**EXHIBIT AA-B**

Hazen

MONTEREY PENINSULA WATER MANAGEMENT DISTRICT

# Proposal for
# Monterey Peninsula Water Supply Project
# Conveyance Facilities - Value Engineering Study

June 23, 2016

**EXHIBIT AA-B**

June 23, 2016

David Stoldt
General Manager
Monterey Peninsula Water Management District
5 Harris Court – Bldg G
Monterey, CA 93940

**Re: California American Water Company – Monterey Peninsula Water Supply Project (MPWSP) Conveyance Facilities –Request for Proposal – Value Engineering Study**

Dear Mr. Stoldt:

Hazen and Sawyer (Hazen) is pleased to present this Proposal to assist the MPWMD with the value engineering services for the Monterey Peninsula Water Supply Project (MPWSP) Conveyance Facilities. We are excited at the prospect of being a part of the challenging MPWSP to solve the local water supply and provide an environmental mitigation solution in Monterey and the surrounding area. The project is a complex system of slant well intake system, seawater supply pipeline, desalination plant, brine line, Salinas Valley pipeline, ASR Pipelines and treated water conveyance pipelines, pump stations and the terminal reservoirs.

***Our knowledge and prior Cost Savings ideas and work will provide substantial value to the MPWSP!***

Hazen is a leader in providing innovative solutions for water projects to clients throughout the Country and in California. This expertise, combined with our direct technical experience associated with prior review of the MPWSP, positions us well to quickly and efficiently review the conveyance projects and will provide the best value to the MPWSP. Our general approach to assisting the MPWMD consists of the following key strategies:

- **Assemble a Diverse Team of Experts to Meet the MPWSP Conveyance Project Needs.** Hazen has assembled a diverse team of experts that can provide the type of innovative thinking that will be required to ensure the developed solutions will provide the best value to the MPWMD. Our team includes world renowned experts in Value Engineering, conveyance and seawater process and design. We have included on our team Don Stafford, who as a Certified Value Specialist has particpated and facilitated over 400 Value Engineering or Peer Review workshops during his career with approximately 100 being water and or wastewater facilities. Our Project Manager, Kevin Alexander is a known membrane expert who has participated with Don on multiple VE Studies. He has direct recent experience helping MRWPCA with evaluation of cost saving ideas for the overall MPWSP.
- **Work as Part of an Integrated Team with MPWMD and CAW.** Hazen recognizes the importance of working as part of an integrated team with MPWMD, CWA and other MPWSP stakeholders. Given the number and complexity of the projects, the need for a collegial and collaborative approach will be an important element of success. Our culture promotes

Job no

collaboration and we have learned that philosophy is a key element of successful Value Engineering services. When providing Value Engineering services we are always conscientious of working with other consultants who have strong ownership in their design. Sometimes VE recommendations can be perceived as criticism of a design so particular care is exercised to ensure the VE recommendations are seen as opportunities.

- **Leveraging Familiarity and Knowledge of MPWSP Conveyance Projects, Our Team Covers the Full Range of Value Engineering Services.** Based on our understanding of the MPWSP Hazen has assembled a team familiar with Value Engineering services and with all aspects of conveyance design, operations, maintenance and safety. Our team members bring direct relevant experience with similar agencies in the Bay Area and throughout the country. Our Project Manager, VE Facilitator and other key team members all have recent, relevant experience both locally and around the world with similar facilities.
- **A Team with a History of Working Together.** Our team both individually and collectively has a strong working relationship that is founded on previous experience working together. This long history provides us with seamless integration and a more cohesive Value Engineering session.

**Established Working Relationships of Firm Staff**

| Sub consultant | Role | Worked with the Hazen Staff |
|---|---|---|
| RSRI | VE Facilitation | ✓ |
| Jerry Cole | Local Knowledge and Design | ✓ |
| Dennis Van Kirk | Expert Cost Estimator | ✓ |

- **Our Nationwide Experience Brings New Ideas, Innovation, and Cost-Savings.** Our team of experts will be able to leverage their experience on other projects nationally to bring new ideas and cost-savings measures to the MPWSP. Our Value Engineering team members on average save approximately 4 times the cost of the actual Value Engineering fees and for large projects we far exceed this value. On average our team brings forward over 200 relevant comments from each workshop. The value that we bring to the MPWSP is our ability to develop relevant cost-savings and identify potential challenges or issues on each project.
- **Depth and Breadth of Our Team Addresses All Areas of a Project.** We understand that this project is unique and there are limited firms with desalination conveyance experience which requires specialized expertise and technical disciplines. Therefore, our team has been assembled to include both the breadth of skills asked for in the RFP with support from our depth of technical resources to handle all aspects of the project.
- **Ensure the Commitment of Key/Lead Resources.** Our commitment to the MPWMD is we will ensure that our key staff are committed to working on this VE study.

The Hazen team offers proven value engineering expertise; exceptional technical strength; and the full range of engineering, operations and construction specialists that will make us an outstanding addition to the project. We appreciate this opportunity to submit our proposal and look forward to the opportunity to work with you.

Sincerely,

Kevin Alexander
Vice President and Project Manager

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# Section 1: Understanding of the Scope of Work

Section No. 1

# Understanding of the Scope of Work

*Our knowledge and understanding of the Monterey Peninsula Water Supply Project (MPWSP) will allow our team to develop defensible ideas with the purpose of adding real value to the project.*

## Defining the MPWSWP

The California American Water (CAW) is the water supply agency serving the Monterey Peninsula and is the agency developing the Monterey Peninsula Water Supply Project (MPWSP). The project is being developed in response to legal decisions affecting the available water for municipal uses in the Carmel River and the Seaside Groundwater Basin. The project is intended to reduce pressure on those stressed water supplies which have both been effected by local demand and the current drought. The MPWSP is a challenging and exciting water supply solution that provides significant environmental, social and resource benefit to the community.

The Monterey Peninsula Water Supply Project is defined by the following major elements:

- Slant Wells and pumps
- Raw Water Transmission Pipeline- The raw water transmission line will run from the CEMEX property to the Desalination Plant.
- Concentrate disposal transmission pipeline – The concentrate line will run from the desalination plant to the outfall at the MRWPCA regional water reclamation plant.
- Salinas Valley return pipeline – The pipeline will take product water to an infiltration pond for recharge into the Castroville Seawater Intrusion Project for protection and supply of the Salinas Valley Groundwater Basin.
- Desalination Plant (Not part of the VE Study)
- Product Water Conveyance Pipelines- The transmission mains will run from the desalination plant south through the County of Monterey and the cities of Marina, Seaside, Monterey and terminating in Pacific Grove.
- Terminal Reservoir and Pump Stations – The two (2) reservoirs located at the former Ft. Ord site will receive desalinated water for storage and equalization prior to being pumped to the communities.
- Monterey Transmission Pipeline – The pipeline will distribute water to Monterey.
- Aquifer Storage and Recovery (ASR) pipelines – Three (3) pipelines will transmit water to existing aquifer storage and recovery facilities for further aquifer recharge and recovery.

The following table is a further description of all of the components of the project with approximate pipe lengths and number of facilities. This list represents what the Value Engineering team will review from the bid documents and information provided for each component of the project.

| VE Item Number | Description | Component Length (LF) or Number of Components | Diameter(inches)/ Capacity(gpm) | Contractors |
|---|---|---|---|---|
| 1 | Feedwater – Cemex | 11,500' | 42" | Garney Pacific, Inc. |
| 2 | Brine Discharge | 3,800' | 36" | Mountain Cascade, Inc. |
| 2 | Salinas Valley Return | 5,700' | 12" | Mountain Cascade, Inc. |
| 3 | Transfer Pipeline | 49,500' | 36" | Garney Pacific, Inc. |

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| VE Item Number | Description | Component Length (LF) or Number of Components | Diameter(inches)/ Capacity(gpm) | Contractors |
|---|---|---|---|---|
| 4 | Aquifer Storage & Recovery | 5,100' | 36" | Monterey Peninsula Engineering |
| 4 | ASR Extensions – 3 pipeline | 4,300' (each) | 16" | Monterey Peninsula Engineering |
| 5 | Monterey Pipeline | 35,000' | 36" | Garney Pacific, Inc. |
| 6 | Terminal Reservoirs - tanks and related civil work and electrical work | 2 Tanks | 3 Million Gallons (each) | Monterey Peninsula Engineering |
| 6 | Terminal Reservoir Inlet/ Outlet Piping | 1700' (each) | 16" | Monterey Peninsula Engineering |
| 7a | Monterey Pump Station and related civil work, electrical and piping work | 1 pump station | 6300 gpm | Monterey Peninsula Engineering |
| 7b | Valley Greens Pump Station and Related civil work, electrical and piping work | 1 pump station | 2500 gpm | Monterey Peninsula Engineering |

The listed transmission, pump stations and reference projects have all been bid to the contractors in the local area.

## VE Project Objective

Our understanding is that this project for MPWMD as part of the governance committee for the MPWSP would like to identify potential changes to the project design or construction that could allow the project and components of the project to meet primary functions of supplying water to the region but at a lower capital and lifecycle costs or at a better overall value to the communities. As part of the project, the VE team is to work with MPMWD to evaluate and provide input on the constructability, durability of the design, adaptability of the project, operability, safety, and maintenance issues.

Our approach to conducting this value engineering study will be consistent with the standards of SAVE International®, EPA, the State of California, and ASTM for conducting value engineering. To maximize the effectiveness of the process for MPWMD and CAW, we have made some significant improvements to the details of the process. These improvements result in a better understanding of the fundamental issues for our VE Team and functions of the project, thus producing what we know will be higher quality VE recommendations that are more useful to the MPWMD, CAW and the designer. Our focus is on an efficient VE process itself, resulting in less time spent on decision-making in the process, and more time spent in producing good recommendations for CAW and MPWMD's use.

Our approach is founded on the development of a strict adherence to an "optimized workshop" format. This approach enhances VE team productivity and ensures that all of the work of the team will be completed on time. A unique aspect of our approach is the intense, focused management of the workshop time and activities. We stay on schedule to ensure we deliver results in a planned timely manner.

Furthermore, our study will target the best long-term value, not the greatest short-term savings, by using the most appropriate of several available approaches to Life Cycle Cost (LCC) analysis. Our approach examines the combined initial and O&M cost impacts when developing VE recommendations. Thus, our VE recommendations seek to obtain the best value for the dollar expended, and routinely include such issues as operability, maintainability, operations during construction, aesthetic issues, impacts on neighbors, security and safety, impacts to the environment, staffing, constructability, public and political acceptance.

*Our VE recommendations seek to obtain the best value for the dollar expended*

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# Section 2: Proposed Methodology and Delivery Schedule

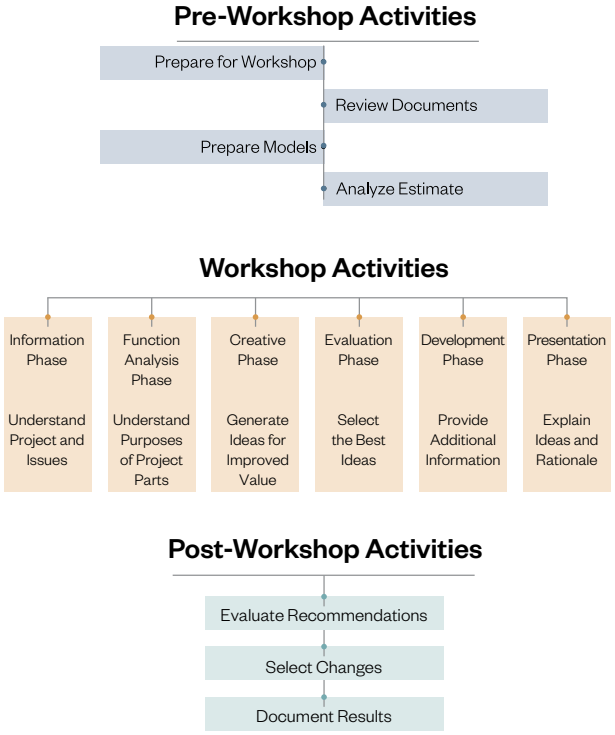
Section No. 2

# Proposed Methodology and Delivery Schedule

*Our proven process for delivering VE studies will find capital and O&M savings for the Monterey Peninsula Water Supply Project (MPWSP).*

## The VE Process

For our projects, we use a systematic approach called the Job Plan in conducting VE studies. The Job Plan functions as a road map through the VE process, ensuring that all of the needed steps in the process are performed in the optimal fashion for maximum MPWMD and CAW benefit.




The figure above illustrates our Job Plan. As can be seen from the diagram, the VE process takes place in three major groups of activities: pre-workshop, workshop, and post-workshop.

### 1. Pre-Workshop

During the pre-workshop period our VE team will conduct several activities designed to make the team's use of the workshop time most efficient by creating formats, identifying design standards for the area and identifying all prior documentation for use by the VE Team. In addition, for this project because it has been completely designed our estimator will review the overall project budget and the bids to ensure the VE recommendations will be prepared on a common cost basis with the estimates and bids, so that any cost savings identified are truly representative of the VE changes, rather than representing differences in estimating.

We are proposing to prepare capital cost, O&M cost and Life Cycle cost models, as appropriate, for each part of the VE study.

### 2. Workshop

As noted previously, for the optimized workshop we use the SAVE International® standard 6-step process. This six-step process is an expansion of the historical 5-step process initially used by the US Army Corps of Engineer for the past several decades, modified to put greater emphasis on analysis of the project's critical functions for success. Our approach to each of the six steps as identified in the RFP is described in the following sections including a description of our optimization to each step.

#### 2.1.1 Information Phase

In the Information Phase, our VE team learns firsthand, the goals and objectives of MPWSP and the project designer's approach to accomplishing them. This phase continues the process of educating the VE team in understanding the project that began during the pre-workshop review of project documents.

We believe that a thorough VE team understanding of the project, the project issues and CAW and MPMWD and designer concerns is critical to the development of usable VE recommendations. Thus we place heavy emphasis on ensuring during this phase of the process

that 1) the VE team asks questions and 2) all questions are clearly and completely answered by CAW and MPMWD and the designer. Unless the VE team truly understands the project, the true potential of the VE process to identify usable VE recommendations is reduced.

We are therefore recommending that the VE team members take a tour of where the proposed pipelines and pump stations will be installed on the first day of the workshop.

### 2.1.2 Function Analysis Phase

During the Function Analysis Phase, the VE team uses one or more of several function analysis tools to analyze the project. The VE team will review the objectives of the overall project and will further analyzes the functions of the key elements of the project. The team leader leads the team through intensive discussions of the possible functions of the project elements until they have a clear and precise understanding of the true purposes of the project components. Unlike some VE processes where only a single function analysis method is used, our team members are well versed in several function analysis methods, enabling them to select the analytical approach best suited to your project. This could include a mission statement analysis methodology, a mind-mapping exercise, Tabular Function Analysis or any of several Function Analysis System Technique (FAST) methods.

