STATEMENT OF QUALIFICATIONS FOR

WASTEWATER MASTER PLAN UPDATE

CITY OF HOLLYWOOD | PROJECT NO. 20-1335

FIRM NAME & ADDRESS
Black & Veatch Corporation
3111 N. University Drive, Suite 700
Coral Springs, FL 33065

CONTACT PERSON
Rafael Frias, PE
(754) 229-3049
FriasRE@bv.com

June 16, 2020

BLACK & VEATCH

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EVALUATION CRITERIA CROSS REFERENCE

CATEGORY	CRITERIA	RESPONSE LOCATION (S)
1. Expertise of Designated Staff (25 pts)	Experience related to the type of work	page 61
	Designated staff & employment status	page 1
2. Previous Performance on Related Projects (30 pts)	Relevant project experience of staff	page 5 Appendix A: Resumes
3. Current & Projected Workload and Time Schedule to Complete Project (10 pts)	Workload both currently and projected for the Firm	page 69
	Work previously awarded to the firm by the City in the last five years	page 79
4. Principal Location (5 pts)	Ease of contract administration and responsiveness	page 3
	Distance to City offices	page 3
5. Ability to Complete Project on Time (15 pts)	References for the last ten projects	page 75
	Bar chart of projected vs actual completion time frames	page 77
6. Ability to Complete Project on Budget (15 pts)	Chart of the costs on previous projects as compared to the estimated cost prior to commencing work	page 78

BLACK & VEATCH

BLACK & VEATCH CORPORATION
Rafael Frias, PE
3111 N. University Drive, Suite 700
Coral Springs, FL 33065
P +1 754.229.3049 | E FriasRE@bv.com

June 16, 2020

Clece Aurelus, PE
Interim Assistant Director
Department of Public Utilities
1621 N. 14th Avenue
Hollywood, FL 33020

RE: Project No. 20-1335: Professional Engineering Services for City of Hollywood Wastewater Master Plan Update

Dear Mr. Aurelus:

The City of Hollywood's Department of Public Utilities (City) is a forward-thinking utility that has established a culture of continuous improvement to ensure the reliable and cost-effective disposal of wastewater for all its customers. The City is currently in the process of developing a Wastewater Master Plan that will consider the future needs of it's wastewater infrastructure and result in the identification of capital improvement projects that will allow the City to upgrade it's system, while maintaining a great and cost effective level of service to its customers. Black & Veatch proposes to develop a Wastewater Master Plan that will result in the following benefits to the City:

DELIVER RECOMMENDATIONS TO SUPPORT ITS STRATEGIC PLAN

We will align our recommendations and strategies with the City's Strategic Plan (Vision Hollywood 2020). Our goal is to help the City become "South Florida's top city to live, learn, work, invest and play." This includes reducing risk of system failures and making sound financial decisions for the future of the City.

PROVIDE ADAPTIVE AND DYNAMIC TOOLS FOR THE FUTURE

Black & Veatch knows that the City benefits from a sophisticated and self sufficient utility. We will provide decision support tools to allow the City's Utility to easily update and use the hydraulic models for system optimization and emergency response as well as providing dynamic capital improvement planning ensuring success today and in the future by providing adaptability to ever-changing conditions.

DEVELOP PRACTICAL & DEFENSIBLE CAPITAL PLAN

Black & Veatch will support the City in developing a comprehensive and prioritized CIP plan that is backed by robust business case evaluations that consider risks and life cycle costs.

ASSIST CITY STAFF

We will be partners with the City of Hollywood by keeping the City's Project Manager and team apprised of the project status and any issues which may arise, and we will work to provide adaptive tools and training to meet the City's needs well into the future.

To ensure the delivery of these benefits, Black & Veatch provides the City with a local team of professionals with first-hand knowledge of the City's Wastewater System and expertise in master planning. Our team is comprised of the following resources:

- A local **Project Manager, Isabel Botero, PE,** with intimate knowledge of the City's WWTP and proven experience successfully delivering projects for the City including the recent Cityworks implementation in support of the City's asset management efforts.
- A **Technical Director, Amanda Schwerman, PE,** who has completed over 40 planning studies and master plans for water, wastewater and reclaimed water systems. She was the Planning Manager for the Broward County Regional Wastewater Master Plan, which is very relevant to the City's master planning needs under this contract.
- A linear system partner with intimate knowledge of the City's wastewater collection system in **Tetra Tech.** Tetra Tech's lead engineer, Janine Alexander, PE, supported the City with the Wastewater Main Replacement Program and other pipeline improvements.
- Detailed knowledge of the City's inflow and infiltration conditions will aid the City in making data driven decisions regarding rehab and replacement of pipelines. **McKim & Creed's** is leading these efforts for the City and will provide continuity for the master plan.

