompanies each invoice, which includes earned value, prior to submission to PVSC. This process enables Black & Veatch to provide accurate and timely updates for the Program Manager's internal and required FEMA reports and financial forecasting. Project work-arounds will be handled on a case-by-case basis. Should a situation occur that impedes the progress of work, we will evaluate schedule and cost impacts and take action to bring the project back on track.

Commitment to Quality

Our goal is always to provide professional services that meet the quality expectations and requirements of our clients. Achieving this goal is the function of Black & Veatch's QMS.

Our QMS is based on the International Organization for Standardization (ISO) 9001:2008, Quality Management System Requirements, and addresses all elements of the standard as well as any project-specific contract, codes, and standards requirements.

Our professionals show up ready to execute the project, but not before receiving orientation on Black & Veatch's quality expectations. The orientation includes general and project-specific quality requirements.

Our Quality Management team will be led by experienced professionals that are experts in their field. For example, **Mark Kleveter** is Black & Veatch's Chief Electrical Engineer and has been responsible for medium- and high-voltage electrical substations and equipment. Most recently Mark is the lead engineer for the North River WWTP Cogeneration & Electrification project and was project manager for two of our referenced projects. **Nader Sreyo** is one of our Chief Engineers for power generation work and is involved with PVSC's Standby Power Plant project. **Dave Nelson**, **Jon Swarts** and **Lou Nemeth** are Black & Veatch's department heads for the Building Mechanical, Structural and Architectural groups, respectively.

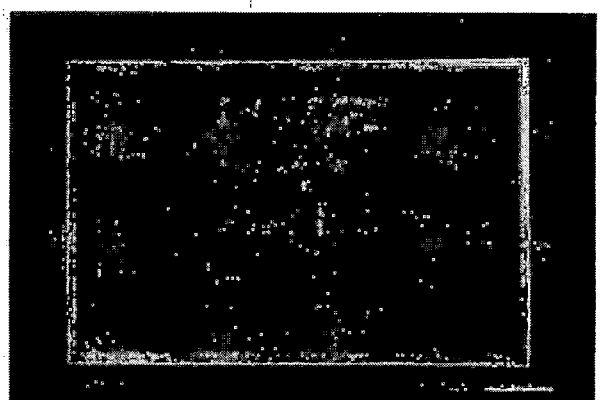
BLACK & VEATCH IS DEDICATED TO PROVIDING QUALITY-FOCUSED WORK PRODUCTS. WE DO THIS BY:

- Assigning experienced quality team members for the duration of a project, promoting consistency
- Communicating with the team and our clients so that our commitment to quality meets expectations on each deliverable
- Following Black & Veatch's established design and quality procedures
- Providing independent quality reviews and verifications of project deliverables
- Performing internal audits to achieve compliance with our Quality Management System
- Controlling project schedule

Commitment to Environmental Health & Safety

Black & Veatch's Environmental Health and Safety culture is rooted in its **THINK PLAN ACT** philosophy and goal for **Zero Injuries Today.**

Black & Veatch places the highest importance on the safety and health of its professionals and the employees of its contractors during the performance of their work. Incident prevention involves not only personal safety but also many other factors affecting the progress and efficiency of the work. Our goal is to provide an efficient and productive effort incorporating safe working methods and strong safety consciousness by all of our employees, supervisors, contractors, and suppliers. To demonstrate this commitment, we successfully executed one of the **Prevention through Design (PtD)** workshops related to construction and operator safety for the New York City DEP at the North River WWTP for the cogeneration and electrification project. As a result of the overwhelming positive feedback from the NYCDEP, we will be implementing this concept at this project's 60 percent design review workshop. At the Cox Creek Water Reclamation Facility in Anne Arundel County, Maryland, Black & Veatch implemented a number of initiatives aimed at elevating safety culture and awareness.



On March 20, 2017, NYC DEP awarded Black & Veatch "Excellence in Prevention Through Design" for our professionalism and dedication in leading the EHS Deep Dives and Identification of EHS risks for the North River WWTP Cogeneration and Electrification Projects.

Schedule

This project will integrate with other current projects under the Program Management JV, such as the standby power plant and stormwater pumping station. As with any well managed project, the schedule drives the project, and maintaining the schedule is key to project success. An overall design and construction schedule summary for two construction contracts is provided on page 45. Breaking the construction work into two phases with the first phase requiring the modification to Switchgear A be complete prior to the commissioning of the power plant and stormwater pumping stations will provide PVSC the required redundant power sources protect the facility from future flooding. The Phase 1 construction contract will require an upfront milestone for the Contractor to adhere to, forcing this work to be completed early in the construction schedule. Going straight to the final installation orientation of Switchgear A and not performing the modified Switchgear A work will put PVSC at risk due to the time to physically perform the work to reconnect the second PSE&G utility feed to Switchgear A. Switchgear A needs both Bus A and Bus B energized.

The two contract approach (Phase 1 and Phase 2) provides an accelerated, but risk mitigated, implementation. This approach incorporates several specific features that will increase the effectiveness of the project team. Highlights and proposed features include the following:

Preliminary Design for High Quality Detailed Design. This feature involves the base work to setup of very clear detailed design documents to minimize any construction delays for this advanced contract. By the nature of this project, a delay in the Advanced Electrical Contract delays two other projects under this FEMA resiliency program. Completing the Transient Stability Study early, executing 3D Laser Scanning of existing spaces and evaluating additional value concepts will provide immediate benefit to the plant and reduce the construction scope and schedules.

Advance Construction Work to Support the FEMA Program. Requiring a Construction milestone early in the Phase 1 contract supports PVSC and provides immediate benefit to the plant. The lead time for new breakers and cables associated with the modified Switchgear A work is significantly shorter than procuring new and temporary electrical equipment. An interim project milestone is an excellent mechanism to emphasize the urgency to a Construction Contractor.

- **Project Permitting.** We understand that obtaining required permitting approvals is one of the major risks to completing the project on time.

These features are incorporated into the schedule to provide an efficient and effective project execution as schedule compression provides cost savings.

Workshop Driven Project Delivery

Our project approach is workshop driven and focused on well-defined deliverables that are submitted in a timely manner. The following features, without limitation to the PMP and Program Procedures Manual will serve as a guide for the submittals and the structure of the workshops used to review these submittals as shown on the schedule enclosed in this section.

BLACK & VEATCH HAS DEVELOPED A SOLID APPROACH TO THE DESIGN SERVICES DURING CONSTRUCTION THAT PROVIDES THE FOLLOWING:

- Construction knowledge and experience as contractors.
- Experience implementing AECOM + HDR JV Project Delivery Manual.
- Effective quality management.

The completion of the BODR validation will lead into the immediate development of the Preliminary Engineering Report (PER). The acceptance of the final PER is a critical milestone for this project, locking in the project scope and marking the beginning of the design phase. In keeping with the requirements of the RFQ/RFP, the following discussion is focused on the execution of the base project scope defined by the RFQ/RFP, although we acknowledge that the BODR validation may result in features differing from the project as originally planned.

The basic design approach will not change based on the scope of the constructed project.

Our project team will work with PVSC and the Program Management JV to develop the project scope and plan that will culminate in the preparation and delivery of the PER. During this phase, we will initiate discussions with PSEG, NJDEP, NJDCA, and authorities having jurisdiction (Newark, New Jersey) to obtain their input on the requirements of the new Switchgear W building, Substation No. 1 expansion and new Switchgear E room and National Fire Protection Association (NFPA) 820 compliance, so that the PER will contain the key requirements to satisfy all outside agencies.

The 30 percent deliverable is the next key milestone in the project delivery, and this document will be reviewed by an independent value engineering team; the comments from that team will be incorporated into an updated document. By this time in the project, all technical issues will have been decided and documented in the PER. After approval by all agencies, the design can progress to 60 percent, 90 percent, and then completion.

During detailed design, we will advance the project through the 30 percent, 60 percent, and 90 percent stages in accordance with the PMP. At the 30 percent level, the 3-D model is being utilized for BIM, wherein assets are identified and located in space, and the interior of spaces can be viewed in real-time walk-throughs. This effort will ensure that the O&M staff can experience the facility layout using an approach that is more user-friendly than reviewing drawings.

Our site preparation and geotechnical project partner CDM Smith, will conduct boring and subsurface investigations to provide PVSC and the project team with an accurate understanding of the existing conditions at the proposed site.

DELIVERY APPROACH OF DESIGN SERVICES DURING CONSTRUCTION

Bid & Construction Phase Services

Black & Veatch has a high voltage protocol for Commissioning and ARC Flash and safety training for high voltage work that will benefit PVSC.

Our team will provide bid and construction phase services to support PVSC and the Program Management JV until project closeout. The design services during construction are assumed to cover a 36 months for Phase 1 and 24 months for Phase 2, coordinating with the construction duration. Black & Veatch will provide all personnel necessary for project construction quality control, progress meetings, site representation, risk management, submittal review, shop witness testing, requests for information, startup/commissioning/ training, and project closeout activities. As we anticipate the foundation design will includes piles for the new superstructure, we have included 20 man-days at 10 hours per day for pile inspection that will culminate into a letter report.

Electrical Power Distribution Training

CDM Smith's Robert Gosse will lead the training task for the new electrical power distribution equipment provided under this contract and performed electrical startups throughout the region. Robert has performed training on more than 10 projects over the past 10 years.

The purpose of electrical power distribution training is to provide PVSC employees with information so they can be better prepared to effectively assist the startup and commissioning team during the startup phase of the project, as required by Subtask 4.12 of the RFQ/RFP. The training sessions will help prepare the employees to make intelligent choices on how to start up, operate, and maintain the new equipment and systems in a safe, reliable and cost-effective manner. Robert will lead the development of the Facility Start-up Plan and coordinate review of this plan with PVSC, AECOM+HDR and our Engineers and Resident Project Representatives.

The training will be conducted at the site for the operations and maintenance staff. During the training, the power distribution systems will be studied with an emphasis on understanding the interlocks and the control energizing breakers, buses and downstream equipment. The participants will be given arrangement drawings and electrical one-line diagrams to be reviewed in class. The daily schedule will include class lectures, self-study of the provided materials, and walking tours of the project.

The electrical power distribution training will supplement the training provided by specific equipment suppliers and will conclude with an Operations & Maintenance Manual for PVSC's use with the requirements of N.J.A.C. 7:14A-6.12.

Training materials provided will include the following three components:

Training Manual. This manual contains text giving a description of the equipment and processes. These are prepared from the design engineer's system descriptions and will not include detailed integrated operating procedures, problem-solving guides, or maintenance overview.

Drawing Book. The drawings include building and site general arrangement drawings, P&IDs, one-line electrical diagrams, and selected vendor drawings.

Walkdown. This process is key to the continuous learning process. Each day includes a walkdown tour of the systems studied.

Our project understanding and technical approach describes our complete understanding of the issues and challenges related to this project. We will provide innovative solutions to ensure successful completion of the work, as well as our method for delivering it. Our team members have the knowledge and understanding of PVSC projects and procedures and are invested and committed to working with PVSC.

PROJECT SCHEDULE

This project will integrate with the Standby Power Plant and Stormwater Pumping Station projects. The schedule depicts specific milestones from the Standby Power Plant project that influence the Advanced Electrical Contract, specifically the Bid Opening date of the Power Generation System procurement contract and the Standby Power Plant commissioning date. The RFQ/P indicated the project should take no longer than 12 months with completion of Phase 1 construction desired by December 1, 2020. We are committed to complete the designs for Phases 1 and 2 within 18 months from Notice to Proceed. This schedule is based on our understanding of outside stakeholders having input to the project, the required upfront work to be performed prior to starting detailed design and the schedule linkage between the selected Generator and Transient Stability Study. We also note that the RFQ/P is explicit in the planned durations for Phase 1 and Phase 2 construction, 3 years and 2 years respectively. As the expected NTP date for design is after December 1, 2017, we evaluated multiple approaches to condense the anticipated duration for Phase 1 construction from 3 years to less than 2 years. This proved challenging, but we have planned and expect to have Switchgear "E" energized under Phase 1 prior to the Substantial Completion date for the Standby Power Plant. As the work associated with Switchgear "E" is part of the Modified Switchgear "A" arrangement, Switchgear "E" needs to be constructed and ready for energization prior to disconnecting any existing loads as the breakers allocated for this gear is currently supporting downstream switchgear – the same switchgear that Switchgear "E" will eventually feed. With that, Switchgear "E" is anticipated to be energized by June 2021, approximately 6 months after the RFQ/P requirement for Phase 1 completion. We believe energizing Switchgear "E" is the true critical path as part of Phase 1 as it supports Switchgears "N", "S" and Stomwater Pumping Station substations. Switchgear "W" is part of Phase 1 work, but is not as constrained as the new facility and can be constructed on a parallel or independent path to Switchgears "E", "N" and "S".

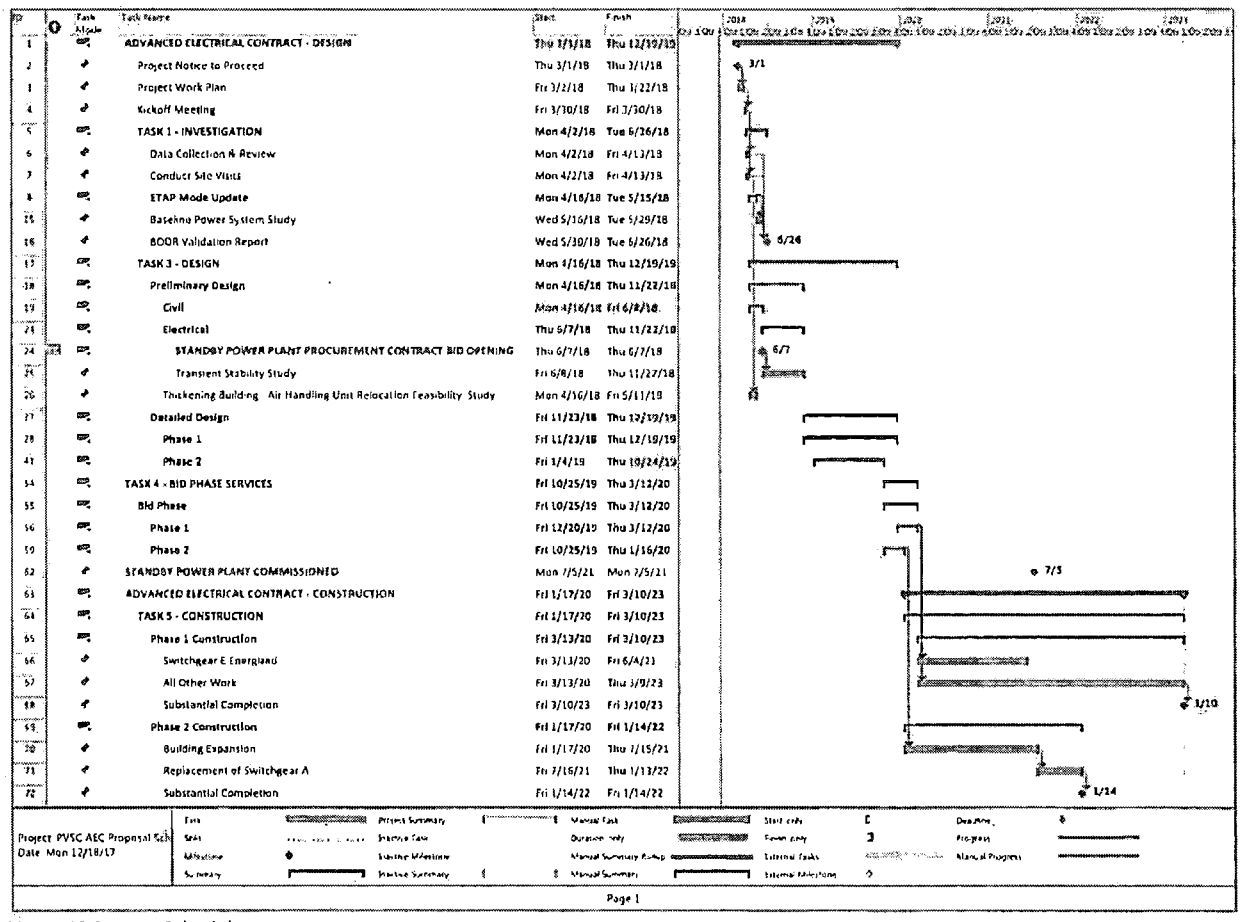


Figure 12 Project Schedule

PVSC ADVANCED ELECTRICAL CONTRACT

Phase 1 Construction
Sheet List

DISCIPLINE	DRAWING NUMBER	SHEET NUMBER	DESCRIPTION
			GENERAL DRAWINGS
G	G-0	1	COVER SHEET
G	G-1	2	DRAWING INDEX 1 OF 2
G	G-2	3	DRAWING INDEX 2 OF 2
GC	GC-1	4	ABBREVIATIONS, LEGEND AND GENERAL NOTES
GC	GC-2	5	OVERALL SITE PLAN
GC	GC-3	6	ELECTRICAL MANHOLE AND MISCELLANEOUS DETAILS
GA	GA-1	7	ABBREVIATIONS, LEGEND AND GENERAL NOTES
GA	GA-2	8	ROOM/DOOR/ WINDOW/ LOUVER SCHEDULES
GA	GA-3	9	DOOR/WINDOW/LOUVER DETAILS
GA	GA-4	10	DOOR/WINDOW/LOUVER DETAILS
GA	GA-5	11	ROOFING DETAILS
GA	GA-6	12	MISCELLANEOUS DETAILS
GS	GS-1	13	STRUCTURAL NOTES
GS	GS-2	14	STD CONCRETE JOINT DETAILS
GS	GS-3	15	STD CONCRETE REINF DETAILS
GS	GS-4	16	TYP MASONRY WALL REINF DETAILS
GS	GS-5	17	TYP MASONRY LINTEL & JAMB DETAILS
GS	GS-6	18	GUARDAIL & HANDRAILING DETAILS
GS	GS-7	19	TYPICAL STAIR DETAILS
GS	GH-1	20	ABBREVIATIONS, LEGEND AND GENERAL NOTES
GH	GH-2	21	MISCELLANEOUS DETAILS
GH	GH-3	22	SCHEDULES
GH	GH-4	23	SEQUENCE OF OPERATIONS
GH	GH-5	24	AIRFLOW SCHEMATICS
GE	GE-1	25	ABBREVIATIONS, LEGEND AND GENERAL NOTES 1 OF 2
GE	GE-2	26	ABBREVIATIONS, LEGEND AND GENERAL NOTES 2 OF 2
GE	GE-3	27	MISCELLANEOUS DETAILS 1 OF 2

PVSC ADVANCED ELECTRICAL CONTRACT

Phase 1 Construction
Sheet List

DISCIPLINE	DRAWING NUMBER	SHEET NUMBER	DESCRIPTION
GE	GE-4	28	MISCELLANEOUS DETAILS 2 OF 2
GE	GE-5	29	DEMOLITION OVERALL ONE-LINE DIAGRAM
GE	GE-6	30	OVERALL ONE-LINE DIAGRAM
GE	GE-7	31	UTILITY TUNNEL KEY PLAN
GI	GI-1	32	ABBREVIATIONS, LEGEND AND GENERAL NOTES
GI	GI-2	33	MISCELLANEOUS DETAILS
AREA 1: NEW SWITCHGEAR "W" AND NEW WEST ELECTRICAL BUILDING (PHASE 1)			
C	C-1	34	EXISTING SITE PLAN
C	C-2	35	SITE PLAN
C	C-3	36	SITE GRADING AND UTILITY PLAN
C	C-4	37	EROSION CONTROL PLANS
C	C-5	38	ELECTRICAL DUCTBANK SECTIONS AND DETAILS
C	C-6	39	ELECTRICAL DUCTBANK CONNECTION AND DETAILS
C	C-7	40	MISCELLANEOUS DETAILS
C	C-8	41	PAVING DETAILS
A	A-1	42	ELECTRICAL BUILDING - 3D PERSPECTIVE
A	A-2	43	ELECTRICAL BUILDING - CODE/LIFE SAFETY PLAN
A	A-3	44	ELECTRICAL BUILDING - BASEMENT FLOOR PLAN
A	A-4	45	ELECTRICAL BUILDING - GROUND FLOOR PLAN
A	A-5	46	ELECTRICAL BUILDING - ROOF PLAN
A	A-6	47	ELECTRICAL BUILDING - ELEVATIONS
A	A-7	48	ELECTRICAL BUILDING - WALL SECTIONS
S	S-1	49	NEW WEST SUBSTATION BASEMENT PLAN
S	S-2	50	NEW WEST SUBSTATION OPERATING LEVEL PLAN
S	S-3	51	NEW WEST SUBSTATION ROOF PLAN
S	S-4	52	NEW WEST SUBSTATION SECTIONS AND DETAILS
S	S-5	53	NEW WEST SUBSTATION SECTIONS AND DETAILS

PVSC ADVANCED ELECTRICAL CONTRACT

Phase 1 Construction
Sheet List

DISCIPLINE	DRAWING NUMBER	SHEET NUMBER	DESCRIPTION
S	S-6	54	NEW WEST SUBSTATION SECTIONS AND DETAILS
S	S-7	55	NEW WEST SUBSTATION SECTIONS AND DETAILS
H	H-1	56	ELECTRICAL BUILDING - BASEMENT FLOOR PLAN
H	H-2	57	ELECTRICAL BUILDING - GROUND FLOOR PLAN
E	E-1	58	SITE PLAN
E	E-2	59	DUCTBANK SECTIONS
E	E-3	60	ELECTRICAL BUILDING POWER PLAN - BASEMENT
E	E-4	61	ELECTRICAL BUILDING POWER PLAN - GROUND FLOOR
E	E-5	62	ELECTRICAL BUILDING LIGHTING PLAN - BASEMENT
E	E-6	63	ELECTRICAL BUILDING LIGHTING PLAN - GROUND FLOOR
E	E-7	64	ELECTRICAL BUILDING GROUNDING PLAN
E	E-8	65	CONDUIT AND CABLE SCHEDULES
E	E-9	66	CONDUIT AND CABLE SCHEDULES
E	E-10	67	PANELBOARD SCHEDULES
E	E-11	68	125VDC SYSTEM ONE-LINE DIAGRAM
E	E-12	69	SWITCHGEAR "W" SINGLE-LINE DIAGRAM
E	E-13	70	SWITCHGEAR "W" SINGLE-LINE DIAGRAM
E	E-14	71	SWITCHGEAR "W" SINGLE-LINE DIAGRAM
E	E-15	72	MISCELLANEOUS SINGLE-LINE DIAGRAM
E	E-16	73	SWITCHGEAR "W" BREAKER SCHEMATICS
E	E-17	74	SWITCHGEAR "W" BREAKER SCHEMATICS
E	E-18	75	MISCELLANEOUS SCHEMATICS
E	E-19	76	SWITCHGEAR "W" FRONT ELEVATIONS
E	E-20	77	MISCELLANEOUS DETAILS
E	E-21	78	WEST PUMPING STATION POWER PLAN
E	E-22	79	UTILITY TUNNEL POWER PLAN AND ELEVATIONS
E	E-23	80	UTILITY TUNNEL POWER PLAN AND ELEVATIONS
E	E-24	81	UTILITY TUNNEL POWER PLAN AND ELEVATIONS
E	E-25	82	UTILITY TUNNEL POWER PLAN AND ELEVATIONS

PVSC ADVANCED ELECTRICAL CONTRACT

Phase 1 Construction
Sheet List

DISCIPLINE	DRAWING NUMBER	SHEET NUMBER	DESCRIPTION
E	E-26	83	UTILITY TUNNEL POWER PLAN AND ELEVATIONS
E	E-27	84	UTILITY TUNNEL POWER PLAN AND ELEVATIONS
E	E-28	85	UTILITY TUNNEL POWER PLAN AND ELEVATIONS
E	E-29	86	UTILITY TUNNEL POWER PLAN AND ELEVATIONS
E	E-30	87	UTILITY TUNNEL POWER PLAN AND ELEVATIONS
E	E-31	88	UTILITY TUNNEL POWER PLAN AND ELEVATIONS
I	I-1	89	ELECTRICAL BUILDING - ELECTRICAL SYSTEM
I	I-2	90	DETAILS
AREA 2A: MODIFIED SWITCHGEAR "A" (PHASE 1)			
A	A-1	91	SWITCHGEAR "A" -LIFE SAFETY PLANS
A	A-2	92	SWITCHGEAR "A" -FLOOR PLAN
A	A-3	93	SWITCHGEAR "A" -WALL SECTION & DETAILS
S	S-1	94	MODIFIED SUBSTATION NO. 1 BASEMENT PLAN
S	S-2	95	MODIFIED SUBSTATION NO. 1 OPERATING LEVEL PLAN
S	S-3	96	MODIFIED SUBSTATION NO. 1 ROOF PLAN
S	S-4	97	MODIFIED SUBSTATION NO. 1 SECTIONS AND DETAILS
S	S-5	98	MODIFIED SUBSTATION NO. 1 SECTIONS AND DETAILS
S	S-6	99	MODIFIED SUBSTATION NO. 1 SECTIONS AND DETAILS
S	S-7	100	MODIFIED SUBSTATION NO. 1 SECTIONS AND DETAILS
H	H-1	101	ELECTRICAL BUILDING - GROUND FLOOR PLAN - DEMOLITION
H	H-2	102	ELECTRICAL BUILDING - GROUND FLOOR PLAN
E	E-1	103	SWITCHGEAR "A" SINGLE-LINE DIAGRAM - DEMOLITION
E	E-2	104	SWITCHGEAR "A" SINGLE-LINE DIAGRAM - DEMOLITION
E	E-3	105	SWITCHGEAR "A" SINGLE-LINE DIAGRAM - DEMOLITION
E	E-4	106	SWITCHGEAR "A" SINGLE-LINE DIAGRAM - DEMOLITION
E	E-5	107	ELECTRICAL BUILDING POWER PLAN - BASEMENT
E	E-6	108	ELECTRICAL BUILDING POWER PLAN - GROUND FLOOR
E	E-7	109	ELECTRICAL BUILDING ELEVATIONS

PVSC ADVANCED ELECTRICAL CONTRACT

Phase 1 Construction
Sheet List

DISCIPLINE	DRAWING NUMBER	SHEET NUMBER	DESCRIPTION
E	E-8	110	CONDUIT AND CABLE SCHEDULES
E	E-9	111	CONDUIT AND CABLE SCHEDULES
E	E-10	112	SWITCHGEAR "A" SINGLE-LINE DIAGRAM
E	E-11	113	SWITCHGEAR "A" SINGLE-LINE DIAGRAM
E	E-12	114	SWITCHGEAR "A" SINGLE-LINE DIAGRAM
E	E-13	115	SWITCHGEAR "A" SINGLE-LINE DIAGRAM
E	E-14	116	MISCELLANEOUS SINGLE-LINE DIAGRAM
E	E-15	117	SWITCHGEAR "A" BREAKER SCHEMATICS
E	E-16	118	SWITCHGEAR "A" BREAKER SCHEMATICS
E	E-17	119	MISCELLANEOUS SCHEMATICS
E	E-18	120	SWITCHGEAR "A" FRONT ELEVATIONS
E	E-19	121	MISCELLANEOUS DETAILS
I	I-1	122	ELECTRICAL BUILDING - ELECTRICAL SYSTEM
I	I-3	123	DETAILS
AREA 3: NEW SWITCHGEAR "E" AND NEW ELECTRICAL ROOM (PHASE 1)			
A	A-1	124	ELECTRICAL ROOM - CODE/LIFE SAFETY PLAN
A	A-2	125	ELECTRICAL ROOM - FLOOR PLAN
A	A-3	126	ELECTRICAL ROOM - WALL SECTIONS
A	A-4	127	ELECTRICAL ROOM - REFLECTED CEILING PLAN & DETAILS
A	A-5	128	SLUDGE THICKENING BUILDING - PART 2 - BASEMENT FLOOR PLAN
A	A-6	129	SLUDGE THICKENING BUILDING - PART 2 - GROUND FLOOR PLAN
A	A-7	130	SLUDGE THICKENING BUILDING - ROOF PLAN - PART 2
A	A-8	131	SCHEDULES AND DETAILS
S	S-1	132	NEW EAST SUBSTATION BASEMENT PLAN
S	S-2	133	NEW EAST SUBSTATION OPERATING PLAN
S	S-3	134	NEW EAST SUBSTATION ROOF PLAN
S	S-4	135	NEW EAST SUBSTATION SECTIONS AND DETAILS
S	S-5	136	NEW EAST SUBSTATION SECTIONS AND DETAILS

PVSC ADVANCED ELECTRICAL CONTRACT

Phase 1 Construction
Sheet List

DISCIPLINE	DRAWING NUMBER	SHEET NUMBER	DESCRIPTION
S	S-6	137	NEW EAST SUBSTATION SECTIONS AND DETAILS
S	S-7	138	NEW EAST SUBSTATION SECTIONS AND DETAILS
S	S-8	139	NEW EAST SUBSTATION SECTIONS AND DETAILS
H	H-1	140	SLUDGE THICKENING BUILDING - PART 2 - BASEMENT FLOOR PLAN - DEMOLITION
H	H-2	141	SLUDGE THICKENING BUILDING - PART 2 - GROUND FLOOR PLAN - DEMOLITION
H	H-3	142	SLUDGE THICKENING BUILDING - PART 2 - ROOF PLAN - DEMOLITION
H	H-4	143	SLUDGE THICKENING BUILDING - PART 2 - BASEMENT FLOOR PLAN
H	H-5	144	SLUDGE THICKENING BUILDING - PART 2 - GROUND FLOOR PLAN
H	H-6	145	SLUDGE THICKENING BUILDING - PART 2 - ROOF PLAN
H	H-7	146	MISCELLANEOUS SECTIONS
E	E-1	147	SLUDGE THICKENING BUILDING - PART 2 - GROUND FLOOR PLAN - DEMOLITION
E	E-2	148	SLUDGE THICKENING BUILDING - PART 1 - BASEMENT FLOOR PLAN
E	E-3	149	SLUDGE THICKENING BUILDING - PART 2 - BASEMENT FLOOR PLAN
E	E-4	150	SLUDGE THICKENING BUILDING - PART 3 - BASEMENT FLOOR PLAN
E	E-5	151	SLUDGE THICKENING BUILDING - PART 2 - GROUND FLOOR PLAN
E	E-6	152	SLUDGE THICKENING BUILDING - PART 2 - ROOF PLAN
E	E-7	153	SLUDGE THICKENING BUILDING ELEVATIONS
E	E-8	154	SLUDGE THICKENING BUILDING ELEVATIONS
E	E-9	155	ELECTRICAL ROOM POWER PLAN
E	E-10	156	ELECTRICAL ROOM LIGHTING PLAN
E	E-11	157	ELECTRICAL ROOM GROUNDING PLAN
E	E-12	158	CONDUIT AND CABLE SCHEDULES
E	E-13	159	CONDUIT AND CABLE SCHEDULES
E	E-14	160	CONDUIT AND CABLE SCHEDULES
E	E-15	161	CONDUIT AND CABLE SCHEDULES
E	E-16	162	PANELBOARD SCHEDULES
E	E-17	163	125VDC SYSTEM ONE-LINE DIAGRAM
E	E-18	164	SWITCHGEAR "E" SINGLE-LINE DIAGRAM
E	E-19	165	SWITCHGEAR "E" SINGLE-LINE DIAGRAM

PVSC ADVANCED ELECTRICAL CONTRACT

Phase 1 Construction
Sheet List

DISCIPLINE	DRAWING NUMBER	SHEET NUMBER	DESCRIPTION
E	E-20	166	SWITCHGEAR "E" SINGLE-LINE DIAGRAM
E	E-21	167	MISCELLANEOUS SINGLE-LINE DIAGRAM
E	E-22	168	SWITCHGEAR "E" BREAKER SCHEMATICS
E	E-23	169	SWITCHGEAR "E" BREAKER SCHEMATICS
E	E-24	170	MISCELLANEOUS SCHEMATICS
E	E-25	171	MISCELLANEOUS SCHEMATICS
E	E-26	172	SWITCHGEAR "E" FRONT ELEVATIONS
E	E-27	173	MISCELLANEOUS DETAILS
E	E-28	174	NORTHEAST PUMPING STATION POWER PLAN
E	E-29	175	SOUTHEAST PUMPING STATION POWER PLAN
E	E-30	176	UTILITY TUNNEL POWER PLAN AND ELEVATIONS
E	E-31	177	UTILITY TUNNEL POWER PLAN AND ELEVATIONS
E	E-32	178	UTILITY TUNNEL POWER PLAN AND ELEVATIONS
E	E-33	179	UTILITY TUNNEL POWER PLAN AND ELEVATIONS
I	I-1	180	ELECTRICAL ROOM - ELECTRICAL SYSTEM
I	I-2	181	DETAILS
AREA 4: NEW SWITCHGEAR "N"			
A	A-1	182	ELECTRICAL ROOM - CODE/LIFE SAFETY PLAN
A	A-2	183	ELECTRICAL ROOM - FLOOR PLAN
A	A-3	184	ELECTRICAL ROOM - ELEVATIONS
A	A-4	185	ELECTRICAL ROOM - WALL SECTIONS
A	A-5	186	SCHEDULES AND DETAILS
S	S-1	187	MODIFIED NORTH SUBSTATION PLANS
S	S-2	188	MODIFIED NORTH SUBSTATION SECTIONS AND DETAILS
S	S-3	189	MODIFIED NORTH SUBSTATION SECTIONS AND DETAILS
E	E-1	190	SLUDGE HEAT TREATMENT BUILDING - BASEMENT FLOOR PLAN - DEMOLITION
E	E-2	191	ELECTRICAL ROOM DEMOLITION PLAN
E	E-3	192	SLUDGE HEAT TREATMENT BUILDING - BASEMENT FLOOR PLAN

PVSC ADVANCED ELECTRICAL CONTRACT

Phase 1 Construction
Sheet List

DISCIPLINE	DRAWING NUMBER	SHEET NUMBER	DESCRIPTION
E	E-4	193	SLUDGE HEAT TREATMENT BUILDING - BASEMENT FLOOR PLAN
E	E-5	194	SLUDGE HEAT TREATMENT ELEVATIONS
E	E-6	195	SLUDGE HEAT TREATMENT ELEVATIONS
E	E-7	196	SWITCHGEAR "N" SINGLE-LINE DIAGRAM - DEMOLITION
E	E-8	197	SWITCHGEAR "N" SINGLE-LINE DIAGRAM - DEMOLITION
E	E-9	198	ELECTRICAL ROOM POWER PLAN
E	E-10	199	ELECTRICAL ROOM LIGHTING PLAN
E	E-11	200	ELECTRICAL ROOM GROUNDING PLAN
E	E-12	201	CONDUIT AND CABLE SCHEDULES
E	E-13	202	CONDUIT AND CABLE SCHEDULES
E	E-14	203	PANELBOARD SCHEDULES
E	E-15	204	125VDC SYSTEM ONE-LINE DIAGRAM
E	E-16	205	SWITCHGEAR "N" SINGLE-LINE DIAGRAM
E	E-17	206	SWITCHGEAR "N" SINGLE-LINE DIAGRAM
E	E-18	207	MISCELLANEOUS SINGLE-LINE DIAGRAM
E	E-19	208	SWITCHGEAR "N" BREAKER SCHEMATICS
E	E-20	209	SWITCHGEAR "N" BREAKER SCHEMATICS
E	E-21	210	MISCELLANEOUS SCHEMATICS
E	E-22	211	SWITCHGEAR "N" FRONT ELEVATIONS
E	E-23	212	MISCELLANEOUS DETAILS
I	I-1	213	ELECTRICAL ROOM - ELECTRICAL SYSTEM
I	I-2	214	DETAILS
AREA 5: NEW SWITCHGEAR "S"			
A	A-1	215	ELECTRICAL ROOM - CODE/LIFE SAFETY PLAN
A	A-2	216	ELECTRICAL ROOM - FLOOR PLAN
A	A-3	217	ELECTRICAL ROOM - ELEVATIONS
A	A-4	218	ELECTRICAL ROOM - WALL SECTIONS
S	S-1	219	MODIFIED SOUTH SUBSTATION PLANS