Our team leaders also ensure that two other goals are accomplished during the function analysis phase:

1. The VE team is molded from a group of individuals into a high-energy, cohesive team prior to the creative phase, to ensure optimal effectiveness of the creative idea generation, and
2. The ideas for project value improvement that are typically generated during a well-managed function analysis effort are identified and captured for inclusion in the subsequent creative phase.

The first of these is a particularly important issue, for, if the "team-work environment" has not been completely and successfully formed in the function analysis phase, the effectiveness of the creative phase will suffer significantly due to reduced creativity on the part of one or more team members.

The best function analysis tools for each VE study of each project will be selected by the VE team leader and project manager during the pre-workshop preparation period, based on the information available at the time.

### 2.1.3 Creative Phase

During the creative phase the team participates in the most exciting and vibrant part of the workshop – generating new ideas. Again, we have a number of techniques for stimulating the generation of ideas for project improvement, and the most appropriate is selected for the project. The most commonly used is the very consistently effective "brainstorming" technique. The brainstorming technique is very effective and efficient in generating ideas from a group of the typical VE team size and is quite effective in reducing negative thinking, which is very inhibitory to goals of this step in the VE process. Using augmentation techniques to improve the effectiveness of the brainstorming activity, our teams usually generate from 150 to over 300 ideas.

During this part of the VE process, the team goes well beyond traditional design solutions, to identify unusual and innovative approaches, without regard to their ultimate acceptability. This ensures that all possible answers, no matter how ridiculous they may initially appear, have been identified. This is important, because sometimes an apparently impractical idea, when modified, becomes the seed of a wonderfully practical idea that would otherwise have been overlooked.

### 2.1.4 Evaluation Phase

Once all of the ideas have been identified and tabulated, the team must select the best of them for development into full-fledged VE recommendations. As with the other steps in the process, we utilize a number of evaluation tools to accomplish this step in the process. We select the one with the best applicability for the type of project, based on a number of factors, including the level of documentation of the selection process needed, the time available for the evaluation, the number of ideas which must be considered, and the production capability of your VE team. Again, one of our strengths

is we utilize a number of ways of conducting this phase of the VE process, with increased effectiveness in the overall process.

An analysis of the functions of the various phases of the VE process led our team to conclude several years ago that a more efficient method was needed to accomplish this workshop phase than was then available. Accordingly, we have developed a very time-efficient method of idea evaluation to minimize the time spent in this phase and make more time available for development of additional VE recommendations. This method is a combination of a voting methodology and exception-based consensus discussion. The voting process is used to make the initial screening of ideas, and can be done efficiently, even with a very large number of ideas.

Following the voting, the team discusses the idea-selection decisions made in the voting process to determine, by exception, whether changes should be made to the initial decisions about which ideas to recommend to the owner. This second step ensures that the knowledge that may be unique to each individual team member is considered fully in the idea evaluation process.

Use of this new evaluation process can cut the time required by other evaluation methods in half, making the additional time available for developing more VE recommendations.

### 2.1.5 Mid-Point Review

In important additional step in our approach after the evaluation phase is complete, we invite CAW and MPMWD and designer to review the initial list of recommendations with our VE Team Leader. They are asked to identify any ideas that are "fatally flawed". This reduces the chance that the VE team will spend valuable time working on recommendations that, because of unique CAW, MPMWD or designer knowledge, have no potential for success. The result is that the recommendations that are developed by the VE team have a much higher likelihood of acceptance. At this time, CAW and MPMWD and designer are also given the opportunity to identify other ideas for further VE team consideration, which had not been selected by the VE team as recommendations. This check also provides CAW and MPMWD and designer with a preliminary look at the ideas that will be presented at the end of the workshop to help determine which staff members should attend the VE presentation. This activity is conducted by the VE team leader, CAW and MPMWD and designer representatives in parallel with the beginning of the recommendation development effort by the VE team members, so no productive time is lost by the team.

### 2.1.6 Development Phase

As with the other phases of the VE process, there are several approaches to conducting the development phase. Selection of the technique is based on the specific project needs. The general approach followed in all cases, however, is the development of justification, design calculations, illustrations, and cost information for the selected ideas. This information enables CAW and MPMWD and designer staffs to decide whether the VE recommendation has sufficient promise for their project to warrant inclusion into the design.

We always conducts this process in a combined team environment, rather than allowing individual team members to return to their offices for this work. This continuation of the "teamwork" approach ensures that all aspects of a concept will be developed and included in the VE recommendation through the interaction of all of the disciplines represented on the team.

Our approach to presenting the VE recommendations involves the development of each idea as a separate recommendation, to provide a "shopping list" of potential cost savings and project improvements from which the owner and designer can select their optimal combination.

### 2.1.7 Presentation Phase

In the last VE workshop phase, our VE team will present the workshop results to CAW and MPMWD and to the designer. The team members will present the recommendations they developed during the workshop, and will provide CAW and MPMWD and the designer the opportunity to ask questions to ensure your understanding of the concepts that generated the recommendations. This permits a first-hand discussion with the idea developer to improve understanding of each recommendation. This last step in the workshop process is not a debate of the acceptability of the VE ideas, but rather a continuing exchange of perspectives.

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The VE team cost estimator also presents the results of the examination of the project budget and details of the estimate at this time. The cost estimator's review provides a second opinion on the adequacy of the estimated project cost to either validate the project budget, or identify suggested changes.

Because VE recommendations can sometimes be perceived as criticisms of the design, particular care is exercised ensure that the VE recommendations are presented as opportunities for improving the design performance, for the mutual benefit of CAW and MPMWD and the designer, rather than as criticism of the design. The talents of our team leaders are very important in this workshop phase, because they ensure a productive environment for the initial consideration of the VE recommendations and minimize defensiveness on the part of the designer.

### 3. Post-Workshop

We are mindful that staying on schedule is important, therefore, to speed the review process, we will provide CAW and MPMWD with a preliminary report that includes all of the work produced in the workshop within three working days of workshop completion. CAW and MPMWD and designer can quickly begin their review of the VE recommendations, thus shortening the time for decision-making regarding acceptance.

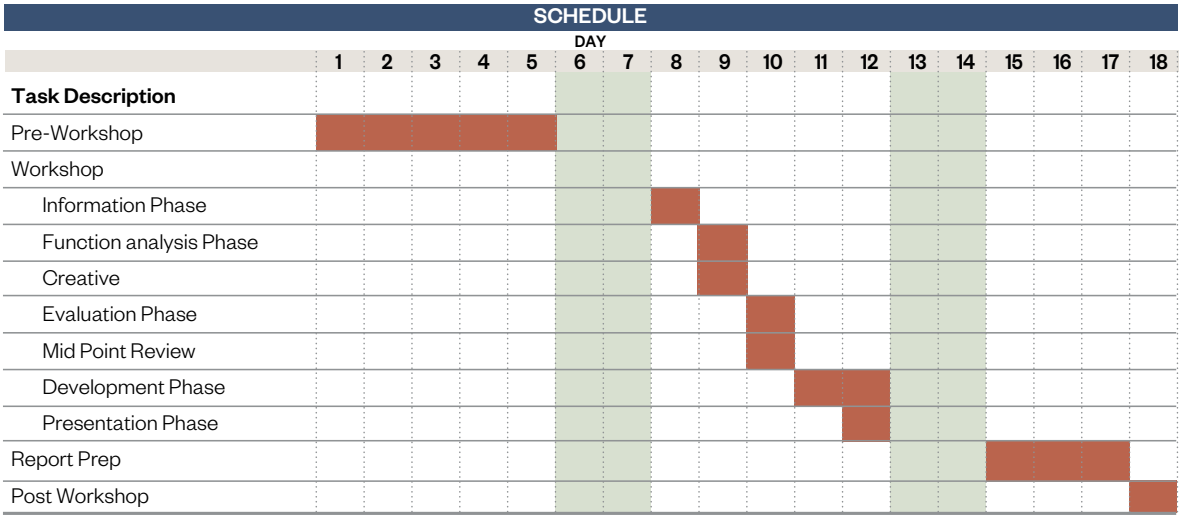
Additional post workshop activities consist of coordinating and facilitating CAW and MPMWD's decision-making process, and documenting the complete Value Engineering process. This interactive feature of our post-workshop process ensures that good VE recommendations are not lost through lack of understanding, personal preferences, insufficient involvement of all appropriate staff in the decision-making.

Our experience indicates that with a written designer response and a decision-making meeting that includes VE team representation, substantial additional savings will be realized from the VE study. Without both of these steps, designer reluctance to make changes, lack of a thorough understanding of the full consequences of the VE recommendations, and the lack of an open forum for CAW and MPMWD to hear all sides of the issues raised by the VE recommendations can result in lost opportunities. Therefore, our proposed approach includes a plan for a written response to be provided by the designer, and discussions of the decisions on the VE recommendations in a decision-making meeting that includes representatives from the CAW, MPWMD, the designer and the VE team.

Our decision-making steps ensure maximum information to CAW and MPMWD to enable the best possible decision. The reports provide documentation of the VE study and recommendation acceptance for later review to confirm the inclusion of the desired changes in the design, and to document the work effort.

## Proposed VE Team Schedule

Our proposed schedule is shown in the following simple format. The schedule will encompass approximately 3 weeks of effort to complete all of the tasks and workshop efforts.



# Section 3: Qualifications and Experience

## Section No. 3

# Qualifications and Experience

*Hazen is a nationally-recognized environmental engineering and consulting firm, specializing in the engineering and management of wastewater collection, treatment, and disposal; recycled water treatment and distribution; and water supply, distribution, and treatment.*

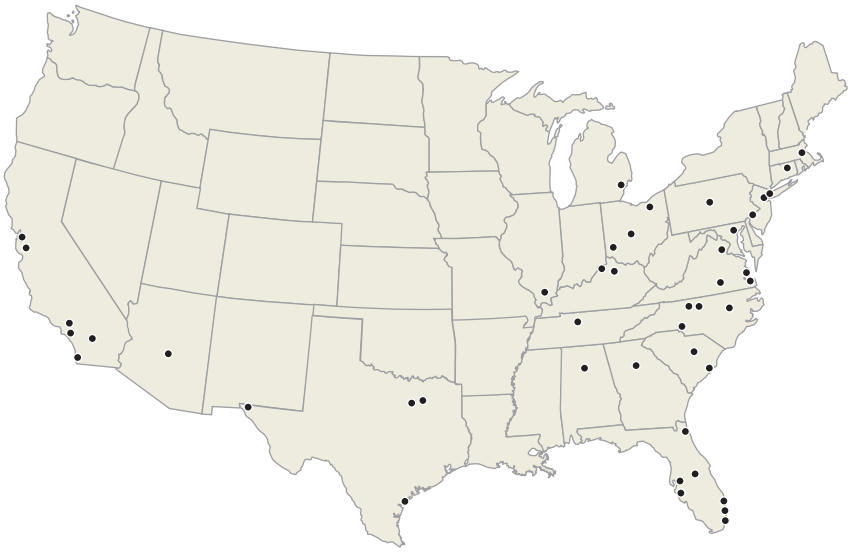
Since our founding in 1951, the firm has developed a reputation for the technical, quality, and timeliness of our work. Currently, we have over 900 professionals and support staff in 46 offices with 6 offices in California.

Hazen has a strong focus in planning, design, startup, and operation and maintenance of water treatment and distribution/conveyance systems. We have a west coast team that has extensive desalination experience working on treatment and distribution of desalinated water. We inherently consider water quality, safety and O&M concerns from the outset of a project. We are able to do this because our key team members bring a working background in operations, having worked at water treatment plants including desalination treatment plants similar to MPWSP. We are always focused on solutions that provide efficient operations and low maintenance.

Our key subconsultant, RSRI, was selected based on their expertise, working relationship with Hazen team members, and familiarity with the area and with large water treatment and conveyance systems.

RSRI's experience in Value Engineering reaches back to 1981, providing clients with 35 years of experience in optimizing projects and conducting Value Engineering studies to improve the cost effectiveness of capital projects.

The MPWMD Value Engineering Services contract requires a wide range of skills to address different aspects of the project that may be included under the scope of these services. Hazen has selected a talented team for this contract with specialists in the areas of desalinated water treatment, pipeline and pump stations, reservoirs, value engineering facilitation, cost estimating, and construction.



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Lexington
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# Value Engineering Projects

## Ridgewood View Park Reservoir & Pump Station – Beaverton, OR

**Reference** Mike Britch, Tualatin Valley Water District, 503-701-1343, mike.britch@tvwd.org

VE study of a project to construct a new 7 MG, cast in place, concrete, finished water reservoir at the location currently occupied by the 5 million gallon Hyde Park Reservoir, which is in poor condition and is currently not in use. Additionally, the project will construct a new 11 mgd integrated pump station, interconnecting piping and fluoridation facilities. Estimated construction cost is approximately $27 million. Owner-accepted VE alternatives totaled $3.64 million in net life cycle cost savings.

## IPL Pipeline – Tarrant Regional Water District – Ft. Worth, TX

**Reference** Ed Weaver, Tarrant Regional Water District, 817-720-4255, ed.weaver@trwd.com

Eight separate VE Team studies on elements of a $2.2 billion, 105 mile long, new raw water pipeline system serving the Dallas-Ft. Worth area were conducted. Project elements included more than 100 miles of 84-108-inch raw water pipeline; three new raw water pump stations, ranging in capacity from 150-277 mgd; and three booster pump stations ranging in capacity from 200-350 mgd; along with associated balancing reservoirs, short and long tunnels, corrosion control facilities and chemical feed facilities. Owner-accepted savings from the VE studies were in excess of $50 million.

## DC Water Blue Plains Advanced Wastewater Treatment Plant, Facility Improvements

**Reference** Rouben Derminassian, DC Water, 202-787-2372

DC Water operates the Blue Plains Advanced Wastewater Treatment Plant (AWTP) which is the largest advanced wastewater treatment plant in the world with a capacity of 384 mgd and a peak capacity of 1,076 mgd. It has a design peak hour treatment capacity of 555 mgd. The facility employs high level treatment to meet or surpass regulatory requirements for wastewater treatment. The liquid process includes primary clarification, 2-stage biological treatment (aeration basins and clarifiers), enhanced nitrogen removal denitrification reactors, post aeration, filtration and chlorine disinfection. The solids process includes gravity thickening of primary sludge, dissolved air flotation thickening of WAS, thermal hydrolysis pre-treatment, mesophilic anaerobic digestion, belt filter press dewatering, gas turbine combined heat and power and anammox filtrate treatment.