The City will benefit from our proven asset management, master planning and condition assessment experience by receiving an Adaptive & Dynamic Wastewater Master Plan prioritizing its CIP based on risk to ensure responsible allocation of City funds and timely implementation of wastewater system improvement projects, before any failure occurs.

We will provide the City with an Adaptive & Dynamic Master Plan that incorporates asset management principles to deliver the following benefits:

1. Better understanding of wastewater system performance through the development and monitoring of levels of service (LOS) and key performance indicators (KPIs).
2. Consistency in risk and condition assessment through the development of consequence criteria.
3. Better collection of condition assessment data and development of an asset registry through Cityworks.
4. Capital investment efficiency from a master plan that recommends improvements only when triggers drive the need for a project.
5. Reduction of risk from an optimized capital improvement plan (CIP) that prioritizes projects based on risk of failures.
6. Trained City staff on a user-friendly, CIP prioritization tool, **iCIP**, which allows the City to update its CIP continuously.
7. Improved communication of Utility performance and decision making through the development of Utility Management Dashboards.
8. Cost and time savings from improved coordination of Utility projects with other City CIP projects.

We welcome the opportunity to discuss the details of our proposal and invite you to contact us with any questions at (954) 465-6872. Thank you for your consideration; we look forward to partnering with the City of Hollywood on this important contract.

Very truly yours,

BLACK & VEATCH

Rafael E. Frias III, PE
Project Director

Isabel Botero, PE
Project Manager

Amanda Schwerman, PE
Technical Director

THIS SHEET MUST BE SIGNED

RESPONDENT CHECK LIST

I M P O R T A N T: Please read carefully, sign in the spaces indicated and return with your Submittal.

Respondent should check off each of the following items as the necessary action is completed:

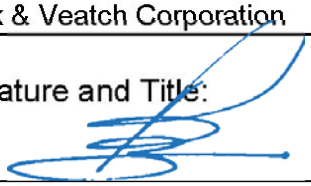
✓1. The Submittal has been signed.
✓2. Any required descriptive literature, etc. have been included.
✓3. Any information required is included.
✓4. Any addenda have been signed and included.
✓5. The mailing envelope has been addressed to:
Office of the City Clerk
City of Hollywood
P.O. Box 229045.
Hollywood, FL 33022-9045
✓6. The mailing envelope must be sealed and marked with Submittal Number, Submittal Title and Due date.
✓7. The Submittal will be mailed or delivered in time to be received no later than the specified due date and time. Otherwise Submittal cannot be considered.)
✓8. Submittal includes:
a) Statement of current and projected workload
b) List of sub-consultants
c) Auditor's letter
d) Organizational chart
e) Litigation
f) Project schedule

ALL COURIER-DELIVERED STATEMENTS OF QUALIFICATIONS MUST HAVE THE RFQ NUMBER AND TITLE ON THE OUTSIDE OF THE COURIER PACKET

Company Name:

Black & Veatch Corporation

Signature and Title:



Associate Vice President

Date:

June 16, 2020

DEPARTMENT OF PUBLIC UTILITIES
ENGINEERING AND CONSTRUCTION SERVICES DIVISION

1621 N. 14th Avenue
Hollywood, FL 33019
Phone (954) 921-3930 Fax (954) 921-3591

ADDENDUM NUMBER 1

Date: M**ay 4, 2020**

FOR: **REQUEST FOR STATEMENTS OF QUALIFICATIONS (RFQ) PROFESSIONAL ENGINEERING SERVICES FOR CITY OF HOLLYWOOD WASTEWATER MASTER PLAN**

FILE NUMBER: **20-1335**

ALL RESPONDENTS BE ADVISED OF THE FOLLOWING CHANGES TO THE ABOVE REFERENCED PROJECT AS LISTED BELOW:

This addendum is issued as part of the RFQ package for the above described project. The changes incorporated in this addendum shall be considered as a part of the documents and shall supersede, amend, add to, clarify, or subtract from those conditions shown in the original documents dated March 2020. The respondent shall coordinate all modifications herein with all trades and disciplines related to the RFQ package. **The respondent shall acknowledge receipt of this addendum per Item No. 4 of the "Respondent Check List" included in this addendum**. Failure to do so may subject Respondent to disqualification.