PVSC ADVANCED ELECTRICAL CONTRACT

Phase 2 Construction
Sheet List

DISCIPLINE	DRAWING NUMBER	SHEET NUMBER	DESCRIPTION
G	G-0	1	COVER SHEET
G	G-1	2	DRAWING INDEX 1 OF 2
G	G-2	3	DRAWING INDEX 2 OF 2
GC	GC-1	4	ABBREVIATIONS, LEGEND AND GENERAL NOTES
GC	GC-2	5	OVERALL SITE PLAN
GC	GC-3	6	ELECTRICAL MANHOLE AND MISCELLANEOUS DETAILS
GA	GA-1	7	ABBREVIATIONS, LEGEND AND GENERAL NOTES
GA	GA-2	8	MISCELLANEOUS DETAILS
GS	GS-1	9	STRUCTURAL NOTES
GS	GS-2	10	STD CONCRETE JOINT DETAILS
GS	GS-3	11	STD CONCRETE REINF DETAILS
GS	GS-4	12	TYP MASONRY WALL REINF DETAILS
GS	GS-5	13	TYP MASONRY LINTEL & JAMB DETAILS
GS	GS-6	14	GUARDAIL & HANDRAILING DETAILS
GS	GS-7	15	TYPICAL STAIR DETAILS
GH	GH-1	16	ABBREVIATIONS, LEGEND AND GENERAL NOTES
GH	GH-2	17	MISCELLANEOUS DETAILS
GH	GH-3	18	SCHEDULES, SEQUENCE OF OPERATIONS
GE	GE-1	19	ABBREVIATIONS, LEGEND AND GENERAL NOTES 1 OF 2
GE	GE-2	20	ABBREVIATIONS, LEGEND AND GENERAL NOTES 2 OF 2
GE	GE-3	21	MISCELLANEOUS DETAILS 1 OF 2
GE	GE-4	22	MISCELLANEOUS DETAILS 2 OF 2
GE	GE-5	23	DEMOLITION OVERALL ONE-LINE DIAGRAM
GE	GE-6	24	OVERALL ONE-LINE DIAGRAM
GE	GE-7	25	UTILITY TUNNEL KEY PLAN
GI	GI-1	26	ABBREVIATIONS, LEGEND AND GENERAL NOTES
GI	GI-2	27	MISCELLANEOUS DETAILS

PVSC ADVANCED ELECTRICAL CONTRACT

Phase 2 Construction
Sheet List

DISCIPLINE	DRAWING NUMBER	SHEET NUMBER	DESCRIPTION
C	C-1	28	EXISTING SITE PLAN
C	C-2	29	SITE PLAN
C	C-3	30	SITE GRADING AND UTILITY PLAN
C	C-4	31	EROSION CONTROL PLANS
C	C-5	32	ELECTRICAL DUCTBANK SECTIONS AND DETAILS
C	C-6	33	ELECTRICAL DUCTBANK CONNECTION AND DETAILS
C	C-7	34	MISCELLANEOUS DETAILS
C	C-8	35	DEMOLITION PLAN
C	C-9	36	DEMOLITION ELEVATIONS AND DETAILS
C	C-10	37	PAVING DETAILS
A	A-1	38	ELECTRICAL BUILDING - 3D PERSPECTIVE
A	A-2	39	ELECTRICAL BUILDING - CODE/LIFE SAFETY PLAN
A	A-3	40	ELECTRICAL BUILDING - BASEMENT PLAN
A	A-4	41	ELECTRICAL BUILDING - FLOOR PLAN
A	A-5	42	ELECTRICAL BUILDING - ROOF PLAN
A	A-6	43	ELECTRICAL BUILDING - ELEVATIONS
A	A-7	44	ELECTRICAL BUILDING - WALL SECTIONS
A	A-8	45	SCHEDULES
A	A-9	46	DOOR/ WINDOW/ LOUVER DETAILS
A	A-10	47	ROOFING DETAILS
S	S-1	48	Substation No. 1 Expansion Basement Demolition Details
S	S-2	49	Substation No. 1 Expansion Operating Level Demolition Details
S	S-3	50	Substation No. 1 Expansion Roof Demolition Details
S	S-4	51	Substation No. 1 Expansion Basement Plan
S	S-5	52	Substation No. 1 Expansion Operating Level Plan
S	S-6	53	Substation No. 1 Expansion Roof Plan
S	S-7	54	Substation No. 1 Expansion Sections and Details

PVSC ADVANCED ELECTRICAL CONTRACT

Phase 2 Construction
Sheet List

DISCIPLINE	DRAWING NUMBER	SHEET NUMBER	DESCRIPTION
S	S-8	55	Substation No. 1 Expansion Sections and Details
S	S-9	56	Substation No. 1 Expansion Sections and Details
S	S-10	57	Substation No. 1 Expansion Sections and Details
S	S-11	58	Substation No. 1 Expansion Sections and Details
S	S-12	59	Substation No. 1 Expansion Sections and Details
S	S-13	60	Substation No. 1 Expansion Sections and Details
S	S-14	61	Substation No. 1 Expansion Sections and Details
H	H-1	62	ELECTRICAL BUILDING - BASEMENT FLOOR PLAN - DEMOLITION
H	H-2	63	ELECTRICAL BUILDING - GROUND FLOOR PLAN - DEMOLITION
H	H-3	64	ELECTRICAL BUILDING - BASEMENT FLOOR PLAN
H	H-4	65	ELECTRICAL BUILDING - GROUND FLOOR PLAN
E	E-1	66	SITE PLAN
E	E-2	67	DUCTBANK SECTIONS
E	E-3	68	SWITCHGEAR "A" ONE-LINE DIAGRAM - DEMOLITION
E	E-4	69	SWITCHGEAR "A" ONE-LINE DIAGRAM - DEMOLITION
E	E-5	70	SWITCHGEAR "A" ONE-LINE DIAGRAM - DEMOLITION
E	E-6	71	SWITCHGEAR "A" ONE-LINE DIAGRAM - DEMOLITION
E	E-7	72	SITE PLAN - DEMOLITION
E	E-8	73	ELECTRICAL BUILDING POWER PLAN - BASEMENT
E	E-9	74	ELECTRICAL BUILDING POWER PLAN - GROUND FLOOR
E	E-10	75	ELECTRICAL BUILDING LIGHTING PLAN - BASEMENT
E	E-11	76	ELECTRICAL BUILDING LIGHTING PLAN - GROUND FLOOR
E	E-12	77	ELECTRICAL BUILDING GROUNDING PLAN
E	E-13	78	ELECTRICAL BUILDING ELEVATIONS
E	E-14	79	ELECTRICAL BUILDING ELEVATIONS
E	E-15	80	CONDUIT AND CABLE SCHEDULES
E	E-16	81	CONDUIT AND CABLE SCHEDULES

PVSC ADVANCED ELECTRICAL CONTRACT

Phase 2 Construction
Sheet List

DISCIPLINE	DRAWING NUMBER	SHEET NUMBER	DESCRIPTION
E	E-17	82	CONDUIT AND CABLE SCHEDULES
E	E-18	83	CONDUIT AND CABLE SCHEDULES
E	E-19	84	PANELBOARD SCHEDULES
E	E-20	85	125VDC SYSTEM ONE-LINE DIAGRAM
E	E-21	86	SWITCHGEAR "A" SINGLE-LINE DIAGRAM
E	E-22	87	SWITCHGEAR "A" SINGLE-LINE DIAGRAM
E	E-23	88	SWITCHGEAR "A" SINGLE-LINE DIAGRAM
E	E-24	89	SWITCHGEAR "A" SINGLE-LINE DIAGRAM
E	E-25	90	MISCELLANEOUS SINGLE-LINE DIAGRAM
E	E-26	91	SWITCHGEAR "A" BREAKER SCHEMATICS
E	E-27	92	SWITCHGEAR "A" BREAKER SCHEMATICS
E	E-28	93	MISCELLANEOUS SCHEMATICS
E	E-29	94	SWITCHGEAR "A" FRONT ELEVATIONS
E	E-30	95	MISCELLANEOUS DETAILS
I	I-1	96	ELECTRICAL BUILDING - ELECTRICAL SYSTEM
I	I-2	97	ELECTRICAL BUILDING - ELECTRICAL SYSTEM
I	I-3	98	DETAILS

PVSC ADVANCED ELECTRICAL CONTRACT TECHNICAL SPECIFICATIONS LIST		
#	Section	Title
DIVISION 00 00 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS		
1	00 11 13	Advertisemetn to Bid
2	00 21 13	Instruction to Bidders
3	00 21 14	Checklist for Bidders
4	00 27 00	Acknowledgement of Receipt of Changes to Bid Document Form
5	00 41 00	Bid Form
6	00 43 16	Bid Bond
7	00 43 31	Equipment Questionnaire
8	00 43 32	Control System Questionnnaire
9	00 43 36	Subcontractor Listing
10	00 45 01	Statement of Ownership
11	00 45 13	Bidder's Qualification Form
12	00 45 14	Bidder's Affidavit
13	00 45 19	Non-Collusion Affidavit
14	00 45 30	Affirmative Action Affidavit
15	00 45 33	Certification of Non-Segregated Facilities
16	00 45 47	Certification of Bidder's Status
17	00 45 48	Public Works Contractor Registration
18	00 45 49	Certificate of Equal Opportunity
19	00 45 50	Certification of Affirmative Action Plan
20	00 45 51	American Iron and Steel Certification
21	00 45 52	Disclosure of Investment Activities in Iran
22	00 51 00	Notice of Award
23	00 52 13	Contract Agreement
24	00 55 00	Notice to Proceed
25	00 61 13.13	Performance Bonds
26	00 61 13.16	Payment Bonds
27	00 61 19	Maintenance Bond
28	00 61 20	Environmental Maintenance Bond
29	00 62 76	Consent of Surety
30	00 62 77	Surety Disclosure Statement and Certification
31	00 62 78	Contractor's Application for Payment
32	00 63 36	Field Order
33	00 63 49	Work Change Directive
34	00 63 63	Change Order
35	00 65 16	Certificate of Substantial Completion
36	00 72 00	General Conditions
37	00 73 00	Supplementary Conditions
DIVISION 01 - GENERAL REQUIREMENTS		
38	01 11 00	Summary of Work
39	01 14 01	Control of Work
39	01 22 01	Measurement and Payment
40	01 29 73	Schedule of Values
40	01 31 19.23	Meetings
41	01 32 00	Construction Progress Documentation
41	01 32 16	Construction Progress Schedule
42	01 32 33	Construction Photographs
42	01 33 00	Submittals

PVSC ADVANCED ELECTRICAL CONTRACT TECHNICAL SPECIFICATIONS LIST		
#	Section	Title
43	01 35 00	Special Provisions
43	01 35 43	Environmental Protection Procedures
44	01 42 13	Abbreviations of Terms and Organizations
44	01 45 00	Quality Control
45	01 50 00	Temporary Facilities
45	01 65 00	Product Delivery Requirements
46	01 66 00	Product Storage and Handling Requirements
46	01 68 00	Equipment and Valve Identification
47	01 73 01	Maintenance of Plant Operations
47	01 78 18	Contract Closeout
48	01 78 23	Operation and Maintenance Manuals
48	01 78 32	Warranties and Bonds
49	01 78 39	Record Documents
49	01 79 00	Demonstation and Training
50	01 87 01	Material and Equipment
		DIVISION 02 - EXISTING CONDITIONS
51	02 41 00	Demolition
		DIVISION 03 - CONCRETE
52	03 11 00	Concrete Forming
53	032 00 00	Concrete Reinforcing
54	03 15 19	Concrete Joints and Accessories
55	03 33 00	Cast-in-Place Concrete
56	03 30 13	Concrete Placing
57	03 30 50	Concrete Finishing
58	03 39 00	Concrete Curing
59	03 41 00	Precast Structural Concrete
60	03 60 00	Grouting
61	03 01 26 66	Concrete Crack Repair
		DIVISION 04 - MASONRY
62	04 00 00	Masonry
		DIVISION 05 - METALS
63	05 21 00	Steel Joist Framing
64	05 31 00	Steel Roof Decking
65	05 40 00	Cold Formed Metal Framing
66	05 52 13	Handrailing, Guardrailing, and Ladders
67	05 52 13	Grating
68	05 81 00	Anchorage In Concrete and Masonry
69	05 50 13	Structural and Miscellaneous Metals
		DIVISION 07 - THERMAL AND MOISTURE PROTECTION
70	07 16 00	Dampproofing
71	07 51 00	Built-Up Bituminous Roofing
72	07 52 50	Modified Bituminous Membrane Roofing
73	0 753 10	EPDM Roofing, Mechanically Fastened
74	07 53 20	EPDM Roofing, Fully Adhered
75	07 54 00	Fluid Applied Deck Coverings
76	07 60 00	Flashing and Sheet Metal

PVSC ADVANCED ELECTRICAL CONTRACT TECHNICAL SPECIFICATIONS LIST		
#	Section	Title
77	00 79 00	Joint Sealants
		DIVISION 08 - OPENINGS
78	08 11 00	Stainless Steel Doors and Frames
79	08 30 05	Floor Access Doors and Hatches
80	08 33 00	Overhead Coiling Stainless Steel and Fire Doors
81	08 41 00	Aluminum Entrances and Assemblies
82	08 52 00	Aluminum Windows
83	08 70 00	Hardware
84	00 88 00	Glazing
92	08 91 13	Louvers and Vents
		DIVISION 09 - FINISHES
84	09 97 16	Finishes
85	09 20 00	Lath and Plaster
86	09 20 50	Gypsum Board
87	09 50 10	Acoustical Panel Ceilings
88	09 60 60	Resilient Flooring
89	09 80 20	Cementitious Coating
90	09 90 20	Painting
91	09 90 40	Protective Coatings
		DIVISION 23 - HEATING, VENTILATION AND AIR CONDITIONING (HVAC)
92	23 00 00	Heating, Ventilating, and Air Conditioning
93	23 50 11	Heating Systems Equipment
94	23 09 11	Building System Controls
95	23 05 93	Testing, Adjusting, and Balancing
		DIVISION 26 - ELECTRICAL
96	26 05 13	Medium-Voltage Cables
97	26 05 19	Low-Voltage Electrical Power Conductors and Cables
98	26 05 23	Control-Voltage Electrical Power Cables
99	26 05 26	Grounding and Bonding for Electrical Systems
100	26 05 29	Hangers and Supports for Electricl Systems
101	26 05 33	Raceway and Boxes for Electrical Systems
102	26 05 36	Cable Trays for Electrical Systems
103	26 05 43	Underground Ducts and Raceways for Electrical Systems
104	26 05 53	Identification for Electrical Systems
105	26 05 73	Overcurrent Protective Device Coordination Study
106	26 09 13	Electrical Power Monitoring and Control
107	26 09 23	Lighting Control Devices
108	26 12 16	Dry Type, Medium Voltage Transformers
109	26 13 19	Medium-Voltage Vacuum Interrupter Switchgear
110	26 22 13	Low-Voltage Distribution Transformers
111	26 24 16	Panelboards
112	26 28 16	Enclosed Switches and Circuit Breakers
113	26 29 13	Enclosed Controllers
114	26 29 23	Variable-Frequency Motor Controllers
115	26 33 13	Batteries
116	26 33 16	Battery Racks
117	26 33 43	Battery Chargers
118	26 33 46	Battery Monitoring

PVSC ADVANCED ELECTRICAL CONTRACT TECHNICAL SPECIFICATIONS LIST		
#	Section	Title
119	26 36 00	Transfer Switches
120	26 41 13	Lightning Protection for Structures
121	26 51 13	Interior Lighting Fixtures, Lamps, and Ballasts
122	26 52 00	Emergency Lighting
123	26 53 00	Exit Signs
124	26 56 29	Site Lighting
		DIVISION 27 - ELECTRONIC MONITORING AND CONTROL
125	27 31 00	Voice Communications Switching and Routing Equipment
126	27 32 00	Voice Communications Telephone Sets, Facsimiles and Modems
		DIVISION 28 - ELECTRONIC MONITORING AND CONTROL
127	28 05 00	Common Work Results for Electronic Safety and Security
128	28 10 00	Electronic Access and Intrusion Detection
129	28 31 00	Fire Detection and Alarm System
130	28 46 00	Electronic Monitoring and Control
		DIVISION 31 - EARTHWORK
131	31 23 11	Excavation and Fill for Structures
132	31 23 12	Excavation Support and Protection
133	31 23 19	Dewatering
134	31 23 33	Trenching and Backfilling
135	31 62 13 23	Prestressed Concrete Piles
136	31 62 13 24	Pile Installation
137	31 62 13 25	Geotechnical Instrumentation
		DIVISION 32 - EXTERIOR IMPROVEMENTS
138	32 12 16	Asphalt Paving
139	32 16 16	Concrete Sidewalk, Curb, and Gutter
140	32 92 21	Seeding and Sodding
		DIVISION 33 - UTILITIES
141	33 05 14	Manhole and Vault Covers and Accessories
		DIVISION 40 - PROCESS INTERCONNECTIONS
141	40 69 13	Uninterruptible Power Supply
142	40 61 11	Instrumentation and Control System
143	40 78 00	Panel Mounted Instruments
144	40 68 83	Software Control Block Descriptions
145	40 66 11	Network Systems
146	40 66 33	Metallic and Fiber Optic Communication Cables and Connectors

PASSAIC VALLEY SEWERAGE COMMISSION

ADVANCED ELECTRICAL CONTRACT PROJECT
PHASE 1

BLACK & VEATCH
SUMMARY OF TOTAL MAN-HOUR ESTIMATE
("ATTACHMENT G")

		Estimate of Man Hours								
	DESCRIPTION OF WORK	Project Director	Technical Advisor	Project Manager	Project Engineer	Engineer	Designer	Technician	Support	Total Man Hours
	Staff Name ---->	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	
Task 1	Review and Compilation of Data									
1.1	Investigation	4	4	72	518	176	0	100	8	882
Task 2	Project Work Plan and Reporting									
2.1	Project Work Plan	24	4	446	180	30	0	0	76	760
Task 3	Design Services									
3.1	Design	70	10	94	4,572	7,026	74	1,672	164	13,682
3.2	Meetings	0	0	260	248	48	0	0	0	556
3.3	Value Engineering	10	0	24	142	6	0	0	0	182
3.4	Permitting	0	0	4	146	4	0	0	0	154
3.5	Bidding Assistance	0	0	30	129	106	0	72	4	341
Task 4	Design Services During Construction (DSDC)									
4.1	Notice to Proceed	0	0	0	0	0	0	0	0	0
4.2	Liaison and Administration	0	0	16	20	0	0	0	0	36
4.3	Meetings	0	0	36	144	0	0	0	0	180
4.4	Baselines and Benchmarks	0	0	4	0	0	0	0	0	4
4.5	Approval of Manufacturers/Vendors	0	0	2	8	0	0	0	0	10
4.6	Shop Drawings	0	0	2	544	690	0	0	0	1,236
4.7	Contractor Initiated Substitutions	0	0	2	125	70	0	0	0	197
4.8	Testing	0	0	2	384	0	0	0	0	386
4.9	RFI's & Field Orders	0	0	2	534	387	0	0	0	923
4.10	Change Orders	10	0	2	225	105	14	0	0	356
4.11	Payment Requests	0	0	0	0	0	0	0	0	0
4.12	Start-Up Services	0	0	4	400	0	0	0	0	404
4.13	Post Construction Assistance	0	0	12	92	172	0	205	20	501
	Subtotal Tasks 1 through 4	118	18	1,014	8,411	8,820	88	2,049	272	20,790
Task 5	Resident Project Representative (per Scope of Work)									
5.1	Resident Project Representative	0	0	0	6,000	0	0	0	0	6,000
5.2	Part Time Administrative Assistant	0	0	0	0	0	0	0	3,000	3,000
	Subtotal Task 5	0	0	0	6,000	0	0	0	3,000	9,000

December 20, 2017

Total Man Hour Estimate 29,790

PASSAIC VALLEY SEWERAGE COMMISSION

ADVANCED ELECTRICAL CONTRACT PROJECT
PHASE 2

BLACK & VEATCH
SUMMARY OF TOTAL MAN-HOUR ESTIMATE
("ATTACHMENT G")

		Estimate of Man Hours								
	DESCRIPTION OF WORK	Project Director	Technical Advisor	Project Manager	Project Engineer	Engineer	Designer	Technician	Support	Total Man Hours
	Staff Name ---->	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	
Task 1	Review and Compilation of Data									
1.1	Investigation	0	0	0	0	0	0	0	0	0
Task 2	Project Work Plan and Reporting									
2.1	Project Work Plan	0	0	0	0	0	0	0	0	0
Task 3	Design Services									
3.1	Design	43	0	30	1,337	1,655	23	589	80	3,757
3.2	Meetings	0	0	60	144	24	0	0	0	228
3.3	Value Engineering	10	0	16	102	16	0	0	0	144
3.4	Permitting	0	0	4	116	4	0	0	0	124
3.5	Bidding Assistance	0	0	16	89	84	0	0	2	191
Task 4	Design Services During Construction (DSDC)									
4.1	Notice to Proceed	0	0	0	0	0	0	0	0	0
4.2	Liaison and Administration	0	0	16	0	0	0	0	0	16
4.3	Meetings	0	0	24	96	0	0	0	0	120
4.4	Baselines and Benchmarks	0	0	4	0	0	0	0	0	4
4.5	Approval of Manufacturers/Vendors	0	0	2	8	0	0	0	0	10
4.6	Shop Drawings	0	0	2	185	340	0	0	0	527
4.7	Contractor Initiated Substitutions	0	0	2	41	24	0	0	0	67
4.8	Testing	0	0	2	104	0	0	0	0	106
4.9	RFI's & Field Orders	0	0	2	136	104	0	0	0	242
4.10	Change Orders	4	0	2	100	32	5	0	0	143
4.11	Payment Requests	0	0	0	0	0	0	0	0	0
4.12	Start-Up Services	0	0	4	200	0	0	0	0	204
4.13	Post Construction Assistance	0	0	4	12	66	0	90	0	172
	Subtotal Tasks 1 through 4	57	0	190	2,670	2,349	28	679	82	6,055
Task 5	Resident Project Representative (per Scope of Work)									
5.1	Resident Project Representative	0	0	0	4,000	0	0	0	0	4,000
5.2	Part Time Administrative Assistant	0	0	0	0	0	0	0	2,000	2,000
	Subtotal Task 5	0	0	0	4,000	0	0	0	2,000	6,000

Task 1 and Task 2 Services are included in Phase 1 Man-Hour Estimate

Total Man Hour Estimate	12,055

December 20, 2017

ATTACHMENT A

CERTIFICATION OF INSURANCE

I HEREBY CERTIFY THAT MY OFFICE CARRIES INSURANCE ADEQUATE TO COVER PASSAIC VALLEY SEWERAGE COMMISSION ("PVSC") AND PROTECT PVSC FOR ANY ERROR OR OMISSION BY THE UNDERSIGNED THAT CREATES LIABILITY TO PVSC. THIS INCLUDES ERRORS AND OMISSIONS POLICY AND ANY OTHER TYPE OF POLICY WHATSOEVER THAT CAN BE UTILIZED TO PROTECT THE INTERESTS OF PVSC. I HAVE ATTACHED HERETO COPIES OF THE DECLARATION PAGES OF EACH SUCH POLICY THAT I ASSERT DOES OR CAN PROTECT ANY ERROR, OMISSION OR ACTIVITY IN WHICH I OR ANYONE FROM MY OFFICE MIGHT ENGAGE ON BEHALF OF PVSC.

I FURTHER CERTIFY THAT THE POLICIES OF INSURANCE THAT ARE CARRIED BY MY OFFICE SHALL CONTINUE TO BE CARRIED DURING THE ENTIRE TERM OF MY APPOINTMENT AS **DESIGN SERVICES AND DESIGN SERVICES DURING CONSTRUCTION OF ADVANCED ELECTRICAL CONTRACT**, IN THE EVENT THAT MY OFFICE IS SELECTED TO SERVE IN THAT CAPACITY. IN THE EVENT THAT THE DECLARATIONS PAGE(S) SUBMITTED HEREWITH SHOWS THE POLICY OR POLICIES OF INSURANCE WILL LAPSE DURING THE COURSE OF THE TERM OF MY APPOINTMENT, I WILL PROVIDE TO PVSC A COPY OF THE RENEWAL POLICY DECLARATION PAGE. I FURTHER CERTIFY THAT THE RENEWED POLICY SHALL HAVE THE SAME OR GREATER LIMITS OF LIABILITY AS THE ONE PROVIDED FOR THE BEGINNING OF MY APPOINTMENT.

CERTIFYING OFFICIAL:

NAME: Brent M Reuss, PE

TITLE: Senior Vice President

SIGNATURE:

DATE: 20 Dec 2017

ATTACHMENT B

CONFLICT OF INTEREST CERTIFICATION

THE UNDERSIGNED CERTIFIES TO PASSAIC VALLEY SEWERAGE COMMISSION ("PVSC"), COUNTY OF ESSEX, STATE OF NEW JERSEY THAT IN PERFORMING SERVICES TO PVSC HE/SHE IS AWARE OF NO CIRCUMSTANCE THAT WOULD CONSTITUTE A CONFLICT OF INTEREST, FINANCIAL OR OTHERWISE, BETWEEN HIMSELF/HERSELF (OR HIS/HER FIRM) AND THE INTERESTS OF PVSC. THE UNDERSIGNED CERTIFIES THAT HE/SHE HAS MADE A SEARCH OF HIS/HER FIRM'S CLIENT BASE AND HAS EXECUTED THIS CERTIFICATION SUBSEQUENT TO SUCH SEARCH.

THE UNDERSIGNED ACKNOWLEDGES THIS IS A CONTINUING CERTIFICATION, AND SHALL REMAIN IN EFFECT FOR THE TERM OF THE SERVICES CONTAINED IN THE SOLICITED REQUEST FOR PROPOSAL. I CERTIFY THAT THE FOREGOING STATEMENTS MADE BY ME ARE TRUE. I AM AWARE THAT IF ANY OF THE FOREGOING STATEMENTS MADE BY ME ARE FALSE, PVSC IS FREE TO TERMINATE ANY PROFESSIONAL SERVICES AGREEMENT ENTERED INTO WITH THE UNDERSIGNED AND/OR HIS OR HER FIRM.

THE UNDERSIGNED CERTIFIES THAT NO PERSON OR SELLING AGENCY HAS BEEN EMPLOYED OR RETAINED TO SOLICIT OR SECURE THIS CONTRACT UPON AN AGREEMENT OR UNDERSTANDING FOR A COMMISSION, PERCENTAGE, BROKERAGE OR CONTINGENT FEE, EXCEPT BONA FINE EMPLOYEES OR BONA FIDE ESTABLISHED COMMERCIAL OR SELLING AGENICES MAINTAINED BY THE CONTRACTOR FOR THE PURPOSE OF SECURING BUSINESS, FOR THE BREACH OR VIOLATION OF WHICH WARRANTY THE STATE SHALL HAVE THE RIGHT TO ANNUL SUCH CONTRACT WITHOUT LIABILITY OR IN ITS DISCRETION TO DEDUCT FROM THE CONTRACT PRICE OR CONSIDERATION THE FULL AMOUNT OF SUCH COMMISSION, PERCENTAGE, BROKERAGE OR CONTINGENT FEE.

Applicant

Signature: _____

Typed: Brent M Reuss, PE

Firm Name: Black & Veatch Corporation

Title: Senior Vice President

Date: 20 Dec 2017

ATTACHMENT C

I HEREBY CERTIFY THE INFORMATION CONTAINED IN THIS PROPOSAL IS CORRECT AND ACCURATE TO MY PERSONAL KNOWLEDGE. I AM MAKING THIS CERTIFICATION IN GOOD FAITH.

CERTIFYING OFFICIAL:

NAME: Brent M Reuss, PE

TITLE Senior Vice President

SIGNATURE:

DATE: 20 Dec 2017

ATTACHMENT I

ACKNOWLEDGEMENT OF RECEIPT OF CLARIFICATIONS

The undersigned Respondent hereby acknowledges receipt of the following clarifications to the Request for Qualifications and Compensation (Fee) Proposal. By indicating date of receipt, Respondent acknowledges the submitted qualifications and proposal takes into account the provisions of the issued clarification(s). Note that the PVSC's record of clarification(s) issued shall take precedence and that failure to include provisions of changes in qualifications and proposal may be submit for rejection of the qualifications and proposal.

PROFESSIONAL SERVICES FOR
DESIGN SERVICES AND DESIGN SERVICES DURING CONSTRUCTION FOR ADVANCED ELECTRICAL CONTRACT

Directions: Complete Part I or Part II, whichever is applicable

PART I: LISTED BELOW ARE THE DATES OF ISSUE FOR EACH CLARIFICATION RECEIVED IN CONNECTION WITH THIS RFQ/RFP:

CLARIFICATION #1, DATED December 11th , 2017

CLARIFICATION #2, DATED _____ , _____

CLARIFICATION #3, DATED _____ , _____

CLARIFICATION #4, DATED _____ , _____

PART II: ____ NO CLARIFICATION WAS RECEIVED IN CONNECTION WITH THIS RFQ/RFP.

DATE: 20 Dec 2017

NAME Domenick Loschiavo, PE SIGNATURE Domenick A Loschiavo

Resumes

James T Barrett, PE

PSE&G Consultant

James Barrett is the Manager of Engineering for the Raleigh Power Delivery Group of approximately 65 professionals. He is responsible for resource allocation, recruiting, performance management and employee retention. He is also an Electrical Engineer responsible for leading project teams in the design of substations and switchyards for PSE&G. Past experience also includes protection and control design, physical design and protective relay settings. Barrett has also had experience with power plants, including coordination studies, protective relay settings and arc flash analyses. Additional responsibilities include mentoring and presenting substation topics to new engineers and technicians. Barrett has been an engineer for ten years at Black & Veatch. Prior experience includes three summer internships at a municipal utility in the Electrical Engineering Department.

Education

- MS, Electrical Engineering, North Carolina State University, 2006
- BS, Electrical Engineering, North Carolina State University, 2005

Professional Registration

PE - Electrical, 36812, NC, 2010

PE - Electrical, 43872-6, WI, 2014

Year Career Started

2006

Year Started with B&V

2007

Office Location

Cary, NC

PROJECT EXPERIENCE

Public Service Electric and Gas (PSE&G) | Hillsdale Transmission Hardening and Energy Strong; Hillsdale, NJ

Project Lead Engineer. Rebuild of existing 230kV Air Insulated Substation (AIS) to new Gas Insulated Substation (GIS) housed in a new GIS hall with control room. Responsibilities include schedule development, man-hour estimates and ensuring on time delivery of drawing packages and equipment to site. Additional responsibilities include P&C design, physical design, procurement support and construction support.

Public Service Electric and Gas (PSE&G) | BBR – Bridgewater Reconfiguration; Bridgewater, NJ

Project Lead Engineer. Rebuild of existing 230kV yard to five (5) bay breaker and a half configuration. Installation of new control building for 230kV equipment. Replacement of two (2) existing 230kV/26kV transformers. Responsibilities included schedule development, man-hour estimates and ensuring on time delivery of drawing packages and equipment to site. Additional responsibilities included P&C design, physical design, procurement support and construction support.

American Transmission Company (ATC) | Various Projects; Various, WI & MI

Project Lead Engineer. Responsibilities included scoping, schedule development, man-hour estimates and ensuring on time delivery of drawing packages and equipment to site. Additional responsibilities included P&C design, physical design, procurement support, mentoring and checking P&C design of junior engineers.

Westar Energy | Timber Junction Cap Bank Addition; Sumner County, KS

Project Lead Engineer. Responsibilities included scoping, schedule development, man-hour estimates and ensuring on time delivery of drawing packages and equipment to site. Additional responsibilities included procurement support, mentoring and checking P&C design of junior engineer.

ATC | Various Projects; Various, WI & MI

P&C Lead Engineer. Responsibilities included P&C design, calculations, procurement activities, mentoring and checking design of junior engineers for the P&C work. Also, ensured P&C deliverables were on time and budgeted hours were not exceeded. Worked on the physical design of several substations during this time.

Westar Energy | Timber Junction and Sumner County; Sumner County, KS
P&C Lead Engineer. Responsibilities included mentoring and checking design of junior engineers. Also, ensured deliverables were on time and budgeted hours were not exceeded.

Public Gas and Electric (PG&E) | PG&E Brighton Substation; Sacramento, CA
Design Engineer. Aided with design of the MPAC building schematics. Aided with physical design. On-site engineering construction support for Spring construction.

Westar Energy | Westar Wichita Substation; Wichita, KS
Design Engineer. Design of new protection scheme to convert the existing ring bus configuration to a breaker-and-a-half configuration. Rewired the existing control building to incorporate new protective relaying. Aided the physical demo and design.

Florida Power and Light (FP&L) | FPL Port Everglades Arc Flash Analysis; Ft. Lauderdale, FL
Electrical Engineer. Performed arc flash analysis for Unit 3 at the plant which included modeling the auxilary power system in ETAP and using ETAP to run the analysis. Results were then used to propose new settings for the relays to mitigate arc flash hazards.

Westar Energy | Westar Stranger Creek Substation; Stranger Creek, KS
Design Engineer. Design of metering and relaying oneline and associated schematics for the substation. Aided with the rewiring of the existing control building to incorporate new protective relays. Aided the physical design. Created relay settings for transformer differential relays.

Westar Energy | Westar Reno County Substation; Reno County, KS
Design Engineer. Design of Metering and Relaying Oneline for substation. Design of schematics. Design of conduit layout and cable routing. Aided the physical design. Relay settings for line relays and bus differential relays.

Westar Energy | Westar Emporia Energy Center; Emporia, KS
Design Engineer. Design of schematics for switchyard. Design of conduit layout for switchyard. Cable routing within switchyard. Relay settings and coordination for plant.

Brian L Butler, PE

Instrumentation/ PMCS

Mr. Butler specializes in the design of wastewater and water instrumentation and controls systems. His experience includes the design of advanced software programmable control systems utilizing Programmable Logic Controller (PLC) or Distributed Control Systems (DCS) based controllers fully automating all aspects of plant and distribution operations from process applications to site safety and monitoring. The design of Supervisory Control and Data Acquisition (SCADA) systems or DCS both for new facilities as well as upgrades and improvements to existing facilities to incorporate global control and monitoring of the facility both locally at the facility and remotely. Advanced network designs incorporating the latest advancements in network reliability and security. Mr. Butler has experience in wireless networks, both serial based and Ethernet based radios, copper based Ethernet networks, fiber based Ethernet and serial networks as well as internal fieldbus networks within a facility. Mr. Butler has extensive experience in a wide variety of flow, pressure, level, temperature and analytical instrumentation regularly utilized in water and wastewater facilities. Mr. Butler's experience includes design work, field investigations, submittal reviews, RFI responses, system checkout, site inspections, start up and construction resident services. Mr. Butler has designed projects which include many diverse technologies and encompass a wide variety of field instrumentation, controllers, operator interfaces, communications, digital field networks and plant equipment.

Education

- BS, Electrical Engineering, Kansas State University Manhattan, 1991

Professional Registration

PE - Electrical, 11777, AR, 2004
PE - Electrical, 58386, AZ, 2014
PE - Electrical, 16009, KS, 2000
PE - Electrical, 16569, CA, 2001
PE - Electrical, 42810, MD, 2012
PE – Electrical, 23736, NV, 2015
PE - Electrical, 78307, OH, 2013
PE - Electrical, 51332, VA, 2013
PE – Electrical, E-43788-6, WI, 2014

Year Career Started
1991

Year Started with B&V
2002

Office Location
Kansas City, MO

PROJECT EXPERIENCE

City of San Jose, California Environmental Services Department | San Jose-Santa Clara Regional Wastewater Facility (SJSCRWF) Digester and Thickener Upgrades; San Jose, CA

Lead Instrumentation and Controls Engineer. Designed and specified a DCS and PLC-based controls for digester gas pipeline header monitoring flow, pressure condensate accumulator water level and packaged waste gas flare controls which interface with the existing ABB 800xA DCS through extension of the fiber optic network. Major components consist of ABB RIO and an Allen-Bradley CompactLogix PLC with Ethernet switches and uninterruptible power supplies.

City of Anaheim, California Public Utilities Department | Lenain Water Treatment Plant Automation and Control System Replacement; Anaheim, CA

Construction Instrumentation & Control Systems and Electrical Resident Engineer - Westin Engineering, Inc. Oversight and coordination between the design and the general contractor related to instrumentation and controls for a PLC-based SCADA system for the plant. Major components consist of GE RX3i PLCs with Ethernet switches and uninterruptible power supplies.

Inland Empire Utilities Agency (IEUA) | Enterprise SCADA System Upgrade; Ontario and Chino, CA

Project Engineer, Lead Instrumentation and Control Systems and Electrical Engineer - Westin Engineering, Inc. Modify HMI and PAC standards to be Rockwell PlantPAx specific. Architected, designed and specified dual-redundant PLC-based controls for a plant-wide SCADA system utilizing Ethernet over an existing plant LAN. Utilize the existing WAN to initiate a PlantPAx Enterprise. Major components consist of FactoryTalk VM servers, historian, VantagePoint, thin clients, Allen-Bradley ControlLogix PACs, remote I/O with Ethernet switches, and uninterruptible power supplies.