A number of these facilities and processes have been upgraded or implemented in the recent years to support the migration to enhanced nitrogen removal (ENR) and achieving a final effluent total nitrogen concentration of 3.0 mg/L. As these facilities have been in the design process, Hazen was retained by DC Water to perform Value Engineering services on several of the upgrades to ensure that the projects are delivered to result in the highest value for DC Water. A description of some of these Value Engineering studies follows.

### Enhanced Nutrient Removal (South) Improvements

The heart of this project was the construction of a large denitrificatvaion reactor with a total volume of approximately 37 million gallons. Secondary effluent conveyance from the nitrification reactors, post aeration basins and conversion of existing nitrification sedimentation basins to denitrification sedimentation basins were the other key elements of the project. The cost estimate for the project prior to the Value Engineering study was approximately $295 million. Over the 5-day VE workshop, the Value Engineering team fully developed 14 VE alternatives and 7 design suggestions for consideration by DC Water and the design team.

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### Enhanced Nutrient Removal (North) Improvements

This project was to perform improvements and modifications on the first stage biological process to support extended service life and improve the aeration system to support continued operation of these facilities as the AWTP migrates to an Enhanced Nutrient Removal facility. Significant work was required on very large centrifugal blowers to rehabilitate them for continued service and a large portion of the estimated $51 million construction cost (prior to the Value Engineering study) was related to aeration system improvements. Over the 4-day VE workshop the Value Engineering team fully developed 10 VE alternative and 13 design suggestions for consideration by DC Water and the design team.

### Gravity Thickener Upgrades (Phase II)

This project was to perform improvements and modifications to the existing gravity thickeners to support the biosolids processing improvements that were planned (and have now been implemented) to convert the facility to thermal hydrolysis pretreatment and mesophilic anaerobic digestion. Significant considerations for mechanical and structural rehabilitation as well as odor control via cover system selection were included in the project. The cost estimate for the project prior to the Value Engineering study was approximately $16 million. Over the 4-day VE workshop, the Value Engineering team fully developed 17 VE alternatives and 19 design suggestions for consideration by DC Water and the design team.

### Filtrate Treatment Facility

The conversion to thermal hydrolysis and anaerobic digestion biosolids treatment results in a dewatering sidestream rich in nitrogen and phosphorus that has the potential to significantly impact the ability of the AWTP to meet the target effluent total nitrogen concentration of 3.0 mg/L. The proposed process was a system that could function in either a nitrification-denitrification configuration or an anammox (DEMON) configuration. Pretreatment of the filtrate prior to the anammox process through a combination of physical/chemical treatment and dilution is planned to help mitigate potential toxicity of the sidestream to the biological process of the filtrate treatment facility. The cost estimate for the project prior to the Value Engineering study was approximately $63

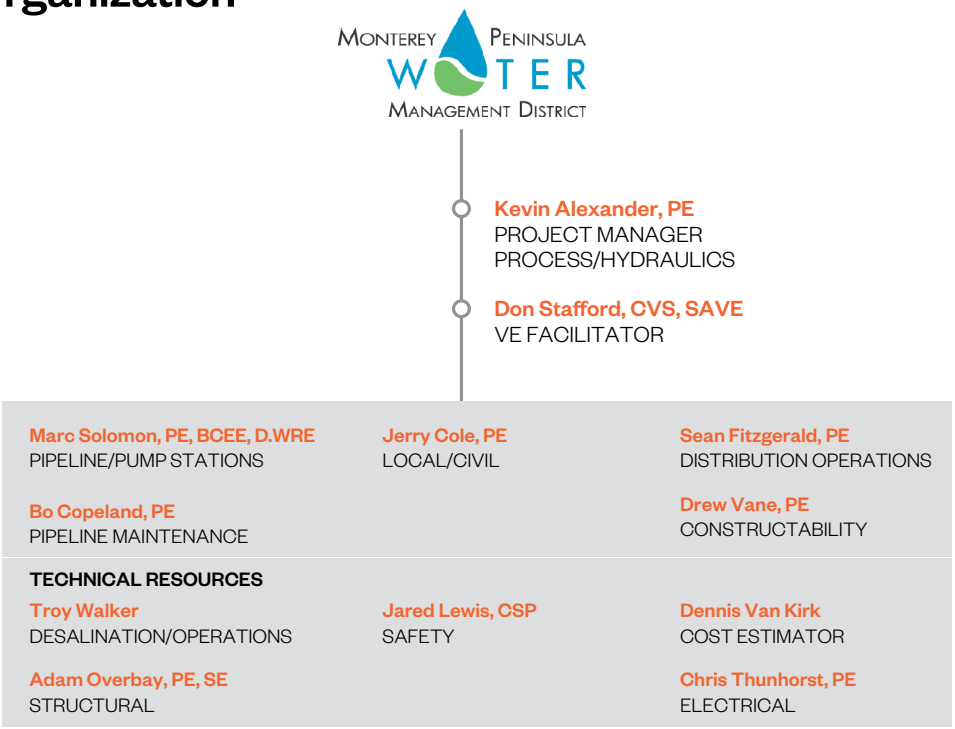
# Section 4: Key Personnel

Section No. 4

# Key Personnel

*Our team is built to address all aspects of the MPWSP Transmission Projects allowing us to find the most savings and value. Our VE team is made up of the core disciplines and are supported by Technical Resources that address other valuable aspects of the Project.*

## Team Organization




## Team Biographies

### Kevin Alexander, PE

**Project Manager**

Mr. Alexander is Vice President and Senior Project Manager for Hazen with an extensive background in desalination projects and system operations. He has spent the entirety of his career working on large desalination projects for brackish groundwater, brackish wastewater and seawater. His understanding of these types of projects including the many project specific consideration necessary to address this specific type of water treatment and treatment operations will be valuable to the MPWSP. He has participated in all aspects of these types of projects from planning, design, construction and operations. His most recent work was directly related to evaluating potential savings associated with the MPWSP. His familiarity with the project will provide valuable time savings in guiding and managing the VE team. He is a team leader with a team building style that garners trust from team members and clients.

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## Don Stafford, CVS, SAVE

### VE Facilitator

Mr. Stafford is a founding partner in Robinson, Stafford & Rude, Inc. (RSRI), currently serving the firm as President and as a Senior Project Manager. His career includes nearly 50 years of experience in the planning, management, design, value engineering (VE) and construction of public and private capital projects across North America. For 30+ years, he has been managing and leading value engineering studies. His experience includes more than 400 VE studies on a very wide variety of project types, including water and wastewater conveyance, including large pipeline projects; storage and treatment facilities; drainage facilities; and transportation facilities. He has conducted VE studies on projects and programs with capital costs ranging from a few hundred thousand dollars to $2 billion.

## Jerry Cole, PE, BCEE

### Civil/Local Knowledge

Mr. Cole has over 35 years of civil engineering experience on projects from conceptual planning, design, construction management, and project and program management. He has provided services on water supply and treatment; wastewater collection, treatment, disposal and reuse management for municipal, foreign, commercial, and industrial clients. He has in-depth experience in development and implementation of water projects in an around Monterey and will provide valuable insight into the challenges of implementing projects and potential value engineering ideas. He has worked for various agencies in the area and understands how projects move forward.

## Dennis Van Kirk, CET

### Cost Estimating

Mr. Van Kirk is a has over 50 years of professional experience in project cost management services including cost estimating, change order analysis, value engineering, and constructability reviews. He has extensive experience in estimating through all aspects of projects from conceptual planning and design through construction and closeout. He has one of the broadest backgrounds in project estimating including pump stations, pipelines, tunnels, treatment plants, power plants, bridges, railroads, transportation systems, aviation complexes, marine structures and outfalls, manufacturing plants, power generation and transmission facilities, solid waste disposal facilities, laboratories, office buildings, schools, medical facilities, landfills, and underground utilities. He will brings a wealth of knowledge on cost estimating and understands how to evaluate and integrate local conditions into his estimates.

## Sean Fitzgerald, PE

### Distribution Operations

Mr. FitzGerald has over 24 years of conveyance experience. He has worked on large wastewater collection systems as well as large distribution systems. He serves as Hazen's Conveyance Practice Leader. His has extensive experience in all stages of collection system planning, operation and detailed design. He has led numerous master planning projects including evaluations for wet weather capacity involving complex hydraulic modeling. Sean has also helped clients develop cost-effective CMOM programs including condition assessment and cleaning as well as overall Asset Management.

## Drew Vane, PE

### Conveyance/Construtability

Mr. Vane serves as a project manager and technical designer for sanitary sewers, force mains and water mains and the associated construction administration. His experience also includes resident inspection and construction administration for wastewater treatment plant projects; design and studies for pump stations and collection systems; hydraulic computer modeling; and regulatory permit applications. Mr. Vane also serves as the primary technical resource for Horizontal Directional Drilled Pipe (HDD) pipe projects corporate-wide.

## Bo Copeland, PE

### Pipeline Maintenance

Mr. Copeland is an expert in water and wastewater conveyance systems, including engineering services from planning through construction, operations engineering, condition assessment, and other issues related to operation and maintenance of these systems.

## Jared Lewis, CSP

**Safety**

Mr. Lewis is Hazen's corporate safety and risk management leader. He is a safety specialist with professional experience in developing, implementing and monitoring risk-based programs and projects to identify, assess and mitigate any operational risk while maintaining a balance between risk mitigation and operational efficiency. His strength is in assessing project safety and operational safety for projects during design to ensure Owners and Operators understand the daily risks that will be present while conducting routine job.

## Adam Overbay, PE, SE

**Structural**

Mr. Overbay is the lead structural engineer for Hazen's West Region. Mr. Overbay specializes in structural design of water and wastewater treatment and pumping facilities. His experience includes reinforced and prestressed concrete, structural steel, and reinforced masonry structures. He is experienced in computer modeling and analysis of structural systems and condition assessments of reinforced concrete, steal, and wood structures. Mr. Overbay is involved in design and construction of alternative delivery projects and understands how quickly ideas need to be turned into design.

## Chris Thunhorst, PE

**Electrical**

Mr. Thunhorst is a registered Electrical and Instrumentation Engineer with over 17 years of experience providing power supply solutions and control system solutions to water and wastewater facilities including treatment plants and associated water distribution and wastewater collection systems. He has participated in value engineering studies as part of teams for various alternative delivery projects. His ability to quickly identify electrical and control system solutions and define the project needs will be valuable to the VE team.

## Troy Walker

**Dealination/Operations**

Mr. Walker is the corporate Membrane Technology Lead and is one of Hazen's most experienced operations experts. He has over 20 years' experience in the planning, design, construction and operations management of advanced water reuse and seawater desalination facilities. His experience with membrane plants began in 1994, where he was involved in the commissioning of the first ever application of microfiltration and reverse osmosis together for reuse of municipal effluent at the Eraring Power Station in Australia. Since that time he has designed, constructed, commissioned and operated multiple advanced reuse and desalination facilities. He was previously the lead technical manager for Veolia in Australia where he managed the operations of the Sydney Desalination Plant, the Gold Coast Desalination Plant and the operations of the Western Corridor Project which included three advanced water treatment plants for indirect potable reuse. His value to the team will be in evaluating ideas from a desalination plant operations perspective.

## Marc Solomon, PE, BCEE, D.WRE

**Pipeline/Pump Stations**

Mr. Solomon has more than 30 years of experience as an accomplished designer and project manager on a wide range of water, water reuse and wastewater projects. His career has been focused on water projects with extensive experience on large pump station and pipelines in California and around the world. He has delivered on challenging projects like the Geysers Recharge project for the City of Santa Rosa which included large diameter pipe with a wide range of high pressure pump stations. He is also credited with designing one of the largest pump stations in the world in Singapore. His roll-up-the-sleeves style and good interpersonal skills allows Marc to develop trust within teams and with clients.

# Appendix 1: Resumes

# Kevin Alexander, PE

## Vice President

*Mr. Alexander is a Vice President and Senior Project Manager with over 20 years of extensive experience in the planning, design, construction and operation of large water, wastewater and reclaimed water treatment programs.*

He is a known expert in designing cutting edge membrant treatment technologies from membrane filtration and reverse osmosis for brackish and seawater desalination. He has participated in over 15 value engineering studies and has developed cost models for membrane treatment plant capital and O&M costs to allow for rapid project life cycle cost evaluations. He has participated in the startup and operations support of large programs. He has experience with many different project delivery methods including: design-bid-build, CM at risk, alliance contracting, design-build and design-build-operate.

### Education

B.S. Civil Engineering, Missouri University of Science and Technology (Previously University of Missouri at Rolla)

### Certification/License

Professional Engineer: CA, AZ, ID, OK, TX, WA

### Areas of Expertise

- Project Management
- Project Delivery
- Microfiltration
- Reverse Osmosis
- Drinking Water
- Wastewater
- Water Reclamation
- Concentrate Treatment

### Professional Activities

AWWA, AZWA, AMTA

CA-NV AWWA

CA Water Reuse Association

WateReuse Association

WEF

### Technical Publications

Author of more than 30 technical presentations and publications.

**City of Signal Hill – Design Build Project for a NF Treatment Plant for Well No. 9, Signal Hill, California**

As part of the Filanc DB Team, Mr. Alexander is the Design Project Manager responsible for the process, civil, electrical, structural and mechanical design of the NF plant from the well pump through the treatment process and into the distribution system. Project pursuit required completion of value engineering, constructability and pricing of a 60 percent design to allow for development of a GMP for a 2.0 MGD NF treatment plant for color removal. Project cost proposal is under review.

**Monterey Regional Water Pollution Control Agency – MPWSP and GWR Cost Evaluation Study, Monterey, California**

As Project Manager, Mr. Alexander was the lead evaluator performing a cost study of the Desalination and Groundwater Replenishment System projects. The project included development of savings options and a review of capital costs, bids and unit pricing.

**City of Santa Barbara – Design-Build-Operate (DBO) Services For Reactivation and Operation of the Charles Meyer Desalination Plant, Santa Barbara, California**

As part of the Acciona/Filanc DBO Team, Mr. Alexander was the Design Project Manager responsible for the civil, electrical, structural and mechanical design of the desalination plant from the open ocean intake through the treatment process. Project required a 60 percent design to



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allow for development of is a 2.9 MGD seawater desalination plant that is expandable to an ultimate capacity of 8.9 MGD. Project was not awarded to the Team.