Item 1: <u>INTRODUCTORY MEETING CANCELLATION</u>

The project introduction meeting scheduled for **Tuesday, May 5, 2020 at 9:00 AM**, at the Southern Regional Wastewater Treatment Plant, 1621 N. 14th Avenue, 2nd Floor Conference Room, Hollywood, Florida, 33020, **is canceled**.

ALL OTHER TERMS AND CONDITIONS IN THE RFQ PACKAGE SHALL REMAIN THE SAME.

Clece Aurelus, P.E.
Interim Assistant Director
Department of Public Utilities
City of Hollywood

RECEIVED

CITY OF HOLLYWOOD
DEPARTMENT OF PUBLIC UTILITIES
ENGINEERING AND CONSTRUCTION SERVICES DIVISION

1621 N. 14th Avenue
Hollywood, FL 33019
Phone (954) 921-3930 Fax (954) 921-3591

ADDENDUM NUMBER 2

Date: **May 27, 2020**

FOR: **REQUEST FOR STATEMENTS OF QUALIFICATIONS (RFQ) PROFESSIONAL ENGINEERING SERVICES FOR CITY OF HOLLYWOOD WASTEWATER MASTER PLAN**

FILE NUMBER: **20-1335**

ALL RESPONDENTS BE ADVISED OF THE FOLLOWING CHANGES TO THE ABOVE REFERENCED PROJECT AS LISTED BELOW:

This addendum is issued as part of the RFQ package for the above described project. The changes incorporated in this addendum shall be considered as a part of the documents and shall supersede, amend, add to, clarify, or subtract from those conditions shown in the original documents dated March, 2020. The respondent shall coordinate all modifications herein with all trades and disciplines related to the RFQ package. **The respondent shall acknowledge receipt of this addendum per Item No. 6 of the "Respondent Check List" included in this Addendum**. Failure to do so may subject Respondent to disqualification.

Item 1: CHANGE OF SUBMITTAL COPIES

On page 9, Section VII, change "SIX COPIES OF ALL SUBMITTALS ALONG WITH ONE ELECTRONIC COPY" to "**TWO** COPIES OF ALL SUBMITTALS ALONG WITH ONE ELECTRONIC COPY".

Item 2: DELIVERY OF RFQ PACKAGE AND PUBLIC OPENING

To assist in mitigating the 2019 Novel Coronavirus (COVID-19) potential exposure and transmission risks, City Clerk is not accepting personal delivery at this time. All RFQ packages need to be mailed to City Clerk of the City of Hollywood, or delivered to Records and Archives located in the Annex building on the west side of City Hall, 2600 Hollywood Boulevard, Hollywood, Florida, 33020, on or before (but not later than) **2:00 PM** Local Time on **Tuesday, June 16, 2020**. It is recommended that a delivery confirmation email be sent to the Senior Project Manager, Jeff Jiang, P.E. (fjiang@hollywoodfl.org) after you drop off the packages but before 2 PM on the submittal date.

CITY OF HOLLYWOOD
DEPARTMENT OF PUBLIC UTILITIES
ENGINEERING AND CONSTRUCTION SERVICES DIVISION

1621 N. 14th Avenue
Hollywood, FL 33019
Phone (954) 921-3930 Fax (954) 921-3591

ADDENDUM NUMBER 2

On **June 16, 2020** at **2:15 PM**, the names of the companies submitting statements of qualifications will be read publicly at City Hall Parking Lot instead of Southern Regional Wastewater Treatment Plant originally planned. List of respondent companies will be available the same day upon request email sent to the Senior Project Manager, Jeff Jiang, P.E. (fjiang@hollywoodfl.org).

Item 3: WEBEX TELEPHONIC MEETING FOR ORAL PRESENTATION

Oral Presentation will be conducted through WebEx telephone meeting. City will provide WebEx meeting link, dial in number and access code before the Oral Presentation. RFQ Respondent could present their files through sharing computer function during the WebEx meeting.

Item 4: CHANGE IN RFQ SECTION II, "SCOPE OF SERVICES"

RFQ, page 4, Section II, "SCOPE OF SERVICES", add the following bullet at the end of this section:

- At the City's sole discretion, the following tasks may be included in this project:
  - i) Update and calibrate City's wastewater model to a complete sewer system model. City's existing wastewater model includes all force main system, all lift stations and major gravity sewer pipes.
  - ii) Evaluate, recommend and design a new force main route as alternate / backup to the 30 inch diameter and 48 inch diameter major truck line along Taft Street.