Hampton Roads Sanitation District | Interceptor Systems Pump Station Control and SCADA; Norfolk and Newport News, VA
Project Engineer, Lead Instrumentation & Control Systems Engineer - Westin Engineering, Inc. Designed and specified a RTU-based controls for remote lift stations which interface with a microwave WAN through UHF telemetry utilizing Ethernet to interface with a new GE Proficy HMI/SCADA iFix top end. Major components consist of Emerson ControlWave RTUs with Ethernet switches, uninterruptible power supplies, engine generators.

Charles County, Maryland Department of Public Works | Waldorf Automation RTU Replacement; La Plata, MD
Construction Project Engineer, Construction Instrumentation & Control Systems Resident Engineer - Westin Engineering, Inc. Oversight and coordination between the design and the general contractor related to instrumentation and controls for a county-wide RTU-based telemetry system for wells, pump stations and elevated storage tanks. Major components consist of Allen-Bradley CompactLogix PLCs with Ethernet switches, 900 MHz spread spectrum radios, 500 MHz licensed radios and uninterruptible power supplies.

Metropolitan Water District of Southern California | Control System Master Plan, Instrumentation Technical Memorandum; Los Angeles, CA
Instrumentation & Control Systems Engineer - Westin Engineering, Inc. Interviews were conducted with Operations, Maintenance, Engineering, and IT personnel. A field walk down was performed for a typical water treatment facility which included extensive photographs and notes. The Technical Memorandum documented the current state of the instrumentation, maintenance practices, SWOT analysis, industry best practices and guidelines for maintaining and improving instrumentation.

City of Columbia | Columbia Regional Wastewater Treatment Facility Phase I Improvements; Columbia, MO
Lead Instrumentation & Control Systems Engineer. Architected, designed and specified instrumentation for upgrade and expansion of the existing stand alone PLCs into a PLC-based plant SCADA system. The wastewater treatment plant utilized influent screening, raw wastewater pumps, grit removal, flow splitting, clarifiers, primary sludge pumps, aeration basins, aeration blowers, RAS pumps, WAS pumps, scum pumps, odor control systems, digester gas treatment systems, centrifuges, heating water systems, non-potable water, gravity thickeners, digesters, digested sludge pumps, sludge injection pumps, peak flow clarifiers, chemical systems, boilers, and engine generators. Major components consist of twenty-three PLCs with a self-healing ring fiber optic data highway; two SCADA servers, one historical server, four workstations, seventeen operator interface terminals, uninterruptible power supplies; level, temperature, pressure, flow, and analytical instrumentation.

City of Soledad | Soledad Wastewater Treatment Plant 5.5 MGD Upgrade and Expansion; Soledad, CA
Lead Instrumentation & Control Systems Engineer. Designed and specified instrumentation for the wastewater treatment plant utilized influent screening, grit removal, flow splitting, BNR basins, aeration blowers, RAS pumps, WAS pumps, scum pumps, clarifiers, filtration, UV disinfection, sludge stabilization basins, screw presses, reclaimed water pumps, decant pumps, non-potable water pumps, chemical systems, and engine generators. Major components consist of twenty-three PLCs with a self-healing ring fiber optic data highway; two SCADA servers, one historical server, four workstations, seventeen operator interface terminals, uninterruptible power supplies; level, temperature, pressure, flow, and analytical instrumentation.

City of Rogers | Rogers Wastewater Treatment Plant Wastewater Treatment Plant Expansion; Rogers, AR
Construction Instrumentation & Control Systems Engineer. Oversight and coordination between the design and the general contractor and sub-contractors related to instrumentation and controls for an expansion of the wastewater treatment plant during construction. The wastewater treatment plant utilized a headworks facility, grit removal, five stage BNR, RAS pumps, WAS pumps, scum pumps, traveling bridge filters, oxygen injection system, chemical systems, and one engine generator. The plant-wide SCADA System included fiber optics, Ethernet, and ControlNet communications. Major components consist of six Allen-Bradley ControLogix programmable logic controllers (PLCs), two operator interface terminals, four operator workstation computers with Windows XP operating system, spread spectrum radio telemetry; uninterruptible power supplies; level, pressure, flow, temperature, and analytical instrumentation.

Kevin Cahill, PE, LEED AP BD+C

HVAC; NFPA 820 Expert

Mr. Cahill has experience in the design of various mechanical systems, including heating, ventilating, and air conditioning (HVAC), odor control, dehumidification and plumbing.

Mr. Cahill has designed and overseen the construction phase services of systems for HVAC, odor control, dehumidification and plumbing for water and wastewater infrastructure projects and federal government facilities. His experience covers the application of these systems for administration buildings, laboratories, maintenance facilities, chemical areas, pumping stations, and process related areas. He has been involved in numerous designs and reports for new and existing facilities.

Education
- BS, Mechanical Engineering, University of Nebraska - Lincoln, 2006

Professional Registration
PE - PE.0051102, CO, 2016
PE - 908625, DC, 2016
PE - PE040951, GA, 2016
PE - 22026, KS, 2011
PE - 53701, MN, 2016
PE - 096372, NY, 2016
PE - 12947, SD, 2016
LEED AP BD+C – 10351333, KS, 2012

Year Career Started
2007

Year Started with B&V
2007

Office Location
Kansas City, MO

PROJECT EXPERIENCE

NYCDEP | North River Wastewater Treatment Plant Cogeneration and Electrification; New York, NY
Lead Mechanical Engineer. Provided lead mechanical HVAC and plumbing system design for upgrades to the existing North River WWTP and a new electrical substation. Responsibilities included developing technical memoranda to set the HVAC and plumbing approach, existing system investigation, leading / supervising production of detailed drawings and specifications and mechanical services during permit, bid and construction phases. Ensured mechanical system compliance with current code and standard requirements including NFPA 820. Worked with the NYC Department of Buildings to confirm NFPA 820 compliance with challenging conditions inherent in the North River plant.

NYCDEP | Oakwood Beach WWTP Electrical Upgrades; New York, NY
Lead Mechanical Engineer. Provided mechanical HVAC and plumbing system design for upgrades to an existing wastewater treatment facility and a new electrical substation.

City of Toronto | Humber Treatment Plant Secondary Treatment Upgrades; Toronto, Ontario, Canada
Lead Mechanical Engineer. Provided mechanical HVAC and plumbing system design for a wastewater treatment facility upgrade.

Metropolitan Water District of Southern California | Greg Ave Pressure Control Structure; Sun Valley, CA
Lead Mechanical Engineer. Provided mechanical HVAC and plumbing system design for a new control building associated with an existing outdoor pump station.

Frederick-Winchester Service Authority | Opequon Water Reclamation Facility Green Energy Project; Winchester, VA
Lead Mechanical Engineer. Provided mechanical HVAC and odor control system design for an operation, chemical feed and dewatering facility rehabilitation and a new digester control building.

Irvine Ranch Water District | Michelson Water Recycling Plant Biosolids and Energy Recovery Facilities; Irvine, CA
Mechanical Engineer. Provided mechanical HVAC construction phase support for a biosolids and energy recovery project.

City County Utilities Commission | Muddy Creek Wastewater Treatment Plant Consolidated Influent Pumping Improvements; Winston-Salem, NC

Lead Mechanical Engineer. Provided mechanical HVAC and odor control system design for a new influent pump station.

Town of Cary | Kit Creek Odor Control Improvements; Cary, NC
Lead Mechanical Engineer. Provided mechanical odor control system design for an existing pump station, screenings structure and distribution vault.

County of Harford | Sod Run Wastewater Treatment Plant ENR Upgrades; Harford County, MD
Mechanical Engineer. Provided mechanical HVAC and odor control system design for a wastewater treatment facility upgrade.

City of Pueblo | Wastewater Treatment Plant Ammonia and Nutrient Removal Project; Pueblo, CO
Lead Mechanical Engineer. Provided mechanical HVAC and plumbing system design for the expansion of an existing wastewater treatment facility. Work included a new UV building and an expansion of an existing blower building.

South Adams County Water and Sanitation District | Wastewater Treatment Plant Modifications; Commerce City, CO
Mechanical Engineer. Provided mechanical HVAC system design for an upgrade to an existing headworks building that utilized chemical media filters to prevent corrosion of electrical equipment.

Town of Oak Island | Oak Island Wastewater Treatment Plant; Oak Island, NC
Mechanical Engineer. Provided mechanical odor control system design for a new lift station.

ACSA | Middle River Wastewater Treatment Facility; Verona, VA
Mechanical Engineer. Provided mechanical HVAC system design for an upgrade to an existing wastewater treatment facility. This design included renovations to an existing blower building, grit removal facility and electrical building and new designs for a dewatering building and filter building.

East Bay Municipal Utility District | RARE Membrane Building; Richmond, CA
Mechanical Engineer. Provided mechanical HVAC system design for a new membrane building that included administrative, electrical, storage and process areas.

Wanda K Cox

RPR - Phase 1 Construction (Admin)

Wanda has a well-rounded background in administration management and project and document controls, having served as the Administrator for numerous major capital projects. She has administered project documentation, change management systems, correspondence files, O&M Manual formulation, and other field duties. She is a coach and supporter Contract Manager software by Primavera and has administered several programs with these tools. She is experienced in developing and implementing grants programs with accounting and financial reporting of labor records, T&M logs, and preparing documentation for US/EPA and State Grants programs. Wanda is skilled in establishing field offices including fit outs, file management, and organization of document control procedures and protocols. She has managed administrative offices for major capital projects with values up to $600 million. Wanda managed all the administration staff and set up technical information libraries for project documentation and future operations for these projects.

Wanda assists in set up of Black & Veatch construction management projects utilizing the Jump Start Toolkit for project startup, enabling project uniformity of delivery and adding to the quality of work. She also administers web based project management tools and implements the field communications, hardware and software tools.

Professional Associations
- Construction Management Association of America

Year Career Started
1984

Year Started with B&V
2007

Office Location
Curtis Bay, MD

PROJECT EXPERIENCE

New York Department of Environmental Protection | 26th Ward Emergency Generator Project Construction Management; New York, NY
Project Administrator. Responsible for setting up document control procedures, training project staff on our project management tools, setting up file management, conducting project audits to ensure compliance with the NYCDEP SOPs.

New York Department of Environmental Protection | Manhattan Tunnel No. 3 Construction Management; New York, NY
Project Administrator. Responsible for setting up document control procedures, training project staff on our project management tools, setting up file management, conducting project audits to ensure compliance with the NYCDEP SOPs.

Anne Arundel County | Cox Creek WRF ENR Upgrade and Expansion; Curtis Bay, MD
Project Controls Administrator. Responsible for setting up document control procedures, establishing and equipping the field offices, training project and County staff on our project management tools, installing the network and web system, file management, processing submittals, requests for information and maintaining an even flow of correspondence for the project.

Sewerage and Water Board of New Orleans | Sewer Rehabilitation Project; New Orleans, LA
Project Controls Assistant. Responsible for setting up and maintaining records. Work includes 10 design contracts and the eventual construction work for the program. P6 and Contractor Manager are used.

Howard County | Little Patuxent Reclaimed Water Pump Station; Howard County, MD
Project Controls Assistant. Managed the project recordkeeping, files, and documentation for the 5MGD pumping station project.

City of Hagerstown | Hagerstown ENR/UV; Hagerstown, MD
Project Controls and Administrator. Project involved upgrade of a 30 mgd treatment plant. Processed contractor submittals, RFI's and maintained project documentation.

City of Lancaster Bureau of Water | Susquehanna and Conestoga Water Treatment Plants; Lancaster, PA
Project Controls Assistant. Responsible for the project document controls procedures for the 24 MGD and 12 MGD membrane filtration upgrade project, setting up and maintaining document for the two contracts and training new users on the contract management software. Processed project correspondence, project submittals, managed the flow of RFIs, and O&M manuals utilizing the project's delivery system.

DC Water | Lead-Pipe Service Replacement Program; Washington, DC
Office Manager - Arcadis. LSR Joint Venture working on the $450M Lead-Pipe Service Replacement Program. Responsible for organizing and maintaining document control procedures and protocols for the four current contracts. Created survey packages, tracked and input cost estimates into the database for private side replacements. Processed project correspondence, project submittals, contractor's bid proposals and contracts for the District. Managed the flow of RFIs, change orders, and correspondence utilizing the project's delivery system.

Scott L Cutting, PE

Power Distribution

Scott Cutting is a Professional Electrical Engineer with over 26 years of experience specializing in the design of electrical power distribution and control systems for water and wastewater treatment plants and pumping stations. He has Professional Engineer Registrations in Kansas, Indiana, North Dakota, and North Carolina. His experience includes the design of large medium and low voltage power distribution systems utilizing primary and secondary unit substation and pad mount style transformers, medium voltage metal-clad switchgear, low voltage switchgear and switchboards; Motor control design utilizing medium and low voltage motor control centers including schematic development; On site power generation design utilizing engine driven generators and generator paralleling switchgear both at medium and low voltage; Medium and low voltage adjustable frequency drives; Miscellaneous systems including SCADA, fire alarm, electronic security including access control and CCTV, and lightning protection. Scott worked in power distribution system studies such as load studies; Fault current and coordination studies including arc flash analysis; Load flow, voltage drop, and motor starting studies all utilizing the SKM software for power distribution systems.

Scott has a tremendous understanding of the National Electrical Code, National Electrical Safety Code, and various building codes with respect to electrical design. He has an excellent understanding of Green Design Technologies and incorporates them into all design projects.

Scott has superb field investigation abilities and can make recommendation on how to upgrade existing facilities. He has managed and performed construction phase services for all size projects including shop drawing review, and correspondence with Contractors and Owners to ensure proper installation of all electrical systems.

Education

- Bachelors, Electrical Engineering, Power Systems, Kansas State University, 1990

Professional Registration

PE - Electrical, 19800311, IN, 1998
PE - Electrical, 033006, NC, 2007
PE - Electrical, PE-4321, ND, 1999

Year Career Started

1989

Year Started with B&V

1989

Office Location

Kansas City, MO

PROJECT EXPERIENCE

City of Toronto | Ashbridges bay Wastewater Treatment Plant M&T Pump Station Critical Repairs; Toronto, ON

Lead Electrical Design Engineer. Project involved the demolition of an existing medium voltage motor control center that had reached it useful life with a new lineup of medium voltage fused load break switches housed in a outdoor environmentally controlled pre-engineered electrical equipment enclosure.

Johnson County Wastewater | Arc Flash Safety Improvements Project; Johnson County, KS

Lead Electrical Design Engineer. As a result of the system wide arc flash study performed for Johnson County Ks Wastewater in 2014 the Arc Flash Safety Improvements project was designed. This project identified ways to lower incident energy levels at various power buses by installing main circuit breakers upstream of existing MCCs and other distribution equipment that incorporated circuit breaker trip units that included an arc flash maintenance mode setting. This project also included the replacement of medium voltage switches and motor control centers. The new motor control centers were specified with up to date arc flash safety features.

The Metropolitan District Hartford | South Hartford Conveyance and Storage Tunnel CL&P Duct Bank Relocation and Switchgear Site Work; Hartford, CT

Lead Electrical Design Engineer. This project involved very detailed coordination with Connecticut Light & Power (CL&P) for the design and construction of a new ductbank for a

CL&P 29 kv circuit and the development of the site for new 29 kv rated CL&P owned service switchgear. CL&P design details were carefully reviewed and coordinated into the ductbank construction and very specific switchgear manholes and grounding details were required.

Johnson County Wastewater | System Wide Arc Flash Study; Johnson County, KS
Lead Electrical Design Engineer. Design included arc flash studies for 7 wastewater treatment plants and 30 collection system pump stations. Tasks performed included visiting each site for data collection including circuit breaker settings and fuse ratings and noting all panels including switchgear, motor control centers, panelboards, and control panels that require arc flash labeling. After data collection was complete all information was entered into SKM software and power distribution models were developed for each facility. Arc flash system studies were then run and the results were tabulated and assembled into report format. Arc flash labels were made in accordance with NPFA 70E and applied to applicable equipment.

City of Lawrence | Wakarusa Wastewater Treatment Plant; Lawrence, KS
Lead Electrical Design Engineer. Wakarusa WWTP was a completely new treatment plant design that included a complete electrical design from the utility interface through all treatment processes. Electrical equipment designed and specified included low voltage service entrance switchgear, motor control centers, adjustable frequency drives, fire and security systems, and SCADA system designs. Motor control schematics were developed for all motor driven equipment. Plan drawings were developed for all facilities showing all electrical equipment including switchgear, motor control centers, circuit routing using conduit and cable tray. Coordination was performed with all design groups to ensure all electrical systems were coordinated with civil, mechanical, and HVAC equipment.

Johnson County Wastewater | DL Smith Middle Basin Wastewater Treatment Plant BLDG 1 & 6 Improvements; Johnson County, KS
Lead Electrical Design Engineer. Design included the development of single line drawings, control schematics, and specifications for the replacement of 2 Motor Control Centers and modifications to 2 additional motor control centers. For this project Eaton FlashGard MCCs were specified as a project requirement, and additional attention to layout was required because FlashGard MCCs require more floor space then standard MCCs. For this project a new electrical room was constructed and the new MCCs were located in the new electrical room and electrical load was transferred from the old to new MCC. Field investigation of existing MCCs had to be performed to ensure new MCCs were provided with the proper starters and circuit breakers. Load studies were performed as well as short circuit studies to ensure proper bus and circuit breaker ratings.

City County Utilities Commission | C.N. Chitty Booster Pump Station Electrical and Pump Upgrades; Winston-Salem, NC
Lead Electrical Design Engineer. This design included the complete demolition and removal of their existing medium and low voltage power distribution system and it was replaced with a new system that included a new medium voltage substation style transformer, medium voltage utility isolation switch and new service entrance medium voltage switchgear with standby generation. In addition the design included the development of specifications for medium voltage reduced voltage solid state starters for 600 HP rated motors and low voltage systems for heating ventilating and air conditioning systems, and lighting. In addition to design performed coordination and arc flash studies for the power distribution system designed and provided labels for all applicable equipment in accordance with NFPA 70E.

City of Springfield | Springfield Wastewater Treatment Plant, Wet Weather & Capacity Improvement; Springfield, OH
Lead Electrical Design Engineer. Designed major medium and low voltage power distribution system upgrades including new service entrance rated 15 kV switchgear, standby engine generator system, and motor control centers for several process buildings. The standby engine generator system included the ability to parallel with the electric utility for soft load and unload capability. Design also included SCADA upgrades, and fire protection systems for chemical feed and storage building. Large low voltage adjustable frequency drives were specified and motor control schematics were developed for all process motors. Electrical site plans were developed showing all underground circuits, and power and lighting plans were developed for all new process building.

Matthew J Deeken

BIM/CAD

Mr. Deeken is a BIM Manager for Black & Veatch's Water Division. The BIM Manager assist with the overall management of the BIM Initiative, promotes and implements current processes within the Division and provides guidance for future direction.

The BIM Manager has the responsibility to accurately and fully inform management of each project's overall BIM efforts, including potential liabilities and/or concerns.

Some of Mr. Deeken's key responsibilities include:

- Lead BIM/IPD efforts on large projects or group of smaller projects - Includes establishing objectives, providing technical direction and support.
- Develop job-specific BIM implementation plans and strategies, including staffing and hardware cost forecasts for projects.
- Oversees the day-to-day activities of project BIM Coordinators to ensure BIM standards are maintained throughout the duration of a project.
- Responsible for the personal administration, staffing, and development of BIM coordinators and other project staff who need to be proficient with BIM.

Education
- Computer Aided Drafting & Technology, Northeast Kansas Area Technical College

Professional Associations
- Autodesk User Group International (AUGI)

Year Career Started
1999

Year Started with B&V
1999

Office Location
Kansas City, MO

PROJECT EXPERIENCE

BHP Billiton | Escondida Water Supply Project; Antofagasta, Chile
BIM Coordinator. Responsible for development of detailed 3D BIM models to be used for project coordination and generation of construction documents. Performed quality control checks and performed MTO extraction from BIM models. Utilized BIM models in the development of a 4D construction sequence for use in constructability reviews.

Irvine Ranch Water District | Michelson Water Recycling Plant; Irvine, CA
BIM Coordinator. Responsible for coordinating the development of BIM models to support the design of a new biosolids and energy recovering facility.

North Texas Municipal Water District | Wylie WTP Ozone Addition; Wylie, TX
BIM Coordinator. Responsible for development of detailed 3D BIM models to be used for project coordination and generation of construction documents. Performed quality control checks and performed BOM extraction from 3D models.

Minera Escondida | Desaladora Desalination Plant; Antofagasta, Chile
BIM Coordinator. Developed detailed 3D BIM models during preliminary design phase for quantity reporting and estimating. Responsible for overall development and quality control of 3D BIM models by the international project team.

City Water Light & Power | Dallman Unit 4; Springfield, IL
Engineering Technician. Developed conceptual and detailed design of 69kV and 138kV transmission line re-routes. Scope also included design of 3 underground to overhead riser structures. Responsibilities included steel structure design and transmission line hardware selection.

International Transmission Company | Wixom-Quaker 230kV Transmission Line; Wixom, MI
Engineering Technician. Primary Designer for 120kV to 230kV upgrade project, including conversion of 120kV towers to 230kV. Created new PLS-CADD models from existing plan & profile drawings. Also, developed new steel pole design for substation entrance structure.

International Transmission Company | Wixom Substation; Wixom, MI
Engineering Technician. Developed conceptual and detailed design of new transmission structures at Wixom Station. Modeled designs in PLS Pole. Detailed investigation of insulator swing was necessary due to the unique situation. Also, responsible for selection of necessary transmission hardware.

International Transmission Company | Milan Substation Cut-In; Milan, MI
Engineering Technician. Modeled design for new double circuit 120kV transmission line in PLS-CADD. Developed loading tables for steel pole design. Provided drilled pier foundation design, hardware selection, and other technical work.

American Transmission Company | West Marinette to Amberg T-Line; Marinette, WI
Engineering Technician. Modeled design for new double circuit 138/69kV transmission line in PLS-CADD. Involved in developing loading for steel pole design, FAA notification documents, and other technical work.

Gregory J Fitch

Scheduling

Greg Fitch is within Black & Veatch's Water Division. Greg Fitch has more than 20 years of progressively responsible experience in program management and cost & schedule engineering on some of the largest, most complex and innovative transportation and water projects as well as on U.S. foreign operations.

Experience includes: Managing Logistics and Program Controls Groups; Developing and Implementing Earned Value Management Systems; Developing Work Breakdown Structures; Cost Estimating; Developing Baseline and Maintaining Program Schedules; Coordinating Between Multiple Prime Contracts; Reviewing and Reporting on Contractors' Resource Loaded Baseline and Monthly Schedule Updates; Negotiating Change Orders; On Site Management of Personnel, Equipment and Materials; Drafting Contract Schedule Requirements; Constructability and Value Engineering Studies; Developing and Interpreting Cash Flow Curves; Mitigating Cost Overruns and Delays, Dispute Resolution; and Complex Delay Analysis.

In addition, Greg Fitch is competent with most construction and program management software programs including Oracle Primavera P6 scheduling software and Contract Manager. Greg Fitch is also competent with all Microsoft Office suite software programs.

Education
- PhD, Civil Engineering, Columbia University, 2018 (pending)
- MS, Civil Engineering, Northeastern University, 2003, China
- BS, Civil Engineering, Worcester Poly Institute, 1998

Professional Associations
- Construction Management Association of America
- American Society of Civil Engineers

Year Career Started
1997

Year Started with B&V
2013

Office Location
New York, NY

PROJECT EXPERIENCE

New York department of Environmental Protection (NYCDEP); North River WWTP Cogeneration and Electrification; New York, NY

Designer's Construction Scheduler. Responsible for designer's construction schedule for the Black & Veatch cogeneration & electrification design at the upgrade to the 340 mgd pumping station and new process air blower facility during detailed design. The program included multiple advanced contracts to streamline the work with a total $225 M construction value. This scope included replacement of the existing dual fuel engines with electric motors, installation of new cogeneration engine generators and associated improvements to the electrical system. New engine generators will be utilized to supply 10 MW of power to the plant burning digester gas and natural gas. Heat will be recovered from these units for use onsite. Main Sewage Pump (MSP) improvements include new 1,850 HP wound-rotor induction motors, right angle gear speed reducers and structural modifications for five existing MSPs and one new MSP. MSP power train designed for flood resiliency by utilizing three new 2,000 psig hydraulic power units for pump suction & discharge valve actuation and elevating the power train above the base flood design elevation. New process air blower facility encompassed nine 350-HP high-speed gearless turbo-blowers to meet the facility air requirements for treatment.

New York Department of Environmental Protection | Third City Water Tunnel Construction and Activation; New York, NY

Project Controls Lead Analyst. Responsible for all project control tasks related to the final phase of construction and the activation phase of the Third Water Tunnel, including mechanical operation within ten tunnel shafts. Responsibilities include the following: Review and report on monthly schedule updates; Foresee and mitigate delays and cost overruns;

Generate and interpret cash flow curves; Report on completed, in-progress and future work activities; Coordinate multiple contracts; Maintain an integrated master program schedule.

Liverpool Wastewater Treatment Plant Project; Medina, OH
Lead scheduler and Project Controls Engineer. On-site scheduler of the Design-Build Project at the Liverpool Wastewater Treatment Plant Project in Medina, Ohio.

Millennium Challenge Corporation | MCA-Jordan Water and Wastewater Network Project; Zarqa, Jordan
Program Controls Manager - Hazen and Sawyer. Program Controls Manager on the U.S. funded Millennium Challenge Account with Jordan for the water and wastewater network program (USD 276M). Duties included: Managing Program Controls; Develop and Implement Earned Value Management Systems; Review and report on resource loaded baseline and monthly schedule updates; Foresee and mitigate delays and cost overruns; Generate and interpret cash flow curves; Report on completed, in-progress and future work activities; Coordinate multiple contracts; Maintain an integrated master program schedule; Review and revise contract specifications related to project cost and scheduling requirements.

NYCDEP | Newtown Creek Wastewater Treatment Facility Upgrade and Expansion; New York, NY
Program Controls Engineer - Hazen and Sawyer. Cost and schedule engineer for the New York Department of Environmental Protection at the Newtown Creek Sewage Treatment Plant in Brooklyn (~USD 6B) and at the Cross River Reservoir and Croton Falls Reservoir Pump Stations (~USD 80M) in Westchester County, NY. Duties include: Manager of Cost and Schedule; Review and report on cost loaded baseline and monthly schedule updates; Foresee and mitigate delays and cost overruns; Generate and interpret cash flow curves; Report on completed, in-progress and future work activities; Coordinate multiple contracts; Maintain an integrated master program schedule; Review and revise contract specifications related to project cost and scheduling requirements; Completed several complex delay analyses and participated in dispute resolution.

Debbie A Flaig, EIT

Project Controls

Ms. Flaig has 15 years of experience in Civil Engineering Technology including technical design of water treatment, wastewater collection and wastewater treatment facilities; hydraulic modeling and calibration; project controls, including schedule and budget preparation as well as earned value management and reporting; GIS analysis and manipulation; preparation of contract documents and bid document administration and distribution; review of contractor submittals; and computer-aided design and drafting. As an Engineering Technician, her primary responsibilities included technical design, preparation of contract documents, project drafting coordination, administration of project AutoCAD standards, quality assurance and computer-aided design and drafting. Ms. Flaig has also been involved in water distribution modeling and calibration, GIS analysis, technical report preparation and master planning. In 2010 Ms. Flaig broadened her expertise to Project Controls, including schedule and budget preparation, resource loading and earned value project management. Software experience includes H2OMAP, ArcGIS, Actrix, AutoCAD, MS Project, and Primavera.

Education

- Bachelors, Engineering Technology, Mechanical, University of Cincinnati, 2014
- Associates, Engineering Technology, Civil Engineering Architecture, Cincinnati State Technical and Community College, 2003

Professional Associations

- AACE International
- Water Environment Federation

Year Career Started
2001

Year Started with B&V
2001

Office Location
Cincinnati, OH

PROJECT EXPERIENCE

City of Toledo | Collins Park Ozone Upgrades; Toledo, OH

Project Controls Lead. Scheduling, cost controls, subcontract management, budgeting, and invoicing for this $5,900,000 professional services contract.

City of Akron | White Pond & Sourek Pump Station; Akron, OH

Project Controls. Assisted project management in schedule and budget preparation, analysis and updating as well as earned value management for this $389,000 professional services project.

Tennessee Valley Authority | Boone Dam Office Engineering Support; Sullivan County, TN

Project Controls Lead. Lead diverse team of project controls professionals across multiple locations in scheduling and cost controls. Assisted project management in schedule and budget preparation, analysis and management as well as earned value management for this $40 Million professional services contract. Portfolio-type management of many concurrent purchase orders under this contract with weekly cost earnings and project health reporting as well as monthly accruals reporting and cash flow forecasting. Assisted in preparation of the Project PEP, drafting of client purchase orders and subcontracts.

City of Columbus | Southerly Biosolids Land Application Facility; Columbus, OH

Project Controls. Assisted project management in schedule and budget preparation, analysis and updating as well as earned value management for this $6.6 Million professional services project.

Northeast Ohio Regional Sewer District | Southerly Maximum Achievable Control Technology Compliance; Cleveland, OH

Project Controls. Assisted project management in schedule and budget preparation, analysis and updating as well as earned value management for this $3.5 Million professional services project. Prepared baseline and monthly updates for cost loaded Primavera CPM schedule throughout preliminary and detailed design. Also performed subcontract administration for the duration of the contract.

City of Columbus | Multiple Hearth Incineration; Columbus, OH
Project Controls. Assisted project management in schedule and budget preparation, analysis and updating as well as earned value management for this $793,000 project.

Detroit Water and Sewer Department | Wastewater Treatment Plant PC-791 SSI Air Quality Control Improvements; Detroit, MI
Project Controls. Assisted project management in schedule and budget preparation, analysis and updating as well as earned value management for this $3,400,000 project.

City of Springfield | Wastewater Treatment Plant Wet Weather Upgrades - Constant Pressure Systems and Resident Engineering Services; Springfield, OH
Project Controls. Assisted project management in schedule and budget preparation, analysis and updating as well as earned value management for this $4,300,000 project.

Metropolitan Sewer District of Greater Cincinnati | Werk & Westbourne Enhanced High Rate Treatment (EHRT) Facility; Cincinnati, OH
Project Controls. Assisted project management in technical report preparation, invoice review, document control, quality control and quality assurance, as well as schedule analysis and earned value management and reporting for this $6.2 Million professional services project. Also prepared project schedule updates using Primavera P6 and completed two project re-baselines.

City of Columbus | Osis Augmentation and Relief Sewer (OARS) Phase 1 and 2 Construction Management; Columbus, OH
Project Controls. Assisted project management in schedule and budget preparation, analysis and updating as well as earned value management for the $38 Million professional construction management services of this $370 Million TBM Tunnel. Also assisted in the development staffing forecasts, cost projections and preparation of associated documentation to support yearly contract modifications. Performed subcontract administration for seven sub consultants throughout the contract duration.

Metropolitan Sewer District of Greater Cincinnati | Original Lower Mill Creek Partial Remedy - Phase I Tunnel; Cincinnati, OH
Project Controls. Assisted project management in technical report preparation, data collection and review, invoice review, document control, quality control and quality assurance, as well as schedule analysis and earned value management and reporting for this $19 Million professional services project. Attended various client meetings and workshops, preparing and developing both materials to be presented and minutes for distribution. Additional support includes GIS analysis and figure preparation for technical reports.

Lexmark International | Electrical Building Improvements and Constant Pressure System; Lexington, KY
Project Controls. Assisted project management in schedule and budget preparation, analysis and updating as well as earned value management for this $60,000 project.

Lexmark International | Sewer Abandonment Design and Constant Pressure System; Lexington, KY
Project Controls. Assisted project management in schedule and budget preparation, analysis and updating as well as earned value management for this $37,000 project.

City of Dayton | New Biosolids Storage Building; Dayton, OH
Project Controls. Assisted project management in schedule and budget preparation, analysis and updating as well as earned value management for this $97,000 project.

Metropolitan Sewer District of Greater Cincinnati | Mill Creek Wastewater Treatment Plant Standby Sludge Holding Tanks BCE; Cincinnati, OH
Project Controls. Assisted project management in schedule and budget preparation, analysis and updating as well as earned value management for this $38,000 project.

Joseph T Forbes, PE

Technical Advisor

Mr. Forbes has been involved in designs and reports on new and existing water and wastewater treatment facility and pumping station projects. He is responsible for the design and preparation of construction documents for treatment plant power distribution systems, motor controls, and process controls.

His electrical design experience includes drawing and specification design of switchgear, transformers, motor starters, adjustable frequency drives, and motors for low and medium voltage power systems. He has completed power system evaluation studies for reliability, redundancy, and energy efficiency, and has completed designs for onsite generation systems, automatic transfer systems, synchronizing switchgear, and exercising load banks for plant power systems to provide standby power and interruptible service (load shedding rate structure) operation. His design experience also includes fire alarm, security, lightning protection, and intercommunication systems design.

Mr. Forbes has been actively involved in development of Black & Veatch standard design procedures for lightning protection, power system grounding, energy efficiency, fire and NFPA 820 wastewater hazard alarm systems, and quality control.

Mr. Forbes was a speaker at the 2009 American Water Works Association ACE09 Conference in San Diego, California. His presentation at the conference, Energy Management Strategies for Water Utilities, focused on methods to optimize energy consumption and energy costs at water treatment and distribution facilities. He has led teams on unique project assignments, including a system reliability assessment and a forensic investigation.

Mr. Forbes currently serves as the Section Lead of Electrical and Instrumentation Services in the Systems Engineering Department for Black & Veatch Water Americas.

Education

- Bachelors, Electrical Engineering, University of Missouri - Kansas City, 1991

Professional Registration

PE - 31633, LA, 2005
PE - 6201051882, MI, 2004
PE - 27168, MD, 2002
PE - PE057191E, PA, 2000
PE - 21590, KY, 2000
PE - 34048-006, WI, 2000
PE - 14568, IA, 1998
PE - 62941, OH, 1998
PE - E-27568, MO, 1996

Year Career Started

1991

Year Started with B&V

1991

Office Location

Kansas City, MO

PROJECT EXPERIENCE

Medina County Sanitary Engineers | Liverpool Plant Improvement and Efficiency Project; Valley City, OH

Electrical Quality Control Lead. Performed quality control review and Senior Electrical Engineer consultation for the Black & Veatch Electrical team.

Toronto Water | Ashbridges Bay Treatment Plant Integrated Pumping Station; Toronto, ON, Canada

Electrical Quality Control Lead. Performed quality control review for the planning and design of the new Integrated Pumping Station.

SFPUC | Biosolids and Energy Recovery Facilities; San Francisco, CA

Electrical Quality Control Lead - Energy Recovery Facilities. Performed quality control reviews of the Energy Recovery Facilities designed by the Black & Veatch Electrical team.

City of Sunnyvale | Clean Water Program; Sunnyvale, CA

Technical Reviewer. Responsible for electrical design reviews of the design of the new headworks and primary Treatment facilities at the Sunnyvale Water Pollution Control Plant. Tasks include review of design submittals and responses from the designer on previous submittal comments.

Metropolitan Sewer District of Greater Cincinnati | Werk & Westbourne Enhanced High Rate Treatment Facility; Cincinnati, OH
Electrical Quality Control Engineer. Responsible for electrical quality assurance review for a new 35 mgd enhanced high rate treatment facility to treat combined sewer overflows from CSO 522 in Green Township, Ohio. The system design will employ fine screening; rapid mix; flocculation; chemically-assisted sedimentation basins; pH control; chlorine contact; and dechlorination.

Sacramento Regional County Sanitation District | Echowater Project - Advanced Wastewater Treatment Plant Biological Nitrogen Removal Project; Sacramento, CA
Electrical Lead Quality Control Engineer. Responsible for electrical design quality control for the design of a secondary treatment process upgrade for a 181 mgd wastewater treatment plant to meet new NPDES discharge limitations. Estimated at approximately $600M, the construction includes a new biological nitrogen removal (BNR) complex and associated blower facility and chemical storage/feed facility.