**Coachella Valley Water District – Water Supply Treatment for Hexavalent Chromium, Coachella Valley Water District, Palm Desert, CA**
As Principle In Charge and Technical Advisor to the project. Mr. Alexander is providing assistance with reviewing project deliverables for the design of 31 wellhead treatment projects, 10 plus miles of pipeline and Ion Exchange treatment processes and a central ion exchange regeneration facility.

**West Basin Municipal Water District – Seawater Desalination Demonstration Facility Decommissioning, Redondo Beach, California**
As Project Manager, Mr. Alexander is leading the project for decommissioning of the 110 GPM seawater desalination system. A major effort includes finding a buyer or research organization for purchasing the used equipment to maximize value to the Client.

**Sand City, Seawater Desalination Facility Planning and Design Build Document Development, Sand City, California, Project Engineer**
Assisted with the development of a 300 GPM Seawater RO system treating wedge water between brackish groundwater and seawater for potable use. Assisted with permitting of the facility as a groundwater under the direct influence of surface water and with development of the design build documents.

**Veolia Water Services- Australia, Adalaide Desalination Project-Add Water Alliance, 36 MGD, Project Tendering Design, Adalaide, Australia, Project Manager**
Managed a team and provided quality control of design and construction documents, performed RO membrane projection and developed energy calculations for 20 years of operation scenario for the entire desalination plant under various turndown capacities and seawater conditions..

**Veolia Water Services-Australia, Wonthaggi Seawater Desalination Project- Bass Water Alliance, 108 MGD, Melbourne, Australia, Project Manager**
Managed the team to assist with the development and operation of a seawater pilot system. Assisted with preparation and review of computer based RO membrane projections to develop a comprehensive energy consumption model for the guarantees for a 30 years plant operation to ensure the design met the energy, carbon footprint and cost objectives.

**City Of Scottsdale, Pump Station 68 Retrofit, Scottsdale, Arizona, Project Manager**
Assisted with development of detailed mechanical plans and specifications for a 525 gpm pump station retrofit project. The project converted horizontal pumps to vertical drypit pumps to allow the pump station to meet current electrical codes. Project was delivered as a design build project.

**City Of Scottsdale, Hualapai Drive 24 inch Pipeline, Scottsdale, Arizona, Project Engineer for Black & Veatch**
Developed design plans and specifications for a 0.5 mile pipeline in Hualapai Drive. The pipeline was design and installed to carry reclaimed water in the RWDS system. Responsibilities included design and engineering support during construction.

# EXHIBIT AA-B

*BS, Civil Engineering*
*Georgia Tech*

*Registrations/Certifications*

*Professional Engineer – FL, GA, NJ, OR, TX, WA, VA*

*Certified Value Specialist - Life Certified*

*CTM, Toastmasters International*

*SAVE, International, - Fellow, former VP Education, Director, Certification Board Member*
*American Society of Civil Engineers - Member*

*Water Environment Federation – Member*

**Years Experience – 48**

Don Stafford is a founding partner in Robinson, Stafford & Rude, Inc. (RSRI), currently serving the firm as President and as a Senior Project Manager.

Don's career includes nearly 50 years of experience in the planning, management, design, value engineering (VE) and construction of public and private capital projects across North America.

For 30+ years, he has been managing and leading value engineering studies. His experience includes more than 400 VE studies on a very wide variety of project types. Complementing his VE experience is 16 years of additional experience in planning, management, design and construction of civil works projects.

His education includes a degree in civil engineering from Georgia Tech and advanced training in value engineering. He is a registered civil engineer in seven states and a Life-Certified, Certified Value Specialist (the highest level of certification in VE).

Don's employment experience has included working for public agencies (owners), designers, value engineers and contractors, providing him with an unusually broad range of perspectives on capital project issues. His design and project management experience includes many water, wastewater and drainage facilities.

Don's VE study experience includes roads and bridges; water and wastewater conveyance, including large pipeline projects; storage and treatment facilities; and drainage facilities. He has conducted VE studies on projects and programs with capital costs ranging from a few hundred thousand dollars to $2 billion.

He is particularly adept at conducting VE studies on water and wastewater facilities, with extensive experience in this arena as an owner, designer and VE specialist.

The true measure of Don's capability as a value professional, however, is his record of savings for his clients on past VE studies. Studies he has led have averaged owner-accepted savings in excess of four times the VE industry average. Examples of his experience follow:

***Red River Valley Water Supply Project - Garrison Diversion Conservancy District - Bismarck, ND*** VE study of the large pipeline project that is being constructed to transfer water from the Missouri River Basin to the Sheyenne and Red River basins to provide supplemental water during drought conditions in the Sheyenne and Red River basins. The entire project will include an intake structure on the McClusky Canal, a 122 CFS water treatment plant, a 122 CFS pump station, a 122-mile, 66-inch diameter pipeline, a flow control structure and an outlet structure into the Sheyenne River. **Owner-accepted savings totaled over $30 million on this $438 million project.**

***Integrated Pipeline (IPL) Project VE Study #1 - Tarrant Regional Water District (TRWD) - Fort Worth, TX*** VE study of the joint TRWD-Dallas IPL project, at the end of the planning stage (0% Design). The $1.3 billion project consists of a 350 MGD raw water transmission pipeline system from Lake Palestine to Lake Benbrook with connections to Cedar Creek Reservoir, Richland Chambers Reservoir, and a Dallas delivery point, collectively constituting approximately 180 miles of pipeline and six pump stations. This is the first of three workshops to be conducted for the IPL Project. **After the first workshop, VE team recommendations resulted in Owner-accepted savings totaling over $278 million.**

***IPL pipeline – 60% Design, Tarrant Regional Water District – Ft Worth, TX*** – Co-led a VE study of a large raw water pipeline serving the Dallas and Ft Worth, TX area, consisting of 23 miles of 84-inch, 13 miles of 96-inch and 69 miles of 108-inch pipe, 30 short tunnels and a five-mile, 14-foot diameter deep tunnel, along with valves, surge control and cathodic protection facilities. **Owner-accepted capital cost savings totaled approximately $46 million.**

***TRWD IPL Booster Pump Stations - Tarrant Regional Water District, Ft. Worth, TX*** VE study of three separate booster pump stations at 30% design completion. The booster stations will increase system pressure in the new IPL raw water system being constructed by TRWD. Each booster station also includes a large earthen balancing reservoir to address surge and changes in flow rates. The stations have capacities of 350 mgd, 350 mgd and 200 mgd respectively, with build-out capacity to over 1,000 mgd for the first two station and 400 mgd for the third. **Owner-accepted life cycle cost savings totaled in excess of $35 million.**

***San Diego River Outfall Tunnel – City of San Diego -San Diego, CA*** VE study of a planned twelve-foot diameter deep rock tunnel to connect the new treated effluent conveyance system for the City's new North City Water Reclamation Plant to the existing Point Loma effluent discharge system.

***Point Loma Parallel Outfall – City of San Diego - San Diego, CA*** VE study of the planned one mile long twelve-foot diameter parallel outfall tunnel for the Point Loma Wastewater Treatment Plant, to be built under the sea bed in the Pacific Ocean.

# EXHIBIT AA-B

***Washington Park Reservoir Improvements Project – Portland Water Bureau – Portland, OR*** – VE study of a project to replace two, 120-year old open, concrete lined reservoirs, located in a major City park, with a new, cast in place, covered concrete 14 million gallon underground reservoir. The project includes updating of piping, valves and metering facilities, as well as construction of extensive public amenities, including reflecting ponds, a cascade, walkways and landscaping. The reservoir site is located at the base of a historical landslide that is still slowly moving. Also included are repairs to 120-year old historical features of the original reservoir facilities. The estimated construction cost is approximately $101 million. The project will be delivered using a Construction Manager/General Contractor (CMGC) approach.

***JCC1 Intake Pump Station – 60% Design – Tarrant Regional Water District – Ft Worth, TX*** – Co-led a VE study of a 277 mgd raw water pump station, withdrawing water from the Cedar Creek Reservoir and pumping the flows into the new IPL pipeline. The station will have seven identical pumps, withdrawing water through six slotted fish screens. Pumps will be driven by VFD-controlled, water-cooled 4160 volt motors. A chemical addition facility will also be constructed to introduce chloramines for control of invasive species in the pipeline, and to introduce sodium hydroxide for pH control. The estimated construction cost is approximately $78 million. **Owner-accepted net life cycle cost savings totaled approximately $700,000.**

***JB3 Pump Station – 60% Design – Tarrant Regional Water District – Ft Worth, TX*** – Co-led a VE study of a raw water booster pump station with an initial capacity of 350 mgd, and a total build-out capacity of 1,050 mgd. The JB3 site includes two 40 MG earthen embankment, balancing reservoir cells. The total build-out reservoir capacity is planned for 160 MGD. The estimated construction cost is approximately $121 million. **Owner-accepted life cycle cost savings totaled approximately $6.3 million**

***Ridgewood View Park Reservoir and Pump Station – Tualatin Valley Water District – Beaverton, OR*** - VE study of a project to construct a new 7 MG, cast in place, concrete, finished water reservoir at the location currently occupied by the 5 million gallon Hyde Park Reservoir, which is in poor condition and is currently not in use. Additionally, the project will construct a new 11 mgd integrated pump station, interconnecting piping and fluoridation facilities. Estimated construction cost is approximately $27 million. **Owner-accepted VE alternatives totaled $3.64 million in net life cycle cost savings.**

***TRWD IPL Lake Pump Stations - Tarrant Regional Water District, Ft. Worth, TX*** VE study of three separate raw water intake pump stations at 30% design completion. The three pump stations will withdraw raw water from the Cedar Creek, Richland Chambers and Lake Palestine Reservoirs, and have capacities of 277 mgd, 250 mgd and 150 mgd, respectively. All three use multiple, variable speed, vertical turbine pumps. **Owner-accepted savings totaled $10.9 million.**

***Bend Water Treatment Plant – Bend, OR*** VE study of proposed improvements to the existing water intake facility to add fish screens, a fish ladder and replace the existing building; construction of a new 10-mile long raw water transmission main; construction of a hydropower facility and construction of a 13.6 mgd membrane filtration plant. The treatment processes will include rapid mix and flocculation tanks, plate settlers and membrane filtration facilities. **Owner implemented VE alternatives resulted in $2.9 million is accepted life cycle cost savings.**

***City of Saint John Water System Improvements- City of Saint John - Saint John, NB, Canada*** Three VE studies of a proposed $200+ million improvement program for the Saint John Water System. The program includes construction of improvements to the reservoir intakes, a new 100 megaliter per day conventional filtration plant, and extensive replacements and repairs to the transmission and distribution system, as well as additional booster pump stations, storage tanks, and system and customer meter installations. The water system provides both potable and industrial quality water to the entire City. The VE studies reviewed supply, treatment and system configuration; plant design capacity and process selection; and a qualitative risk assessment comparing alternative program delivery scenarios including public-private partnership options. **Owner-accepted savings resulting from the VE studies will exceed $30 million.**

***Hillview Reservoir Cover – New York City OMB - New York, NY*** VE study of a proposed $500 million concrete cover for New York City's 90-acre, 900 million gallon Hillview water reservoir that serves as the balancing reservoir for the City's Catskill and Delaware watersheds. The reservoir has two basins separated by a concrete dividing wall. The proposed cover will use pre-cast concrete components, a concrete topping and a roof system. The proposed roof system will consist of water-resistant concrete, waterproof membrane, and a multi-layered green roof system, consisting of native plants, succulents and sedum. An architecturally finished concrete ring wall extending around the reservoir perimeter will, along with columns in the reservoir, provide the structural support for the cover.

***City of Columbus Upground Reservoir – City of Columbus - Columbus, OH*** VE study of the City of Columbus Upground Reservoir project reviewed at 90% design completion consisting of construction of a new 9.3 billion gallon above grade raw water reservoir, an inflatable dam on the Scioto River, a raw water pump station and a 72-inch pipeline from the pump station to the new reservoir. This new reservoir is the first of three above-grade reservoirs to be constructed by the city to increase the safe yield of the Scioto River basin. The new system will also provide additional water for the Delaware Water Company (Delco) for a new water treatment plant to built downstream of the reservoirs. **Owner-accepted savings total $1.8 million.**

# Marc S. Solomon, PE, BCEE, D.WRE

**Vice Presient**

*Mr. Solomon is an accomplished project manager on a wide range of wastewater projects. Marc's broad project experience has exposed him to all phases of project planning, design, system modeling, system controls, construction management, and operational reliability. In addition, Marc has a Value Engineering certification from the US Army Corps of Engineers and has conducted and participated in numerous VE Peer Review sessions.*

### Education

BS, Civil Engineering, Duke University, North Carolina

MS, Public Health, Tulane University, Louisiana

### Certification/License

Professional Engineer: CA, LA, OH, OR, PA, WA

Water Treatment Plant Operator

Water Distribution System Operator

AAEE Board Certified Environmental Engineer

ASCE Diplomat, Water Resource Engineer

Value Engineering Certification

### Areas of Expertise

- Managing complex wastewater and recycled water projects
- Design of wastewater process, headworks, and pump stations
- O&M consulting
- Workshop Facilitation using Multi-criteria Decision Analysis
- Value Engineering and Peer Review Facilitation

### Experience

- 33 total years
- 3 years with Hazen

**Peer Review-Secondary Clarifier Study and Design, San Francisco Public Utilities Commission, Southeast WWTP, SF, CA**

The SFPUC Southeast WWTP (SEP) is a 57-mgd high purity oxygen activated sludge facility. The sixteen 120-ft diameter secondary clarifiers are at the end their useful lives and require replacement. Rather than replace in-kind, SFPUC opted to pursue a modern clarifier design to serve the facility for the next 40 years. To support the secondary clarifier design, Mr. Solomon was project manager for the peer review phase. Process, structural, mechanical, and electrical reviews were performed for preliminary and final design.

**Carlsbad Desalination Facility, Poseidon Water, San Diego, CA**

Principal-in-Charge for the study, design, and construction of a 50-mgd desalination plant and transmission system for Poseidon Water. When completed the plant will be the largest seawater desalination plant in the Western Hemisphere.