Item 5: CHANGE IN RFQ SECTION VII, "ORAL PRESENTATION"

RFQ, page 9, Section VII, "ORAL PRESENTATION", Item 4, shall read as follows.

2. Master Plan Development Philosophy and Concepts (15 Points) - Explain in detail your Master Plan Development philosophy and how it will be used to deliver a successful outcome in this specific project setting. Include details that will be analyzed and incorporated into the overall Master Plan Development. Explain how you will ensure that the project will be implemented to include all the aspects the City desires. Describe how you have used innovative Master Plan Development concepts on other similar projects.

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ENGINEERING AND CONSTRUCTION SERVICES DIVISION

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ADDENDUM NUMBER 2

Item 6: RESPONDENT CHECK LIST

Please include Exhibit 1 of this addendum - "Respondent Check List" in RFQ Response Package.

Item 7: PROFESSIONAL ENGINEERING CONSULTANT SERVICES AGREEMENT

Please find Exhibit 2 of this addendum for "Professional Engineering Consultant Services Agreement", which will be utilized for the project awarding.

ALL OTHER TERMS AND CONDITIONS IN THE RFQ PACKAGE SHALL REMAIN THE SAME.

Clece Aurelus, P.E.
Interim Assistant Director
Department of Public Utilities
City of Hollywood

RECEIVED

INSURANCE REQUIREMENTS

The insurance policy shall not contain any exceptions that would exclude coverage for risks that can be directly or reasonably related to the scope of goods or services in this bid/proposal. A violation of this requirement at any time during the term, or any extension thereof shall be grounds for the immediate termination of any contract entered in to pursuant to this bid/proposal. In order to show that this requirement has been met, along with an insurance declaration sheet demonstrating the existence of a valid policy of insurance meeting the requirements of this bid/proposal, the successful proposer must submit a signed statement from insurance agency of record that the full policy contains no such exception.

The City reserves the right to require additional insurance in order to meet the full value of the contract.

The City reserves the right to require any other insurance coverage it deems necessary depending upon the exposures.

HOLD HARMLESS AND INDEMNITY CLAUSE:

Lockton Companies Kurt Colden Kurt Colden

(Company Name and Authorized Signature, Print Name),

the contractor shall indemnify, defend and hold harmless the City of Hollywood, its elected and appointed officials, employees and agents for any and all suits, actions, legal or administrative proceedings, claims, damage, liabilities, interest, attorney's fees, costs of any kind whether arising prior to the start of activities or following the completion or acceptance and in any manner directly or indirectly caused, occasioned or contributed to in whole or in part by reason of any act, error or omission, fault or negligence whether active or passive by the contractor, or anyone acting under its direction, control, or on its behalf in connection with or incident to its performance of the contract.

Lockton Companies Kurt Colden Kurt Colden

(Company Name and Authorized Signature, Print Name),

further certifies that it will meet all insurance requirements of the City of Hollywood and agrees to produce valid, timely certificates of coverage.

OTHER CONSIDERATIONS

Copies submitted may not be viewed until 30 days after opening date or notice of intent to award is posted.

CERTIFICATE OF LIABILITY INSURANCE

11/1/2020

DATE (MM/DD/YYYY) 6/12/2020

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Lockton Companies 444 W. 47th Street, Suite 900 Kansas City MO 64112-1906 (816) 960-9000	**CONTACT NAME:** **PHONE (A/C, No, Ext):** **FAX (A/C, No):** **E-MAIL ADDRESS:**
	INSURER(S) AFFORDING COVERAGE — **NAIC #**
	INSURER A : Zurich American Insurance Company — 16535
INSURED 1456545 BLACK & VEATCH CORPORATION 11401 LAMAR OVERLAND PARK KS 66211 PROJECT MANAGER: BOTERO, ISABEL	**INSURER B :** American Zurich Insurance Company — 40142
	INSURER C : Lexington Insurance Company — 19437
	INSURER D :
	INSURER E :
	INSURER F :