New York Department of Environmental Protection | North River Water Pollution Control Plant; New York, NY
Site Investigation Team Leader. After a fire occurred in the engine room an assessment to North River Water Pollution Control Plant was performed. Assessment of the root cause for the fire was performed and recommendations were provided to prevent another similar occurrence to other equipment. Assessment also included reviewing of existing facilities to mitigate other potential future risks of potentially unsafe or catastrophic failure scenarios of the engines.

Greater Cincinnati Water Works | Eden Park Pump Station Engine Generator; Cincinnati, OH
Lead Electrical Systems Engineer. Served as electrical engineering manager for the design of a new 2500kw diesel engine generator at the Eden Park Pump Station with associated generator switchgear and tie-in to the existing 4160 volt power system at the pump station. The project is currently at the 100 percent design stage and is nearing construction.

Greater Cincinnati Water Works | Eden Park Pump Station Engine Generator; Cincinnati, OH
Lead Electrical Systems Engineer. Served as electrical engineering manager for the design of a new 2500kw diesel engine generator at the Eden Park Pump Station with associated generator switchgear and tie-in to the existing 4160 volt power system at the pump station. The project is currently at the 100 percent design stage and is nearing construction.

Greater Cincinnati Water Works | Cherry Grove and Kennedy Avenue Pump Stations, Engine Generators; Cincinnati, OH
Lead Electrical Systems Engineer. Served as electrical engineering manager for the design of 480 volt generators and automatic transfer systems for the Cherry Grove and Kennedy Avenue Pump Stations. Each site included an engine generator, service entrance transfer switch, and interlocks to the existing pump controls to limit pump operation on the generator. Project construction was complete in 2008.

Greater Cincinnati Water Works | Cherry Grove and Kennedy Avenue Pump Stations, Engine Generators; Cincinnati, OH
Lead Electrical Systems Engineer. Served as electrical engineering manager for the design of 480 volt generators and automatic transfer systems for the Cherry Grove and Kennedy Avenue Pump Stations. Each site included an engine generator, service entrance transfer switch, and interlocks to the existing pump controls to limit pump operation on the generator. Project construction was complete in 2008.

City of Olathe | Harold Street Wastewater Treatment Plant; Olathe, KS
Lead Electrical Systems Engineer. Directed the conceptual study for conversion of existing plant to meet anticipated nutrient removal requirements, replacement of existing UV disinfection facilities, and improvements to solids processing and stabilization facilities. The UV portion of the study included pilot testing of Trojan and Wedeco UV equipment and is currently under construction.

Allen Gardner, PE

Transient Stability Studies

Allen Gardner is an electrical engineer in the Energy department control and electrical group located in Cary, North Carolina. Mr. Gardner's experience includes creating design drawings, equipment specifications and performing auxiliary power design calculations such as power flow, short circuit, and arc-flash hazard analysis. Technical focus areas include protective relaying and electrical system transient analysis. Mr. Gardner has 12 years of experience in power plant electrical design involving plant electrical system upgrades, as well as new installation.

PROJECT EXPERIENCE

Army Corp of Engineers | LRDR Power Study; AK
Electrical Engineer. Oversee the development of load flow, short circuit and arc flash calculations for the power plant electrical system. Perform the transient analysis in ETAP for islanded diesel generation plant configuration.

Jordan Cove Energy | South Dunes Power Plant; OR
Electrical Engineer. Perform dynamic analysis for islanded electrical system at LNG export facility. Modeled various electrical system disturbances to determine generation impact and system stability. Research and communicate results and recommendations on the impact of subsynchronous torsional interaction at the facility due to large VFD drive for refrigerant compressors.

Griffith Energy | Griffith Energy Out of Step Relaying, AZ
Electrical Engineer. Review and update of generator relay settings based on system stability simulations. Duties included updating the out of step function relay settings for Schweitzer SEL300G to detect transient stability simulated fault conditions

Northeast Ohio Regional Sewer District | Heat Recovery Project, OH
Electrical Engineer. Performed generator protective relay settings calculation for newly installed 4.375 MVA steam turbine generator at an existing wastewater facility.

Florida Power & Light | FPL Undervoltage Studies; FL
Electrical Engineer. Electrical study to analyze the effects of voltage dips in the plant auxiliary electrical system during transmission level fault events. Duties included data collection, creation of ETAP and Power Tools for Windows dynamic model, and transient analysis of fault conditions. Study performed at four sites including Ft. Myers, Martin, Sanford and Turkey Point.

DC Water | Combined Heat and Power Project; Washington, DC
Electrical Engineer. Addition of three Solar gas turbines for on-site generation. Duties included protective relay settings for generators and on-site commissioning test support.

Orlando Utilities Commission | Stanton Energy Center; FL
Electrical Engineer. Various upgrades to plant systems including Auxiliary Power, Service Water, Sludge Conditioning and Brine Concentrator. Main duties were creation of one-lines, schematics and wiring diagrams, as well as equipment specifications for four new main and

Education
- Masters, Electrical Engineering, Power Systems, Georgia Institute of Technology, 2012
- Certificate, Electrical Engineering, Renewable Electric Energy Systems, North Carolina State University, 2010
- Bachelors, Electrical Engineering, North Carolina State University, 2005

Professional Registration
PE - Electrical, 53227, MA, 2017
PE - Electrical, 35032, NC, 2008

Year Career Started
2003

Year Started with B&V
2005

Office Location
Cary, NC

reserve auxiliary transformers and the isolated phase bus duct associated with the main auxiliary transformer. Other duties included construction specification development and vendor submittal reviews.

TVA | NERC PRC Compliance Assessment - Chickamauga Hydro Plant; Chattanooga, TN
Electrical Engineer. Performed the analysis and prepared the report for the review of the generator and transformer protective relaying against PRC-019, PRC-024 and PRC-025.

TVA | NERC PRC Compliance Assessment - Great Falls Hydro Plant; Rock Island, TN
Electrical Engineer. Performed the analysis and prepared the report for the review of the generator and transformer protective relaying against PRC-019, PRC-024 and PRC-025.

TVA | NERC PRC Compliance Assessment - Wilson Hydro Plant; Muscle Shoals, AL
Electrical Engineer. Performed the analysis and prepared the report for the review of the generator and transformer protective relaying against PRC-026 and PRC-027.

TVA | Bull Run Precipitator Controls Upgrade; Clinton, TN
Electrical Engineer. Demolition and replacement of existing electrostatic precipitator system controllers to upgraded GE/Alstom controllers. Responsibilities included design of wiring for interface between new and existing plant equipment, use of TVA records tools (ICRDS, BSL), and development of DCN package documentation.

Kissimmee Utility Authority | Cane Island Station; FL
Electrical Engineer. Update generator protective relay settings with newly provided data for a combustion turbine unit utilizing Schweitzer SEL-300G and Beckwith M3425A relays.

Wolf Creek Nuclear Operating Corporation | Wolf Creek Relay Coordination Study; KS
Electrical Engineer. Performed review of various relay settings for plant auxiliary transformers and reactor coolant pumps to determine if settings were acceptable according to INPO guides, latest industry practices and site operating conditions.

Celanese | Narrows Boiler MACT; VA
Electrical Engineer. Addition of five boilers at an existing chemical plant. Duties included performing the medium voltage relay setting calculation and checking the preliminary arc-flash calculation.

Florida Municipal Power Agency | Multi-unit PRC-006-1 Relay Modifications; FL
Electrical Engineer. Reviewed existing frequency and volts/hertz relay settings for various generating units and step up transformers to determine if they met the requirements stated in NERC standard PRC-006-1. Relay settings that were not acceptable were identified and modified relay settings were provided.

Architect of the Capitol | Capitol Power Plant Cogen; Washington, DC
Electrical Engineer. Conceptual and preliminary design for the installation of two Solar gas turbines and Rentech HRSGs to be integrated into the existing Capitol refrigeration facility. Duties included electrical calculations, equipment specifications, drawing development and protective relay settings.

NESCO | Klamath Falls Bioenergy; OR
Electrical Engineer. Design of new 35MW wood waste burning bioenergy facility. Duties include all electrical design calculations, equipment specifications and drawing development.

Black Hills Generation | Airport Power Plant; CO
Electrical Engineer. Design of new simple cycle LMS100 units. Main duties included duct bank cable sizing, short circuit and preliminary arc-flash calculation.

Mark Kleveter, PE

QA/QC - Electrical Systems

Mr. Kleveter has been involved in a variety of electrical power system designs of water and wastewater treatment facility projects. His responsibilities include lead electrical design and the supervision of various electrical design teams. His experience includes power and instrumentation design, in-depth power system studies, on-site generation study and design, field investigations, and construction phase field services. He also supervises the development and implementation of electrical design standards and quality control guidelines.

His electrical design experience includes drawing and specification development of power distribution systems, control schematics, wiring diagrams, intercom systems, fire alarm systems, electronic security systems, lightning protection systems, and instrumentation systems. He has experience in the design and implementation of medium and low voltage switchgear, engine-generator synchronizing switchgear, primary and secondary unit substations, medium voltage motor control equipment, medium voltage variable frequency drives, low voltage variable frequency drives, and solid-state motor control equipment. Additionally, Mr. Kleveter has also designed electrical systems for new and existing electrical generation facilities where his responsibilities included generator protection, contract administration and factory test inspections.

Mr. Kleveter has established himself as Black & Veatch's expert in renewable energy for water and wastewater treatment facilities. He has coauthored "Renewable Energy Options for Water and Wastewater Systems", APWA Reporter, February, 2009. His experience also includes green engineering, sustainability assessments, and energy management. His responsibilities have included energy master planning, energy audits and optimization, and equipment and power supply reliability projects.

Education
- BS, Electrical Engineering, California State University Fullerton, 1992

Professional Registration
PE - 41567, AZ, 2004
PE - E17748, CA, 2005
PE - 42984, CO, 2009
PE - 15148, KS, 1998
PE - 5747644-2202, UT, 2005
PE - 17776, WV, 2008

Year Career Started
1993

Year Started with B&V
1993

Office Location
Kansas City, MO

PROJECT EXPERIENCE

NYCDEP | Oakwood Beach WWTP Electrical Distribution Improvements Project; Staten Island, NY

Project Manager. Responsible for managing the design team during the facility planning and design portions of this contract. Project involved the facility planning for the evaluation of 4.16 kV switchgear, 4.16 kV – 480 V transformers, and 480 V motor control centers. Detailed design will be determined based on the outcome of the evaluation of the equipment.

NYCDEP | Oakwood Beach WWTP Electrical Upgrades Project; Staten Island, NY

Project Manager. Responsible for managing the design team during the facility planning and design portions of this contract. Project involved the design of new service entrance transformers to replace the existing transformers which are at the end of their useful life and associated 33 kV primary and 5 kV secondary switchgear to upgrade the entire high tension service to meet the requirements of the latest version of Con Edison's EO?2022 High Tension Service Specification.

NYCDEP | North River Water Pollution Control Plant Cogeneration Project; New York, NY

Electrical Design Manager. Project involved evaluation of improvements to an existing 340 mgd secondary wastewater treatment plant, including replacement of existing diesel engine driven main sewage intake pumps and diesel engine driven aeration blowers with electric

motors. Additionally, the project included addition of 15MW of engine-generator units which burn natural and/or digester gas cogenerating in tandem with the electric utility. Initial project scope included evaluation of technical feasibility and operational efficiency of the pump and blower motor options as well as the electrical distribution improvement options to incorporate new motor and co-generator equipment. Detailed design includes supervising, producing and maintaining all project one-lines, schematics, power plans and specifications along with staffing, budgets and schedules. Personal project responsibilities included:

- Budget and staffing planning for production of electrical design documents
- Developing technical memoranda including performance, risk analysis, feasibility, logistics and life cycle costs
- Coordination with electrical utility (Consolidated Edison) on project standards, required design elements and protection schemes
- Developing electrical design criterion and report documentation
- Supervising production of project one-lines, three-lines, schematics, power plans and specifications
- Supervising project calculations including short-circuit studies, motor starting studies, and battery sizing

NYCDEP | North River Waste Water Treatment Plant Hurricane Sandy Flood Response; New York, NY
Senior Electrical Engineer. Evaluated electrical equipment due to plant flooding and determine if repairs or replacement was required. Performed inspections of motor control centers, transformers, panelboards, motors, controls, lighting systems, cable, and conduit. Provided instruction on cleaning, testing, replacement of electrical systems and overseer of work done. Designed new equipment for the replacement of damaged equipment.

NYCDEP | North River Water Pollution Control Plant Fire Assessment and Emergency Response and Restoration; New York, NY
Senior Electrical Engineer. After a fire occurred in the engine room an assessment to North River Water Pollution Control Plant was performed. Assessment of the root cause for the fire was performed and recommendations were provided to prevent another similar occurrence to other equipment. Assessment also included reviewing of existing facilities to mitigate other potential future risks of potentially unsafe or catastrophic failure scenarios of the engines. In addition to assessment of root cause of the fire a plan was developed to bring the plant back to pre-fire conditions on an accelerated schedule. Responsibilities included supervising, producing and maintaining all project one-lines, schematics, power plans and specifications as well working with the Construction Manager and NYCDEP on-site to meet critical project dates to improve plant operations to critical systems. Restoration to the plant included working with NYCDEP and contractors to bring the Main Sewage Pump back on-line that was damaged by the fire so that standby pumping capacity would be made available again.

Domenick Loschiavo, PE

Project Manager

Mr. Loschiavo is a Project Manager with experience in civil/mechanical engineering design on a variety of water and wastewater plant upgrade and infrastructure projects. His recent experience is managing and leading the detailed design for a cogeneration & electrification project as part of a large treatment facility upgrade. He was also a lead team member restoring a fire damaged 1700 HP internal combustion engine. His design experience includes a range of domestic & international projects including plant expansion, pump station upgrades, reservoir rehabilitation and large diameter pipeline design & rehabilitation. He has also executed construction work as part of Design-Build project teams and supported projects as a Resident Engineer.

Education

- MS, Civil Engineering, Environmental, Northeastern University, 2009
- BS, Civil Engineering, Northeastern University, 2002

Professional Registration

PE - 47378, MA, 2007
PE - 24GE05243000, NJ, 2015
PE – 89933, NY, 2011

Professional Associations

- New York Water Environment Association
- New England Water Works Association - Young Professionals Committee
- New England Water Works Association - Distribution & Storage Committee
- American Society of Civil Engineers - M.ASCE

Year Career Started

2001

Year Started with B&V

2001

Office Location

New York, NY

PROJECT EXPERIENCE

PVSC | Standby Power Generation Facility; Newark, NJ

Project Manager. Responsible for managing the Black & Veatch multi-discipline design team during the Basis of Design Report Validation and Detailed Design for this $110M FEMA Resiliency project. This scope included the procurement of new Power Generation Equipment utilizing utility supplied low pressure natural gas, design of a new facility dedicated to the generating equipment and electrical interconnection with PSE&G (local utility) and the facility's existing electrical infrastructure to permit parallel and island mode operation. Design encompassed a No-Single Point of Failure mentality incorporating equipment and operational redundancy. New Power Generation System will be utilized to supply 34 MW of power to the WWTP as a standby blackstart configuration. The Standby Power Generation facility consisted of three 17 MW Combustion Gas Turbines, two 2500 kW Natural Gas Fired Reciprocating Engines and three 1500 HP multistage Fuel Gas Compressors outfitted with electric motors and VFDs.

NYCDEP | North River WWTP Cogeneration and Electrification; New York, NY

Deputy Project Manager/Engineering Manager. Responsible for managing the Black & Veatch cogeneration & electrification design team as well as leading the upgrade to the 340 mgd pumping station and new process air blower facility during detailed design. The program included multiple advanced contracts to streamline the work with a total $225 M construction value. This scope included replacement of the existing dual fuel engines with electric motors, installation of new cogeneration engine generators and associated improvements to the electrical system. New engine generators will be utilized to supply 10 MW of power to the plant burning digester gas and natural gas. Heat will be recovered from these units for use onsite. Main Sewage Pump (MSP) improvements include new 1,850 HP wound-rotor induction motors, right angle gear speed reducers and structural modifications for five existing MSPs and one new MSP. MSP power train designed for flood resiliency by utilizing three new 2,000 psig hydraulic power units for pump suction & discharge valve actuation and elevating the power train above the base flood design elevation. New process air blower facility encompassed nine 350-HP high-speed gearless turbo-blowers to meet the facility air requirements for treatment.

NYCDEP | North River WWTP Emergency Response and Reconstruction; New York, NY

Engineering Manager. Responsible for coordinating multiple work orders and engineering design of reconstruction contracts to return the North River WWTP to pre-incident condition where a fire to one of the 10 direct drive internal combustion engines caught fire and

damaged critical process components. The work was broken into Work Orders valued at $14M and nine Construction Contracts valued at $18M. Work Orders directed Contractors for immediate repair with an emphasis on personnel safety. Contract work was divided into nine discipline specific contracts to stabilize the critical plant systems with replacement of equipment to return the plant to a fully functional facility. The design was completed under a fast track aggressive schedule with all work to be completed within 18 months of Black & Veatch mobilizing to the site. The design was enhanced with the aid of a Three Dimensional model to avoid interferences and assist in the post fire condition assessment. The 3-D model of the facility was developed around 3-D laser scanning technology which documented the existing conditions of the facility and created accurate as-built information conditions. Black & Veatch incorporated the as-built data, developed and enhanced the model of the facility during the design of each contract or work order task.

Melbourne Water Corp (MWC) | Alliance EPC Wastewater Project, Eastern Treatment Plant Tertiary Upgrade; Melbourne, Victoria, Australia

Project Engineer. Developed civil infrastructure components for three 30% designs as part of the Owner-Engineer-Constructor Alliance on this 756-million liter/day (200MGD) tertiary treatment upgrade to improve ocean outfall quality and prepare for future water reuse. Responsible for the design of two major pumping stations, at full plant capacity, that meets required flow conditions for the treatment processes Responsibilities also included the civil-structure designs of the ultraviolet light & ultra-filtration membrane systems and ozone cooling system pump station.

Massachusetts Water Resources Authority (MWRA) | Wastewater Treatment System; Hudson, MA

Engineer. Performed jar tests to simulate WWTP at several locations, with varying dosages of microchip manufacturer's Chemical-Mechanical Polishing Slurry. Set-up a 24 hour filter column study to analyze effectiveness against Chemical-Mechanical Polishing Slurry.

City of West Haven | West Haven Water Pollution Control Facility Upgrade and Expansion; West Haven, CT

Project Engineer. Performed on site special inspection of the deep foundation raw sewage pump station building expansion. Deep foundation consisted of eleven 5 -1/2 inch diameter micro-piles with load capacities of 70,000 lbs (axial), 2,000 lbs (uplift), and 4,000 lbs (lateral). Inspection also included witness testing of one test pile for verification of pile capacity in accordance with contract documents.

Dave W Nelson, PE

QA/QC - Building Mechanical

Mr. Nelson has experience in the design of various mechanical systems, including heating, ventilating, and air conditioning (HVAC), plumbing, odor control, dehumidification, emergency gas treatment systems (chlorine scrubbers), and fire sprinkler systems.

Mr. Nelson has designed or supervised the design and construction of systems for HVAC, plumbing, odor control, emergency gas treatment systems, and fire sprinkler systems for many water and wastewater treatment, distribution, and collection facilities. His diverse experience covers the application of these systems for laboratories, administration buildings, maintenance facilities, chemical areas, pumping stations, and process related areas. He has been involved in numerous studies, designs, and reports for new and existing water and wastewater treatment plants and associated facilities including energy conservation and feasibility studies.

PROJECT EXPERIENCE

New York Department of Environmental Protection (NYCDEP) | North River WWTP Cogeneration & Electrification, New York, NY

Mechanical Engineer. Collaborated and provided quality control for the mechanical plumbing, HVAC, and fire protection designs for a major renovation of the North River Wastewater Treatment Plant (WWTP) that provides 12 megawatts (MW) of generating capacity on site with heat recovery designed to provide for building heat and heat for the digester process. The existing Main Sewage Pumps (MSPs) that were currently engine driven were fitted with motors, and a sixth pump installed to provide N+1+1 units for this critical process. Digester gas produced on site is conditioned to remove undesirable constituents, and the exhaust of the engine generators provided with oxidation catalysts to ensure compliance with air quality regulations.

New York Department of Environmental Protection (NYCDEP) | Oakwood Beach WWTP Power Distribution Improvements, New York, NY

Mechanical Engineer. Collaborated and provided quality control review for the mechanical HVAC design associated with a new Electrical Service Building and Transformer Enclosure facility.

Orange County Utilities | Southern Regional Water Supply Facilities, Orange County, FL

Mechanical Engineer. Collaborated and provided quality control for the mechanical plumbing, HVAC, and fire protection for an Operations Building, Ozone Building, High Service Pumping Station, chemical storage and feed areas housing fluoride and sodium hypochlorite, and electrical/standby power room.

Winston-Salem/Forsyth County | Thomas Water Treatment Plant Improvements, Winston-Salem, NC

Mechanical Engineer. Collaborated and provided quality control for the mechanical plumbing, HVAC, and fire protection for demolition of an existing 24-mgd water treatment plant and construction of a new 18-mgd water treatment plant to treat water from the Yadkin River and/or Salem Lake. The new facilities includes an operations building which will house the administrative and personnel areas, maintenance shop, control room, and chemical feed and storage; basin and filter complex consisting of rapid mix, flocculation, sedimentation, four

Education
- BS, Mechanical Engineering, University of Nebraska-Lincoln, 1984

Professional Registration
PE - 34018, CO, 1999
PE - 027547, GA, 2002
PE - 062050385, IL, 1996
PE - 19600503, IN, 1996
PE - 11286, KS, 1987
PE - 19397, KY, 1996
PE - 0031330, LA, 2004
PE - 39311, MA, 1996
PE - 45329, MN, 2006
PE - 029940, MO, 1998
PR - PE-6632, ND, 2010
PE - E7098, NE, 1990
PE - 24GE04325900, NJ, 2001
PE - 60320, OH, 2011
PE - 17980, OK, 1996

Professional Associations
- ASHRAE
- ASPE

Year Career Started
1984

Year Started with B&V
1984

Office Location
Kansas City, MO

deep bed filters, and a filter pipe gallery; finished water pumping station; two 1.5-million gallon prestressed concrete finished water reservoirs; wash water supply tank; wash water equalization basin; wash water clarifier; expansion and modification of the two existing residuals storage lagoons; and modernization of the existing residuals pumping station.

City of Wilmington | Sweeney WTP Expansion, Wilmington, NC
Mechanical Engineer. Collaborated and provided quality control for the mechanical plumbing, HVAC, and fire protection for the expansion of the existing Sweeney Water Treatment Plant to 35 MGD including phased demolition of existing facilities, construction of new facilities, and modifications to existing facilities. Facilities consisted of demolition of abandoned water treatment plant and settling basin remnants; modifications to the existing pre and intermediate ozone complex including a new ozone generator; 25 MGD Basin and Filter Complex consisting of mixing, clarification using superpulsators; ten new biological filters; and filter pipe gallery; UV Facility and gallery; Operations/Chemical Feed Building, Administration/Maintenance Facility; Finished Water Pumping Station and piping to existing transmission lines; and support facilities including diesel generator, compressed air systems, and air scour blower facilities installed within existing structure.

City of Charleston | Sweeney WTP Expansion, Charleston, SC
Mechanical Engineer. Collaborated and provided quality control for the mechanical plumbing, HVAC, and dehumidification systems associated with the addition of four granular media filters and associated filter operating and pipe gallery as part of the Stoney filter complex. Each filter will have a capacity of approximately 6.0 mgd, for a total new filtration capacity of approximately 24 mgd.

City of Azusa | Canyon Filtration Plant Expansion, Azusa, CA
Mechanical Engineer. Provided quality control for a 12 mgd expandable to 16 mgd membrane treatment upgrade and expansion. The new facilities include a raw water intake, pretreatment facilities, chemical facilities, membrane feed pump station, membrane treatment facility, 4.0 MG finished water reservoir, finished water pump station, raw and finished water pipelines, and associated electrical, instrumentation, and controls. The work also included a new operations and maintenance building which will houses the plant personnel offices, control room, laboratory, and maintenance area.

Alameda County Flood Control and Water Conservation District | Altamont Water Treatment Plant, City of Livermore, CA
Mechanical Engineer. Collaborated and provided quality control for the mechanical plumbing and HVAC for a new 24 million gallon per day (mgd) water treatment plant. The facilities consisted of pretreatment (strainers, flash mix, and flocculation), filtration (submerged membrane system), biologically active carbon contactors, chemical feed facilities (ozone, coagulant, sodium hypochlorite, sodium hydroxide, aqua ammonia, citric/phosphoric acid, and water treatment polymers), operations and maintenance building, solids handling and dewatering facilities, and raw water pump station.

Louis E Nemeth, RA, CSI, LEED AP

QA/QC - Architectural

Mr. Nemeth is well versed in all phases of architectural services; including building design, construction document production, specification writing and constructability reviews. His experience includes work on water and wastewater treatment facilities as well as participating in value engineering studies.

Mr. Nemeth has served as an architect on projects located in Saudi Arabia, Kuwait and the United Arab Emirates. The international and cultural experience, along with a variety of project types, guarantees the client a successful project.

PROJECT EXPERIENCE

New York Department of Environmental Protection (NYCDEP) | North River Water Pollution Control Plant Cogeneration and Electrification Project; New York, NY
Project Architect. Responsibilities include: building code analysis, life safety/egress plans, building design, material selection, and supervising development of the construction documents.

City of Durham | Administration Building, Brown Water Treatment Plant; Durham, NC
Architect/LEED Specialist. Facilitated LEED charrette workshop with client staff and design team to determine LEED strategies to best fit the needs of the stakeholders. Continued collaboration through design documents to ensure LEED strategies incorporated into building design.

City of Idaho Falls | Booster Pump Station; Idaho Falls, ID
Project Architect. Currently designing a pump station featuring load bearing masonry walls and a flat roof system.

DC Water | Blue Plains AWTF Combined Heat and Power Project; Washington, DC
Project Architect. Provided building designs for a new combined heat and power project that produces up to 100,000 pph of steam for use in the Cambi process as well as up to 15 MW of electricity for use in the Blue Plains AWTF. Facilities included gas blowers, siloxane removal equipment, gas compressors, combustion turbines, heat recovery steam generators, and other ancillary facilities. The project was delivered thru a Design-Build-Operate contract arrangement.

City of Midwest City | Pollution Control Facility Improvements; Midwest City, OK
Project Architect. Designed the following buildings: Headworks, MBBR Blower Building, UV Disinfection, and Biosolids Pumping Complex. The building exterior features masonry veneer to match existing plant buildings. Also, "green materials" will be specified including the use of natural daylighting.

City of Westminster | Influent Pump Station; Westminster, CO
Project Architect. Designed a load bearing masonry pump station. The building exterior features split face masonry to match existing plant buildings along with a clay tile mansard roof system.

Education
- Master of Regional and Community Planning, Kansas State University, 1986
- Bachelor of Architecture, Kansas State University, 1983
- Associate of General Education (Architectural Technology), Northampton Community College, 1979

Professional Registration
RA - 400328, CO, 2004
RA - ARC102081, DC, 2012
RA - AR17368, FL, 2001
RA - A3898, KS, 1995
RA - 16264, MD, 2010
RA - ARC3898, ME, 2012
RA - 1301063881, MI, 2016
RA - A-2009021702, MO, 2009
RA - 3202, MT, 2009
RA - 11487, NC, 2009
RA - 6485, NV, 2009
RA - 36897, NY, 2014
RA - A5784, OK, 2009
RA - 914887, OH, 2009
RA - RA-016572-B, PA, 2001
RA - 8105, SC, 2009
RA - 104446, TN, 2011
RA - 0401-014547, VA, 2008
RA - C-2828, WY, 2013
RA - 66543, NCARB, 2009
LEED v2 Accredited Professional, RA, 2005

Professional Associations
- USGBC-Central Plains Chapter
- CSI-Construction Specifications Institute

Year Career Started
1989

Year Started with B&V
1989

Office Location
Kansas City, MO

City-County Utility Commission | R.A. Thomas Water Treatment Plant LEED Evaluation; Winston-Salem, NC
Architect/LEED Specialist. Collaborated on review of design documents for the new water treatment plant to determine how the 90% complete design compared to the LEED rating system for sustainable/green design and provided recommendations for reasonable additions to the project scope to increase the level of sustainability. Co-authored report documenting findings in terms of LEED point comparison.

Metro Wastewater Reclamation District | Primary Treatment Improvements; Denver, CO
Project Architect. Provided architectural design and detailing for gravity thickeners building, pump station, and an electrical building. The building exterior featured brick veneer to match existing plant buildings.

Southern Nevada Water Authority | Pilot Plant Building, Alfred Merritt Smith Water Treatment Facility; Las Vegas, NV
Project Architect. Provide architectural design and detailing for a 6,670 square foot building that will include office area, break room, training room, bench scale laboratory and pilot plant area. The building will feature a combination of a steel frame structure and load bearing masonry walls and flat roof system. Although LEED certification will not be pursued, "green design" elements will be incorporated.

Scot E Pruett, PE

Fire Protection

Scot Pruett is currently the Fire Protection Engineering Manager for Black & Veatch's Energy Division. He is responsible for assigning, supervising and coordinating the fire protection groups efforts in support of both domestic and international projects. The group includes fire protection professionals in U.S., China, Thailand, and India offices.

He is responsible for maintaining and evolving the company's fire protection standards, processes and procedures to ensure the group is effectively supporting the changing project workload. He specializes in the design and review of fire protection systems and specifications. He is responsible for the fire protection cost estimates, code analysis, communicating with code officials, coordination with facility designers and management, generating the fire protection specification and supporting calculations, bid evaluations, and detailed design and installation drawing reviews.

Previously, he worked for a Fire Suppression and Alarm Panel manufacturer. He designed the controls systems for the fire suppression systems, obtained UL and FM approvals, and was responsible for implementing/coordinating new designs into the manufacturing process. He also supervised the technical support of the distributors (domestic and international) with regards to the controls systems, assisted the production department with the implementation of new or revised products and developed/ presented technical training seminars on the design, installation, and maintenance of the fire alarm and suppression control systems.

PROJECT EXPERIENCE

PLN | Tanjung Jati B 5&6; Indonesia
Fire Protection Engineering Manager. Manage fire protection personnel on this project, oversee specifications, and design details for the coal unit addition to the existing power facility.

BPI | Central Java; Indonesia
Fire Protection Engineering Manager. Manage fire protection personnel on this project, oversee specifications, and design details for the coal unit addition to the existing power facility.

Tenaska Pennsylvania Partners | Westmoreland Generating Station; Smithton, PA
Fire Protection Engineering Manager. Oversaw fire protection specification, bid reviews and detailed design review for the 2 on 1 combined cycle power facility.

Duyen | Duyen HAI; Vietnam
Fire Protection Engineering Manager. Manage fire protection personnel on this project, oversee specifications, and design details for the coal unit addition to the existing power facility.

PLN | Lontar; Lontar Village, Banten, Indonesia
Fire Protection Manager. Assisted with the coordination and organization between the Fire Protection Contractor and Internal engineers.

Therma South Inc. | Therma South; Philippines; 2011-2015
Fire Protection. Oversee fire protection specification, bid reviews and detailed design review for the 2 unit coal power facility.

Education
- Masters, Business, Baker University, 2005
- Bachelors, Electrical Engineering, University of Missouri, Kansas City, 1988

Professional Registration
PE - Fire Protection, 36965, AZ, 2001
PE - Fire Protection, 16321, KS, 2001

Professional Associations
- National Fire Protection Association (NFPA) - NFPA 850 Committee member - Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations
- National Fire Protection Association (NFPA) - NFPA 101 Committee member - Life Safety Code (Chapter 40 Industrial Occupancies)
- National Fire Protection Association (NFPA) - NFPA 853 Committee member - Standard or the Installation of Stationary Fuel Cell Power Systems
- National Fire Protection Association (NFPA) - NFPA 851 Committee member - Recommended Practice for Fire Protection for Hydroelectric Generating Plants

Year Career Started
1996

Year Started with B&V
1996

Office Location
Overland Park, KS

Various Clients | Various Projects; KS
Fire Protection Section Lead. Responsible for administrative duties with regard to the fire protection section. Design and review fire protection systems and specification for power plants (Energy Division) and other divisions within Black & Veatch.

ENMAX | Shepard Energy Centre; Canada
Fire Protection Section Lead. Oversaw fire protection specification, bid reviews and detailed design review for the 2 on 1 combined cycle power facility.

Sprint | Atlanta; GA
Fire Protection Lead. Generated fire protection specification, bid reviews and detailed design review for the building expansion.

Black Hills Corporation | Black Hills; WI
Fire Protection Lead. Responsible for administrative duties with regards to the fire protection section. Designed and reviewed fire protection systems and specification for power plants (Energy Division) and other divisions within Black & Veatch.

Hawaiian Electric Company, Inc. | Substation Expansion; HI
Fire Protection Section Lead. The project consisted of the expansion of an existing indoor substation. Generated fire protection specification, bid reviews and detailed design review of new and reworked fire protection systems.

Bryan D Quarles, PE, LEED AP BD+C

Electrical

Bryan Quarles is a licensed professional electrical engineer in the Water Division at Black & Veatch. He has seven years of experience in the design of electrical systems for surface water and wastewater treatment plants ranging in complexity from 3 MGD to 30 MGD. He has developed electrical one-line diagrams and control schematics for medium and low voltage equipment downstream of the utility ranging from 12.47kV down to 480V, 208V, and 120V levels. He has also produced PLC one-line diagrams and SCADA architecture layouts showing the interfacing and interconnections of all of the plants' SCADA systems. He has designed and sized medium and low voltage electrical equipment, including substation-type transformers, switchgear, generators, and motor control centers. He has gained knowledge and experience in developing specifications and reviewing submittals and shop drawings for each project.

Bryan has an area of expertise in a wide range of electrical calculations, including the following:

- Performing voltage drop calculations, short circuit and selective coordination studies, and arc flash analyses utilizing SKM Power Tools and ETAP.
- Sized medium and low voltage generators using Cummins Power Suite.
- Performed lighting calculations using Lithonia Visual and AGI 32 and determined recommended maintained footcandle levels for each space per IESNA.
- Sized cable trays utilizing Cooper B-Line cable tray sizing program which conforms to NEC requirements for single and multi-conductor cables.

Education
- BS, Architectural Engineering, University of Kansas, 2008

Professional Registration
PE - Electrical, PE23627, KS, 2014
PE - Electrical, 2014010498, MO, 2014
PE - Electrical, 22175, NM, 2014
PE - Electrical, 114488, TX, 2013

Professional Associations
- Electrical Construction & Maintenance (EC&M)

Year Career Started
2008

Year Started with B&V
2014

Office Location
Kansas City, MO

PROJECT EXPERIENCE

New York Department of Environmental Protection (NYCDEP) | Oakwood Beach WWTP Transformer Replacement Project; Staten Island, NY

Supporting Electrical Engineer. Project involved the design of new service entrance transformers to replace the existing transformers which are at the end of their useful life and associated 33 kV primary and 5 kV secondary switchgear to upgrade the entire high tension service to meet the requirements of the latest version of Con Edison's EO-2022 High Tension Service Specification. Assisted in the development of power floor plans, one-line and three-line diagrams, and medium voltage circuit breaker schematics. Performed preliminary short-circuit analysis, using SKM Power Tools software, for all major electrical distribution equipment in order to determine short-circuit current ratings for the new switchgear and to ensure the short-circuit current ratings of existing electrical equipment exceed the maximum available fault current.

City Paso Robles | WWTP Tertiary Treatment Facilities; Paso Robles, CA

Supporting Electrical Engineer. Project involved the construction of a new ultraviolet (UV) disinfection facility to the existing 4 MGD advanced secondary WWTP in order for the wastewater treatment facilities meet tertiary treatment standards. Developed electrical load study to determine ampere ratings of electrical equipment for the project, including a 480V motor control center and miscellaneous 480V and 208V power and lighting panel boards. Developed project electrical specifications, performed submittal reviews, provided RFI responses, and submitted changes during construction (CDC).

Cape Fear Public Authority (CFPUA)| US Highway 421 – Water & Wastewater Utilities; Wilmington, NC
Supporting Electrical Engineer. The project entailed of a conveyance system which included three pump main stations and the system of force mains carrying effluent to an existing easement on the west side of Cape Fear River, with Pump Station No. 1 providing 33,000 GPD, Pump Station No. 2 providing 307,500 GPD, and Pump Station No. 3 providing 22,500 GPD. Developed electrical load study for each pump station to determine minimum ampacity ratings for electrical equipment, including service entrance automatic transfer switches and 480V power panels. Performed preliminary short circuit study for each pump station, utilizing SKM Power Tools software, to determine minimum equipment short circuit current ratings. Developed RTU and electrical one-line diagrams along with equipment control schematics.