**Peer Review-Disinfection Improvements, City of Santa Rosa, Laguna Treatment Plant, Santa Rosa, CA**

Marc was project manager and faciliated all peer review workshops for this project. The City of Santa Rosa owns and operates the Laguna Treatment Plant (LTP), which uses UV as its primary disinfection process. The facility produces disinfected tertiary recycled water, as defined by Title 22. The existing LTP UV system was recently re-rated from a capacity of 67-mgd, with redundancy, to a capacity of 48.5-mgd with redundancy. This creates a potential disinfection system capacity deficiency under some wet weather conditions. Additionally the existing Trojan 4000



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### Professional Activities

Water Environment Federation

American Water Works Association

American Society of Civil Engineers

American Academy of Environmental Engineers

WateReuse Association

### Selected Publications

Contributing Author, "WEF MOP8, Design of Municipal Wastewater Treatment Plants, Centrifuge Dewatering"

Contributing Author, "WEF MOP11, Operation of Municipal Wastewater Treatment Plants"

Author, "Soil Filter Beds: The West Coast Experience, WEF"

Co-author, Bringing Recycled Water to Town – The City of Santa Rosa's Urban Reuse Project"

Co-author, "Video and Sonar Inspection Guides Coronado Transbay Force Main Rehabilitation"

Co-author, "Recycled Water-The Chile Experience"

system was installed in 1997 and is nearing the end of its useful life. These events triggered the need to upgrade the disinfection system in order to ensure that the LTP has adequate disinfection capacity under all flow rates.

**Main Wastewater Treatment Plant, East Bay Municipal Utility District, Oakland, CA**

Project manager for the investigation of struvite formation at the District's Main WWTP. Struvite is a complex mineral precipitate and has reduced the District's dewatering capacity and has caused maintenance concerns. As part of the study Marc is leading workshops with engineering, operations, maintenance, laboratory, and management staff using the multi-criteria decision analysis.

**EBMUD Secondary Clarifier Analysis, Oakland, CA**

Principal and QA Engineer for the analysis and model development of EBMUD's secondary clarifiers. Tasks include working with EBMUD staff to perform pilot and full-scale stress testing and development of a model of the secondary clarifiers. Other operational enhancements include dye studies for optimized flow splits and investigation of Nocardioform froth control at the plant.

**Main WWTP Headworks, East Bay Municipal Utility District, Oakland, CA**

Marc's diverse experience also includes influent pump and effluent pump station design. As Project Manager Marc provided design for the rehabilitation of the Influent and Effluent Pump Stations at EBMUD's Main WWTP with a design capacity of 425-mgd.

**Shitzutou Pumping Station and Headworks, Taiwan Housing and Urban Development Bureau, Taipei, Taiwan**

Marc was Project Manager for the design of the world's largest (at the time) raw wastewater pump station with a design capacity of 1,200-mgd for Taiwan Housing and Urban Development Bureau, Republic of China.

**Laguna Wastewater Treatment Plant, Combined Heat and Power Facility, City of Santa Rosa, CA**

Project Manager for the evaluation of various cogeneration technologies, air permitting, pre-design and design of a new 4.4-MW cogeneration facility that included new ARES internal combustion engines and extensive air permitting for the new facility.

**Town of Windsor Phosphorus Elimination Study, Windsor, CA**

Project Manager for the Plant Phosphorus Elimination Study to analyze potential process upgrades to meet Regional Water Quality Control Board o mg/l effluent phosphorus limits and anticipated future flows and loads. Extensive negotiations with the regional board to develop an accelerated schedule that would phosphorus discharge while also minimizing risk of violation for the Town. Economic and non-economic factors were weighed in the business case evaluation of phosphorus removal alternatives.

**EXHIBIT AA-B**

# T. Gerald Cole, P.E., BCEE

*Consulting Engineer –Water Supply and Recycled Management*

## Education

M.S. in Civil Engineering, University of Notre Dame

B.S. in Civil Engineering, University of Notre Dame

## Registration

Registered Civil Engineer: California, #19784

## Honors/Awards

Board Certified Environmental Engineer (BCEE) - American Academy of Environmental Engineers & Scientists

Sigma Xi

Mr. Cole has extensive conceptual planning, design, construction management, and project and program management experience spanning over 35 years of professional service to municipal, foreign, commercial, and industrial clients. Projects include water supply and treatment; wastewater collection, treatment, disposal and reuse management. He has in-depth experience in development and implementation of recycled water systems and technical direction and quality control for major projects.

## *Selected Water Supply Projects in Monterey County*

**Independent Consultant, Groundwater Replenishment (GWR) Project, Monterey Regional Water Pollution Control Agency (MRWPCA), California.** Mr. Cole developed concept designs and construction cost estimates for the proposed Product Water Conveyance component of the GWR Project. Developed and analyzed two alternative alignments, including pump stations, pipelines and special structures. Conducted preliminary hydraulic analyses for various pipeline capacities. Analyzed electrical power requirements and construction techniques. Interfaced with Project Team members, including several independent consultants. Interacted directly with the CEQA consultant during preparation of the Project EIR. Prepared and submitted several technical memos.

**Independent Consultant, Aboveground Recycled Water Storage Project, Monterey Regional Water Pollution Control Agency (MRWPCA), California.** Mr. Cole developed concept design and construction cost estimates for the proposed Aboveground Recycled Water Storage Project for winter storage of tertiary treated recycled water. The conceptual design of the storage reservoir was developed for capacity of 600 acre-feet (AF) of tertiary treated recycled water. Tertiary water quality data were evaluated and a reservoir mixing system was included to circulate the stored water, along with chemical feed systems to maintain water quality, and reservoir lining system to prevent leakage. A Technical Memo was prepared that described the Project components and the estimated construction cost of $30 million.

**Project Manager, Groundwater Replenishment (GWR) Project, Monterey Regional Water Pollution Control Agency (MRWPCA), California.** Served as Project Manager for CDM for early phase of conceptual planning of the Groundwater Replenishment Project for Monterey Regional Water Pollution Control Agency, which would provide up to 3,500 AFY of MF/RO/UVOX recycled water to recharge the Seaside Groundwater Basin.

**Principal-in-Charge and Project Manager, Pebble Beach-Carmel Recycled Water Project, California.** Served as Principal-in-Charge and Project Manager for Parsons Engineering-Science for the planning, design and construction management of the Pebble Beach-Carmel Recycled Water Project, which provides recycled water to the seven golf courses within Pebble Beach. In

addition to a tertiary treatment plant the project also includes a distribution system consisting of a 1,400 gpm high-service pump station, 5 miles of pipelines, 2.5 mg steel storage tank, and a 2 mgd potable water booster pump station for emergency make-up water to the recycled water distribution system. *The project won the Project of the Year Award from the WateReuse Association.*

**Principal-in-Charge and Project Director, Regional Wastewater Program, Monterey Regional Water Pollution Control Agency, California.** Principal-in-Charge and Project Director Parsons Engineering-Science for Monterey Regional Water Pollution Control Agency's (MRWPCA) $120 million Regional Wastewater Program, including planning, design and construction. The MRWPCA Project includes 30 miles of large diameter interceptors, 7 pump stations, 2-mile ocean outfall and a 20 mgd secondary (TF/AS) treatment plant. Served as Project Director for the concept development, planning, design and construction and operations of MRWPCA's demonstration project for irrigation of unprocessed food crops in the lower Salinas Valley. This project, after full-scale development, supplies approximately 14,000 AFY of Title-22 recycled water to 12,000 acres of food crops for irrigation.

**Principal-in-Charge and Project Manager, Recycled Water Treatment Plant Design, DSRSD, California.** Served as Principal-in-Charge and Project Manager for the design of the DSRSD $18 million Recycled Water Treatment Plant, which produces Title 22 recycled water for unrestricted irrigation to over 300 customers in the Dublin, San Ramon, Danville area. During the construction phase, he served as Project Manager for CDM for the development of a System-Wide Operations Plan for the $70 million DERWA Recycled Water Program, which will ultimately deliver up to 16.5 mgd of recycled water to over 500 customers. The DERWA RW system includes 8 pump stations ranging in size from 300 gpm up to 7,000 gpm. The back-bone distribution system consists of approximately 25 miles of pipelines, ranging in size from 18 to 30 inches diameter & six reservoirs. The Operations Plan included strategies for moving water throughout five pressure zones while meeting customers' demands and maintaining water quality requirements throughout the recycled water distribution system. The operating strategies were designed to be implemented by the District's SCADA system.

## *Value Engineering Projects*

Salt Lake City, UT WWTP, 2 studies

City of Everett, WA, Wastewater pump stations and interceptors

City of Las Vegas, NV WWTP

Orange County Sanitation Districts, CA Five-mile wastewater interceptor

## *Professional Affiliations*

American Water Works Association, Life Member

WateReuse Association

American Academy of Environmental Engineers & Scientists

**EXHIBIT AA-B**

# STATEMENT OF QUALIFICATIONS

## Dennis E. Van Kirk, C.E.T. VK Tech Services

***Mr. Van Kirk has over 50 years of professional experience in project cost management services including cost estimating, change order analysis, value engineering, and constructability reviews. He has extensive experience in all CSI Specification Divisions, ranging from conceptual planning and design through construction and closeout. Projects include pump stations, pipelines, tunnels, treatment plants, power plants, bridges, railroads, transportation systems, aviation complexes, marine structures and outfalls, manufacturing plants, power generation and transmission facilities, solid waste disposal facilities, laboratories, office buildings, schools, medical facilities, landfills, and underground utilities. His experience includes renovations, remodels, demolition, historic preservation, conversions, additions, hazardous materials remediation, and new construction.***

***Education:***

***Diploma, Liberal Arts, Yakima Valley College, Washington, 1962***

***Certification/Registration:***

***Certified, Engineering Technician, Architectural Engineering Technology, National Institute for Certification in Engineering Technologies, (NICET) 1972***

***King County SCS Certification No. 760***

***Washington State Veteran's Affairs (Veteran-Owned Business) Certification No. 42338AB2***

***Disabled Veteran-Owned Business (SDVOB)(U.S. Dept. of Veteran's Affairs)***

***Professional Affiliations:***

***Honorary Life Member, Association for the Advancement of Cost Engineering (AACEI). President, Oregon Section, 2009-2011.***

***Society of American Value Engineers (SAVE)***

***COST ESTIMATING (Not All-Inclusive)***

**Water/Wastewater:**

–Kelso, WA, Mint Farm Regional Water Supply Project estimate review. Client: Kennedy-Jenks. 2011

–Confidential. Mississippi River Lock and Dam No. 1 Fish Deterrence Array 95% Design Submittal Estimate. Client: Smith-Root/Pinnell-Busch. 2013.

–King County, WA. North Sammamish Diversion Project Conceptual and Pre-design level estimates. Included Alternative pipeline route selection estimates and alternatives to modifications at the North Creek and York Pump Station sites. Client: Gray and Osborne. 2015.

–City of Portland, OR, BES, Columbia Boulevard Wastewater Treatment Plant Wash Water Pipeline Replacement Project. Predesign estimates for alternative selection. Alternatives included replacing pipe in place in an existing tunnel, Installing new pipeline in the tunnel, and rehabilitating the existing piping in the tunnel. Client: Tetra-Tech, 2015.

–Lake Oswego/Tigard Water Partnership West Linn WTP Expansion Cost Estimate review. Client: Brown & Caldwell/Pinnell-Busch. 2011

– Lake Oswego/Tigard Water Partnership 30% and 60% Raw Water and Finished Water Pipeline estimate Reviews. Client: Brown & Caldwell/Kennedy-Jenks. 2012

-Lake Oswego/Tigard Water Partnership Raw Water and Finish Water Pipelines (24" – 42". Pre-Design Estimates. Client: Pinnell Busch/Brown & Caldwell. 2010

-Lake Oswego Influent Sewer Lake Down project. Final Engineer's Estimate. Client: Pinnell Busch/Brown & Caldwell. 2010

- City of Everett, Washington WTP Clearwell No. 2 Estimate review. (Carollo). 2008

- Tualatin Valley Water District – Proposed Pipelines and River Intake – Alternatives up to 96". (Carollo). 2007

- City of Eugene, Oregon – WWTP Expansion (Carollo). 2007

- King County, WA – Brightwater WWTP Recycled Water Facilities (Carollo). 2008

-Salem, OR WWTP Expansion, including riverine outfall. (Carollo).

• Cost estimator for proposed digester rehabilitation at the Hyperion Wastewater plant in Los Angeles, California. Work included replacement of interconnecting pipelines in galleries beneath the digesters, and rehabilitation/replacement of ferric

chloride systems. (CH2M Hill). Estimating work included a field survey of existing conditions and conceptual cost estimates. (CH2M Hill)

- Lead estimator and estimate reviewer on the City of Portland, Oregon, Bureau of Environmental Services CSCC project. Major project elements included a large-diameter tunnel for combined sewer overflow (CSO) conveyance and storage. (C3MG)

- Lead cost estimator for the Portland, Oregon, West Side CSO Project 35-percent design. Project included a large-diameter tunnel, vertical shafts, and a large, deep pumping station on Swan Island. (C3MG)

- Lead estimator for the 5 Denny Way CSO projects in Seattle, Washington. Work included a large diameter tunnel, pumping stations, marine outfall, conveyance lines and a major CSO control facility. For the same client, the Henderson CSO Projects, consisting of pipelines, large diameter tunnel and pumping facilities. (C3MG)

- Cost estimator on the city of Portland, Oregon, Bureau of Environmental Services Columbia Boulevard Wet Weather Pump Station project. Estimating work included conceptual, budgetary and final estimates; value engineering team participation; and cost support. (C3MG)

- Lead cost estimator for the West Point Municipal Wastewater Plant, King County, Washington. This large plant had construction costs in excess of $200 million. Major site work issues included poor soil conditions and restricted access. Estimating work included conceptual estimates, value engineering team participation and cost support, budgetary estimates, final estimates, and change order estimates. (CH2M Hill)

- Cost estimator for the base infrastructure facilities at the Kodiak, Alaska, Coast Guard Base. Projects included water transmission and wastewater conveyance pipelines, pump stations, a water treatment facility at Buskin Lake, a wastewater treatment plant, and a marine outfall. Estimating work included conceptual, budgetary, final, and change order estimates. (CH2M Hill)

- Cost estimator for conceptual and budget level estimates for selecting alternatives on the proposed replacement of AC sewer lines in lake Washington at the North end of Mercer Island. (C3MG)

- Cost estimator for a municipal wastewater plant and conveyance system for Bremerton, Washington. The project consisted of the wastewater plant, pump stations and pipelines, and a marine undercrossing of Port Washington Narrows. Estimating work included conceptual, budgetary, final, and change order estimates. (CH2M Hill)

- Cost estimator on the Post Point Wastewater Treatment Plant in Anacortes, Washington. The project included demolition of existing facilities and the construction of conveyance pipelines and an influent pumping station. Estimating work included conceptual, budgetary, and final estimates. (CH2M Hill)

- Cost estimator for the F.E. Weymouth Water Treatment Facility at LaVerne, CA. This is a proposed new WTP. Budgetary and final engineer's estimates included Site Preparation, Yard & Process Piping, Ozone System, Caustic Soda Tank Farm, Sulfuric Acid Tank Farm, Hydrogen Peroxide Tank Farm, Sodium Hypochlorite Tank farm, Liquid Oxygen Tank Farm, and Gaseous Chlorine Facilities. (Carollo, 2007).