Johnson County Wastewater| Tomahawk Wastewater Treatment Facility; Johnson County, KS
Supporting Electrical Engineer. The wastewater treatment facility currently treats 7 MGD from the Tomahawk Creek and Indian Creek watersheds in addition to the Dykes Branch sub-watershed. The project included expanding the dry weather treatment capacity, modifying treatment processes to meet future permit limits, and new facilities such that upstream water surface levels in the stream are not impacted under flood conditions. Developed PLC and electrical one-line diagrams for equipment within the Basin Blower Building and BNR Basins, including the Basin Blower Building switchboard, motor control center, and miscellaneous 480V and 208V power and lighting panel boards. Designed cable and conduit routing requirements for all four BNR Basins on power and lighting floor plans. Developed duct bank sections and schedules between the BNR Basins and the Basin Blower Building.

Lincoln Water System | Yankee Hill Pump Station; Lincoln, NE
Lead Electrical Engineer. The project entailed of a new pump station which directly provides 9 MGD in the initial phase of with an ultimate build-out capacity of 18 MGD to the service level in southeast Lincoln to meet increased water demand. Developed an electrical load study to determine the required ampacity for electrical equipment, including the service entrance motor control center and miscellaneous 480V and 240V power and lighting panel boards. Developed preliminary short-circuit study of all major electrical equipment to determine the minimum electrical equipment short-circuit current ratings using SKM Power Tools software. Developed electrical and PLC one-line diagrams along with creating equipment control schematics. Developed project electrical specifications and performed submittal reviews.

Missouri-American Water Co. | Parkville District Water Treatment Plant; Parkville, MO
Lead Electrical Engineer. Developed a load study to determine the required ampacity for electrical equipment on the project, including the main plant switchgear, clear well pump station motor control center, and miscellaneous 480V and 208V power and lighting panel boards. Developed electrical and PLC one-line diagrams along with creating equipment control schematics. Coordinated with another engineering firm, involved with the electrical site and generator design, to determine duct bank routing requirements and manhole locations. Provided electrical calculations, including voltage drop and preliminary short circuit using SKM Power Tools software.

Orange County Sanitation District (OCSD) | OCSD Plant P1-101 Short Circuit & Coordination Study & Arc Flash Analysis; Orange County, CA
Supporting Electrical Engineer. Performed a short circuit and coordination study and arc flash analysis for the OCSD Plant P1-101 project utilizing ETAP software. Obtained equipment manufacturer and model data from the conformed design documents and construction submittals to accurately model short circuit values and equipment incident energy. Created several scenarios of electrical configurations to determine the maximum short circuit current and worst case which would provide the highest level of incident energy at a particular piece of equipment. Developed time current curves to achieve selective coordination and then provided an arc flash summary showing the equipment incident energy values.

San Jacinto River Authority (SJRA) | GRP SJRA Water Treatment Plant; Lake Conroe, TX
Supporting Electrical Engineer - HDR Engineering, Inc. The project consisted of a new surface water treatment plant of delivering 30 MGD from Lake Conroe with an ultimate buildout of 120 MGD. Designed electrical distribution systems for the water treatment plant, including the main plant paralleling switchgear and coordination of service requirements with the utility. Developed a load study to determine ratings of electrical equipment and then created electrical site plans, electrical one-line diagrams, control schematics, and PLC one-line diagrams.

Thomas Raihl, PE, CCM

Constructability

Thomas has worked for 32 years in the New York Environmental Industry as everything from a Construction Inspector through Construction Manager. He has also worked in the Design side starting as a Design Engineer working his way through Design Manager. Project sizes varied from $30 million to $450 million.

PROJECT EXPERIENCE

NYCDEP | Wards Island Battery Addition Contract 76; Wards Island, NY
Assistant Resident Engineer. Responsible for all field inspection and inspection personnel

NYCDEP | City Wide Contract 3A; New York, NY
Program Manager. Was the head of the TOC for HAKS writing proposals, work orders, preparing CM payments, interfacing with the clients, and acting as the Construction Manager on multiple Contract tasks all across New York.

NYCDEP | NYC Third Water Tunnel Contract TCM-52; Manhattan, NY
Construction Manager. Responsible for all construction, start-up, and commissioning of NYC Legacy Project on the Third Water Tunnel. Had up 170 CM personnel working for him at one point. This successful project was the culmination of a series of projects going back over 60 years to bring additional fresh water into Manhattan from the NYC reservoir system.

NYCDEP | Jamaica WPCP BNR Upgrade; Queens, NY
Construction Manager. Overall responsibility for multiple Contracts and Resident Engineers for a $400+ million dollar upgrade to the Jamaica WPCP. Had responsibility for all personnel, reports, construction documents, schedule, payments, meetings with the client, and correspondence.

NYCDEP | Manhattan Pump Station Contract 40; Manhattan, NY
Resident Engineer. Responsible for all aspects of construction for the 400 MGD Manhattan Pump Station including coordination with 17 different City Agencies, private entities, and utilities for NYCs largest Pump Station which just happens to be built on a 100'X200' footprint with a grade school, a day care center, a church, the City's largest power transformer yard, and high rise apartment buildings immediately adjacent to the project. The Contract required the installation of a new 6MW Diesel Powered Interim Emergency Power System; installation of new permanent 10MW Gas Turbine Emergency Power System; installation of 5-2,500 HP mixed flow impeller Main Sewage Pumps, Installation of a completely new structure above ground while keeping all existing facilities fully operational; installation of a new 5kV power distribution system; installation of new screening equipment; and installation of new ventilation and controlled environment electrical rooms.

NYCDEP | Manhattan Pump Station Design; Manhattan, NY
Design Manager. Responsible for all aspects of design for the 400 MGD Manhattan Pump Station including coordination with 17 different City Agencies, private entities, and utilities for NYCs largest Pump Station which just happens to be built on a 100'X200' footprint with a grade school, a day care center, a church, the City's largest power transformer yard, and high rise apartment buildings immediately adjacent to the project. The project was designed three times due to reconfiguration of the incoming power feeders (six 13 kV feeders with limited frontage).

Education
- BS, Marine Engineering, Diesel and High Pressure Steam Power Systems, US Merchant Marine Academy, 1982

Professional Registration
PE - 0031723, CT, 2016
PE - 81489, FL, 2016
PE - 068940, NY, 1992

Professional Associations
- Water Environment Federation - Member - Operations Challenge Judge
- American Water Works Association
- New York Water Environment Association

Year Career Started
1982

Year Started with B&V
2016

Office Location
New York, NY

NYCDEP | Newtown Creek Interim Upgrade; Brooklyn, NY
Manager Design Services During Construction/Design Liasion Engineer. Tracked all contract documents including Contract Drawings, Shop Drawings, Requests for Information, correspondence with the designer, Change Orders, Scope Change Requests, and personnel approvals. Engineer was Greeley and Hansen, but H&S had the DSDC. Developed the Request for Clarification system for the DEP, troubleshot all design issues, wrote some design change orders, performed startup services on systems for the project and attended all meetings as the Designers representative,

NYCDEP | Central Sludge Dewatering Facilities Contracts 57G, 57E, 57P, 57H, 60G and 60E; Oakwood Beach, NY
Assistant Resident Engineer, Operations Coordinator. Responsible for coordinating the field efforts of all trades during the construction, testing and start-up and operation of the Oakwood Beach Sludge Dewatering Facilities. Supervised the leads and inspectors from all trades as well as the start-up staff to meet the consent decree operation dates for the sludge dewatering facility which utilized Humboldt Wedag 13,000 rpm centrifuges. Responsible for all construction activities at Oakwood Beach for the follow on Sludge Cake Storage facility. Responsible for start-up operation of all four city wide Sludge Cake Storage Facilities which used Putzmeister Sludge Cake Pumps and Grosstag Bin Live Bottom Unloaders.

NYCDEP | Red Hook WPCP Contracts 6B-1, 6B-2, 6B-3, 7, 8A, 8B, 9; Brooklyn, NY
Construction Inspector. Responsible for day to day inspection of Process Mechanical, Plumbing, HVAC, and Electrical Controls; processed Contractor Payments; wrote Change Orders; performed start-ups of critical systems; troubleshot problems with system operations; performed balancing of process air systems in Aeration Tanks and Mixed Liquor Feed Channels; assisted process engineer with respiration rates and other laboratory work on site.

Nassau County Department of Public Works | Bay Park WPCP Contracts 3A, 3B, and SSDW; East Rockaway, NY
Lead Mechanical Field Engineer. Supervised inspection of all mechanical systems plant wide; responsible for installation, testing, troubleshooting, and initial operation of a 12 MW diesel power plant; responsible for installation, testing, troubleshooting, and initial operation of a 60,000 SCF Digester Gas Horton Sphere; responsible for installation, testing, troubleshooting, and initial operation of the Sludge Dewatering Building which used 12 Belt Filter Presses.

Ryan D Rhodes, EIT

Transient Stability Studies

Ryan Rhodes is an Electrical Engineer that works in the Electrical & Controls Group. A graduate from Clemson University, Ryan has previous internship and co-op experience in the Power Industry. Work experience has been focused on Electrical Design, Power System Protection and Electrical Power Systems Studies, such as Load-Flow, Short-Circuit, Cable Sizing, Motor Starting, and Arc Flash Hazard Analysis.

Education
- BS, Electrical and Computer Engineering, Power Systems, Clemson University, 2015

Professional Registration
Engineer-In-Training (EIT) - 19790, 2015

Professional Associations
- IEEE Industry Applications Society (IAS)
- IEEE Power & Energy Society (PES)

Year Career Started
2013

Year Started with B&V
2014

Office Location
Cary, NC

PROJECT EXPERIENCE

Passaic Valley Sewerage Commission (PVSC) | PVSC Standby Power; New Jersey
Dynamic Motor Starting and Transient Stability Analysis. Performed a dynamic motor starting of the largest synchronous and induction motors and a transient stability analysis to see how the new combustion turbine generator's excitation and governor control systems would respond to the large inrush currents associated with starting large motors while not connected to the utility grid (islanding mode).

CPS Energy | Calaveras Coal Yard Arc Flash Study; San Antonio, TX
Arc Flash Analysis. Created an overall diagram of the plant in SKM Power Tools software based on one line drawings and data collected from a site visit. Used SKM and industry standards such as IEEE 1584 and NFPA 70E to perform an arc flash analysis for all of the equipment at the plant that is at and above 480 volts.

Narenco | Suwannee Solar Grounding and Lightning Protection; Florida
Grounding Analysis. Performed a grounding analysis for the new design of the Suwannee County PV Facility.

Hawaiian Electric Company (HECO) | Kahe 5 GC-RTU Upgrade; Hawaii
Electrical/Controls Design. Design upgraded or removed the existing RTU's at Kahe Unit 5 that communicate load control signals and metering data between the plant DCS and Generation Control ("GC" - the dispatch center) and ran the MW and MVAR transducer signals directly to DCS. Created new removal and installation wiring diagrams and electrical schematics, as well as a new cable schedule and block diagrams.

Tennessee Valley Authority (TVA); Frequency Response Improvement; Tennessee
Electrical Design. Helped create Project Planning Documents for four TVA fossil sites that propose a design that would implement new generator frequency meters capable of communicating with the stations distributed control system (DCS).

Florida Power & Light (FPL) | Turkey Point Air System Upgrade; Florida
Electrical/Controls Design. Created wiring diagrams and electrical schematics for the addition of an air compressor room with two air compressor skids, two air dryers, and two receiver tanks being fed from Unit 1 MCC's. Also, performed a cable sizing calculation, conduit sizing, and feeder breaker sizing for the new 480V feeder cables to the compressor skids.

Duke Energy | Belews Creek FGD 5kV Switchgear Short-Circuit Study; North Carolina
Short-Circuit Analysis. This project was to analyze results from the previous FGD load study that indicated two 5kV switchgear were overdutied when they were fed in single-ended operation. Several options for mitigating the system to below the equipment short-circuit duty rating were provided to the client.

Ecoplexus, Inc. | Ecoplexus Solar Project; North Carolina
Grounding Analysis. Performed a grounding analysis using CDEGS software for two solar sites, American Legion and Baker.

Duke Energy | H.F. Lee Lake Water Makeup (LMU) Station Upgrade; North Carolina
Arc Flash Hazard analysis and Relay/Breaker Settings Calculation. Developed the relay settings and low-voltage circuit breaker trip unit settings for protection and upstream coordination of the new LMU station switchgear and MCC, in addition to the arc flash analysis.

Duke Energy | Belews Creek FGD Auxiliary Power Load Study; North Carolina
Load flow and short circuit analysis. Analyzed the impact of several upgrade projects that the Belews Creek Steam Station had scheduled to add additional loading to their FGD system.

Duke Energy | Sutton Grounding Analysis; Wilmington, NC
Grounding Analysis. Performed grounding analysis for the existing combined cycle plant ground grid to determine if any hazards emerged from the disruption of the existing grid due to the demolition of three of the coal burning units and the addition of two new simple cycle gas turbines at the L.V. Sutton Energy Complex.

Arizona Public Service (APS) | Ocotillo Modernization Project; Tempe, AZ
Grounding Analysis. Performed grounding analysis and helped develop the new ground grid design for five new simple cycle gas turbines and the auxiliary power equipment at the Ocotillo Power Plant.

CPS Energy | AvR Arc Flash Study; San Antonio, TX
Arc Flash Analysis. Created an overall diagram of the plant in ETAP software based on one line drawings and data collected from a site visit. Used ETAP and industry standards such as IEEE 1584 and NFPA 70E to perform an arc flash analysis (including a short circuit analysis and coordination of all protective devices) for all of the equipment at the plant that is at and above 480 volts. Based on the study results, recommendations were made to mitigate any equipment that was considered too dangerous to work on during plant maintenance practices, i.e. over 40 cal/cm^2.

Excelon | Project Phoenix OE Support; United States
Reviewing Engineer. EPC - Post Award Review of Vendor Drawings per Electrical Scope of Contract.

Tennessee Valley Authority | Watauga Hydro Plant HMOD; United States
Relay Panel Layouts, Wiring Diagrams, and Schematic Designs. Client was upgrading two hydro plant generators. We were tasked with replacing the outdated electromechanical relays with new GE electronic relays.

Southern Company/Strata Solar | Buffalo Pen/Demil Solar Project; United States
Solar PV Design. Used site layouts of proposed solar installations to calculate effects of adding the solar pv to the client's existing electric grid.

Duke Energy | Smith Energy Complex Arc Flash Analysis; United States
Arc Flash Study. Looked at the one-line diagrams and the SKM model of the 13.8kV auxiliary switchgear to determine the incident energy available at that bus.

Duke Energy | Phase II Arc Flash Study; United States;
Arc Flash Analysis. Verified Phase I One-Line Diagram in ETAP. Determine which buses had an Incident Energy above the NFPA 70E Hazard Category 4 recommendation. Mitigate all buses/equipment to below 40 cal/cm^2.

Duke Energy | Belews Creek FGD Upgrade; United States
BOP and FGD Upgrade. Plant Information Data and Load flow analysis were used to determine what effects an FGD upgrade would have on both the main plant auxiliary and the current FGD electrical systems at the Belews Creek Steam Station.

Transmission Engineering; United States
Protection & Controls Engineering - Duke Energy. Designed One-Line, Three-Line, and Elementary Schematics, as well as Relay Settings, for HV Transmission Substations.

Michele F Roth, PE, LEED AP BD+C

Building Mechanical

Ms. Roth has experience in the design and task leadership of various mechanical systems, including heating, ventilating, and air conditioning (HVAC), odor control, plumbing, and dehumidification systems for many water and wastewater treatment, distribution, and collection facilities as well as dam, tunnel and substation facilities.

Her diverse experience covers the application of these systems for administration buildings, laboratories, maintenance facilities, chemical areas, pumping stations, process areas, battery rooms, tunnels, and substation control buildings. She is currently the section sustainable design/LEED specialist. She has been involved in studies, designs, building energy models, energy audits and reports for existing treatment plants and associated facilities.

PROJECT EXPERIENCE

City of Olathe | Cedar Creek Wastewater Treatment Plant - Phase 1 Expansion; Olathe, KS

Mechanical Engineer/Discipline Lead. Responsible for mechanical building systems project management. Collaborated on mechanical design and responsible for detailed HVAC design, drawings and specifications for the new Headworks, Aeration Blower, and Chemical Feed Buildings, and the remodeled area of the Operations Building.

City of Lawrence | Wakarusa Wastewater Treatment Plant; Lawrence, KS

Mechanical Engineer/Discipline Lead. Responsible for mechanical building systems project management. Collaborated on mechanical design and responsible for conceptual HVAC design for the new WWTP, and detailed HVAC design drawings and specifications for the new Maintenance and UV Disinfection Buildings.

City of Great Falls | WTP Improvements Phase I; MT

Mechanical engineer, discipline project lead. Performed discipline project management duties and was engineer in responsible charge for building mechanical work. Collaborated on building mechanical design and performed conceptual and detailed design for HVAC systems, including calculations, drawings and specifications.

Mount Pleasant Waterworks | Center Street Wastewater Treatment Plant Capacity Enhancements; Mount Pleasant, SC

Mechanical Engineer/Discipline Lead. Responsible for mechanical building systems project management. Collaborated on mechanical design and responsible for detailed HVAC Systems design, drawings and specifications for the improvements project which included conversion of gaseous chlorine to sodium hypoclorite, a new blower building to support BNR improvements, new laboratory facility and remodeling of existing operations facilities and pump stations.

Biokyowa, Inc. | Wastewater Treatment Plant Improvements; Cape Girardeau, MO

Mechanical Engineer/Discipline Lead. Responsible for mechanical building systems project management on the design-build project for an amino acid manufacturing plant. Collaborated on mechanical design and responsible for detailed HVAC Systems design, drawings and specifications for the Membrane Equipment Building serving the new bioreactor basins and submerged membrane filters.

Education

- Bachelors, Mechanical Engineering, Brigham Young University, 1981

Professional Registration

PE - Mechanical, 17959, AR, 2017
PE - Mechanical, 57931, AZ, 2014
PE - Mechanical, 37687, NC, 2011
PE - Mechanical, 21217, NV, 2011
PE - Mechanical, 33747, MD, 2007
PE - Mechanical, 22032, MO, 1987
PE - Mechanical, 19472, MT, 2009
PE - Mechanical, 28925, SC, 2011
PE - Mechanical, 402054146, VA, 2014
LEED Accredited Professional Building Design + Construction, 10017955, 2006

Professional Associations

- American Society of Heating, Refrigerating and Air Conditioning Engineers

Year Career Started

1981

Year Started with B&V

1999

Office Location

Kansas City, MO

City of Hollywood | Energy Efficiency Master Plan; Hollywood, FL
Mechanical engineer, discipline project lead. Performed discipline project management duties, and conducted site survey and inventory of building mechanical systems. Interviewed plant staff and documented operational issues. Performed energy use evaluation and input results and recommendations in the master plan document.

City of Tulsa | Northside Wastewater Treatment Plant and Southside WWTP Disinfection Improvements; Tulsa, OK
Mechanical Engineer/Discipline Lead. Responsible for mechanical building systems project management. Collaborated on mechanical design and responsible for detailed HVAC design, drawings and specifications for the building ventilation modifications at the two plants in the project as required for converting the chlorine systems to sodium hypochlorite.

City and County of Broomfield | Wastewater Reclamation Facility, Phase 2 Upgrade and Expansion; Broomfield, CO
Mechanical Engineer. Responsible for odor control and HVAC system design, drawings and specifications for additional facilities at the existing wastewater treatment facility. Odor control design incorporated airflow from new facilities into an existing biofilter.

City of Fargo | Fargo Membrane Water Treatment Plant and Improvements; Fargo, ND
Mechanical Engineer/Discipline Lead. Responsible for mechanical building systems discipline project management. Collaborated on mechanical design and responsible for conceptual HVAC design for the membrane water treatment plant addition to the existing facility.

City of Cedar Falls | Water Reclamation Facility – Disinfection and Solids Handling Facilities Improvements; Cedar Falls, IA
Mechanical Engineer/Discipline Lead. Responsible for mechanical building systems project management. Collaborated on mechanical design and responsible for detailed HVAC and Odor Control Systems design, drawings and specifications for the new UV and Solids Dewatering Buildings.

Northern Water Hydropower Water Activity Enterprise | Carter Lake Hydroelectric Project; CO
Mechanical Engineer/Discipline Lead. Responsible for mechanical building systems project management. Collaborated on mechanical design and responsible for detailed HVAC design, drawings and specifications for the small hydroelectric power house.

City of Lakeland | Disinfection Facilities Upgrade; Lakeland, FL
Mechanical Engineer/Discipline Lead. Responsible for mechanical building systems project management. Collaborated on mechanical design and responsible for detailed HVAC design, drawings and specifications for the building ventilation and emergency chlorine gas treatment system upgrades at the three plants in the project.

City of Sioux City | Southbridge Regional Water Treatment Plant; Sioux City, IA
Mechanical Engineer/Discipline Lead. Responsible for mechanical building systems discipline project management. Collaborated on mechanical design and responsible for conceptual HVAC design and Quality Control review for the new 10 MGD Water Treatment plant. The plant includes a flocculation and sedimentation basin building with membrane feed pump station, an operations building with membrane filters, chemical storage and feed and high service pumping station.

San Francisco Public Utilities Commission | Alameda Siphon No. 4; Alameda County, CA
Mechanical Engineer/Discipline Lead. Responsible for mechanical building systems project management. Responsible for detailed HVAC design, drawings and specifications for the Coast Range Tunnel ventilation system replacement. The system design included requirements for redundancy, reversibility and explosion hazard. The ventilation system is used during inspection and repair of the 25 mile long water conveyance tunnel.

El Dorado Irrigation District | El Dorado Hills Water Treatment Plant Expansion - Phase 1B; Placerville, CA
Mechanical Engineer/Discipline Lead. Responsible for mechanical building systems project management. Collaborated on mechanical design and responsible for detailed HVAC design, drawings and specifications for the chemical storage and feed expansion facilities at the existing water treatment plant.

Nick Salem, PE, LEED AP

Electrical Distribution System Design Manager

Professional Engineer with a master's degree in Electrical Engineering. Passionate, goal-oriented, and success-driven, determined to be a recognized leader in the engineering/construction industry. Strong background in electrical design and construction at NYC wastewater treatment plants and NYC schools dealing with low and medium voltage power distribution systems, as well as many low voltage systems such as fire detection and alarm and exterior security lighting in schools. Also possess significant experience with energy performance contracting involving the full spectrum of electrical and mechanical systems.

PROJECT EXPERIENCE

NYCDEP | Ward's Island Grit Chamber Motor Failure Analysis; New York, NY

Electrical Engineer. Investigated the motor failures on the US Filter bar screens installed to replace the aged IDI bar screens at the Manhattan and Bronx Grit Chambers for the Ward's Island Waste Water Treatment Plant. Proposed solutions to prolong the functioning life of the motors and keep the facility operating until the permanent traveling bar screens are installed. Responsibilities included performing site investigations to evaluate motor failures, development of proposed near and long-term solutions for the client, communication with bar screen and motor manufacturers, development of report documentation.

NYCDEP | Ward's Island Grit Chamber Analysis; New York, NY

Electrical Engineer. Assisted in the mechanical design lead for the mechanical grit pumping system replacement in the Manhattan and Bronx Grit Chambers for the Ward's Island Waste Water Treatment Plant. Responsibilities included performing site investigations, analyzing potential equipment layouts, as well as assisting in the development of proposed near and long-term solutions for the client.

NYCDEP | North River Water Pollution Control Plant Cogeneration and Electrification Project; New York, NY

Electrical Engineer/Engineering Manager. Project involved the electrification of the existing diesel engine driven main sewage intake pumps and diesel engine driven aeration blowers with electric motors, as well as the addition of 15MW of engine-generator units cogenerating in parallel with the electric utility. Personal project responsibilities included coordination with electrical utility (Consolidated Edison) and NYC Electrical Advisory Board, performing site investigations, development of technical specifications for specific electrical equipment, and electrical support for various design tasks. The North River WWTP Cogeneration and Electrification project included the NR-44 Riverbank State Park Feeder Separation project. This advanced contract involved the separation of the primary service feeders serving the Riverbank State Park from the North River WWTP's electrical distribution system to make available the electrical capacity required to meet peak loading conditions of the WWTP. The project design included a new electrical substation dedicated to the Riverbank State park, independent of the North River WWTP. Personal project responsibilities included coordination with electrical utility (Consolidated Edison) for a new primary electrical service for the Riverbank State Park, coordination with the State Parks Commission, performing site investigations, development of technical memoranda evaluating equipment selection, and development of preliminary design criteria and report documentation.

Education
- MS, Electrical Engineering, Power, Polytechnic Institute of NYU, 2009
- BS, Electrical Engineering, University of Maryland, 2004

Professional Registration
PE - 24GE05315300, NJ, 2016
PE - 87702, NY, 2010
PE - 40874, MD, 2011
LEED Accredited Professional, 10093409, 2006

Professional Associations
- New Jersey Water Environment Association - Energy Committee Member
- New York Water Environment Association - Member

Year Career Started
2005

Year Started with B&V
2013

Office Location
New York, NY

NYCDEP | Oakwood Beach WWTP Power Distribution Improvements Project; Staten Island, NY
Engineering Manager/Electrical Engineer. Design of replacement motor control centers and switchgear to replace the existing distribution equipment which are at the end of their useful life. Another main project goal is to bring the new and existing electrical rooms into compliance with NFPA 820. Personal project responsibilities included performing site investigations, development of technical memoranda evaluating equipment selection, and development of preliminary design criteria and report documentation.

NYCDEP | Oakwood Beach Wastewater Treatment Plant Electrical Upgrades Project; Staten Island, NY
Electrical Engineer. Project involved the design of suitably-sized transformers to replace the existing transformers which are at the end of their useful life and associated 33 kV primary and 5 kV secondary switchgear to upgrade the entire high tension service to meet the requirements of the latest version of Con Edison's EO?2022 High Tension Service Specification. Personal project responsibilities included coordination with electrical utility (Consolidated Edison), performing site investigations, development of technical memoranda evaluating equipment selection, and development of preliminary design criteria and report documentation.

NYCDEP | Newtown Creek Wastewater Treatment Plant Main Sewage Pump Re-Manufacturing; New York, NY
Lead Electrical Design Engineer. Lead the electrical portion of the design of the Brooklyn/Queens main sewage pump station upgrade. Detailed design included installation of isolation valves on discharge pipe and replacement of main sewage pumps to meet 428 MGD consent decree capacity. Responsibilities included coordinating the design with the existing MSP resistor bank controller manufacturer, site investigations to confirm existing conditions, new equipment and conduit layouts, and the integration of new equipment into existing operational protocol.

Whitehall Coplay School District | Energy Efficiency Upgrades; Whitehall, PA
Project Manager/Project Engineer. Participated in design-build project development to install 2 new geothermal HVAC systems into 2 Whitehall Coplay public schools and integrate them into the existing infrastructures. Led the construction effort for this self-performance based construction contract. Managed the construction schedule to condense the construction duration for both schools to have functioning systems for the start of the school year. Balanced client demands to hold to conceptual design intentions and drive margins, while meeting the end user's essential needs. Other tasks included change orders, request for information, shop drawing review and substantial completion determination.

Michael B Shafer, PE

Technical Advisor

Mike is an engineering manager that has experience with all facets of water and wastewater systems, including treatment plant upgrades and expansions that include major renovation of electrical distribution systems. In addition, Mike serves as the East Region Chief Engineer, overseeing the implementation of quality programs for projects throughout the eastern United States. He reviews and approves the QAQC Plans for each project and works with the design teams to assign quality control reviewers to the projects. He also assists in the developing and maintaining the standards and procedures for the design process including standard specifications, calculation templates, work instructions, and other guidance documents within the company's Quality Management System.

Education
- Masters, Environmental Engineering, NC State, 1994
- Bachelors, Civil Engineering, NC State, 1991

Professional Registration
PE - Civil, 22008, NC, 1996

Professional Associations
- American Water Works Association

Year Career Started
1991

Year Started with B&V
1991

Office Location
Cary, NC

PROJECT EXPERIENCE

DC Water | Blue Plains AWTF Combined Heat and Power Project; Washington, DC
Engineering Manager. Provided design of new combined heat and power project that produces up to 100,000 pph of steam for use in the Cambi process as well as up to 15 MW of electricity for use in the Blue Plains AWTF. Facilities included three Solar Mercury 50 combustion turbines coupled with 11,000 pph heat recovery steam generators (HRSG). Duct burners in each turbine exhaust boosts the HRSG steaming capacity to 34,000 pph. Gas processing facilities include wet scrubber, 250 hp gas blowers, siloxane removal equipment, and 450 hp gas compressors. The project is being delivered thru a Design-Build-Operate contract arrangement.

City of Durham | Brown and Williams WTP Upgrade and Expansion; Durham, NC
Engineering Manager. Design of upgrades and expansion of the Brown WTP to 42 mgd including two new treatment trains of flocculation, sedimentation, and filtration. Upgrades include replacement of the 4,160 volt electrical systems, new standby power generator, new SCADA system, and a new LEED certified Administration Building.

Winston-Salem/ Forsyth County Utilities Commission | Muddy Creek WWTP Power Generation Upgrade; Winston-Salem, NC
Project Engineer. Assisted in planning and permitting of a combined heat and power facility including a new 1,100 kilowatt engine generator fueled by digester gas, natural gas, or a blend of both. Hot water from the engine cooling system is utilized for digester and building heating. The electricity produced will be exported and sold to the local electric utility, providing approximately $368,000 of projected annual electricity sales revenue and 66% reduction in net energy usage. The system will also provide additional emergency standby power capacity such that, in the event of loss of utility power, the system controls will automatically parallel with existing diesel generators to power the plant.

Sacramento Regional County Sanitation District | Sacramento Regional WWTP Biological Nutrient Removal Project; Sacramento, CA
Hydraulics Engineer. Developed the hydraulic profile for the secondary treatment process at the 181 mgd facility, including new biological nutrient removal basins. The basins were configured to allow four different operating schemes at a peak effluent flow of 330 mgd.

City of Greensboro | Mitchell WTP Upgrades; Greensboro, NC
Project Manager. Designed multiple upgrades to the 22 mgd Mitchell WTP including sedimentation and filter upgrades, new standby power generator, conversion of existing 575-volt distribution system to a 480-volt system, and new wiring and lighting throughout the plant.

Charleston Water System | West Ashley Sewer Tunnel and Pump Station; Charleston, SC
QAQC Reviewer. Provided quality control review and assisted in the finalization of design of the 75 mgd influent station located at the Plum Island WWTP. The pump station is located in a 150 foot deep tunnel shaft with five centrifugal pumps surrounding the 10ft diameter wetwell shaft. The pumps are submersible pumps with a cooling water jacket to allow them to operate in a dry-pit while providing continuous operation in the event the dry-pit floods.

San Francisco Public Utilities Commission | Southeast Water Pollution Control Plant Biosolids Digester Facilities Project; San Francisco, CA
QAQC Reviewer. Provided Quality Control reviews for portions of civil and mechanical process disciplines on the Biosolids Digester Facilities Project, including review of the demolition package, utility trench design, and sludge pumping systems. Reviews included deliverables from within Black & Veatch as well as deliverables from our teaming partners.

Greenville Utilities Commission | Southside Pump Station Improvements; Greenville, NC
Project Manager. Provided design and construction administration services upgrades to an existing 22 mgd wastewater pumping station that includes a new bar screen structure with two multi-rake bar screens and screenings compaction equipment and new odor control facilities.

County of San Diego | Rancho San Diego Pump Station Rehabilitation; San Diego, CA
Quality Control. Provided level 3 quality control review of the rehabilitation of a 7.6 mgd wet-pit/dry-pit wastewater pump station.

Greenville Utilities Commission | Sterling Pointe Regional Pump Station and Force Main; Greenville, NC
Project Manager. Provided design for a 5.6 mgd wastewater pumping station that includes wet-pit/dry-pit pump station, three 125 hp vertical end-suction centrifugal pumps, mechanically-cleaned bar screen, odor control, emergency generator, and 11,000 feet of 20-inch diameter force mains. The project included a Preliminary Engineering Report and Environmental Assessment, as required to obtain loan funding from the State Revolving Funds.

City of Morganton | Catawba River WPCF Regulatory Improvements; Morganton, NC
Project Engineer. Provided design of upgrades to the influent screening and pump station structure. Two new climber screens were designed to replace the existing screens. Four new pumps, providing a firm capacity of 30 mgd were provided with VFD controls for improved influent flow control.

City of Kinston | Forrest Street Lift Station and Wastewater Force Main; Kinston, NC
Project Engineer. Designed modifications to the existing Forrest Street Lift Station following major flooding event from Hurricane Floyd. An abandoned dry-well was retrofitted into a second wetwell to allow the existing station to remain in continuous operation. Four 300 hp submersible pumps were installed in two wetwells to provide a firm pumping capacity of 17 mgd. A 1,250 kilowatt natural-gas fired engine generator was provided to ensure continuous operation during flooding events that isolated the pump station site.

George M Slivka, BSEE/BSME, PE

RPR - Phase 1 Construction

George Slivka is a Senior Engineering and Construction professional with over 37 years of diversified experience in project management, construction management, electrical engineering, mechanical engineering, and field construction inspections. He is a licensed Professional Engineer with dual degrees – Electrical Engineering as well as Mechanical Engineering. Projects included emergency generation facilities, municipal wastewater treatment plants, municipal water treatment plants, power plants, industrial facilities, and manufacturing plants. He possesses broad skills and experience in plant construction, start-up and commissioning, field construction MEP, in-plant high-voltage electrical distribution facilities, SCADA systems, pumping stations, HVAC systems, boilers, vessels, process equipment, chemical feed systems, and process piping.

Education
- BS, Mechanical Engineering, Lafayette College, 1983
- BS, Electrical Engineering, Lafayette College, 1976

Professional Registration
PE - 90117, NY, 2011
PE - Mechanical, PE031749E, PA, 1982

Professional Associations
- IAEI - Associate

Year Career Started
2003

Year Started with B&V
2010

Office Location
Gaithersburg, MD

PROJECT EXPERIENCE

Anne Arundel County Maryland Department of Public Works | Cox Creek WRF ENR Upgrade and Expansion; Maryland

Senior Electric Inspector. -Phase I - Overall responsibility for the installation of two 35kv utility service feeds to the Cox Creek WRF Facility in advance of the Phase II ENR upgrade. Mr. Slivka was responsible for the overseeing of electrical duct bank and service feeder.

New York Department of Environmental Protection | 26th Ward Emergency Electrical Generation Facility; New York

Resident Engineer/Construction Manager. Overall responsibility for Resident Engineering and Construction Management for a $50 million project which includes the replacement of the emergency back-up generation facility at the 26th Ward WWTP located in Brooklyn, NY. He and his staff are responsible for all resident engineering, field inspection, field progress reports and records, project controls, scheduling, change order management, permit management, and start-up & commissioning. The project includes replacing the existing gas turbine generators with diesel generators, replacing the existing diesel black start generator, and all modifications required to the substation, switchgear, and control systems. Also included is the complex construction of a new plant hydraulic regulator structure, and associated demolition and foundation work.

King Saud University Campus in Riyadh | King Saud University for Women; Saudi Arabia

Senior MEP Consultant - FTR INC. Senior MEP Consultant assigned to the King Saud University Campus in Riyadh, Kingdom of Saudi Arabia. Responsible for providing inspection services for all Mechanical & Electrical elements and assisting the Mechanical/Electrical/Plumbing teams on a $2.2 billion project. The 34 buildings included classrooms, laboratories, medical facilities, residences, general utilities facility and a wastewater treatment facility. He supported the Prime Contractor, SBG, as part of the FTR Project Management & Construction Management QA/QC team which consisted of 24 professionals onsite that provided technical support, drawing review, specification investigations, code analysis, installation compliance/solutions, QA/QC and Safety services.

Anna Arundel County | Water Recovery Facility & Odor Control Project; Maryland

Resident Engineer/Senior Inspector - Arcadis, Inc. Senior Resident Engineer/Senior Inspector for a large Water Recovery/Odor Control Facility expansion. His duties included professional

services for the installation, testing and operation of a 3 - 1250kw emergency generators and a new 2,500kva switchgear facility which included double-ended main - tie -main switchboard sections, sub-feeder sections, and auto-transfer switching sections. He also provided professional services for the installation and relocation of 6 - 5,300scfm blowers, a SCADA control system with fiber optic networking, and all interconnected piping.

Orange Water & Sewer Authority; Mason Farm Wastewater Treatment Plant; North Carolina
Resident Engineer/Senior Inspector - Arcadis Inc. Performed professional services for the installation of emergency generation and electrical facilities for an extensive Wastewater Treatment Plant Upgrade and Expansion. The project included one new 2,700kw emergency generator, the relocation of an existing 2,500kw emergency generator, the installation of new 12.5kv primary services, the relocation of existing 12.5KV services, and the installation, testing and operation of a new 2,700 kva switchgear facility. He also coordinated the installation of a temporary interim 2,500kw generator and manual transfer switch to the existing 2,500kw plant emergency generator.

In addition, he oversaw the installation and testing of multi-conductor TC-rated primary and secondary power feeds and motor control centers, and assisted in optimizing operation of new electrical feeds, switchgear and distribution system, SCADA system data highway, and PLC locations. He also oversaw the installation, and testing of all equipment power and control wiring, and startup of related equipment in the new Filter Building, Switchgear Building, Generator Building, new Aeration Basins, Clarifiers, Head Works and Influent Pump Station, and massive upgrade of existing Aeration Basins, Clarifiers, Digesters, Fermentation Facility and all associated hazardous (classified) locations issues relative the NEC70.

Nader Sreyo, PE

QA/QC - Power Generation Interconnect

Nader Sreyo is a Senior Electrical Engineer in the Raleigh, North Carolina, office. Sreyo has 30 years of experience on coal and gas fired power plant projects and has been involved in all aspects of the electrical design of power plants with emphasis on power system analysis and protective relaying. Sreyo has experience in all aspects of the electrical work, including detailed design, scheduling, budgeting, Sreyo currently functions as the Control/Electrical Manager of Engineering for the Raleigh office, with overall responsibility for projects designed in Raleigh, as well as administrative responsibility for personnel in the department.

PROJECT EXPERIENCE

Texas Municipal Power Agency | Gibbons Creek; TX
QA/QC. Provided QA/QC check for report developed to ensure NERC compliance for PRC-019, PRC-024 and PRC-025 for generator protection relay.

Black Hills Energy | Pueblo Airport Generating Station; CO
QA/QC. Provided QA/QC check for reports developed to ensure NERC compliance for PRC-019, PRC-024 and PRC-025 for generator protection and limiter settings.

Tampa Electric | Polk 2 Combined Cycle Conversion; FL
QA/QC. Provided QA/QC check for generator, generator step up transformer and station service transformer protective relays.

Dominion | Chesterfield Wet to Dry Ash Conversion; VA
Electrical Poject Engineer. Prepared EPC specification for the addtion of bottom ash dewatering equipment and ash storage silos.

Zilkha Biomass | Waiau Black Pellet Conversion; HI
Electrical Project Engineer. Study to determine the cost of converting an existing boiler from burning oil to burning Black Pellet biomass.

Klamath Falls | Klamath Falls Bioenergy Facility; OR
Electrical Project Design Engineer. Detail design for a 42MW biomass plant.

Hawaiian Electric Light Company | Puna Biomass Conversion Project; HI
Electrical Project Engineer. Study to determine the viability and cost of converting an existing boiler from burning oil to biomass.

Orlando Utilities Commission (OUC) | Stanton Energy Center; FL
Electrical Project Engineer. Performed an Aurora Vulenrability Assement of the Stanton Energy Center.

Consumers Energy | DE Karn Unit 1&2 AQCS Project; MI
Electrical Project Design Engineer. PDE on project to add dry scrubbers to a two unit 265 MW coal plant.

Education
- BS, Electrical Engineering, Power Systems, University of North Carolina, 1986

Professional Registration
PE - Electrical, 56613, FL, 2001
PE - Electrical, 27452, KY, 2010
PE - Electrical, 20779, MD, 1994
PE - Electrical, 6201059049, MI, 2012
PE - Electrical, 30724, NC, 2005

Professional Associations
- Institute of Electrical and Electronics Engineers (IEEE)

Year Career Started
1986

Year Started with B&V
1996

Office Location
Cary, NC

OUC | Stanton Energy Center, Units 1 and 2; FL
Electrical Project Design Engineer. Engineering and procurement to support the upgrade of the station's auxiliary electrical system, the wastewater treatment system, burner replacement, and scrubber upgrade of a two unit 460 MW coal fired plant. Work included the evaluation of the plant's auxiliary electrical system; addition of new reserve and main auxiliary transformers; and preparation of schematics, one-line diagrams, three-line diagrams, grounding, lighting, and specifications.

Oglethorpe Power Corporation | Oglethorpe Project; GA
Electrical Project Design Engineer. Conceptual design for a 100 MW biomass plant. Work includes plant arrangement; development of a one-line diagram; preparation of the boiler and steam turbine generator specification; turbine generator and boiler bid evaluation; and preparation of engineering, procurement, and construction (EPC) specification.

Saint Johns River Power Park (SJRPP) | SJRPP NO_x Reduction; FL
Electrical Project Design Engineer. Engineering and procurement of equipment to support the addition of an SCR to a two unit 650 MW coal fired power plant. The scope of work included upgrading the induced draft (ID) fans and replacing the existing ID fan motors and variable frequency drives with larger drives and motors; the addition of a new 480 volt secondary unit substation and 480 volt motor control centers; expansion of the station ground grid; and for new buildings and equipment, heat tracing design. Work consisted of preparing all equipment sizing calculations, one-lines, schematics for all the new equipment, specifications, and bid evaluations.

Northern Indiana Public Service Company (NIPSCO) | Bailly 7 Selective Catalytic Reduction (SCR); United States
Project Design Engineer. Engineering and procurement of equipment to support the addition of an SCR to a 150 MW coal fired power plant.

Northern Indiana Public Service Company (NIPSCO) | Bailly 8; United States
Project Design Engineer. Engineering for replacement of 480V switchgear.

Craig Stillman

Fire Protection

Craig Stillman is a fire protection engineer. Since joining Black & Veatch in early 2011, Craig has worked on a variety of projects including LNG, coal, and combined cycle plants. Craig now specializes in fire protection for the Water division projects. Using knowedge from previous work experience and on the job training Craig has been able to use his skills to provide the project with help meeting the dates and budget constraints for fire protection.

Education
Masters, Mechanical Engineering, University of Missouri at Columbia, 2010
Bachelors, Mechanical Engineering, University of Missouri at Columbia, 2009

Professional Registration
License, EIT, 2009

Year Career Started
2008

Year Started with B&V
2010

Office Location
Denver, CO

PROJECT EXPERIENCE

North River Waste Water Treatment Plant; United States
Fire Protection Engineer. Check drawings from highered fire subcontract and answer fire questions from project team. Perform future warehouse calculations and review 1968 New York Building Code.

Central Java; Central Java, Indonesia
Fire Protection Design. Responsibilities include system design of fire protection systems, writing fire hazard analyses, and running system calculations. Also, Craig participated in the procurement of materials.

D.E. Karn; United States; 2011-In-Progress
Fire Protection Design. Responsibilities include detailed system design of fire protection systems, writing fire hazard analyses, hydrant layouts, designing transformer firewalls, and running system, static, and pressure loss calculations.

Cambell 3; United States
Fire Protection Design. Responsibilities include detailed system design of fire protection systems, writing fire hazard analyses, hydrant layouts, designing transformer firewalls, and running system, static, and pressure loss calculations.

Ennore; India
Fire Protection Engineer. Help write fire protection philosophies, perform calculations, and help procure materials

Oklahoma Gas and Electric; Sooner; Oklahoma
Fire Protection Engineer. Responsibilities include detailed system design of fire protection systems, writing fire hazard analyses, hydrant layouts, writing specs, and running system, static, and pressure loss calculations.

Oregon Clean Energy; United States
Fire Protection Engineer. Responsibilities include detailed system design of fire protection systems, writing fire hazard analyses, hydrant layouts, designing transformer firewalls, and running system, static, and pressure loss calculations.

EchoWater; California
Fire Protection Engineer. Determine density and flow rate of BNR tunnel sprinkler system. Layout sprinklers and work with designers to get them put in the model for the client. Write a performance based spec.

Potash; Lima; Ohio; 2013-2014
Fire Protection Engineer. Analyze new systems/changes to see what types of detection is needed. Also, analying existing system to see where hydrants/monitors shoudl be added.

Tampa Electric; Teco; Florida
Fire Protection Design. Responsibilities include detailed system design of fire protection systems, writing fire hazard analyses, hydrant layouts, designing transformer firewalls, and running system, static, and pressure loss calculations.

Taiwan Power Company; Lungmen; Taipei City, Taiwan
Fire Protection Plant Assistance. Responsibilities include addressing problems that came up on site and fixing them, working with the client, and providing information back to the home office support team.

Wang Noi; Thailand
Fire Protection Design. Responsibilities include detailed system design of fire protection systems, writing fire hazard analyses, hydrant layouts, designing transformer firewalls, and running system, static, and pressure loss calculations.

Douglas LNG FEED; British Columbia, Canada
Fire Protection Design. Responsibilities include system design of fire protection systems, writing fire hazard analyses, writing fire pump specifications, and running system calculations. Also, Craig ran heat transfer calculation for pool fires in order to calculate the minimum distance for exposure protection for vessels.

EGAT; Chana; Thailand
Fire Protection Design. Responsibilities include detailed system design of fire protection systems, writing fire hazard analyses, checking transformer firewalls design, hydrant layouts, and running system calculations to ensure the existing pumps adequate.

Cameron; United States
Fire Protection Design. Responsibilities include system design of fire protection systems, writing fire hazard analyses, and running system calculations. Also, Craig participated in the procurement of materials.

Joe Stromwall, PE

Construction Manager

Joe Stromwall is an experienced Project Manager and Construction Manager and has successfully led project teams in the Mid-west and New York Metro region for more than 17 years. Joe has hands on experience in construction, design, regulatory compliance and permitting of complex and multi-disciplinary water, waste-water and industrial construction projects. Having spent the majority of his CM career focused on water and waste water facilities construction, Joe leads the Black & Veatch Program and Construction Management Group supporting water and waste water construction execution throughout North and South America.

Education

- MS, Civil/Environmental Engineering, Milwaukee School of Engineering, 2008
- BS, Architectural Studies, University of Wisconsin, 2002

Professional Registration

PE - 24GE04910400, NJ, 2001
PE - 089254-1, NY, 2001
PE - 40091-6, WI, 2001

Year Career Started

1999

Year Started with B&V

2013

Office Location

New York, NY

PROJECT EXPERIENCE

Toronto Water | Humber & Ash Bridges Bay WWTP's; Toronto, ON

Construction Support Lead. As the owners engineer for this project, Black & Veatch is responsible for Design & Construction management of over $500M in ongoing capital projects. Joe is responsible for field staffing, Constructability, Contract administration support and development of the project execution and QA/QC plan(s).

BHP Billiton | Escondita Water Supply – Desalination Plant; Antofagasta, Chile

Construction Support Lead. As the owners engineer for this project, Black & Veatch is responsible for Design & Construction Support & commissioning of over $1B in ongoing capital projects. Joe is responsible for field staffing, Constructability, Contract administration support and QA/QC plan oversight.

NYCDEP | City Water Tunnel No.3, Stage 2; New York, NY

Construction Manager. Joe Stromwall was the Construction Manager for the Construction of major clean water infrastructure providing additional capacity and redundancy for the potable water supply in Manhattan. This $250M project provided for installation and activation of large diameter piping, mechanical, HVAC electrical and process telemetry equipment at ten locations in New York in the Borough of Manhattan. This significant and historic public works project has required significant coordination and collaboration with local and state agencies as well as local business community members.

Parsippany-Troy Hills Wastewater Treatment Plant (WWTP) 16 MGD Redesign and Upgrade; NJ

Resident Engineer - CDM SMITH. Joe Stromwall was responsible for supervising construction, applications engineering, commissioning and startup activities on this multi-disciplinary project in which the Parsippany-Troy Hills WWTP was converted to a step-feed BNR process. The project included complete demo and replacement of the plant process air system, installation of backup generators, install of new motor control centers, extensive excavation, installation of large-diameter process piping and a new plant outfall. Numerous facility outages and in-plant diversions were necessary. Completed in 2012, the township of Parsippany-Troy Hills received a modern SCADA system and a treatment process with half the energy consumption compared to historical usage. The total construction value of this project was $27 million.

Milwaukee Metropolitan Sewerage District | Engine and Blower Upgrades Project; WI
Senior Project Manager - Milwaukee Metropolitan Sewerage District. Joe Stromwall was the Project Manager and on-site Construction Manager for the $30 million Engine & Blower Upgrades Project in which Bio-Gas generators, capable of providing 6 mW, were installed and existing engine blowers were replaced with electric blowers. In addition to the increased Co-Gen capacity, a key component of the project were modifications to the existing electrical distribution system at South Shore WWRF (Oak Creek, WI) which now allow the plant to continue operations independent of the local Utility and provide emergency back-up power. As the Project Manager, Joe Stromwall was responsible for design oversight, permitting and regulatory issues, budget, construction, and commissioning, start-up and turn-over of the system. In addition, he was in charge of a project team who successfully completed a 150MGD bypass, the largest planned construction-related flow diversion in history at MMSD.

Milwaukee Metropolitan Sewerage District | Milorganite Facility Improvements; WI
Resident Engineer - Milwaukee Metropolitan Sewerage District. Mr. Stromwall was responsible for coordinating and supervising construction, applications engineering, commissioning and start-up activities for the $5.6 million Milorganite Facility Improvements Project. The Basis of this project was to replace aging infrastructure in a drying and dewatering facility. During construction, Mr. Stromwall was actively involved in resolving material incompatibility issues and manufacturing defects in screw, elevator and belt conveyors.

Milwaukee Metropolitan Sewerage District | Jones Island and South Shore VFD Upgrades Project; WI
Asst. Resident Engineer - Milwaukee Metropolitan Sewerage District. Mr. Stromwall was responsible for coordinating and supervising construction, applications engineering, commissioning and start-up activities for the $3.1 million Jones Island and South Shore VFD Replacement Project. Under this project 30 variable frequency drives were replaced and 30 pumps, from 10 hp to 200hp, were replaced at the 300MGD Jones Island water reclamation facility (Milwaukee, WI) and the 300 MGD South Shore Water Reclamation Facility (Oak Creek, WI). This VFD Upgrades Project was complimentary to an ongoing comprehensive SCADA system upgrade integrated the controls for the affected processes into the new SCADA system.

Milwaukee Metropolitan Sewerage District | Acid Tank Replacement Project; WI
Resident Engineer - Milwaukee Metropolitan Sewerage District. For the Acid Tank Replacement Project, Mr. Stromwall was responsible for supervising construction, commissioning and startup activities related to replacing six 80,000 gallon Pickle Liquor tanks with new FRP tanks. During construction of this $2 million project, Mr. Stromwall implemented an improved sequence of construction which allowed plant operations the flexibility of continuous feeding of Ferric and Ferrous chloride and Ferrous sulfate to the secondary plant.

Jon Swarts, PE

QA/QC - Structural

A senior structural engineer with Black & Veatch, Mr. Swarts is the Facilities Design Department Staffing Coordinator for Black & Veatch Water Global Engineering Services. He has many years of experience in structural analysis and design, specification preparation, construction phase services, business development and project management.

PROJECT EXPERIENCE

New York Department of Environmental Protection | North River WWTP - Cogeneration and Electrification Project NR-38; New York, NY
QA/QC Structural Engineer. Provide quality assurance and quality control for the structural design of the miscellaneous improvements at the Riverbank State Park and the North River Wastewater Treatment Plant.

New York Department of Environmental Protection | North River WWTP - Riverbank State Park Power Feed CONTRACT NR-44; New York, NY
QA/QC Structural Engineer. Provide quality assurance and quality control for the structural design of the new electrical substation supporting the Riverbank State Park and the North River Wastewater Treatment Plant.

New York Department of Environmental Protection | Wards Island Bar Screen Replacement CONTRACT WI-280; New York, NY
Structural Engineer of Record. Structural engineer in responsible charge for this existing bar screen replacement project. The existing channels were modified as required to accommodate the new bar screens and other process improvements.

Beaver Water District | Chlorine Dioxide Facility; Lowell, AR
Lead Structural Engineer. Led the structural analysis, design and preparation of construction documents for a masonry shear wall, steel bar joist roof structure with specific client requests regarding roof framing and wall construction. Worked closely with a local architect as directed by the client to design a structure that would closely match the other structures of the facility.

AquaSure | Victorian Desalination Project; Melbourne, Australia
Structural Engineer. Assist with the structural design and preparation of construction documents for structures within the Lime Treatment and Sludge Process area for the 108MG Desalination Plant.

Little Blue Valley Sewer District | WWTP Conveyance System Improvements; Independence, MO
Lead Structural Engineer. Design of new incinerator building as part of the district's conveyance system improvements. Lead design of entire building, including the structural steel roof diaphragm, two irregular interior mezzanine levels and the four story interior volume.

Harford County | Sod Run WWTP ENR Upgrade; Harford County, MD
Structural Engineer. Responsible for managing the work assignments and coordinating the design efforts of the seven-filter, denitrification structure and adjacent filter feed pump station.

Education
- MS, Civil Engineering, Montana State University, 1996
- BS, Civil Engineering, Montana State University, 1994
- BA, Mathematics, Carroll College, 1994

Professional Registration
PE - 2011, NY, 16 090042
PE - 2011, NC, 37240
PE - 2011, SC, 28478
PE - 2000, KS, 16016
NCEES

Professional Associations
- American Society of Civil Engineers (ASCE)

Year Career Started
1996

Year Started with B&V
2009

Office Location
Kansas City, MO

City of Durham | Brown WTP Upgrade and Expansion; Durham, NC
Lead Structural Engineer. Design of new two-story administration building. Building is to be LEED certified. Performed design of entire building, including an exterior green roof garden area, structural steel stud walls with brick veneer, steel post and beam framing, steel joist floor and roof framing and concrete foundations.

Kentucky Lock Addition Upstream Monoliths; Tennessee River
Structural Engineer. Assisted with the design efforts of the new 1200 foot long monolithic concrete navigation lock adjacent to the existing 600 foot long navigation lock on the Tennessee River.

Larimer County | Carter Lake Hydroelectric Project; Larimer County, CO
Lead Structural Engineer. Designed a new masonry shear wall, steel bar joist roof powerhouse structure with associated access bridge and substation. Lead structural design including the design of the interior loading dock and the design of the interior 25-ton bridge crane.

Merwin Dam Upstream Collection and Transport Facility, Lewis River Fish Passage
Structural Engineer. Designed a new 75 foot tall structural steel lift structure as part of a larger collection and transport system. Performed design of entire steel superstructure and analyzed the capacity of the existing dam concrete substructure.

PRIOR EXPERIENCE

Page McNaghten Associates; Fairway, KS
Senior Project Manager. Developed and reviewed design concepts and supervised project engineers for a structural consulting engineering firm. Scope of work included structural project management, business development, client relations and structural analysis and design. Projects included an 18-story cast-in-place concrete condominium tower, conference centers, hotels, schools, office buildings, parking garages, and numerous structural renovations. Structural engineering experience included designing with steel, concrete, masonry, and wood.

Walter P. Moore / Kerr Conrad Graham; Kansas City, MO
Structural Project Engineer. Served as Structural Project Engineer managing projects from design development through final walk through. Projects included schools, stadiums, office buildings, parking garages, churches, justice and detention centers and numerous structural renovations. Structural engineering experience included designing with steel, concrete, masonry, and wood. Worked directly with clients to prepare construction documents, structural calculations and specifications. Verified all shop drawings and performed all structural construction administration.

Jeff D Szymanski, PE, INCE Bd Cert

Noise Study

Jeff D. Szymanski is the Acoustical Consulting Services Manager and Senior Acoustical Engineer within Black & Veatch's global energy business. Szymanski's team provides design and engineering support for projects across all Black & Veatch divisions and service areas. Projects include power generation facilities, electrical substations, water/wastewater treatment facilities, pump stations, refinery/petrochemical plants, and manufacturing facilities. Szymanski's experience includes projects throughout the United States as well as China, Mexico, the United Kingdom, Thailand, and Vietnam.

Projects range from small consulting projects to large engineering, procurement, and construction (EPC) projects. Responsibilities include facility noise modeling, noise regulation reviews, community noise evaluations, environmental noise assessments, permitting/site certification studies, room acoustics design, architectural sound isolation design, and building systems noise control.

Before joining Black & Veatch, Szymanski worked in the manufacturing and consulting industries. While in manufacturing, he designed acoustical treatment products and assisted with their installation and implementation in various facilities all over the world. Szymanski designed sound isolation and room acoustics for hundreds of recording studios, as well as for award-winning residential cinemas, concert halls, performing arts centers, auditoriums, schools, museums, and churches. Prior to working in the manufacturing industry, he gained extensive experience in consulting for architectural acoustics and noise control projects. Szymanski conducted environmental noise studies; conducted industrial noise exposure studies; managed a noise control monitoring program for a major U.S. airport; and designed noise control for large building heating, ventilating, and air conditioning (HVAC) systems.

Szymanski has written many papers and articles for professional journals and trade publications; given numerous presentations on acoustics and noise control at various levels; contributed to acoustics textbooks; and chaired paper sessions for and participated in technical committee activities of the Acoustical Society of America. He holds two U.S. patents for acoustical treatment products.

Education
- Masters, Engineering General, Acoustics, Pennsylvania State University, 2016
- Bachelors, Engineering General, Acoustical Engineering, Purdue University, 1995

Professional Registration
PE - Mechanical, 10200494, IN, 2002

Professional Associations
- Institute of Noise Control Engineering - Board Certified
- Acoustical Society of America

Year Career Started
1995

Year Started with B&V
2006

Office Location
Overland Park, KS

PROJECT EXPERIENCE

NYCDEP | Oakwood Beach WWTP EO-2022 Electrical Upgrades (OB-136-DES-CM); NY Acoustical Engineer. Black & Veatch was engaged to study the existing 2000 kW portable engine-generator being used at the project site and identify modifications required to replace it with a 1500 kW standby engine-generator. The study included ISO sound level measurements of the existing portable engine-generator and environmental sound level measurements during its operation. Acoustical upgrades were recommended to ensure the future standby engine-generator would comply with applicable New York sound level limits.

NYCDEP | North River WWTP Cogeneration & Electrification (NR-COGEN-DES); NY Acoustical Engineer. Black & Veatch was engaged to provide engineering services for cogeneration upgrades at the North River WWTP facility. The interior sound levels for the engine room and blower room were modeled and analyzed with respect to project and regulatory requirements. Acoustical requirements were developed for equipment and for building interior finishes.

Eastern Municipal Water District | Perris and Elder Booster Pumping Station; CA
Acoustical Consulting Services Manager. Black & Veatch was engaged for the design of a replacement booster pumping station (BPS). As part of the design, an acoustical analysis was performed to identify various equipment sound sources, develop acoustical mitigations measures, and to ensure that the project will be in compliance with regulatory requirements. The analysis included an acoustical model that estimated the anticipated BPS environmental sound levels during normal operation and during emergency operating conditions, and recommended acoustical mitigation measures to ensure compliance with regulatory sound level limits.

DTE Energy | Pinnebog Wind Park; MI
Acoustical Consulting Services Manager. Black & Veatch was engaged to provide permitting and engineering support for a new wind park in the Michigan Thumb area. The wind park was permitted to include 30 wind turbine generators in rural Huron County, Michigan. A sound level survey was coordinated to determine the existing acoustical conditions at residences potentially affected by the project. An acoustical model of the wind farm was developed and the modeling results were analyzed with respect to applicable noise regulations. Wind turbine commissioning measurements were coordinated and completed to evaluate noise reduction requirements. Post-construction compliance testing was coordinated to evaluate completed project sound levels against regulatory requirements.

Oregon Clean Energy | Oregon Clean Energy Center; Ohio
Acoustical Engineer / Acoustical Consulting Services Manager. Black & Veatch provided engineering, procurement, and construction services for a new combined-cycle facility in Ohio. Managed detailed acoustical analysis and design to ensure the project complied with far-field sound level limits. Completed noise performance testing to verify compliance.

NYCDEP | Tallman Island WWTP; NY
Acoustical Engineer. Black & Veatch was engaged to evaluate noise from a bank of transformers at a wastewater treatment plant in New York, New York. A sound level survey was completed and environmental sound levels were compared to the applicable regulatory limits. Near-field transformer sound levels were measured and building architectural features were evaluated to ascertain the main cause of the noise problem.

Enmax | Shepard Energy Center; Alberta, Canada
Acoustical Engineer. Black & Veatch was engaged to provide EPC services related to the construction of an 800 MW 2-on-1 combined cycle power plant facility in Calgary, Alberta, Canada. Specifically, the noise emissions were evaluated to facilitate meeting the contractual noise limits. The new installation included two combustion turbines and heat recovery steam generators (HRSG), a steam turbine generator, a wet mechanical draft cooling tower, and ancillary supporting equipment. Facility noise modeling was performed, and the noise emissions were assessed to maintain compliance with the contractual noise limits. Control of noise for some equipment components required the development of detailed acoustical designs and specifications. Extensive noise emissions tests were completed to verify facility compliance with the contractual limits.

EGAT | Wang Noi 4 Combined Cycle Power Plant; Thailand
Acoustical Engineer. Black & Veatch was engaged to provide EPC services related to the construction of a 2-on-1 combined cycle power plant facility near Ayutthaya, Thailand. Near-field sound levels were measured and evaluated for several cooling system components, including the cooling tower, and the circulating water pumps and enclosure. Detailed acoustical analyses were completed to verify compliance with contractual noise guarantees.

Steve Tarallo, ENV SP

Project Director

Steve serves as a Client Services Director within Water Division. Steve has over 25 years' experience in municipal water and wastewater treatment R&D, design, and project development. He has been involved in a wide variety of environmental engineering solutions, from water treatment technology selection and design to wastewater collection system odor/corrosion control to advanced wastewater process design to biosolids processing and disposal evaluations. His technical responsibilities have included assessment of treatment deficiencies, development and selection of treatment process alternatives, energy optimization studies, renewable energy alternative evaluations, greenhouse gas emissions inventories, life cycle analyses, life cycle cost estimating, and sustainability assessments.

Steve's broad technical background, work experience, and business acumen has provided him with the ability to gain deep understanding of clients' operational and financial needs and challenges. He has a strong ability to understand the interrelationship between regulatory, community, technological, financial, and managerial issues, and to apply a variety of tools, methods, and resources to develop sound, cost-effective, and sustainable solutions for clients.

Education
- Executive Master of Business Administration, Business Administration, College of William & Mary, 1999
- BS, Mechanical Engineering, Villanova University, 1989

Professional Associations
- Water Environment Federation

Year Career Started
1994

Year Started with B&V
2007

Office Location
Maryland

PROJECT EXPERIENCE

NYCDEP | Reconstruction of Manhattan, Bronx Grit Screens at Wards Island Water Pollution Control plants (WPCP); New York, NY

Project Director. Overall responsibility to client for delivery of pre-design and design services for the replacement of eight (8) bar screens at the Wards Island WPCP Headworks Facilities located at the Bronx and Manhattan Grit Chambers. The Bronx (369 mgd) and Manhattan (182 mgd) grit chambers provide preliminary treatment of CSO flows prior to the Wards Island WPCP.

NYCDEP | Oakwood Beach WPCP Primary Power Distribution Transformers Replacement; New York, NY

Project Director. Overall responsibility to client for delivery of design and construction management services to replace the primary power distribution transformers.

NYCDEP | North River Wastewater Treatment Plant Cogeneration and Electrification Improvements Facility Plan; New York, NY

Project Director. Overall responsibility to client for delivery of project scope including replacement of the existing dual fuel engines with electric motors and associated improvements to the electrical system. New engine generators will be utilized to supply 10 MW of power to the plant burning digester gas and natural gas. Heat will be recovered from these units for use onsite.

NYCDEP | North River Waste Water Treatment Plant Cogeneration and Electrification Project; New York, NY

Task Leader for Energy Profile. Responsible for documenting Energy Profiles and conducting energy/GHG performance analysis for the North River WWTP before and after electrification of the main sewage pumps and aeration blowers, installation of engine generators (12 MW total), and various digester and heat recovery improvements. Energy Profile documentation will be maintained and updated throughout the detailed design process. Design alternative

evaluations will be summarized to the extent that the alternatives address equipment, systems, methods, or operating procedures that will reduce energy consumption, increase energy efficiency, and decrease GHG emissions.

Regional Municipality of York | Pre-Design, Detailed Design, Contract Administration, and Site Inspection Services for the Water Reclamation Centre, York Durham Sewage System Modifications, and Total Phosphorus Off-setting Program; Ontario, Canada
Technical Expert Panel – Sustainability. Serving as member of the project's Technical Expert Panel for Sustainability. Development of and participation in Sustainability workshops. Application of Envision™ sustainability framework to assess the alignment of sustainability principles with the planning, design, and construction of a new 40 mega-liter per day Water Reclamation Centre (WRC).

Washington Suburban Sanitary Commission (WSSC) | Strategic Energy Plan; Laurel, MD
Technical Director. Responsible for content development for WSSC's comprehensive 10-year strategic energy plan covering energy efficiency, load management, renewable energy, and energy supply. Project included development of strategic energy goals, key performance indicators, strategic energy objectives, and supporting projects and initiatives. Integration of the energy management program with WSSC's new asset management program was a key part of the project, as well as development of performance measurement and tracking framework and IT support systems.

City of Hollywood Department of Public Services | Energy Efficiency Master Plan; Hollywood, FL
Technical Director. Responsible for identifying and coordinating decision frameworks, tools, models, and professional staff resources to deliver a comprehensive, integrated energy efficiency master plan to help City of Hollywood Department of Public Services achieve significant reductions in the usage and cost of energy at its water and wastewater treatment plants, distribution and collection pumping facilities, and water and wastewater treatment facility buildings.

Water Environment Research Foundation | Project No. ENER1C12 Energy Balance and Reduction Opportunities, Case Studies of Energy-Neutral Wastewater Facilities and TBL Research Planning Support; Alexandria, VA
Co-Principal Investigator. Led multi-disciplinary research team to investigate energy efficiency and production opportunities that achieve energy neutral wastewater treatment. The project develops baseline energy flows for common WWTP process configurations, including opportunities for demand reduction, energy efficiency, and energy recovery; compiles energy neutral (or near neutral) WWTP case studies from throughout the world; and identifies sustainable options for managing biosolids through a triple bottom line assessment of diverse technical and management approaches.

S Earl Tast, PE

Superstructures Design Manager

Mr. Tast was recently given the title as Chief Structural Engineer of the America's Water Division. He has over 30 years of experience as a civil and structural engineer. The majority of his work has been involved with structural design of heavy civil projects focusing primarily on numerous water and wastewater treatment facilities. His experience also includes the design of small dams and spillways; transportation related structures, storm water drainage structures; and municipal work such as street design, swimming pools and sports parks.

In addition to being a senior design engineer in the Kansas City office Mr. Tast provides conceptual and preliminary designs to our regional offices for water/wastewater structures, supervises the work of junior engineers, performs quality reviews, writes project specific specifications and establishes design fee estimates. Mr. Tast has been involved with special designs on retrofit and emergency projects requiring solutions that are readily constructible and cost effective. He works with our Mumbai office to facilitate the design and drafting for many his projects. He has also participated in several Value Engineering studies including projects for the NYC-DEP and has provided structural assessments for several of the DEP facilities.

Education
- BS, Civil Engineering, Transportation, Structural, Water/Wastewater, University of Nebraska, 1985

Professional Registration
PE - 12325, KS, 1991
PE - 51502, MN, 2011
PE - 16848, NE, 2017
PE - 10810, ND, 2017
PE - 093592, NY, 2014
PE - 15859, OK, 1989

Professional Associations
- American Society of Civil Engineers

Year Career Started
1985

Year Started with B&V
2013

Office Location
Kansas City, MO

PROJECT EXPERIENCE

NYCDEP | North River Wastewater Treatment Plant - NR38 Co-Generation and Electrification Project; New York, NY

Lead Structural Engineer. Structural design of oversight for the main contract at the North River WWTP facility. The project encompasses several sub-projects at the facility under one umbrella. Mitigation projects resulting from Super Storm Sandy include the partial closure of half-moon shaped openings of the facility along the Hudson River, retrofitting doorways for water tightness and the replacement of several thousands of feet of expansion joints. Renovation work includes the demolition and replacement of blowers, electrical switchgears, motors, pumps, etc.

NYCDEP | North River Wastewater Treatment Plant - NR-44 Co-Generation Facility; New York, NY

Lead Structural Engineer. Structural design and oversight of new electrical substation supporting the Riverbank State Park and the North River Wastewater Treatment Plant in Manhattan. Currently the power supply to the park is obtained from the North River WWTP and sub-metered for usage and billing. This project will separate the park electrical service from North River WWTP giving the park a more reliable electrical supply dedicated to loads at the park independent of the plant.

NYCDEP | Oakwood Beach WWTP - OB-136; New York (Staten Island), NY

Lead Structural Engineer. Structural design and oversight of a new electrical service building and transformer bays housing a 33kv entrance switchgear, 5kV switchgear and two 33kv-4.16kV transformers. The brick and block structure is located at the Oakwood WWTP originally constructed in 1956. The design aesthetic will match recently constructed buildings off-site.

WaterOne of Johnson County | Hansen Water Treatment Plant - Ozone Facilities; Kansas City, KS
Lead Structural Engineer. Structural design and oversight for the replacement of the chlorine dioxide generation and feed system with an ozone generating facility including liquid oxygen storage area, ozone pipeline contactors, ozone residual analyzer buildings. The project also includes modifications to two clear wells and improvements to the chlorine and ammonia feed systems.

DC Water | Blue Plains Secondary Treatment Upgrades; Washington, DC
Structural Engineer. This project includes modifications and new structures to upgrade the facility. Mr. Tast started as staff structural engineer on the project and moved into the lead structural engineer role upon the retirement of his predecessor. With a construction cost of $130 million, the Blue Plains Advanced Wastewater Treatment Plant in Washington, DC includes the six cell bio-reactor basin with the option to construct three additional cells. The structure includes a pipe gallery between reactor cells, an elevated blower room, and overflow pumping capabilities. A specialized design constraint was the proximity of the water table adjacent to the structure being close to the Potomac River. Monitoring wells combined with a pressure relief system to flood empty cells will be used in conjunction with concrete ballast slabs under the foundation slabs of dry pit structures such as the pipe gallery and pumping room to mitigate the presence of higher than normal groundwater. Construction is expected to begin in 2014.

City of St. Petersburg | Southwest WRF Generator and Electrical Improvements Project; St. Petersburg, FL
Lead Structural Engineer. Structural design and oversight of electrical service building and elevated pad for two new natural gas fueled engine generators and the relocation of two existing diesel fueled engine generators. The service building and pad will be set above the 100-year flood level. This project is part of a multi-phase approach to replace or upgrade the overall facility. The Southwest Water Reclamation Facility (WRF), built in the 1950s, is one of four facilities operated by the City.

City of Lawrence | Wakarusa Wastewater Treatment Plant; Lawrence, KS
Lead Structural Engineer. Structural design and oversight of a new 5MGD treatment facility including headworks, Biological Nutrient Removal (BNR) basins, two 95' diameter final clarifiers, Ultra-Violet (UV) disinfection building, Solids Thickening building, flow splitter structures, administration building and various ancillary items. Preconstruction activities included the placement of 25 feet of soil surcharge on the site to pre-consolidate site soils and raise the site above the 100-year flood level. The project also includes renovations to the Kansas River WWTP administration building and clarifiers tanks and a new off-site pumping station.

Andrew J Truman, PE

Power Distribution; NFPA 820 Expert

Andrew Truman started with B&V as an electrical engineering college graduate in May 2002. Andrew has performed the roles of design engineer, lead engineer and is currently a senior engineer and electrical department team leader. Andrew has been involved in study, detailed design and construction phases of numerous new and existing water and wastewater treatment facility improvement projects and has internally recognized expertise in electrical distribution systems, electrical generators, motor controls, electrical code and NFPA 820 standard compliance as well as electrical design in corrosive and hazardous areas. He is currently responsible for determining the design criteria for the electrical portion of each assigned project as well as production of the accompanying pre-design reports. He is also responsible for leading design teams in the production of construction documents detailing power distribution, motor control and instrumentation systems. Andrew is an experienced, dedicated and driven professional capable of taking on complex project work, developing innovative and efficient electrical design concepts and leading a detailed design team following the design through the construction phase.