- Cost estimator for the Marine Park Water Reclamation Facility in Vancouver, Washington. Major project features included an influent pump station, a screening/grit handling facility, primary and secondary clarifiers, aeration basins, auxiliary power generation, and operator laboratory facilities. Estimating work included conceptual, budgetary, and final estimates. (CH2M Hill) 24M, 1993.

**TRANSPORTATION:**

- Cost estimator for the Sound Transit Link Operations and Maintenance Facility, Tacoma, WA. Project included a new one-story 10,775 SF Maintenance Building for the daily and routine

inspection, maintenance, repairs and cleaning of Sound Transit's light rail vehicles. Project included demolition of existing warehouse buildings, on-site utilities and installation of piling supports for the new structure. The Building is a high-bay pre-engineered metal structure of 8,648 SF with an eave height of 31 feet. Equipment includes a 7.5 ton bridge crane, a car service and jacking pit in the floor, and a 2,300 SF low-bay area with offices. (Waterleaf Architecture/LTK/C3MG 1999-2000).

## Value Engineering Team Member:

- Brightwater Wastewater Treatment Plant, King County, Washington. Included checking and validation of the Engineer's Estimate. (Carollo/RSRI)
- Washington Park Reservoir VE Study. City of Portland, OR Water Bureau. Included checking and validation of the Engineer's Estimate. (Carollo/RSRI)
- Tualatin Valley Water District, Ridgewood View Reservoir and Pump Station. 2013. Included checking and validation of the Engineer's Estimate. (AECOM/RSRI).
- Murray CSO Project, King County, WA. 2012. Included checking and validation of the Engineer's Estimate. (Kennedy Jenks/RSRI/VKTS)
- Dublin, OH Water Plant Expansion Project, Columbus, OH. 2012. Included checking and validation of the Engineer's Estimate. (CH2M Hill/RSRI/VKTS)
- North Beach CSO Project, King County, WA. 2012. Included checking and validation of the Engineer's Estimate. (Kennedy Jenks/RSRI/VKTS)
- Nanaimo, B.C., South Fork WTP, 2012. Included checking and validation of the Engineer's Estimate. (RSRI/VKTS)
- Nanaimo, B.C., South Fork WTP, 2011. Included checking and validation of the Engineer's Estimate.(RSRI/VKTS)
- Bend, OR Surface Water Improvements, 2011. Included checking and validation of the Engineer's Estimate. (RSRI/VKTS)
- Temecula, CA EMWD Plant Expansion, 2010. Included checking and validation of the Engineer's Estimate. (RSRI/VKTS)
- Mason County Belfair Wastewater Treatment Plant 2009. Included checking and validation of the Engineer's Estimate. (RSRI/VKTS)
- Cleveland, Ohio CSO Control Facility, 2010. Included checking and validation of the Engineer's Estimate. (RSRI/VKTS)
- Skokomish-Mason County HPC Management Facilities, 2010. Included checking and validation of the Engineer's Estimate. (RSRI/VKTS)
- City of Pendleton, OR WWTP Phase 1 Upgrades, 2009. Included checking and validation of the Engineer's Estimate. (RHA/VKTS)
- City of Eugene, OR MWMC Tertiary Filtration Project, 2009 Included checking and validation of the Engineer's Estimate. (RHA/VKTS)
- City of Portland, OR Fanno Creek Basin Pump Station Surge Analysis VE Included checking and validation of the Engineer's Estimate. 2009 (RSR/VKTS)
- Bull Run Water Intertie, Portland, Oregon. Included checking and validation of the Engineer's Estimate.
- Bull Run Intake Towers, Portland, Oregon, 2010. Included checking and validation of the Engineer's Estimate. (RSRI/VKTS)
- Tarrant Regional Water District, IPL Project, Fort Worth, TX. (180 Miles of 108" Dia. Pipeline), 2010 (30%) and 2013 (60%). Included checking and validation of the Engineer's Estimate. (RSRI/VKTS)
- Tarrant Regional Water District, IPL Project, Fort Worth, TX. (Intake Pump Stations), 2012 & 2013. Included checking and validation of the Engineer's EstimateS. (RSRI/VKTS)

- Tarrant Regional Water District, IPL Project, Fort Worth, TX. (Booster Pump Stations and Reservoirs)), 2012 (30%) and 2013 (60%). Included checking and validation of the Engineer's Estimate. (HATH/VKTS)
- Columbia Boulevard 125 MGD Influent Pump Station, Portland, Oregon. Included checking and validation of the Engineer's Estimate.
- City of Portland Wellfield Improvements, Portland, Oregon. Included checking and validation of the Engineer's Estimate.
- Wet Weather Pump Station, Portland, Oregon. Included checking and validation of the Engineer's Estimate.
- Ankeny Pump Station, Portland, Oregon. Included checking and validation of the Engineer's Estimate.
- Grant's Pass Master Plan Liquids Stream, Grant's Pass, Oregon. Included checking and validation of the Engineer's Estimate.
- Grant's Pass Master Plan Solids Stream, Grant's Pass, Oregon. Included checking and validation of the Engineer's Estimate.
- U.V. Sterilization Process, LOTT Plant, Lacey, Washington. Included checking and validation of the Engineer's Estimate.
- West Point Wastewater Treatment Plant, King County, WA. Included checking and validation of the Engineer's Estimate. 1984 (RSR)
- Kenmore Interceptor, King County, WA. Included checking and validation of the Engineer's Estimate. 1984 (RSR)
- Kennewick Wastewater Treatment Plant Upgrades, Kennewick, Washington. Included checking and validation of the Engineer's Estimate. (RSR)
- Newport, Oregon Wastewater Treatment Plant. Included checking and validation of the Engineer's Estimate. (RSR)
- North Creek Pump Station, King County, Washington. Included checking and validation of the Engineer's Estimate. (RSR)
- York Pump Station Upgrade, King County, WA. Included checking and validation of the engineer's Estimate. (U.S. Cost/D/ Hamilton).
- Tualatin Valley Water District (TVWD), Willamette Water Supply Program (WWSP Program). The study, based on PDR documents, included a transmission system consisting of over 30 miles of large diameter pipelines. (Included checking and validation of the Engineer's Estimate. (RSR).

**Awards:**

Charles V. Keane Award for Distinguished Service, Association for the Advancement of Cost Engineering International, 1995

Excellence in Publications Award, Association for the Advancement of Cost Engineering International, (AACEI) 1983

AACEI Honorary Life Membership Award, 2009.

**Publications/Presentations:**

Van Kirk, D. "The Unknown Cost Engineer," Cover, *Cost Engineering Magazine*. Volume 25, No. 4. July 1983.

Van Kirk, D. "Cost Estimating Standards," Carollo Internal Document, 2002

Van Kirk, D. "Cost Estimating in a Fluctuating Market" AWPCA Annual Meeting, Mesa, AZ. 2006, JTAC/AWWA , Denver, CO, 2007.

Van Kirk, D. "Introduction to Cost Estimating" 0.3 CEU's. 2005, Carollo CTEC Course No. 3.

Van Kirk, D. "Why Change Orders Cost More," Carollo Internal Document, 2005.

Van Kirk, D., "Contingency - What is it? How Much Should You Use?," Carollo Internal Document, 2004

Van Kirk, D. "Talking to Vendors," Carollo Internal Document, 2003.

**Employment History:**

2008-Present: VK Tech Services. Sole Proprietor and Cost Estimator.

2002-2008: Carollo Engineers, Portland, OR. Firmwide Director of Cost Estimating.

1996-2002: C3 Management Group, Kirkland WA. Senior Cost Estimator and Portland, OR Office Manager.

1993-1996: Public Service, Indiana (PSI Energy). Senior Cost Estimator

1969-1993: CH2M Hill. Senior Cost Estimator

1968-1969:U.S. Army, Vietnam

1961-1968: College, Alaska Division of Buildings, various architectural and engineering firms. Draftsman and Engineering Technician

1960-1961: Federal Bureau of Public Roads, Juneau, Alaska. Engineering Technician.

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# Sean FitzGerald, PE

## Vice President

*Sean FitzGerald has 25 years of collection system and distribution system experience and serves as Hazen's Conveyance Practice Leader. He has extensive experience in all stages of collection and distribution system planning, operation and detailed design.*

He has led numerous master planning projects including projects involving complex hydraulic modeling and growth projections.

Sean is a long-standing member of the Water Environment Federation Collection System Committee where he served as Vice Chair and co-authored two of the leading Manuals of Practice, including FD-6 Exiting Sewer Evaluation and Rehabilitation and FD-17 Prevention and Control of Sewer System Overflows.

### Education

MSEE, University of Cincinnati, 1994

BSCE, University of Cincinnati, 1992

### Certification/License

Professional Engineer: OH, KY, NY, TX

NASSCO PACP Certification

BAM-I Asset Management Certification

### Areas of Expertise

- Hydraulic Analysis
- Pipe and Pump Station Design
- Sewer and Water Master Planning
- Sewer and Force Main Assessment and Rehabilitation

### Experience

- 24 total years
- 10 years with Hazen

### Professional Activities

Water Environment Federation - Collection System Committee

Ohio Water Environment Association - Collection System Committee

American Waterworks Association

North American Society for Trenchless Technology

**City of Fairborn, Ohio Master Plan – Fairborn, OH**
Technical lead for the City of Fairborn Sanitary Sewer Master Plan. The project included a detailed assessment of current and future collection system and wastewater treatment plant capacity for the City of Fairborn, Ohio.

**Greater Cincinnati Water Works Main Replacement Program**
Project Manager for the evaluation and assessment of GCWW's main replacement program. The data was analyzed using a powerful analytics software called Tableau which was able to show definitive patterns in breaks and is allowing GCWW to better target its target main replacements.

**Sanitation District No. 1 Asset Renewal Rate Study**
Project Manager for the Asset Renewal Rate Study as part of SD1's Asset Management program. The study developed a sanitary sewer asset renewal rate in terms of funding for the next 10-20 years based on available condition data for the 1,700 mile system.

**City of Miamisburg, OH Collection System Master Plan**
Mr. FitzGerald was the technical lead for the development of a capacity assessment and improvements plan for the Miamisburg, Ohio collection system. Hazen and Sawyer conducted a flow monitoring program and developed a detailed collection system model which was then used to assess collection system capacity issues and to develop improvements to eliminate the SSOs and address future growth. The master plan also included a detailed condition assessment of the sewer system.



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# EXHIBIT AA-B

**Sanitation District No. 1 of Northern Kentucky – Eastern Regional System Master Plan**
Deputy Project Manager for the Eastern Regional System Master Plan. The Master Plan included the development of a detailed, calibrated collection system model using Infoworks software and the development of a 50-year plan to address overflows and planned growth in the area.

**Butler County Department of Environmental Services (BCDES) – Sewer System Master Plan**
Project Manager for the BCDES sewer system Master Plan. The project included a recalibration of a County-wide model. The models were used to size and analyze system improvements to address wet weather issues and growth through ultimate development conditions.

**Mason OH – Water Distribution Master Plan**
Served as Deputy Project Manager for the Master Plans of the fastest growth City in the state and is projected to double in size within the planning period.

**Miamisburg OH – Water System Master Plan**
Served as Technical Advisor for the development and calibration of a detailed hydraulic model of the City's distribution system to analyze the current performance of the system and to determine and analyze future improvements necessary to address growth.

**South Bend IN Water Master Plan**
Served as Project Engineer for the development and calibration of a distribution system model using EPANET. The model was also used to evaluate system deficiencies, and to develop, plan, and prioritize the system improvements over a 20-year period for a system that serves over 300,000 people.

**Butler County Water and Sewer – Water Master Plan**
Mr. Fitzgerald was Project Manager for detailed modeling and planning for one of the fastest growing communities in the state of Ohio. The planning component was complicated by the fact that the County purchases all of its water from outside sources. The Master Plan included a detailed evaluation of future water supply as well as the planning for distribution and storage facilities through build-out. One key tool used for this Master Plan was genetic algorithms for optimization. The hydraulic modeling software InfoWater was used along with an integral optimization package. Future condition models were developed for every five years and optimization models were run to find the most cost-effective means to meet system demands. Projected optimization improvement for each planning year were evaluated, compared and coordinated to develop a cost-effective overall capital improvement plan through the next 20 years.

**Jefferson County Department of Environmental Services, AL – Asset Management Program**
Mr. FitzGerald is the technical lead for the development and implementation of a comprehensive Asset Management program for JCDES. The program includes the development of a prioritized condition assessment and O&M program with the goal of addressing overflows, many of which are related to O&M issues. The project also includes the development and implementation of Asset Management decision support software tools that will enable the County to better manage its operations and to better target collection system spending. In addition the program includes CIP support, financial information system support, and implementation support for their CityWorks CMMS system.

# Andrew Vane, PE

## Associate

*Mr. Vane serves as a project manager and technical designer for sanitary sewers, force mains and water mains and the associated construction administration.*

### Education

BSCE, Clemson University, 1991

### Certification/License

Professional Engineer: NJ, NC, SC

### Areas of Expertise

- Water, Sewer and Force Main Design and Construction Administration
- Soil Erosion and Sediment Control Design
- Water Line Hydraulic Computer Modeling
- Wastewater Treatment Plant Construction Administration and Inspection
- Wastewater Pumping Station Construction Administration

### Experience

- 24 total years
- 16 years with Hazen

**South Fork Improvements Program, City/County Utilities Commission, Winston-Salem, NC**

Mr. Vane was lead gravity sewer designer for the replacement and parallel installation of new large diameter gravity sewer outfalls. This project was split into two contracts. Contract No. 1 involved replacement of existing 36" diameter RCP gravity sewer and manholes with new 54" diameter FRP and DIP gravity sewer along the South Fork Muddy Creek. Mr. Vane performed all preliminary design, pipe material technical memorandum, cost estimates, detailed design, and assisted the Owner with the bid process. This project also included coordination of eliminating a 15-mgd pumping station along the proposed sewer alignment. Contract No. 2 involved replacement of existing 30" diameter and smaller RCP gravity outfalls sewers with new 42" diameter through 15" diameter gravity sewers upstream of Contract No. 1. This project included elimination of existing diversion structures and a flow restriction, the open-cut of the pipe beneath an existing railroad trestle, and a diversion box to force the new outfall sewer to be used as a relief sewer during high flow periods. Mr. Vane coordinated all efforts to complete the processes of environmental permitting, state highway encroachment permissions, obtaining private easements, railroad encroachment, and erosion control and sediment control design and permitting.