Education
- Bachelors, Electrical Engineering, Power, University of Missouri - Columbia, 2002

Professional Registration
PE - Electrical, 19820, KS, 2007
PE - Electrical, 24GE04856600, NJ, 2010
PE - Electrical, 21283, NV, 2011
PE - Electrical, 85838PE, OR, 2011

Professional Associations
- National Fire Protection Association
- American Society of Mechanical Engineers - PTC-13 Standards Committee - Associate Member

Year Career Started
2002

Year Started with B&V
2002

Office Location
Kansas City, MO

PROJECT EXPERIENCE

New York Department of Environtmental Protection (NYCDEP) | Oakwood Beach WWTP Transformer Replacement (OB136-DES-CM); Staten Island, NY

Senior Electrical Engineer. Project involved the design of a new high tension service to replace the existing utility service transformers which are at the end of their useful life. 33 kV primary and 5 kV secondary switchgear as well as a new electrical service building were included to upgrade the entire existing plant service to meet the requirements of the latest version of Con Edison's EO-2022 High Tension Service Specification requirements. Personal project responsibilities included coordination of other disciplines to support the electrical work, development of technical memoranda evaluating design and electrical equipment selection, development of preliminary design criteria and report documentation, supervision of electrical design team responsible for production of all electrical design documents.

NYCDEP | North River WWTP Cogeneration & Electrification (NR-COGEN-DES); New York, NY

Electrical Discipline Lead Engineer. Electrical scope of this large plant improvements project involved significant electrical upgrades including ConEd 15kV service feeder upgrades, additional in-plant 5kV distribution, 5kV metal-clad switchgear and integration of 15MW worth of engine-generators designed to operate in a cogeneration arrangement as well as provide standby power for the entire plant. Additional project electrical work included replacement of the existing reciprocating engines with electric motors for main sewage pumps which were 1,850 hp wound rotor motor units. Design of a custom resistor bank type motor controller for the purpose of speed control for these units was also included. Low-voltage electrical improvements included a new process air blower facility with nine 350-HP high-speed gearless turbo-blowers which required two new unit substations as well as a new low-voltage service from ConEd to support Riverbank State Park located on top of the facility. Personal project responsibilities included developing technical memoranda on electrical distribution and motor design options, coordination with electric utility, coordination with

engine-generator manufacturer via preselection contract process, on-site design investigations during preliminary and detailed design, authoring of electrical calculations including short-circuit coordination study, supervision of electrical design team responsible for production of all electrical design documents.

NYCDEP | North River WWTP Riverbank State Park Power Feed (Advanced Contract of NR-COGEN-DES; NR-44); New York, NY

Senior Electrical Engineer. Project involved the design of a new high tension feeder derived from ConEd low tension services to replace the existing in-plant distribution to the adjacent state park. 120/208V primary service switchgear, step-up transformers and 5 kV secondary switchgear as well as a new electrical service building were included to create a new suitable independent electrical service for the park. Personal project responsibilities included coordination of other disciplines to support the electrical work, development of technical memoranda evaluating design and electrical equipment selection, development of preliminary design criteria and report documentation, supervision of electrical design team responsible for production of all electrical design documents.

NYCDEP | Oakwood Beach WWTP Power Distribution Improvements (OB-134-DES); Staten Island, NY

Senior Electrical Engineer. Project involved the design of in-plant electrical distribution equipment to replace existing equipment at the end of its useful life. Equipment replacement scope included 5 kV secondary switchgear, dry-type transformers and 480V motor control equipment. Project involved extensive study and conceptual design activity as well as in depth NFPA 820 analysis to allow replacement electrical installations to conform to current NFPA standards in a facility not originally designed and built to conform to these safety standards. Personal project responsibilities included evaluation of record drawings for NFPA 820 compliance, development of conceptual electrical designs, authoring of investigational study documents, development of technical memoranda evaluating design and electrical equipment selection, development of preliminary design criteria and report documentation, supervision of electrical design team responsible for production of all electrical design documents.

City of Olathe | Cedar Creek WWTP Phase 1 Improvements; Olathe, KS

Lead Electrical Engineer & Engineer of Record. Project involved expansion of an existing wastewater treatment plant to 6 mgd with, provisions to expand to 10 mgd, utilizing an activated sludge BNR process. Electrical scope included new 12.47kV utility service, 5kV medium-voltage electrical distribution system, 5kV standby diesel engine-generator, several new buildings and processes with provisions for future expansion, and retrofitting of existing facilities for reuse. Personal project responsibilities included authoring predesign electrical documentation and reports, on-site investigation for NFPA 820 compliance and existing electrical facilities condition assessment, assuring all project deliverables were produced for each project milestone submittal, production of many detailed design documents and calculations, coordinating with City and local utility, construction phase design support throughout construction.

Dennis Trupka, RA NCARB

Architectural

Mr. Trupka is a design architect for laboratory, water, and wastewater projects. His experience as a project architect and a design architect includes 37 years of design of municipal and commercial buildings. He has been involved in programming, design, construction drawings, specification writing, finish selections, construction observation, and facility assessments.

PROJECT EXPERIENCE

New York Department of Environmental Protection (NYCDEP) | North River WWTP Riverbank State Park Power Feed (Advanced Contract of NR-COGEN-DES, NR-44); New York, NY
Project Architect. Performed a quality control review of the architectural design.

New York Office of Management and Budget | Hunts Point WWTP Digester Facilities; New York, NY
Project Architect. Participated in a value engineering review of the digester replacement project. Mr. Trupka developed and evaluated several architectural alternatives to reduce costs of the project, increase safety, and improve the visual impact of the project.

NYCDEP | Capital Project WP-112 Emergency Response Restoration & Reconstruction; New York, NY
Project Architect. Provided a code review and life safety evaluation of the whole North River WWTP in order to secure an occupancy permit.

City of Olathe | Cedar Creek WWTP; Olathe, KS
Project Architect. Provided architectural design for the Control Building remodel and new headworks, sludge pumping station, blower building, and chemical feed building. The masonry buildings were load bearing structures and had hollow core roof slabs or steel and metal deck roof structure. Design was done on a fast track schedule.

MWD of Southern California | Greg Ave Pressure Control Structure; Los Angeles, CA
Project Architect. Mr. Trupka is the lead architect for the New Control Building. The 2,300 square foot building will be built on a very tight site. The masonry building has a low-key appearance with a steel framed flat roof.

Gwinnett County DMR | Sunny Hill Booster Pumping Station; Gwinnett County, GA
Project Architect. Mr. Trupka is the lead architect for the 6,100 square foot booster pumping station. The building is very similar to a pumping station Mr. Trupka designed for the same client in 2002. The walls are color banded CMU. The building has a steel frame and a steeply sloped standing seam metal roof. The steel frame also supports the bridge crane for the pumps.

City of Lawrence | Wakarusa WWTP; Lawrence, KS
Project Architect. Mr. Trupka is the lead architect for the five process buildings on this green-field site. The buildings include Headworks, Chemical Feed & Storage, Final Sludge PS, UV Disinfection, and Solids Thickening. All buildings are have a brick and stone exterior. Interior walls are maintenance-free glazed block. The Headworks Building has a concrete frame and the other buildings have load bearing masonry walls.

Education
- BA, Architecture, Kansas State University, 1980

Professional Registration
RA - 11864, CT, 2009
RA - AR 94845, FL, 2009
RA - 6139, IA, 2008
RA - AR-985007, ID, 2008
RA - AR10800146, IN, 2013
RA - 2987, KS, 1985
RA - A-2009030403, MO, 2015
RA - 10077, NC, 2005
RA - 1801, ND, 2008
RA - 21AI01977000, NJ, 2014
RA - 36913, NY, 2014
RA - 7041, NV, 2013
RA - ARC0814734, OH, 2008
RA - RA404741, PA, 2009
RA - 4074, WV, 2008

Professional Associations
- National Council of Architectural Registration Boards

Year Career Started
1979

Year Started with B&V
1990

Office Location
Kansas City, MO

Irvine Ranch Water District | Michelson Water Recycling Plant Biosolids and Energy Recovery Facility; Irvine, CA
Project Architect. Mr. Trupka was the lead architect on the design of the solids handling facility and the digester complex estimated to be a $100 million dollar project. The solids handling is a two story building housing both process areas and personnel areas. The personnel spaces include a laboratory, a control room, restrooms, locker rooms, and a break room. The building houses centrifuges, a dryer, and a truck load-out facility. The digester complex includes a digester building, three egg digesters, a seventy foot tall access tower, and access bridges to the egg digesters. All structures have a high-tech appearance with exteriors of masonry and metal panels. Mr. Trupka is currently the lead architect for the Construction Phase Services.

City of Fargo | Fargo Membrane WTP and Improvements; Fargo, ND
Project Architect. Mr. Trupka is the lead architect on the design of a 55,000 square foot membrane plant addition to the Fargo WTP. Mr. Trupka was the lead architect on the original 120,000 water treatment plant constructed in 1993. The expanded plant will be surrounded by residential neighborhoods. The client was very pleased with the original building and wants a consistent look for the new membrane plant. The brick and block expansion will feature cast stone accents and large arched windows. All silos and building mechanical equipment will be concealed within penthouses.

City of Olathe | Hedge Lane Pump Station & Reservoir; Olathe, KS
Project Architect. Mr. Trupka was the lead architect on the design of a 12,000 square foot pumping station. The pumping station was designed to meet the growing water demands for the District through the year 2050. The masonry and rough cast stone exterior of the building fits well into the rural landscape of the site.

City of Leavenworth | Leavenworth WWTP UV Disinfection Improvements; Leavenworth, KS
Project Architect. Provided architectural design for the addition and reuse of an existing chlorine building. The existing building was converted to storage and an addition was placed over the existing contact basins converting them to UV channels for disinfection. The new structure was load bearing masonry with double tee roof slabs. A project challenge was to use deeper double tees while still matching the height of the existing building.

Cape Fear Public Utility Authority | ESMD Building; NC
Project Architect. Designed a 12,000 SF building that will house the water and wastewater laboratories for the overall Authority and office space for the other staff of the Environmental Services Management Division.

City of Sioux City | Southbridge Regional WTP; Sioux City, IA
Project Architect. Lead architect for new water treatment plant. The plant was designed on a fast track schedule and will be a catalyst for development of the industrial office park. In addition to process areas, the plant included a laboratory and other personnel spaces. The precast concrete wall panels are very decorative and give an upscale appearance to the inexpensive construction. The building emphasizes energy efficiency with highly insulated walls and a highly insulated reflective white roof. The construction took only 18 months rather than the traditional 30 months.

City of Durham | Brown WTP Upgrade and Expansion; Durham, NC
Project Architect. Designed a two story administration building to meet LEED Sliver certification. The contemporary building with "green" design concepts will elevate the utilities' public image. The building will make use of a unique energy efficient wall construction, natural light, a roof garden, a highly reflective roof, water reuse, high efficiency lighting, and water source heat pumps. The project also includes a new chemical building, a filter building expansion, and an operations building remodel.

Cape Fear Public Utility Authority | Sweeney WTP Expansion; Wilmington, NC
Project Architect. Lead architect for the expansion facilities including new administration building, operations center, and chemical building expansion. All buildings were connected and required special consideration for fire ratings. The veneers were brick and prairie stone supported by concrete block.

Patricia K Forgang, CHMM

Permitting

CDM Smith

Ms. Forgang has over 30 years of experience in regulatory permitting and compliance of a variety of projects, including municipal and industrial wastewater, water supply, infrastructure (dams and bridges), a recreational park, solid waste and hazardous waste operations, as well as project management of multi-faceted and complex contaminated site cleanups, and design/build projects. Ms. Forgang has assisted a variety of public and private clients to comply with the Clean Water Act, including the Pollutant Discharge Elimination System; the Resource Conservation and Recovery Act (RCRA); the Toxic Substances Control Act (TSCA); the Clean Air Act; underground storage tanks (USTs); and specific to New Jersey, the Industrial Site Recovery Act (ISRA), as well as all Division of Land Use Regulation (DLUR) permit matters involving freshwater and coastal wetlands, flood hazard areas, coastal areas, stormwater management, threatened and endangered species, cultural resources, and Category One waters. These projects encompass regulated discharges to groundwater, surface water, and air, and hazardous and solid waste landfill design, construction, and operations, and large-scale facility design/build projects.

PROJECT EXPERIENCE

PVSC | Standby Power Plant Project Services, Newark, NJ

Permitting Task Manager. As a subconsultant, to Black & Veatch, CDM Smith is providing site investigative, permitting, design and DSDC for the construction of a Standby Power Plant. The 34-megawatt plant that will power the entire PVSC wastewater treatment process during a power outage. Ms. Forgang is leading permitting services for the project, which has included updating the facilities Title V air permit, NJDEP DLUR Permit updates, Soil Erosion and Sediment Control Certification, Essex County Regional Health, FAA No Hazard to Air Navigation, New Jersey Department of Community Affairs and the State Comptroller Review. CDM Smith is responsible for the civil design of the facilities, which includes a Site Preparation Contract to be implemented before the construction of the Standby Power Plant, for which existing abandoned subsurface facilities will be demolished and a retaining wall to protect a bridge abutment will be installed. For the Standby Power Plant design, CDM Smith will be responsible for the civil site design work including site drainage, grading and final restoration.

Somerset Raritan Valley Sewerage Authority (SRVSA) | Mercury Emission Control System; Bridgewater, NJ

Permitting. Ms. Forgang is leading the permitting efforts for the evaluation, design, and construction services supporting mercury emission control system for the SRVSA's incinerator.

Linden Roselle Sewerage Authority (LRSA) | Design and Bidding Services for the Rehabilitation of the Main Street Pumping Station; Linden, NJ

Permitting Task Manager. For LRSA, Ms. Forgang provided permitting support for upgrades to LRSA's Main Street Pumping Station (MSPS), originally constructed in 1948, which suffered flooding during Superstorm Sandy, resulting in a failure in the backup generator. To update the MSPS, CDM Smith assisted with several improvements including the demolition of existing ejectors and associated mechanical equipment; addition of two submersible pumps and discharge piping and fittings; structural modifications to the wet well, first floor and roof; additional of stairway access on the eastern side of the pumping station; relocation and the replacement of the station's generator above the FEMA's designated base flood elevation; various electrical and instrumentation modifications; replacement of the station's 8-inch force main; and improvements to the discharge manhole. Ms. Forgang led permitting tasks and was integral in assisting the LRSA in obtaining FEMA funding which financed approximately 90% of this project. She assisted the Authority and the City of Linden Office of Emergency Management by preparing the application, the necessary figures and cost estimates. (FEMA Project Grant #176;S#2099).

Education
- BS, Chemical Engineering, University of Virginia, 1983

Certifications
Certified Hazardous Materials Manager (CHMM), Certificate 2006

40-hour OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) Training

8-hour OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) Refresher Training

Professional Associations
- American Institute of Chemical Engineers (New Jersey Section Treasurer, Former Director, Former Secretary, Former Special Events Chairperson)
- Academy of Certified Hazardous Materials Managers (Board of Trustees and Program Committee New Jersey Chapter)

Awards
Alliance of Hazardous Materials Professionals, Champion of Excellence Award Winner, 2009, 2010

Year Career Started
1987

Year Started with B&V
1987

Office Location
Edison, NJ

Multiple Clients | New Jersey 2009 Recovery and Reinvestment Program "Call for Projects";NJ
Task Leader. Ms. Forgang simultaneously assisted many of CDM Smith's public clients with applying for economic stimulus funding under the state's 2009 Recovery and Reinvestment Program. Her responsibilities included assisting these clients with their planning documentation and the financial loan applications, as well as identifying and preparing permit applications for each of these projects which included air emission permits, New Jersey Pollutant Discharge Elimination System (NJPDES) treatment works approvals, and soil erosion and sediment control. This work was performed on a fast-track basis to meet significantly-compressed program deadline. Projects included wastewater treatment plant improvements, storm water management, and landfill gas-to-energy alternative energy located throughout the state including Morris, Burlington, Middlesex, Hunterdon, and Essex counties.

Orange & Rockland Utilities (O&R) | Harings Corner 138kV Electric Projects – Project Site Plan Development and Permitting, Borough of Old Tappan; Bergen County, NJ
Project Technical Lead. For O&R, CDM Smith prepared the Site Development Plan and permit applications for the construction of the new Harings Corner 138 kV substation, which was planned to offset load growth in eastern Rockland County. The proposed site is next to the Harings Corner 69kV substation. Ms. Forgang assisted with an initial environmental constraints review to identify site soils and geology, site grading and steep slopes, wetlands and wetland areas, vegetation patterns, the presence of threated and endangered species, the presence of stream, stream corridors and riparian zones, a zoning review and other special land designations established by the Borough of Old Tappan to assist in identifying State and local permits necessary for construction.

Rockland Electric Company (RECO) | Ringwood Electric Distribution Service New Circuit - Environmental Constraints Analysis, Borough of Ringwood; Passaic County, NJ
Project Technical Lead. For RECO, CDM Smith's scope included determining the feasibility of constructing a proposed Underground Electric Distribution Service New Circuit 78-3-13, from Ringwood Substation to Skyline Drive, Borough of Ringwood, and identifying all agencies, requirements, and timeframes associated with all aspects of project permitting. The new electric utility line is roughly four miles in length. Ms. Forgang assisted with this feasibility study, which included an initial environmental constraints review to identify site soils and geology, site grading and steep slopes, wetlands and wetland areas, vegetation patterns, the presence of threated and endangered species, the presence of stream, stream corridors and riparian zones, a zoning review and other local ordinances to assist in identifying State and local permits necessary for construction. The project location included drinking water reservoir areas with abundant environmentally-sensitive habitat.

City of Newark | Permit Specialist for Queen Ditch Restoration, Newark City; Essex County, NJ
Task Leader. Ms. Forgang is the permit task leader responsible for preparing the environmental permit applications for the City of Newark to restore Queen Ditch in Newark City, Essex County. Queen Ditch is a combined storm/sanitary sewer overflow point is fed by the Queen District drainage area. The terrain within the eastern portion of the Queen District is drained by combined storm/ sanitary sewers which outlet at the Queen District Regulator Chamber. Combined, stormwater, and sanitary flow enters the Queen District Regulator Chamber. The Queen Ditch has fallen into disrepair and the stormwater/sanitary sewer overflow from the Queen District Regulator Chamber is now blocked off, directing all drainage to the South Side Interceptor, causing overloading and surcharging of the interceptor as well as flooding in the Queen District drainage area during storm events. To implement the Queen Ditch restoration activities, Ms. Forgang is responsible for assisting the city with applying for many permits/approvals, including: NJDEP Division of Land Use Regulation (DLUR) – Freshwater Wetlands General Permits, and Flood Hazard Area Individual permit; NJDEP Division of Water Quality Treatment Works Approval; NJDEP Division of Water Quality Discharge of Stormwater during Construction RFA; NJDEP Division of Water Supply Temporary Dewatering during Construction Permit; and Hudson-Essex-Passaic Soil Conservation District - Soil Erosion and Sedimentation Control (SESC) Plan certification. Ms. Forgang also leads NJDEP/ New Jersey Environmental Infrastructure Trust (NJEIT) financing program assistance task, that includes preparing the program documents on behalf of the City, preparing portions of the multi-part funding application and assisting the City with filing the application on-line using NJEIT's H2Loans.

Robert A Gosse

Training

With over 32 years of experience, Mr. Gosse is a highly skilled master electrician with significant project management and electrical design experience. His expertise is in all phases of construction (laws, regulations, and specifications). Mr. Gosse coordinates electrical projects and follows through, completing the job on time and within budget. He has experience supervising a workforce of up to 38 tradesmen. He has been involved in many CDM Smith projects, with duties including change order review, electrical inspections, assisting resident engineers with electrical questions, electrical startups, and serving as liaison between CDM Smith's electrical design group, electrical contractors, and clients.

PROJECT EXPERIENCE

Upper Blackstone Wastewater Treatment Plant (WWTP); Milbury, MA
Electrical Inspector. Mr. Gosse performed electrical inspections, reviewed change orders, and worked closely with the electrical contractor on this large, multi-phase, $150 million upgrade to the existing WWTP. The project included two headworks buildings, a disinfection facility, plant water pumping station, SCADA and an incinerator building that houses three sludge burning incinerators, a medium voltage electrical distribution system with multiple substations, three 800 HP aeration blower system, and an upgrade to the dewatering process.

Greater Lawrence Sanitary District | Wastewater Facility Upgrade; Massachusetts
Construction Services Representative. Mr. Gosse is an integral part of the team that is overseeing the Combined Heat and Power (CHP) project that is under construction. This project includes integrating the new systems into the existing facility wide SCADA system, reporting the CHP information to the electrical utility, constructing a fourth digester, CHP building, gas conditioning and a new medium voltage distribution system and other systems to support the Organics to Energy program.

Corbalis Water Treatment Facility; Herndon, VA
Construction Services Representative. Mr. Gosse performed electrical inspections, reviewed change orders, and provided technical information to the electrical engineers for RFI responses. This 200-mgd water treatment facility upgrade included a new chemical treatment building, upgrades to several existing buildings, and the addition of a third filter building. The raw water pumping station included a complete medium voltage electrical distribution upgrade and medium voltage soft starters for the 3,000 HP raw water pumps.

Narragansett Bay Commission | Bucklin Point Wastewater Treatment Plant (WWTP); Providence, RI
Electrical Inspector. Mr. Gosse is presently involved in a second phase of construction at this facility which consists of an expanded 480-volt distribution system, several new outdoor motor control centers, new aeration blowers, site-wide fire alarm upgrade, and odor control systems. Mr. Gosse previously worked on the $56 million wastewater treatment facility upgrade as an electrical inspector. His duties included inspecting the installation of a SCADA system with several remote panels, an ultraviolet disinfection system, a large aeration system, and a 5KV distribution system with multiple emergency backup generators.

Education
- Apprentice Electrician Program, New Hampshire Vocational-Technical College, 1988

Certifications/Licenses
National Electrical Code Updates, 1990, 1993, 1996, 1999, 2002, 2005, 2008, 2011, 2013, 2014, 2017

Master Electrician: New Hampshire (1989)
Journeyman: New Hampshire (1988), and Massachusetts

Professional Associations
- International Association of Electrical Inspectors

Year Career Started
1988

Year Started with CDM Smith
2001

Office Location
Manchester, NH

Gloucester Wastewater Treatment Facility; Gloucester, MA
Electrical Inspector. Mr. Gosse oversaw the installation of a new electrical distribution system, including a new outdoor switchgear, new emergency standby generator, new motor control centers, and reconnection of all the existing motor control centers to the new distribution system. The project also included the construction of a new headworks building and renovating the existing operations building.

Water Pollution Control Facility (WPCF); South Windsor, CT
Construction Services Representative. Mr. Gosse performed onsite electrical inspections at this $30 million upgrade to the existing WPCF and was an integral part of the ongoing coordination between CDM Smith and the electrical contractor. His duties included responding to requests for information (RFIs), reviewing change orders, providing resolutions to construction issues, and performing operational checkout of the electrical distribution system.

Water Pollution Control Facility (WPCF); Ansonia, CT
Construction Services Representative. Mr. Gosse oversaw the electrical portion of this $39 million upgrade to an existing WPCF, which included a complex underground electrical ductbank system, a utility and emergency power distribution system, and complete renovations of all areas of the facility.

Brockton Wastewater Treatment Facility (WWTF); Brockton, MA
Construction Services Representative. Mr. Gosse performed electrical inspections, reviewed change orders, and answered RFIs on this multi-phase major upgrade to the existing WWTF. The improvements included major upgrades to the aeration system, a 13.8KV electrical distribution system with two 13.8KV emergency generators, and four 480-volt substations. Other upgrades included a new sand filter system, a new dewatering system, and several chemical systems.

Lewiston/Auburn Water Pollution Control Authority; Lewiston, MN
Electrical Inspector. Mr. Gosse presently oversees the electrical installation at this anaerobic digestion energy recovery project, which includes a new 480-volt outdoor switchgear, new motor control centers, and two digester gas generators to reduce the facility's power consumption. The facility has several hazardous location areas and digester gas conditioning areas, and includes a complex integration with the existing process.

Water Treatment Facility Upgrade; Manchester, NH
Construction Representative. Mr. Gosse oversaw the electrical installations at this facility upgrade, which included a complex SCADA system, three ozone generators, multiple filters, a soda ash system, several stages of pumping capacity and a 5KV distribution system with emergency generator backup.

Jeana M Koscica

Administrative Manager

Ms. Koscica has over 20 years of experience in administrative management services. Her experience includes office management as well as project/client-specific administrative management services. She brings varied administrative skills and training including in Keyboarding (70 wpm), Excel, Microsoft Word, Microsoft Outlook E-mail, Oracle E-mail, Speedwriting (45 wpm), Power Point, Business Math, Microsoft Access, Primavera, Constructware, Windows 8 & 10, Skype for Business, OneDrive.

Education

- Executive Secretarial Program, Certificate, Katharine Gibbs School, Piscataway, New Jersey, 1996

Year Career Started
1996

Year Started with CDM Smith
2002

Office Location
Edison, NJ

PROJECT EXPERIENCE

CDM Smith | Office Coordination; Edison, NJ

Administrative Manager. Ms. Koscica executes multiple functions to coordinate all administrative functions for this large branch office of approximately 100 personnel. Her responsibilities include managing reception, mailroom and administrative staff; ,managing off site records storage and internal record storage, including comprehensive indexing; maintaining logs for all flat files, drawing racks, file cabinets, vendor catalogs and fleet of company vehicles; assisting all New Employees with Computer and iPhone set up; training all employees on how to use Skype for Business including its various functions; prepare and edit correspondence, spreadsheets and presentations; arranging all internal office meetings, vendor lunches and high profile client meetings.

PVSC | Varied Projects;| Newark, NJ

Administrative Manager. On multiple contracts and projects held by CDM Smith with the PVSC, Ms. Koscica manages all administrative tasks and supports report efforts.

Thomas S Laustsen, PE, BCEE

Sitework & Permitting Design Manager

CDM Smith

Mr. Laustsen has 28 years of diverse experience in project management, design and construction of water and wastewater treatment plants; wastewater sludge processing; soil and groundwater remediation systems; landfill caps; site work and mechanical systems; underground and aboveground storage tanks; construction services; storm sewer, water main and force main design; data collection and analysis; and treatment system installation, operation, and maintenance. His experience includes managing CDM Smith's projects with the PVSC since 2003.

PROJECT EXPERIENCE

PVSC | Waste Activated Sludge (WAS) Pumping Station Upgrade; Newark, NJ
Project Manager. For the PVSC, Mr. Laustsen is managing a project to expand the pumping capacity of the PVSC's WAS Pumping Station from 10 MGD to 15 MGD. Evaluation includes considering hydraulic issues, pump clogging, and pumping efficiency. He is also managing the preparation of design, bidding and construction services for upgrading the pumping station, including electrical system upgrades.

Township of Parsippany Troy-Hills | Redesign and Upgrade of the Wastewater Treatment Plant (WWTP); Parsippany Troy-Hills, NJ
Project Manager. Mr. Laustsen managed the design and bidding, and construction of the upgrades to the WWTP. The original treatment process was an inefficient, three-stage activated sludge process. To convert the plant to a step-feed biological nitrogen removal (BNR) process, upgrades included providing high-speed blowers, fine bubble diffusers and new secondary clarifier mechanisms. Other upgrades included providing variable frequency drives on the influent pump motors, conversion of denitrification tanks into chlorine contact tanks, providing polyaluminum chloride (PACl) and polymer feed systems to aid in the removal of phosphorus and to enhance settling in the clarifiers. Electrical improvements included power distribution emergency power and control systems, as well as the installation of premium efficiency motors and variable frequency drives (VFDs) (2@200hp and 2@100 hp) on the influent raw sewage pumps.

Ocean County Utilities Authority (OCUA) | Plant Expansion Evaluation; Bayville, NJ
Project Manager. Mr. Laustsen managed the evaluation of expanding the capacity of the OCUA Northern WPCF from an average design flow of 32 MGD to 36 MGD. Tasks included constructing a BioWin Model of the facility to simulate the process loads to determine what process units would need to be upgraded. A hydraulic model was also constructed to identify bottle necks throughout the facility. The evaluation also included evaluating the facilities cogen equipment, which has reached the end of its useful life, evaluating the plant water system and conducting structural, HVAC and electrical evaluations of the facilities.

NYCDEP | Interim Facility Improvements, Bowery Bay Water Pollution Control Plant (WPCP) and Tallman Island WPCP; New York, NY
Project Manager. The New York Department of Environmental Protection (NYCDEP) is under a consent order to shut down their dewatering facilities at the Bowery Bay WPCP and Tallman Island WPCP to meet nitrogen discharge limits to the Long Island Sound. Mr. Laustsen managed the design of improvements to existing pumping and piping systems that would allow the barging of digested sludge from these facilities to other NYCDEP WPCP's for dewatering.

Education
- MS, Management Engineering, New Jersey Institute of Technology, 1994
- BS, Civil Engineering, Texas A&M University, 1989

Professional Registration
PE - 24GE03870200, NJ, 1994
PE - 079167, NY, 2001
PE - PE051872E PA, 1996

Certifications
40-hour OSHA Health and Safety Training
Health and Safety Officer Training
Confined-Space Entry Training

Professional Associations
- Water Environment Federation
- New Jersey Water Environment Association
- American Water Works Association

Honors/Awards
Board Certified Environmental Engineer (BCEE), American Academy of Environmental Engineers and Scientists

Year Career Started
1989

Year Started with CDM Smith
1989

Office Location
Edison, NJ

NYCDEP | WPCP Evaluation; New York, NY

Project Engineer. For New York's Spring Creek Auxiliary WPCP, Mr. Laustsen participated in data collection to determine the history of flooding in areas tributary to the plant. He also performed hydraulic analyses of the existing sewer system to identify areas requiring an increase in capacity. He also addressed client questions concerning CDM Smith's recommendations.

Rockland County Sewer District| Advanced WWTP; Rockland County, NY

Project Manager. Mr. Laustsen managed the design and construction of an advanced wastewater treatment plant (AWWTP) for the Rockland County Sewer District. As part of a design/build team Veolia Water Systems, CDM Smith designed and oversaw the construction of an AWWTP rated for an average flow of 1.5 mgd that consists of an influent pumping station, headworks consisting of screenings and grit removal, sequencing batch reactors (SBRs), continuous backwash filters and microfiltration. Chemical feed systems included polyaluminum chloride, (PACl), sodium hydroxide, sodium hypochlorite and sodium bisulfite were included in the design.

Village of Mount Kisco | Pumping Station Upgrades; Mount Kisco, NY

Project Manager. Mr. Laustsen designed upgrades to the Saw Mill River Pump Station that included changing out three extended shaft 40 horsepower (HP) dry sewage pumps with similar pumps, modifying an existing mechanical bar screen to provide wider bar spacing, and replacing two existing comminutors with two new comminutors.

Village of Ridgewood| WWTF Upgrade; Ridgewood, NJ

Project Engineer. Mr. Laustsen designed the upgrade and expansion of the existing WWTF. The project included upgrading four existing aeration basins to provide nitrification equipped with fine bubble aeration. Two existing primary clarifiers were upgraded with new spiral collectors. Two existing secondary clarifiers and one new clarifier are being provided with spiral sludge collection for rapid sludge withdrawal. Mr. Laustsen also designed the odor control system, which included covering the primary clarifier launderers, influent channels, grit removal equipment and wet wells and treating the air with regenerative carbon odor control systems.

Somerset Raritan Valley Sewerage Authority (SRVSA) | Secondary Clarification and Sludge Pump Station Design; New Jersey

Project Engineer. For the SRVSA, Mr. Laustsen designed the secondary clarification and sludge pumping station. The secondary clarifiers are chain-and-flight type, and along with the sludge pumping station, were installed in existing stormwater retention tanks.

Kapila S Pathirage, PhD, PE, PEng

Geotechnical

CDM Smith

Dr. Pathirage has more than 25 years of experience in geotechnical/tunnel, geo-environmental, and civil engineering projects for private, commercial, and government clients. He has experience in performing geotechnical investigations for tunnels, microtunneling, horizontal directional drilling (HDD), dams, slurry walls, pipe lines, solid waste landfills, water and waste water treatment plants, contaminant projects, subdivision developments, storm water ponds, and soil liners. His responsibilities include developing project scopes, geotechnical proposals, cost proposals, contact documents (plans and specs) and supervising field exploration programs. His field and laboratory responsibilities include selecting boring locations, assigning laboratory tests, classifying soil samples, developing soil logs and profiles, and analyzing subsurface conditions.

PROJECT EXPERIENCE

Horizontal Directional Drilling (HDD) Crossing of Raritan River, New Jersey
Senior Geotechnical Engineer. Dr. Pathirage was the Geotechnical task leader for the design and installation of a 24-inch water main. The total length of the drill and pullback was ~5,400 LF. This is the longest fusible PVC (fPVC) pipe pullback for a diameter of 24-inch completed to date in the world.

Heritage Hills Sewage Works Corporation | Wastewater Treatment Facility (WWTF) Upgrade; Somers, NY
Geotechnical Project Engineer. Dr. Pathirage was responsible for planning and implementing a geotechnical subsurface investigation for new structures planned as part of a wastewater treatment facility upgrade. The new structures included an equalization tank, a microfiltration building, and a sludge storage tank. He was also responsible for performing geotechnical analyses to recommend foundation types, allowable foundation-bearing pressures, and anticipated total and differential foundation settlements. In addition, he was responsible for making recommendations related to the geotechnical aspects of the proposed construction work and anticipated procedures, including subgrade preparation requirements for foundations, excavation and backfill requirements, dewatering considerations, and provisions for the protection of existing structures and utilities during the work.

Essex County | Pile Foundation Design for Essex County Environmental Center; Essex County, NJ
Geotechnical Task Leader. Dr. Pathirage was responsible for reviewing the draft geotechnical report and boring logs prepared for the Essex County Environmental Center. He was also responsible for developing a seismic site classification for the site, design recommendations for wood pile foundations, and performing a lateral capacity of piles using computer software.

Suffolk County Sewer Outfall; New York, NY
Senior Geotechnical/Tunnel Engineer. Dr. Pathirage served as the geotechnical engineer for the explorations and design of this outfall replacement tunnel under South Bay Cove from the Bergin Point Wastewater Treatment Plant (WWTP). The project involves both land and marine borings and the tunnel is anticipated to be 15,000 lf and be 10 to 12 feet in diameter in either sand or clay. The anticipated lining system will be gasketed precast concrete segmental lining.

Education
- MASc, Geotechnical Engineering, University of British Columbia, Canada, 2000
- PhD, Civil/ Hydraulic Structure (Dams) Engineering, Russian People's Friendship University, Moscow, 1992
- MSc, Civil/ Hydraulic Structure (Dams) Engineering, Russian People's Friendship University, Moscow, 1986

Professional Registration
PE - 24GE04741600, NJ, 2008
PE - NY
PE - OH
PEng - BC, Canada

Professional Associations
- Society of Mining, Metallurgy & Exploration (SME)
- North American Society for Trenchless Technology (NASTT)
- Association of State Dam Officials
- United States Society on Dams
- American Society of Civil Engineers

Year Career Started
1992

Year Started with CDM Smith
2007

Office Location
Edison, NJ

Wastewater Treatment Plant (WWTP) Expansion; Boston, MA
Geotechnical Project Engineer. Dr. Pathirage was responsible for planning and executing a geotechnical subsurface investigation program that included 13 geotechnical borings and installing open-standpipe piezometers, providing geotechnical recommendations, and developing parameters for the design.

Morris Companies | New Warehouse; Newark, NJ
Geotechnical Task Leader. Dr. Pathirage was responsible for reviewing results of an investigation program and selecting samples for laboratory testing. He was also responsible for preparing recommendations for foundation designs.

Domestic Trade Terminal (DDT); Linden, NJ
Geotechnical Task Leader. This project included construction of a barrier wall approximately 650-feet-long and 20- feet-deep and collection trench. The Bio-Polymer slurry method was used to facilitate the trench excavation and the installation of the HDPE liner. Dr. Pathirage was responsible for coordinating with construction activities, planning and executing a geotechnical test pits excavation program followed by laboratory testing programs. He conducted revised trench design analyses and developed contract documents consisting of technical specifications and drawings, and reviewed submittals to provide construction recommendations.

Temple University | Building Demolition Vibration Monitoring; Philadelphia, PA
Geotechnical Task Leader. Dr. Pathirage was responsible for planning and conducting a vibration monitoring program. This program was developed to conduct vibration monitoring near adjacent structures during demolition of a paper factory. In addition, he was responsible for performing calculation to predict the potential vibration levels during this demolition work prior to start of the actual work. The vibration program utilized two potable seismographs (VMS 2000) and two stationary seismographs (VibraTech) to record vibrations induced by the work and USBM criteria were used for the baseline for monitoring work.

New York Department of Environmental Protection (NYCDEP) | Design Services Contract Area 3; New York, NY
Lead Geotechnical Engineer. Dr. Pathirage is currently serving as the lead geotechnical engineer for the green infrastructure (GI) project with the NYCDEP across a 1,200-acre area of Queens, New York. Dr. Pathirage is responsible for planning and executing subsurface investigation programs and preparing geotechnical reports and assisting with developing contract documents.

NYCDEP | Edenwald Houses Green Infrastructure Planning and Design; New York, NY
Lead Geotechnical Engineer. Dr. Pathirage served as the lead geotechnical engineer for the GI development at Edenwald Houses, the largest New York Housing Authority development in the Bronx with 41 buildings on nearly 53 acres. Dr. Pathirage was responsible for planning and executing subsurface investigation programs and preparing geotechnical reports.

NYCDEP | Green Infrastructure Design Services Contract Area 1; Brooklyn, New York, NY
Lead Geotechnical Engineer. Dr. Pathirage served as the lead geotechnical engineer on the project team as a subconsultant for the right-of-way bioswale project. The current phase of the project consists of performing test borings and in-situ permeability tests at proposed bioswale locations to evaluate the suitability of the proposed locations for the bioswales. Dr. Pathirage is responsible for planning and executing subsurface investigation programs and preparing geotechnical reports.

NYCDEP | City Tunnel No.3 Stage 2 in the Borough of Brooklyn; New York, NY
Geotechnical Project Engineer. Dr. Pathirage was responsible for reviewing a geotechnical data report prepared by a consultant and evaluating the proposed engineering parameters for the on-site soils for design use. He was also responsible for reviewing submittals for dewatering, excavation support systems and vibration monitoring at the site.

Welsbach (Klemm/Highland)| Design of an Excavation Support System; Gloucester City, NJ
Geotechnical Task Leader. For a 780-foot-long sheet piling installation, Dr. Pathirage was responsible for reviewing technical submittals and providing construction recommendations as needed.

Virginia A Roach, PE, BCEE

Civil

CDM Smith

Ms. Roach has 31 years of civil and environmental engineering experience. Throughout her career, she has been involved in a broad range of stormwater management studies, site designs and construction projects, as well as wastewater, combined sewer overflow (CSO), and water projects throughout the United States. Ms. Roach was a contributing author to the 2012 WEF *Design of Urban Runoff Controls Manual of Practice,* and the 2014 WEF *Green Infrastructure Implementation* manual.

PROJECT EXPERIENCE

New York Department of Environmental Protection (NYCDEP) | North River Wastewater Treatment Plant Roof Leak Study; New York, NY

Technical Reviewer. Ms. Roach was the Technical Reviewer for an evaluation of the existing drainage system in the 28-acre Riverbank Park, located on top of the North River Wastewater Treatment Plant, and the underlying collection pipe system located in the Wastewater Treatment Plant, as part of the structural investigation of the Treatment Plant roof structure. The purpose of the study was to determine the cause of the observed clogging in the vertical leaders and park-level ponding, as well as leaking within the Wastewater Treatment Plant. The evaluation included reviewing as-built drainage plans, performing hydrologic modeling using the HEC-HMS computer program, and performing a hydraulic capacity analysis of the drainage system.

Various client | Varied Wastewater Projects; Massachusetts and Connecticut

Project Manager/Engineer. Ms. Roach performed a wastewater facilities planning study for the Town of Plymouth, Massachusetts, involving an in-depth study of the Title 5 subsurface wastewater disposal regulations, an examination of wastewater and septage flows and loads, and use of innovative/alternative technologies. She was the project manager for a similar study of wastewater management alternatives for the Town of Wayland, Massachusetts, preparing the town to form a wastewater management district. As project engineer for the facilities plan for a wastewater collection/treatment system in the Town of Swampscott, Massachusetts, Ms. Roach was responsible for preliminary design, siting, and cost estimating for the 2.2-mgd treatment plant and sludge disposal facilities, as well as for coordination of the public information program. A certified Massachusetts Title 5 Soil Evaluator, Ms. Roach has been a technical advisor for wastewater management projects in Dracut, Seekonk, and Attleboro, Massachusetts, and Stonington, Connecticut. She designed the mound septic system for the North Reading water treatment facility.

City of Newark | Green Stormwater Infrastructure Conceptual Designs; Newark, NJ

Technical Design Manager. Ms. Roach served as the technical design manager for the City of Newark and Together North Jersey Contract. Through a U.S. HUD grant awarded to this initiative, CDM Smith selected pilot green stormwater infrastructure (GSI) site opportunities through a combination of broad-scale GIS analyses. Based on this city-wide characterization and in coordination with water and sewer, engineering, neighborhood and recreational services and planning departments, Ms. Roach helped develop conceptual designs for GSI in a phased approach.

Education
- MS, Civil/Environmental Engineering, Worcester Polytechnic Institute, 1992
- BS, Civil Engineering, Worcester Polytechnic Institute, 1985
- BA, Mathematics, College of the Holy Cross, 1981

Professional Registration
PE - 35491, MA, 1990

Certifications
Title 5 Soil Evaluator: Massachusetts, 1995
OSHA 10-hour Occupational Safety and Health Training

Professional Associations
- Water Environment Federation, Vice Chairman, Stormwater Committee
- New England Stormwater Collaborative, Chairman, New England Water Environment Association
- American Society of Civil Engineers, Co-Chairman, 2016 LID/Green Infrastructure Conference
- New England Interstate Water Pollution Control Commission, *TR-16 Guides for the Design of Wastewater Treatment Works*, Contributing Author

Honors/Awards
Board Certified Environmental Engineer (BCEE), American Academy of Environmental Engineers and Scientists
NEWEA E. Sherman Chase Award, 2015

Year Career Started
1985

Year Started with B&V
1985

Office Location
Boston, MA

U.S. Coast Guard | Cape May Coast Guard Facilities and Atlantic City Federal Air Marshall Training Facility; Atlantic City, NJ

Civil/Site Design Manager. Ms. Roach was the civil/site design manager for a LEED-certified Coast Guard Facilities Design in Cape May, New Jersey, as well as a Federal Air Marshall Training Facility in Atlantic City, New Jersey. Both design-build projects included stormwater BMPs (bioretention areas, rain gardens, a particle separator and an infiltration basin) in accordance with strict New Jersey State and Pinelands Commission requirements.

SUEZ Water | Stormwater Collection, Pre-Treatment, and Dry Detention Basin, Haworth Water Treatment Plant; Bergen County, NJ

Stormwater Design Manager. Ms. Roach designed the stormwater collection, pre-treatment and dry detention basin for the Haworth Water Treatment Plant in Bergen County, New Jersey in accordance with New Jersey's stringent stormwater management regulations.

NYCDEP | Design of Green Infrastructure (GI) – NYCDEP and NYCEDC Area-Wide Design; New York, NY

Project Manager. The New York Green Infrastructure Plan is to manage the first inch of runoff from 10 percent of impervious surfaces in combined sewer tributary areas in Queens, Brooklyn and the Bronx by 2030. Ms. Roach is managing multiple green infrastructure (GI) projects with the NYCDEP including siting, performing hydrologic modeling, and designing more than 1,000 ROWBs in an area of Queens totaling over 2,000 acres. The BB-008 contract includes the siting and design of on-site public property retrofits of GI for schools and parks. The contracts require desktop assessments to identify potential locations; field inspections to refine the list of locations to preliminary locations; geotechnical/permeability tests and limited surveys to reduce the number of locations to final locations; design services and design services during construction. Ms. Roach is the Project Director for a similar GI project in the Bowery Bay (BB-005) combined sewer tributary area.

NYCDEP | Edenwald Houses Green Infrastructure Planning and Design; New York, NY

Project Manager. Ms. Roach managed the planning and design of green infrastructure development at Edenwald Houses, the largest New York Housing Authority (NYCHA) development in the Bronx with 41 buildings on nearly 53 acres. CDM Smith completed a facility plan and design for the Edenwald site incorporating green infrastructure controls to maximize storm flow attenuation to the extent practical, and is providing construction services over the next year. This project will reduce combined sewer overflows to the Hutchinson River and thereby improve the water quality of the river and harbor.

Harvard University| Allston Campus Green Infrastructure Design and Construction; Allston, MA

Stormwater Design Manager. Ms. Roach is managing the stormwater facilities planning and design for the proposed Harvard University Allston campus. The development of the Allston campus will improve the stormwater infrastructure of a broad watershed area, improve the quality of stormwater runoff to the Charles River, and incorporate sustainable measures that will ultimately lead to environmental benefit in the area. Sustainable measures under pilot study and design for the Harvard Campus include bioretention areas and street planters, green roof design, porous pavement and subsurface infiltration systems.

Northeast Ohio Regional Sewer District (NEORSD) |East 140th Consolidation and Relief Sewer and Union Buckeye Green Infrastructure Projects; Cleveland, OH

Senior Technical Lead. For the NEORSD, Ms. Roach is the Senior Technical Lead for the design of green infrastructure and storm sewers to divert, treat and offload stormwater runoff from catchments within the project areas to reduce CSOs. The projects include the design of numerous natural storage basins and several miles of new storm sewers.

University of Maryland College Park Utilities Master Plan, Maryland

Project Manager. Ms. Roach managed the water distribution, wastewater collection and stormwater facilities planning for the University of Maryland College Park. The recommended plan includes water distribution, wastewater and drainage system improvements to support the campus master plan growth of a 600-acre area of the campus. In addition to performing hydraulic analyses of the water, sewer and drainage systems, the project developed an Environmental Site Design (ESD) and Best Management Practices (BMP) plan for the campus to meet the State of Maryland stormwater management requirements, including stormwater harvesting, green roofs, porous pavement, rain gardens, bioswales and subsurface storage systems.

Christopher Tomasiello

RPR - Phase 2 Construction

CDM Smith

Mr. Tomasiello is a Senior Construction Representative with nearly 10 years of experience with wastewater management and process controls. He is an assertive, self-motivated individual, and performs and succeeds in either team situations or where he is individually responsible for achieving project goals.

Certifications
OSHA 30

Professional Associations
- International Brotherhood of Electrical Workers

Year Career Started
1998

Year Started with CDM Smith
2013

Office Location
Woodbury, NY

PROJECT EXPERIENCE

Port Authority of NY/NJ | John F Kennedy Airport; New York
Electrical Utility Coordinator. Mr. Tomasiello is responsible for design review and construction inspection of projects as a member of the Port Authority JFK Physical plant and Redevelopment consultant unit. Mr. Tomasiello coordinates with the Resident Engineers office and the construction design team for each project and or contractors for all new and rehabilitation projects within JFK property. He also coordinates with the facility maintenance departments for shutdown or energizing of circuits from low to medium voltage. Projects range from rehabilitation of substations and high-tension gear associated within, rehabilitation of tenant buildings for new tenants including total renovations form medium voltage switches transformers branch circuits 120 volts to 480 volts that power HVAC equipment to fiber optic security cameras.

New York Power Authority | Yonkers Joint WWTP; New York
Onsite Resident Senior Construction Representative. Mr. Tomasiello was responsible for inspection of all on going work and its coordination with the client of three projects at the Yonkers waste water plant. The emergency generator project involves coordination of a 2500KV generator and its connecting 13.2KV switchgear. The HVAC equipment and Odor control improvement project was for the coordination of a Siemens Chemical scrubber odor control systems and their supporting HVAC equipment upgrade. The third project Mr. Tomasiello also oversaw was the rehabilitation and improvements to the plant wide fire alarm system.

PRIOR TO CDM SMITH

New Jersey Transit | Hurricane Sandy Rehabilitation; New Jersey
Tester. Mr. Tomasiello was responsible for testing, which included insulation resistance, contact resistance, hi-pot, and power factor evaluations of cables, bus systems, breakers, and transformers. He was also responsible for installation of new cables, M.O.D.'s, relays, and PM of SF6 gas filled breakers, oil circuit breakers and autotransformers.

WP-56 Hunts Point WPCP – Plant Upgrade; New York
Startup Engineer. Mr. Tomasiello provided design and construction services for wastewater process control and monitoring system, plant-wide instrumentation and distributed control (DCS), medium and low voltage power distribution, power generation, engine/generator instrumentation, synchronization and auxiliary systems. He also provided startup and testing technical and engineering support services for electrical, HVAC and process control systems as well as shop drawing review.

WP-225 Spring Creek AWPCP – Plant Upgrade; Brooklyn, NY
Resident Inspector. Mr. Tomasiello performed field inspection, start up and turnover of all electrical and mechanical installations from contract work to change order work; including

modifications to the boiler system for lead/lag PLC program to activate a standby (lag) boiler or pump in the event of operational failure to the lead boiler or pump. He was responsible for installation of current switches for boiler system recirculation pumps, he also inspected the installation of new air flow meters on the scrubber stacks and their control panels that interface with the SCADA system. Other work Mr. Tomasiello managed on the project included a new local panel and PLC for the fuel oil tank, oil monitoring system, digital interface for an existing seal water pump, power and control wiring for a new magmeter for low hypo chloride metering pumps, and automatic water samplers. He also managed installation of a generator breaker trip alarm, and main breaker trip alarm all of which were connected and monitored to the SCADA system.

Ocean County Utilities Authority Vineland; Ocean County, NJ
Electrical Forman. Mr. Tomasiello installed the Supervisory Control and Data Acquisition Systems (SCADA) for the Ocean County Utilities Authority, a Waste Water Management Company located in Ocean County, New Jersey. His responsibilities included the installation of pipe and junction boxes, control wiring, PLC and communication systems. He performed upgrades to all new field equipment in areas such as grit screening building, influent building, digester and sludge tanks, and materials take off. Mr. Tomasiello's additional responsibilities included the review of as built drawings and identifying and justifying change orders.

Wireman IBEW Local 400, Various Projects; Various Locations
Journeyman. Mr. Tomasiello worked with several companies on various projects, including all the electrical aspects of building new schools such as Neptune High School, Long Branch High School, hospitals, factories, and Oyster Creek Nuclear Power Plant, located in Lacey Township, New Jersey.

Co-Steel Sayreville; Sayreville, NJ
Journeyman. Mr. Tomasiello performed electrical installations, which included lighting, power distribution and energy management, also the installation of AC circuitry types: 120; 277; 480 volts. His additional responsibilities included pipe bending, plan reading, trouble shooting of DC and AC drives, and overhead cranes. Factory maintenance including 130 ton an hour reheat furnace, backup generators and substation repair. Mr. Tomasiello was responsible for the renovation of the steel plant including installation of an 80-megawatt transformer for steel melting and 800hp DC motor.

Chris DuPont

Cost Estimating

Mr. DuPont has 20 years experience in construction in and around New York and is completing his tenth year with Nasco. His responsibilities include cost estimating throughout the design life of projects as well as the preparation of bid estimates. Prior to his association with Nasco he owned and operated a general contracting firm for four years.

His experience includes Sewer & Waste Water Treatment Plants, Dams, Reservoirs and Water Treatment projects. He has performed cost estimates at all stages of design and has performed value engineering on many of these projects.

Responsibilities include: Quantity take-off & pricing; Estimating at all stages of project design; Coordination and review; Value Engineering; Analyzing contractor claims.

Education
- AAS—Civil Technology
- Westchester Community College

Registration
Associate Value Specialist

Year Career Started
1997

Year Started with Nasco
2000

SELECT PROJECT EXPERIENCE

North River WWTP (NYCDEP); New York, NY
Provided cost estimating services for the co-generation & electrification facility plan for Contracts NR39, NR42, NR 43, and NR46 estimated at the 30%, 60%, 90%, and 100% CD phases. Estimated Amount: $250,000,000.

Rikers Island Project; Elmhurst, NY
Provided cost estimating for new co-generation power plant.

26th Ward WPCP (NYCDEP); Brooklyn, NY
Provided cost estimating services for new emergency generator.

Bay Park STP (Nassau County DPW); Nassau County, NY
Provided cost estimating services for 3rd engine generator.

Yonkers WWTP (for Westchester County DPW); Yonkers, NY
Provided detailed cost estimating services for the Sump Pump Replacement/Post Storm Rehabilitation.

Rockaway WWTP- Level 1 BNR Upgrade (NYC DEP); Queens, NY
Provided cost estimating and scheduling services for plant upgrade.

Flushing Bay WWTP (NYCDEP); Queens, NY
Provided cost estimating services for the high level Interceptor improvements.

Clearview Pump Station Reconstruction (NYCDEP); Queens, NY
Provided cost estimating services for the reconstruction of pump station.

Croton Falls Pump Station & Facilities (NYCDEP); Westchester County, NY
Provided detailed cost estimating services for reconstruction of new pump station.

Tallman Island WWTP (NYCDEP); Queens, NY
Provided cost estimating and value engineering support for the Wet Weather Flow project.

Cedar Creek WPCP Pumps & Tanks (for Nassau County DPW); Nassau County, NY
Provided cost estimating services for the improvements to protected and domestic water systems.

Hunts Point WWTP (for NYCDEP); Bronx, NY
Provided cost estimating services for the centrifuge replacement project.

Barnes Avenue Pump Station (for Nassau County DPW); Nassau County, NY
Provided cost estimating for Flow Diversion Pumping Station and Newman's Court Pumping Station Improvements.

Wards Island WWTP (for NYCDEP); Bronx/Manhattan, NY
Provided cost estimating services for the plants settling system replacement.

Bay Park WWTP, Sludge Dewatering Facility Improvements (Nassau County DPW); Nassau County, NY
Provided cost estimating services for the sludge dewatering project.

Bay Park STP Program Management Efforts (for the Nassau County DPW); Nassau County, NY
Provided cost estimating services for pump station mitigation of effluent pumping facility—pump stations PS2, PS3, PS4, PS5, PS6, PS7, and PS8. Estimated Cost

Bay Park STP Raw Sewage Pump Station (for the Nassau County DPW); Nassau County, NY
Cost estimating for the raw sewage pumping system improvements.

Bay Park STP Perimeter Protection (for the Nassau County DPW) Location; Nassau County, NY
Provided cost estimating services for storm hardening and remediation.

Yonkers Joint WWTP, CDM Smith, Yonkers, NY
Provided cost estimating services for the plant rehabilitation after Hurricane Sandy.

New Rochelle WWTP, New Rochelle, NY
Provided detailed cost estimating services for the wastewater treatment composite performance implementation and plant expansion.

Ocean County Utilities Authority—Northern WPC Facilities Expansion, Ocean County, NJ
Parsippany Troy WPCP—Plant Upgrades (NJDEP), Township of Parsippany/Troy, NJ

Exhibit C

BLACK & VEATCH
Building a world of difference.

BLACK & VEATCH | WATER
489 FIFTH AVE, 14TH FLOOR, NEW YORK, NY 10017
646-779-8340 | 212.973.1343 F

January 26, 2018

Mr. John Rotolo, P.E.
Chief Engineer
Passaic Valley Sewerage Commission
600 Wilson Avenue
Newark, NJ 07105

Subject: Design Services and Design Services during Construction for Advanced Electrical Contract

Dear Mr. Rotolo,

Please find enclosed Black & Veatch's Summary of Total Man-Hour Estimate (Attachment G) and Summary of Total Project Cost (Attachment H) for phases 1 and 2 of the Advanced Electrical Contract as discussed at our January 25, 2018 meeting held at the PVSC OEM Building Main Conference Room. Black & Veatch's total project cost is $7,080,000 and represents the Scope of Work presented in our December 20, 2017 proposal, except for the design of new Air Handling Units for the Sludge Thickening Building.

Our Man-Hour Estimate and Total Project Cost include the following Value-Added ideas as presented in our technical proposal. The values of these items are listed below:

- Idea No. 2 – Design of Pressurized Vestibules for Switchgear E: $100,000
- Idea No. 3 – Technical Memorandum for Intelligent Switchgear: $50,000
- Idea No. 5 – Design of new Switchgears N & S Electrical Transformers: $15,000

Please feel free to contact Domenick Loschiavo or me if you need additional information.

Sincerely,

BLACK & VEATCH WATER

Steve Tarallo
Project Director

Domenick A. Loschiavo, P.E.
Project Manager

DAL
Enclosure[s]

cc: B. Reuss, Black & Veatch

PASSAIC VALLEY SEWERAGE COMMISSION

ADVANCED ELECTRICAL CONTRACT PROJECT
PHASE 1

BLACK & VEATCH
SUMMARY OF TOTAL MAN-HOUR ESTIMATE
("ATTACHMENT G")

		Estimate of Man Hours								
	DESCRIPTION OF WORK	**Project Director**	**Technical Advisor**	**Project Manager**	**Project Engineer**	**Engineer**	**Designer**	**Technician**	**Support**	**Total Man Hours**
	Staff Name ---->	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	
Task 1	**Review and Compilation of Data**									
1.1	Investigation	4	4	72	518	176	0	100	8	882
Task 2	**Project Work Plan and Reporting**									
2.1	Project Work Plan	24	4	446	180	30	0	0	76	760
Task 3	**Design Services**									
3.1	Design	70	10	94	4,263	6,730	74	1,672	132	13,045
3.2	Meetings	0	0	260	248	48	0	0	0	556
3.3	Value Engineering	10	0	24	142	6	0	0	0	182
3.4	Permitting	0	0	4	130	4	0	0	0	138
3.5	Bidding Assistance	0	0	30	129	106	0	72	4	341
Task 4	**Design Services During Construction (DSDC)**									
4.1	Notice to Proceed	0	0	0	0	16	0	0	0	16
4.2	Liaison and Administration	0	0	16	20	0	0	0	0	36
4.3	Meetings	0	0	36	144	0	0	0	0	180
4.4	Baselines and Benchmarks	0	0	4	0	0	0	0	0	4
4.5	Approval of Manufacturers/Vendors	0	0	2	8	0	0	0	0	10
4.6	Shop Drawings	0	0	2	494	740	0	0	0	1,236
4.7	Contractor Initiated Substitutions	0	0	2	125	70	0	0	0	197
4.8	Testing	0	0	2	268	0	0	0	0	270
4.9	RFI's & Field Orders	0	0	2	522	399	0	0	0	923
4.10	Change Orders	10	0	2	213	117	14	0	0	356
4.11	Payment Requests	0	0	0	36	0	0	0	0	36
4.12	Start-Up Services	0	0	4	320	0	0	0	0	324
4.13	Post Construction Assistance	0	0	12	92	156	0	205	20	485
	Subtotal Tasks 1 through 4	118	18	1,014	7,852	8,598	88	2,049	240	19,977
Task 5	**Resident Project Representative (per Scope of Work)**									
5.1	Resident Project Representative	0	0	0	6,000	0	0	0	0	6,000
5.2	Part Time Administrative Assistant	0	0	0	0	0	0	0	3,000	3,000
	Subtotal Task 5	0	0	0	6,000	0	0	0	3,000	9,000

January 26, 2018

Total Man Hour Estimate **28,977**

PASSAIC VALLEY SEWERAGE COMMISSION

ADVANCED ELECTRICAL CONTRACT PROJECT
PHASE 2

BLACK & VEATCH
SUMMARY OF TOTAL MAN-HOUR ESTIMATE
("ATTACHMENT G")

		Estimate of Man Hours								
	DESCRIPTION OF WORK	**Project Director**	**Technical Advisor**	**Project Manager**	**Project Engineer**	**Engineer**	**Designer**	**Technician**	**Support**	**Total Man Hours**
	Staff Name ---->	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	
Task 1	**Review and Compilation of Data**									
1.1	Investigation	0	0	0	0	0	0	0	0	0
Task 2	**Project Work Plan and Reporting**									
2.1	Project Work Plan	0	0	0	0	0	0	0	0	0
Task 3	**Design Services**									
3.1	Design	43	0	30	1,261	1,616	23	589	80	3,642
3.2	Meetings	0	0	60	144	24	0	0	0	228
3.3	Value Engineering	10	0	16	102	16	0	0	0	144
3.4	Permitting	0	0	4	100	4	0	0	0	108
3.5	Bidding Assistance	0	0	16	89	84	0	0	2	191
Task 4	**Design Services During Construction (DSDC)**									
4.1	Notice to Proceed	0	0	0	0	16	0	0	0	16
4.2	Liaison and Administration	0	0	16	0	0	0	0	0	16
4.3	Meetings	0	0	24	96	0	0	0	0	120
4.4	Baselines and Benchmarks	0	0	4	0	0	0	0	0	4
4.5	Approval of Manufacturers/Vendors	0	0	2	8	0	0	0	0	10
4.6	Shop Drawings	0	0	2	165	360	0	0	0	527
4.7	Contractor Initiated Substitutions	0	0	2	41	24	0	0	0	67
4.8	Testing	0	0	2	80	0	0	0	0	82
4.9	RFI's & Field Orders	0	0	2	131	109	0	0	0	242
4.10	Change Orders	4	0	2	100	32	5	0	0	143
4.11	Payment Requests	0	0	0	24	0	0	0	0	24
4.12	Start-Up Services	0	0	4	120	0	0	0	0	124
4.13	Post Construction Assistance	0	0	4	12	50	0	90	0	156
	Subtotal Tasks 1 through 4	57	0	190	2,473	2,335	28	679	82	5,844
Task 5	**Resident Project Representative (per Scope of Work)**									
5.1	Resident Project Representative	0	0	0	4,000	0	0	0	0	4,000
5.2	Part Time Administrative Assistant	0	0	0	0	0	0	0	2,000	2,000
	Subtotal Task 5	0	0	0	4,000	0	0	0	2,000	6,000

Task 1 and Task 2 Services are included in Phase 1 Man-Hour Estimate
January 26, 2018

Total Man Hour Estimate **11,844**

PASSAIC VALLEY SEWERAGE COMMISSION

ADVANCED ELECTRICAL CONTRACT PROJECT
PHASE 1

BLACK & VEATCH
SUMMARY OF TOTAL PROJECT COST
("ATTACHMENT H")

		Estimate of Labor Costs								
	DESCRIPTION OF WORK	**Project Director**	**Technical Advisor**	**Project Manager**	**Project Engineer**	**Engineer**	**Designer**	**Technician**	**Support**	**Total Labor Cost**
	Staff Name ---->	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	
	Hourly Rates ---->	$ 248.05	$ 235.00	$ 229.64	$ 191.63	$ 122.51	$ 70.00	$ 134.16	$ 97.23	
Task 1	**Review and Compilation of Data**									
1.1	Investigation	$ 992.20	$ 940.00	$ 16,534.31	$ 99,264.58	$ 21,561.84	$ -	$ 13,415.62	$ 777.87	$ 153,486.42
Task 2	**Project Work Plan and Reporting**									
2.1	Project Work Plan	$ 5,953.20	$ 940.00	$ 102,420.87	$ 34,493.48	$ 3,675.31	$ -	$ -	$ 7,389.75	$ 154,872.61
Task 3	**Design Services**									
3.1	Design	$ 17,363.50	$ 2,350.00	$ 21,586.46	$ 816,856.79	$ 824,495.34	$ 5,180.00	$ 224,309.22	$ 12,834.82	$ 1,924,976.13
3.2	Meetings	$ -	$ -	$ 59,707.23	$ 47,524.36	$ 5,880.50	$ -	$ -	$ -	$ 113,112.09
3.3	Value Engineering	$ 2,480.50	$ -	$ 5,511.44	$ 27,211.53	$ 735.06	$ -	$ -	$ -	$ 35,938.53
3.4	Permitting	$ -	$ -	$ 918.57	$ 24,911.96	$ 490.04	$ -	$ -	$ -	$ 26,320.57
3.5	Bidding Assistance	$ -	$ -	$ 6,889.30	$ 24,720.33	$ 12,986.11	$ -	$ 9,659.25	$ 388.93	$ 54,643.92
Task 4	**Design Services During Construction (DSDC)**									
4.1	Notice to Proceed	$ -	$ -	$ -	$ -	$ 1,960.17	$ -	$ -	$ -	$ 1,960.17
4.2	Liaison and Administration	$ -	$ -	$ 3,674.29	$ 3,832.61	$ -	$ -	$ -	$ -	$ 7,506.90
4.3	Meetings	$ -	$ -	$ 8,267.16	$ 27,594.79	$ -	$ -	$ -	$ -	$ 35,861.94
4.4	Baselines and Benchmarks	$ -	$ -	$ 918.57	$ -	$ -	$ -	$ -	$ -	$ 918.57
4.5	Approval of Manufacturers/Vendors	$ -	$ -	$ 459.29	$ 1,533.04	$ -	$ -	$ -	$ -	$ 1,992.33
4.6	Shop Drawings	$ -	$ -	$ 459.29	$ 94,665.45	$ 90,657.73	$ -	$ -	$ -	$ 185,782.47
4.7	Contractor Initiated Substitutions	$ -	$ -	$ 459.29	$ 24,017.68	$ 8,575.73	$ -	$ -	$ -	$ 33,052.70
4.8	Testing	$ -	$ -	$ 459.29	$ 51,356.96	$ -	$ -	$ -	$ -	$ 51,816.25
4.9	RFI's & Field Orders	$ -	$ -	$ 459.29	$ 100,031.10	$ 48,881.67	$ -	$ -	$ -	$ 149,372.06
4.10	Change Orders	$ 2,480.50	$ -	$ 459.29	$ 40,817.29	$ 14,333.72	$ 980.00	$ -	$ -	$ 59,070.80
4.11	Payment Requests	$ -	$ -	$ -	$ 6,898.70	$ -	$ -	$ -	$ -	$ 6,898.70
4.12	Start-Up Services	$ -	$ -	$ 918.57	$ 61,321.75	$ -	$ -	$ -	$ -	$ 62,240.32
4.13	Post Construction Assistance	$ -	$ -	$ 2,755.72	$ 17,630.00	$ 19,111.63	$ -	$ 27,502.03	$ 1,944.67	$ 68,944.05
	Subtotal Tasks 1 through 4	$ 29,269.90	$ 4,230.00	$ 232,858.21	$ 1,504,682.41	$ 1,053,344.86	$ 6,160.00	$ 274,886.11	$ 23,336.04	$ 3,128,767.53
Task 5	**Resident Project Representative (per Scope of Work)**									
5.1	Resident Project Representative	$ -	$ -	$ -	$ 1,149,782.79	$ -	$ -	$ -	$ -	$ 1,149,782.79
5.2	Part Time Administrative Assistant	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 291,700.50	$ 291,700.50
	Subtotal Task 5	$ -	$ -	$ -	$ 1,149,782.79	$ -	$ -	$ -	$ 291,700.50	$ 1,441,483.29

Total Labor Cost $ 4,570,250.82

Summary of Costs - Phase I

Description		**Cost**
Task 1 - Review & Compilation of Data		$ 153,486.42
Task 2 - Project Work Plan & Reporting		$ 154,872.61
Task 3 - Design Services		$ 2,154,991.24
Task 4 - Design Services During Construction (DSDC)		$ 665,417.26
Task 5 - Resident Project Representative (RPR)		$ 1,441,483.29
Task 6 - Other Direct Costs		$ 100,000.00
Task 7 - Allowances		
	Unforseen Contingencies	$ 400,000.00
	Training	$ 100,000.00
Task 8 - Admin. of PVSC Funding Requirements		$ 30,000.00
	TOTAL PHASE 1 PROJECT COST	**$ 5,200,250.82**

January 26, 2018

PASSAIC VALLEY SEWERAGE COMMISSION

ADVANCED ELECTRICAL CONTRACT PROJECT
PHASE 2

BLACK & VEATCH
SUMMARY OF TOTAL PROJECT COST
("ATTACHMENT H")

		Estimate of Labor Costs								
	DESCRIPTION OF WORK	**Project Director**	**Technical Advisor**	**Project Manager**	**Project Engineer**	**Engineer**	**Designer**	**Technician**	**Support**	**Total Man Hours**
	Staff Name ---->	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	See Staff Category Sheet	
	Hourly Rates ---->	$ 248.05	$ 235.00	$ 229.64	$ 191.63	$ 122.51	$ 70.00	$ 134.16	$ 97.23	
Task 1	**Review and Compilation of Data**									
1.1	Investigation	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Task 2	**Project Work Plan and Reporting**									
2.1	Project Work Plan	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Task 3	**Design Services**									
3.1	Design	$ 10,666.15	$ -	$ 6,889.30	$ 241,709.89	$ 197,976.89	$ 1,610.00	$ 79,018.02	$ 7,778.68	$ 545,648.93
3.2	Meetings	$ -	$ -	$ 13,778.59	$ 27,594.79	$ 2,940.25	$ -	$ -	$ -	$ 44,313.63
3.3	Value Engineering	$ 2,480.50	$ -	$ 3,674.29	$ 19,546.31	$ 1,960.17	$ -	$ -	$ -	$ 27,661.27
3.4	Permitting	$ -	$ -	$ 918.57	$ 19,163.05	$ 490.04	$ -	$ -	$ -	$ 20,571.66
3.5	Bidding Assistance	$ -	$ -	$ 3,674.29	$ 17,055.11	$ 10,290.88	$ -	$ -	$ 194.47	$ 31,214.75
Task 4	**Design Services During Construction (DSDC)**									
4.1	Notice to Proceed	$ -	$ -	$ -	$ -	$ 1,960.17	$ -	$ -	$ -	$ 1,960.17
4.2	Liaison and Administration	$ -	$ -	$ 3,674.29	$ -	$ -	$ -	$ -	$ -	$ 3,674.29
4.3	Meetings	$ -	$ -	$ 5,511.44	$ 18,396.52	$ -	$ -	$ -	$ -	$ 23,907.96
4.4	Baselines and Benchmarks	$ -	$ -	$ 918.57	$ -	$ -	$ -	$ -	$ -	$ 918.57
4.5	Approval of Manufacturers/Vendors	$ -	$ -	$ 459.29	$ 1,533.04	$ -	$ -	$ -	$ -	$ 1,992.33
4.6	Shop Drawings	$ -	$ -	$ 459.29	$ 31,619.03	$ 44,103.76	$ -	$ -	$ -	$ 76,182.08
4.7	Contractor Initiated Substitutions	$ -	$ -	$ 459.29	$ 7,792.97	$ 2,940.25	$ -	$ -	$ -	$ 11,192.51
4.8	Testing	$ -	$ -	$ 459.29	$ 15,330.44	$ -	$ -	$ -	$ -	$ 15,789.72
4.9	RFI's & Field Orders	$ -	$ -	$ 459.29	$ 25,103.59	$ 13,353.64	$ -	$ -	$ -	$ 38,916.52
4.10	Change Orders	$ 992.20	$ -	$ 459.29	$ 19,163.05	$ 3,920.33	$ 350.00	$ -	$ -	$ 24,884.87
4.11	Payment Requests	$ -	$ -	$ -	$ 4,599.13	$ -	$ -	$ -	$ -	$ 4,599.13
4.12	Start-Up Services	$ -	$ -	$ 918.57	$ 22,995.66	$ -	$ -	$ -	$ -	$ 23,914.23
4.13	Post Construction Assistance	$ -	$ -	$ 918.57	$ 2,299.57	$ 6,125.52	$ -	$ 12,074.06	$ -	$ 21,417.72
	Subtotal Tasks 1 through 4	$ 14,138.85	$ -	$ 43,632.21	$ 473,902.14	$ 286,061.90	$ 1,960.00	$ 91,092.08	$ 7,973.15	$ 918,760.33
Task 5	**Resident Project Representative (per Scope of Work)**									
5.1	Resident Project Representative	$ -	$ -	$ -	$ 766,521.86	$ -	$ -	$ -	$ -	$ 766,521.86
5.2	Part Time Administrative Assistant	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 194,467.00	$ 194,467.00
	Subtotal Task 5	$ -	$ -	$ -	$ 766,521.86	$ -	$ -	$ -	$ 194,467.00	$ 960,988.86

Total Man Hour Estimate	**$ 1,879,749.18**

Summary of Costs - Phase 2

Description		**Cost**
Task 1 - Review & Compilation of Data		$ -
Task 2 - Project Work Plan & Reporting		$ -
Task 3 - Design Services		$ 669,410.23
Task 4 - Design Services During Construction (DSDC)		$ 249,350.10
Task 5 - Resident Project Representative (RPR)		$ 960,988.86
Task 6 - Other Direct Costs		$ -
Task 7 - Allowances		
	Unforseen Contingencies	$ -
	Training	$ -
Task 8 - Admin. of PVSC Funding Requirements		$ -
	TOTAL PHASE 1 PROJECT COST	**$ 1,879,749.18**

Task 1, Task 2, Task 6, Task 7 and Task 8 Services are included in Phase 1 Man-Hour Estimate

January 26, 2018