**Taggart Creek Outfall Replacement, Charlotte Water, Charlotte, NC**

Mr. Vane served as lead designer and project manager, to replace 21,000LF of aged and failing gravity sewer outfall measuring 24" through 15" in diameter with new 42" diameter sewer. This project followed Taggart Creek and cross controlled-access highways within the City limits. A portion of this project was accelerated and constructed to allow for the completion of construction of a federal public housing project. Mr. Vane coordinated all efforts to complete the processes of environmental permitting including co-authoring the EA Study, state highway encroachment permissions, obtaining private easements, railroad encroachment, high pressure gas line encroachment, and erosion control and sediment control



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# EXHIBIT AA-B

**Grove Creek WWTP Effluent Force Main, Renewable Water Resources, Mauldin, SC**
Mr. Vane served as Pipeline Design Task Leader for the Grove Creek WWTP Effluent Force Main Project. This project consisted of 12,380 LF of 18/20-inch-diameter force mains, 470 LF of 42-inch-diameter outfall with an 11-part effluent diffuser, and a cascade aerator to increase dissolved oxygen prior to discharge into the Saluda River. This project also included several jack-and-bore crossings of roadways, creeks and CSX railroad (330 LF of 48-inch casing) and parallel 300-LF directional drilled crossings of the Saluda River. Mr. Vane coordinated all environmental permitting on this project.

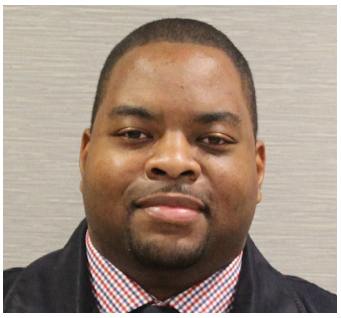
**Harleyville Reach Water Transmission Mains, Lake Marion Regional Water System, Santee, SC**
Mr. Vane served as lead designer and construction administrator for the design, permitting and construction of 34,800 LF of 16" diameter water transmission mains. This project included a 6,800 LF crossing of Four Hole Swamp using Horizontal Directional Drilled (HDD) methods as a single pull, five jack and bore crossings of state highways and Interstate 26, wetlands crossings, a packaged dual master meter station, installation of PRV's and altitude valves at two existing tank sites, and tie-ins to existing water distribution systems. Mr. Vane oversaw all hydraulic modeling, preliminary design, and final design of this project including construction cost estimates, technical specifications, and coordination with multiple Counties and the US Army Corps of Engineers Charleston District office. This project also included aerial and ground survey, development of easement plats, SCDOT encroachment permits, SCDHEC Stormwater design and permitting, obtaining an encroachment from CSX Transportation (railroad), a cultural resources study, and other related permitting activities. ($7.5 M) (2014)

**Arrowood/Sulkirk Road Water Transmission Lines, Charlotte-Mecklenburg Utilities, Charlotte, NC**
Mr. Vane served as Lead Designer and Project Manager for the replacement of 11,500 LF of 24" diameter PCCP water transmission mains. This project was divided into two phases. 5,500 LF of existing 24" water transmission mains was replaced in a major collector roadway for Interstate traffic. 6,000 LF of existing 24" water transmission mains was replaced in an older affluent section of Charlotte along heavily travelled roadways. This project included development of a 40+ phase traffic control plan, coordination with CATS transit system and existing planned intersection improvements, aerial and ground surveying, SUE, geotechnical investigation, and NCDENR Land Quality permitting.

**Bear Cut Water Line Replacement, Miami-Dade Water & Sewer Department, Miami, FL**
Lead designer for the new dual Horizontal Directional Drilled (HDD) water lines adjacent to the West Bridge and Bear Cut between the City of Miami and Key Biscayne, Florida. Mr. Vane designed both HDD crossings for this design-build project. The crossings consisted of 16" diameter HDPE pipe pulled 1,700 LF across the West Bridge crossing and 2,800 LF long 16" diameter HDPE pulled across Bear Cut. The Bear Cut crossing included both vertical and horizontal curves in the pipe to avoid wetlands areas and active traffic roadways. The design included horizontal and vertical layout, design calculations of required stresses, strains, pull strengths, collapse pressures, and other critical aspects of both drills. Upon completion of the drills, Mr. Vane verified the as-built information to ensure the adequate safety factors were achieved post-construction.

**Lake Marion Regional Water System, Santee, SC**
Chief Design Engineer and Project Manager for the Lake Marion Regional Water System which consists of 12- through 36-inch water transmission mains totaling 50+ miles in length in six counties northwest of Charleston, SC. Mr. Vane is currently Project Manager on this project with Santee Cooper Power Company, the U.S. Army Corps of Engineers in Charleston, and various sub-consultants. This project is under various phases of design and construction with approximately 25% of the planned transmission mains installed. Total construction cost is estimated to be over $50M.

**EXHIBIT AA-B**



# Jared M. Lewis, CSP

## Safety Compliance

*Mr. Lewis is a safety and risk professional experienced in developing, implementing and monitoring risk-based programs to identify, assess and mitigate any operational risk while maintaining a balance between risk mitigation and operational efficiency. He has an excellent background in vendor management, employee development, and customer relations. Mr. Lewis will review the safety plan and make sure Hazen staff are up to date on the necessary certifications and protocol and provide quality control for fall safety designs as appropriate.*

### Education

Bachelor of Science, Business Management, St. John's University, Queens, NY

### Certification/License

Certified Safety Professional BCSP

Associate Safety Professional BSCP

OSHA 510 for Construction

OSHA 500 Authorized trainer

RCRA Hazardous Waste Training

National Traffic Incident Responder Training

2012 MTA Chairman's Safety Award for FSTC project

Licensed NYS DOL Asbestos Supervisor

National Safety Council AED/CPR Instructor

FDNY Certified Construction Site Fire Safety Manager

NYC DOB 4-hour Scaffold Course

UMDNJ Systems of Safety Focus-Four Hazard Categories

30-hour OSHA Safety Course

40 hour HAZWOPER

7.5 Globally Harmonized System of Classification and labeling of Chemicals

40 hour NYC DOB Site Safety Manager Course

The Practicing Institute of Engineering, Inc. Soft Ground Tunneling Seminar

NYCT QA/QC Master Workshop

NYCT Core Analyst training program

LIRR/NYCT/MNR/Amtrak railroad safety training

**MTA NYC Transit, New York, NY**

General Superintendent, Safety and Environmental Management.

- Oversee labor relations and worker's compensation claims.
- Management of operations staff and union personnel
- Implement review adherence of safety and environmental management systems
- Participated in corporate mission statement and goals safety committee
- Direct Emergency Management and Fire Safety programs is in compliance with applicable regulations
- Investigate accidents in thorough manner, following corporate protocol.
- Audit and report all work-place violence and communicate with proper authorities.
- Oversee collective bargaining agreements and follow through on all aspects.
- Train staff to make sure that safety and environmental regulations are understood and in compliance.

# EXHIBIT AA-B

## Areas of Expertise

- Safety Inspection
- Code Compliance
- Strategic Planning/Analysis
- Records Management
- Risk Management
- Budget Analysis
- Corporate Governance
- Site Security
- Plant Operations

## Experience

- 15 total years
- 1 year with Hazen

**MTA Bridges and Tunnels, New York, NY**
Safety Engineer

- Managed and directed consultant safety staff.
- Oversaw contract payment verification and reconciliation.
- Participated in contractor/consultant selection committees.
- Developed contract specifications and in-house safety management procedures.
- Reviewed designs and assessed the construction feasibility of proposed projects.
- Investigated all accidents in thorough manner.
- Developed and implemented engineering and operations/maintenance staff safety training.
- Analyzed and worked to improve labor relations through dialogue and communications.
- Oversaw risk management and loss control analysis.
- Selected as member of MTA Bridges and Tunnels Safety Committee.
- Reviewed and approved contractor safe work plans and accident prevention programs.
- Reviewed and updated emergency evacuation plans and Site Security Plans.
- Performed threat and infrastructure vulnerability risk assessments.

**MTA Capital Construction, New York, NY**
Safety Specialist

- Managed contractor safety engineers and labor force.
- Chaired multi-employer Fulton Center Safety Committee.
- Analyzed real and potential hazards and created mitigation plan.
- Coordinated safe working practices and procedures between government and private entities.
- Performed safety audits and conducted incident investigations as needed.
- Counter-terrorism and site security assessments.
- Served as lead rail construction inspector.
- Created detailed project reports for the Federal Transit Administration.

# Adam Overbay, PE, SE

## Senior Associate

*Mr. Overbay is the structural discipline lead for Hazen's West Region. Mr. Overbay specializes in the design of buildings, tanks, and the supporting structures for water and wastewater treatment facilities. His experience includes the design of reinforced and prestressed concrete, structural steel, reinforced masonry structures, and temporary structures. He has led condition assessments of existing infrastructure and assists with structural construction administration.*

### Education

BSCE, North Carolina State University, 1996

MCE, North Carolina State University, 1997

### Certification/License

Professional Engineer: CA, AZ, DE, FL, GA, IN, IA, NY, NC, PA, SC, TN, VA

Structural Engineer: CA, IL

### Areas of Expertise

- Structural Design and Analysis of Sanitary, Industrial, and Architectural Structures
- Structural Construction Administration
- Inspection and Evaluation of Existing Structures

### Experience

- 20 total years
- 18 years with Hazen

### Professional Activities

American Concrete Institute

American Institute of Steel Construction

International Concrete Repair Institute

ACI Committee 350, Environmental Engineering Concrete Structures - Associate Member

American Society of Civil Engineers

**Chromium 6 Water Treatment Facilities, Coachella Valley Water District, Coachella, CA**

Mr. Overbay served as the Structural Engineer of Record on the design team for the Coachella Valley Water District Chromium 6 Water Treatment Facilities Project. The project included a new 200'x300' Central Resin Regeneration Facility, over 20 well sites with multiple structures on each site, and 2 central treatment sites with below grade reinforced concrete tanks and masonry superstructures. Mr. Overbay's responsibilities involved leading the structural design effort and coordinating the structural work with the process requirements and the aggressive design schedule. Structural tasks included design of a reinforced concrete frame building, metal and load bearing masonry buildings, below grade reinforced concrete hydraulic structures, and equipment foundations.

**City of Signal Hill – Wellhead No. 9 NF Treatment System, Signal Hill, CA**

Mr. Overbay served as the Structural Engineer of Record for the design of the Signal Hill nanofiltration treatment facility. The facility consists of multiple structures including metal buildings, metal canopies, and mat foundations for equipment. This project required close coordination with the design-build team to meet an aggressive schedule.

**Oxygen Plant Demolition at Plant No. 2, for Orange County Sanitation District, CA**

Responsible for all aspects of structural design for the Oxygen Plant Demolition at Plant No. 2 for Orange County Sanitation District. The project included demolition of existing structural supports for the main



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air compressors and restoration of the structural floors for reuse as a maintenance facility. Portions of the existing structural supports were incorporated into the new flooring design to facilitate construction and reduce demolition costs.

**Government Cut Utility Relocation Project, Miami-Dade Water and Sewer Department, Miami, FL**
Mr. Overbay served as the Lead Structural Engineer for this design-build project. The project included the design of vertical secant pile shafts installed to facilitate tunneling under Government Cut at the harbor of Miami. The three shafts (two 100-foot and one 70-foot) consisted of overlapping unreinforced 42-inch-diameter secant piles that were further strengthened by the addition of a corrugated metal liner. Most noteworthy is the combination of unreinforced secant piles and a corrugated steel liner to construct a shaft to an unprecedented depth of 100 feet. This project also included the design of sheet pile coffercells and a structural steel working platform located in Government Cut. The aggressive design schedule and extensive coordination with the partnering firm and subconsultants presented unique design challenges.

**Muddy Creek WWTP Clarifier Upgrades, City/County Utility Commission, Winston-Salem, NC**
Mr. Overbay served as the Lead Structural Engineer for design and drafting for the project. The project included a cast-in-place 1.65-mg concrete clarifier, a prefabricated metal storage building, two prefabricated concrete buildings, a cast-in-place concrete flow distribution structure, modifications to the primary clarifiers, conversion of a pair of sludge wet wells into pipe galleries, and coating of four existing steel digester covers. Mr. Overbay conducted condition assessments of the digester covers and recommended repairs and coatings to extend service life.

**Northwest WTP Expansion, Brunswick County, NC**
Mr. Overbay served as Structural Engineer for the expansion of the WTP The project included the addition of a 253 foot diameter prestressed concrete clearwell, a reinforced concrete framed chemical storage building, and a reinforced concrete pipe and containment vault. Mr. Overbay was also involved in the construction administration for the facility.

**Avenue V Pumping Station Upgrade, NYCDEP, New York, NY**
Mr. Overbay served as the Lead Structural Engineer for the design and drafting for the pump station upgrade. The project included a condition assessment, rehabilitation, and seismic retrofit of a 90-year-old historic Pump Station and tie-ins to brick-lined sewers. The structural repairs involved installing a reinforced concrete frame within the existing brick masonry superstructure to provide ductility to meet current building code requirements for seismic design. The project also included construction of a temporary bypass pumping structure, wet well, generator building and electrical building.

**Irwin Creek WWTP Improvements and Upgrades, Charlotte-Mecklenburg Utilities, Charlotte, NC**
Led the structural design for the upgrade to the Irwin Creek WWTP. This effort involved directing the work of assistant engineers and designers and coordinating with other disciplines. The project included the evaluation and rehabilitation of multiple structures, some of which are approximately 80 years old. Our design included the renovation of an existing masonry structure to provide additional access points and to update the process structure to house personnel facilities. Also included was the upgrade of multiple aeration basins with new air piping and air pipe supports.

**Indio Water Authority Cr6 Treatment Facilities, Indio, CA**
Structural Engineer of Record for the design of the treatment facilities for three 3200 gpm wells. The project included the design of equipment support and assistance during construction to meet a demanding schedule.

**EXHIBIT AA-B**

# Christopher Thunhorst, PE

## Senior Associate

*Mr. Thunhorst is a Senior Associate in the firm's Irvine office and he serves as Hazen's Electrical and Instrumentation Group Leader for the West Region. Mr. Thunhorst has over 15 years of experience in electrical engineering for building systems, water and wastewater treatment facilities, and pumping stations associated with water distribution and wastewater collection systems.*

### Education

BSEE, North Carolina State University, 2005

AAS, Asheville-Buncombe Technical Community College, 2001

### Certification/License

Professional Engineer: OH, KY, TN, IN, PA

### Areas of Expertise

- Medium and Low Voltage Power Distribution
- Standby Power Systems
- Control Systems
- Process Instrumentation
- SCADA Systems

### Experience

- 15 total years
- 8 years with Hazen

### Professional Activities

Instrumentation, Systems, and Automation Society

International Association of Electrical Inspectors

**Well #9 Water Treatment Plant, Signal Hill, CA**
Lead Electrical Engineer for the design of a nano-filtration water treatment plant with a treatment capacity of 2 MGD. The design includes a new well pump, cartridge filter pre-treatment, two NF treatment trains, chemical feed systems, product water tank, product water pumps, non-recoverable waste system, clean in place system, and an operations/training building. The electrical design also includes a 600kW diesel standby power generator. Construction of the Well #9 WTP is scheduled to be complete in June of 2016.

**Carson Regional WRF Plant Improvements – Carson, CA**
Lead Electrical Engineer for the plant improvements project including design of a new 2 MGD tertiary-MBR, a 2.64 MGD microfiltration system, modifications to the potable water service, and a new standby power system to supply backup power to the RO product pumps and limited tMBR loads. Design of the plant improvements are scheduled to be complete in September 2016.

**Muncie WTF Phase 1 Improvements Project – Indiana American Water Company, Muncie, IN**
Lead Electrical Engineer for the Muncie WTF Phase 1 Improvements Project design which included a new electrical service, new standby power system including a 1,000 kW, 480V generator, new High Service Pump Station, new Clearwell, and chemical feed system modifications.

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**Richard Miller Treatment Plant – Greater Cincinnati Water Works:**
Electrical Engineer for the Richard Miller Treatment Plant Generator Project which included the installation of a new 1,000kW, 4,160V standby generator to supply backup power to the Filter Building. The project also included modifications to the existing medium voltage switchgear and new paralleling controls to allow closed transition transfer and soft loading capabilities.

**Richmond Road Station WTP Plant Improvements – Kentucky American Water Company, Lexington, KY**
Technical Advisor for the design of improvements to the 25-MGD water treatment plant. Improvements include a new filter building to replace the existing filter building, a new chlorine contact basin and a new backwash pump station. The project is currently under construction and will be constructed using a construction manager at risk.

**Pierce-Union-Batavia WTP – Clermont County, OH**
Electrical Engineer for the study and design of water plant improvements and wellfield rehabilitation for the 15 MGD Pierce-Union-Batavia groundwater treatment plant. Project includes new filter media, new field instruments, new and rehabilitated wells in a floodplain and associated electrical and I&C work.

**Bob McEwen WTP – Clermont County, OH**
Electrical Engineer for the plant improvements project including a new 18 MGD, 10 minute EBCT GAC facility with intermediate lift pumps, modifications to several chemical systems including gas chlorine, coagulant, polymer and sodium hydroxide. The project also included a new instrumenta¬tion and control system for the new GAC facility, as well as replacement of the existing Distributed Control System (DCS) for the en¬tire plant with a non-proprietary PC/PLC based system.

**Cornell PS and Irwin-Simpson PS – Greater Cincinnati Water Works**
Electrical Engineer for the pump station generator project which included the installation of two new 480V generators, 500kW and 450kW respectively, at the Cornell and Irwin-Simpson Pump Stations. The scope of this project also included the installation of new service entrance switchboards and automatic transfer switches.

**Glendale WTP – Village of Glendale, OH**
Electrical Engineer for the Phase 2 water treatment plant improvements project. Improvements included installation of VFDs on lime softening mixers, replacement of lime feed silo, installation of new chemical feed system, modifications to well pumps, SCADA system improvements, and a new Laboratory.

**Bogan Road PS – Buford, GA**
Electrical Designer for the Water Pump Station upgrades increasing the pumping capacity to 7500 gpm. Upgrades include expanding the existing Building, replacing the existing Booster Pumps, relocating the existing Pump Controls, and replacing the existing Electrical Distribution Equipment.

**Eastside Pump Station – Miamisburg, OH**
Technical Advisor for the design of a new 15 MGD dry well / wet well pump station. Station will include two (2) mechanical fine screens and compactors, a separate electrical room, ventilation and emergency generator. Station will house four (4) sanitary pumps, three (3) capable of delivering 15 MGD to the Water Reclamation Facility via the two existing force mains. Two (2) additional pumps will be used to deliver flow in excess of 15 MGD to the Equalization Basin. The 1.3 MG Equalization basin will be constructed below grade in the park just west of the new pump station.

**EXHIBIT AA-B**

# Troy Walker

## Senior Associate

*Mr. Walker is the corporate Membrane Technology lead for Hazen. Mr. Walker has over 20 years' experience with Membrane Treatment Systems including seawater desalination systems and water recycling.*

### Education

BE, Chemical Engineering, University of New South Wales, Australia, 1990–1994; Graduate of CO-OP Scholarship Program.

### Certification/License

MIE (Aust)

### Areas of Expertise

- Seawater Desalination
- Reverse Osmosis
- Microfiltration
- Membrane Bioreactor
- Membrane Procurement
- Delivery of Operation of Membrane Facilities
- Plant Startup

### Experience

- 22 total years
- 3 years with Hazen

### Professional Activities

AWWA – Membrane Process Committee

AWWA – Membrane Systems Subcommittee

American Membrane Technology Association

Water Reuse Foundation

South West Membrane Operators Association

**Carlsbad Desalination Plant**
Provided a detailed review at mechanical completion of the Carlsbad SWRO Desalination Plant in San Diego, California. This included detailed review of seawater reverse osmosis system, energy recovery devices, pretreatment and post treatment systems.

**Confidential Desalination Plant – External to the United States**
Technical review of restart requirements including water quality safety for a large seawater desalination plant following plant damage from a natural storm event. Included a review of the water quality safety plan and practical requirements for membrane testing.

**City of Beverly Hills – RO Plant Operations Optimization and Restart**
Operations support for a 2 MGD groundwater reverse osmosis treatment plant. This work included development of operating plants, operational monitoring, standard operating procedures, membrane selection and procurement and plant restart from long term shutdown.

**West Basin Municipal Water District - Carson Plant**
Project manager for complete design of a 2.0 mgd tertiary membrane biore-actor (tMBR) and a 2.64 mgd microfiltration (MF) system and ancillary processes at the Carson Regional Water Recycling Facility. These will upgrade the existing 5.0 mgd MF - Reverse Osmosis (RO) train and the 0.9 mgd biological aerated filtration (BAF) treatment train originally installed for nitrification.

**Coachella Valley Water District – Chromium Treatment Options Study**
Provision of preliminary design and technical options for chromium removal for numerous groundwater sites in the Coachella Valley. This involved an evaluation of options for mobile ion exchange systems, centralized ion exchange resin regeneration and operations implications. Detailed development of Theory of Operations reviewing operating philosophy and staffing approaches for the future facilities. Review of detailed design.

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### City of Santa Monica – Reverse Osmosis Treatment Plant Optimization

Provision of expert technical advice and planning to troubleshoot and significantly improve the performance of the City's 8 MGD reverse osmosis facility. This included an economical design and retrofit to ameliorate severe membrane fouling.

### Watereuse Research Foundation (WRRF) Direct Potable Reuse Research Projects

Mr. Walker is the Principal Investigator for two key, operationally focused projects as a part of the WRRF Direct Potable Reuse Initiative. WRRF 13-03 "Critical Control Point Assessment to Quantify Robustness and Reliability of Multiple Treatment Barriers of a DPR Scheme" uses the principles of Hazard Analysis and Critical Control Points (HACCP), a safety methodology widely used in food manufacturing and production, to manage microbiological and chemical hazards and ensure the safety of recycled water. This project engaged multiple indirect and direct potable reuse facilities worldwide, and used their operational and maintenance data to provide statistical evidence of process effectiveness. It also provided practical operational response procedures for integration into DPR operating plans. WRRF 13-13 "Development of Operation and Maintenance Plan and Training and Certification Framework for Direct Potable Reuse (DPR) Systems" is aimed at developing the key requirements for operations, maintenance and importantly capturing the training and certification requirements to underpin the skills and knowledge for operations teams that are engaged in direct potable reuse schemes.

## Experience Prior to Hazen

### Gold Coast Desalination Plant, Queensland, Australia

Technical oversight for the Gold Coast desalination plant in Queensland Australia, supporting the operations team on review of operational reporting, environmental compliance oversight and membrane performance monitoring. Responsible for the development of Water Quality Safety and Management Plan, using the critical control point methodology, to ensure safety of water quality. This included both performance of membrane systems as well as post treatment to minimize corrosion and ensure safety of water in distribution systems.

### Western Corridor Recycled Water Scheme, Brisbane, Australia

Led the technical operations team for a $2 billion dollar advanced recycled water scheme in Brisbane, Australia. The scheme provided highly purified recycled water to two coal fired power stations in addition to availability for indirect potable reuse. Provided detailed design review during design phase, commissioning support and managed transition from commissioning to long term operations. Mr Walker took a lead role in the water quality management for the project, including extensive collaboration with power stations to optimize and increase cooling water cycles, manage limitations with cooling water blowdown and identify impacts to power station high purity water boiler treatment circuits.

### Kwinana Water Reclamation Plant, Perth Australia

Completed detailed design, construction support, commissioning and transfer to operations of a 4 MGD advanced membrane recycled water plant near Perth, Australia. This plant provided highly purified water from recycled municipal effluent to a range of industries including titanium oxide manufacturing, oil fired power station, oil refining and bulk chemical industries.

### Wollongong Water Reclamation Plant, Australia

Completed detailed design, construction support, commissioning and transfer to operations of a 5 MGD advanced membrane recycled water plant south of Sydney, Australia. This plant provided highly purified recycled water from municipal effluent to a steel manufacturing plant.

# Robert L. "Bo" Copeland Jr., PE

**Associate**

*Mr. Copeland is an expert in water and wastewater conveyance systems, including engineering services from planning through construction, operations engineering, condition assessment, and other issues related to operation and maintenance of these systems.*

### Education

BSChemE, University of Illinois at Urbana-Champaign, 1993

### Certification/License

Professional Engineer: OH

### Areas of Expertise

- Water Transmission and Distribution Systems
- Gravity Collection Systems and Force Mains
- Pump Stations
- Hydraulic and Surge Modeling
- Condition Assessment of Pump Stations and Pipelines
- Asset Management

### Experience

- 23 total years
- 9 years with Hazen

### Professional Activities

Water Environment Federation

American Water Works Association

AWWA – Ohio Section Distribution Committee

Ohio Rural Water Association

**Water Main Replacement Program Data Management Evaluation and Effectiveness Evaluation, Greater Cincinnati Water Works, OH**
Reviewed current procedures, data types, and tools used in conducting the organization's water main replacement program. Evaluated available data management and decision support software/database tools and developed recommendations for implementation. Compiled and analyzed 30-years of water main failure records to determine failure rates for various pipe cohorts, identify key risk factors that affect the likelihood of failure, and evaluate the effectiveness of the organization's ongoing water main replacement program. GIS, spreadsheets, databases, and visual analytics software were used in this evaluation.

**Standard Specifications for Water Main Construction, Indiana-American Water Company, Inc, Greenwood, IN**
Technical Lead for development of new standard technical specifications for all aspects of water main construction for projects throughout the State of Indiana. The specifications developed under this work have been successfully used on over 200 projects in the first year.

**Distribution System Water Quality Modeling, Clermont County Water Resources Division, OH**
Updated hydraulic model of distribution system to support water quality modeling, & evaluated water age & DBP concentrations. Evaluated operational methodologies & system improvements to remedy areas of high water age & high DBPs, while also reducing treatment costs by maximizing groundwater vs. surface water supplies.

**Water System Supply and Pumping Capacity Evaluation, Butler County Water and Sewer Department, Hamilton, OH**
Project manager, technical leader, and modeler. Coordinated and assisted with field capacity testing of wholesale supply connections, compiled and analyzed resulting data, performed hydraulic modeling, and prepared report summarizing supply, pumping and distribution system capacities that resulted in a capacity rerating from 23.9 to 43.47 mgd by Ohio EPA.

# EXHIBIT AA-B

## Selected Publications and Presentations

"Evaluation of Water Main Replacement Program Helps Greater Cincinnati Water Works Achieve Asset Management Goals", Copeland, B., Weinle, J. and Calder, B., Straight From the Tap, Kentucky/Tennessee Section AWWA, Winter/Spring 2015 (also Ohio Section AWWA Newsletter, Spring 2015).

"Flow Woes: Effects and Solutions for Low Velocities in Force Mains", Copeland, B. and O'Rourke, S., Water Environment and Technology, Water Environment Federation, February 2014.

"Development of a Phased Water Master Plan Using Optimization", Speight, V. L. and Copeland Jr., R. L., ASCE WDSA, Cincinnati, OH, 2006.

**Wastewater Collection System and Treatment Facilities Capital Assets Valuation, Sanitation District No. 1, KY**

Developed inventory & valuations of all sanitary & combined sewer system capital assets, including WWTPs & entire collection system. Project approach used condition data, where available, to help determine remaining useful life & values of collection system assets.

**Wastewater Collection System Trouble Call Standard Operating Procedures, Sanitation District No. 1, KY**

Developed standard operating procedures & flow charts for the District's response to & follow-up from wastewater collection system trouble calls.

**Continuous Sewer Assessment Program Failure Analysis, Sanitation District No. 1, KY**

Project manager and technical lead for evaluation of historical collection system failures (i.e. overflows, backups in buildings, and sinkholes) and inspections data to correlate failures to previously-observed defects, assess time-to-failure for various defects, compare condition score to remaining useful life, assess return frequency of blockages, and related analysis.

**Pump Station Force Main and ARV Preventative Maintenance Program, Sanitation District No. 1, KY**

Condition assessment & testing of 10 priority pump stations, field location of 76 miles of force main, condition assessment of 25 miles of priority force main (incl. 6 miles of leak detection on 6" – 48" force mains), condition assessment of 179 air valves, surge modeling of 7 pump station/force main systems, odor & corrosion survey at approximately 120 pump stations & respective force main discharges, CCTV inspection of 40 miles of gravity sewer, inspection of approximately 297 manholes, & development of a preventative maintenance program for pump stations, force mains & air valves.

**Butler County Department of Environmental Services (1995 – 2007)**

Prior to joining Hazen and Sawyer in 2007, Mr. Copeland worked for 12 years as an engineer for Butler County Department of Environmental Services (BCDES), a medium-sized water and wastewater utility in southwest Ohio. During his tenure at Butler County, he coordinated with management, engineering, accounting, customer service, operations and maintenance staff on nearly all aspects of the organization's operations. He worked particularly closely with distribution system and pump station operations and maintenance personnel in the process of managing over 20 design and construction projects, planning system improvements and extensions, and ongoing engineering support for day-to-day operation and maintenance of the distribution system and pump stations.

**EXHIBIT AA-B**

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