COVERAGES BLAVE01 **CERTIFICATE NUMBER:** 16804139 **REVISION NUMBER:** XXXXXXX

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X **COMMERCIAL GENERAL LIABILITY**	N	N	GLO 4641358	11/1/2019	11/1/2020	EACH OCCURRENCE	$ 1,000,000
A	CLAIMS-MADE X OCCUR			GLO 4641367	11/1/2019	11/1/2020	DAMAGE TO RENTED PREMISES (Ea occurrence)	$ 500,000
A	X CONTRACTUAL			GLO 0139245	11/1/2019	11/1/2020	MED EXP (Any one person)	$ 10,000
	X PD & C/O & XCU						PERSONAL & ADV INJURY	$ 1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$ 2,000,000
	POLICY PRO-JECT LOC						PRODUCTS - COMP/OP AGG	$ 2,000,000
	OTHER:							$
A	**AUTOMOBILE LIABILITY**	N	N	BAP 4641355 (AOS)	11/1/2019	11/1/2020	COMBINED SINGLE LIMIT (Ea accident)	$ 1,000,000
	X ANY AUTO						BODILY INJURY (Per person)	$ XXXXXXX
	X OWNED AUTOS ONLY; SCHEDULED AUTOS						BODILY INJURY (Per accident)	$ XXXXXXX
	X HIRED AUTOS ONLY; X NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$ XXXXXXX
								$ XXXXXXX
	UMBRELLA LIAB OCCUR			NOT APPLICABLE			EACH OCCURRENCE	$ XXXXXXX
	EXCESS LIAB CLAIMS-MADE						AGGREGATE	$ XXXXXXX
	DED RETENTION $							$ XXXXXXX
B	**WORKERS COMPENSATION AND EMPLOYERS' LIABILITY** Y / N		N	WC 4641353 (AOS)	11/1/2019	11/1/2020	X PER STATUTE OTH-ER	
A	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? N	N / A		WC 4641354 (ID, MA, WI)	11/1/2019	11/1/2020	E.L. EACH ACCIDENT	$ 1,000,000
A	**(Mandatory in NH)** If yes, describe under DESCRIPTION OF OPERATIONS below			WC 0139244	11/1/2019	11/1/2020	E.L. DISEASE - EA EMPLOYEE	$ 1,000,000
							E.L. DISEASE - POLICY LIMIT	$ 1,000,000
C	PROFESSIONAL LIABILITY	N	N	026030198	11/1/2019	11/1/2020	$1,000,000 PER CLAIM $1,000,000 ANNUAL AGGREGATE	

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

PROPOSAL NUMBER: 907291.0005; PROJECT NO. 20-1335; PROJECT NAME: PROFESSIONAL ENGINEERING SERVICES FOR CITY OF HOLLYWOOD WATER MASTER PLAN UPDATE; PROJECT MANAGER: BOTERO, ISABEL ; UPON AWARD OF CONTRACT, CITY OF HOLLYWOOD IS INCLUDED AS AN ADDITIONAL INSURED ON THE GENERAL AND AUTO LIABILITY POLICIES.

CERTIFICATE HOLDER

16804139
CITY OF HOLLYWOOD
2600 HOLLYWOOD BLVD., ROOM 221
HOLLYWOOD FL 33020

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Joseph M Agnello

EQUAL EMPLOYMENT OPPORTUNITY

Proposer shall provide a written statement that it does not and will not discriminate against any person, employee, or applicant for employment, because of race, creed, color, religion, sex, national origin, ancestry, age or disability.

PROMPT PAYMENT: LATE PAYMENTS BY CONTRACTOR TO SUBCONTRACTOR AND MATERIAL SUPPLIERS; PENALTY:

When a contractor receives from the City of Hollywood any payment for contractual services, commodities, materials, supplies, or construction contracts, the contractor shall pay such moneys received to each Subcontractor and Material Supplier in proportion to the percentage of work completed by each Subcontractor and Material Supplier at the time of receipt. If the contractor receives less than full payment, then the contractor shall be required to disburse only the funds received on a pro rata basis with the Subcontractors and Material Suppliers, each receiving a prorated portion based on the amount due on the payment. If the contractor without reasonable cause fails to make payments required by this section to Subcontractors and Material Suppliers within 15 working days after the receipt by the contractor of full or partial payment, the contractor shall pay to the Subcontractors and Material Suppliers a penalty in the amount of one percent of the amount due, per month, from the expiration of the period allowed herein for payment. Such penalty shall be in addition to actual payments owed. Retainage is also subject to the prompt payment requirement and must be returned to the Subcontractor or Material Supplier whose work has been completed, even if the prime contract has not been completed. The Contractor shall include the above obligation in each subcontract it signs with a Subcontractor or Material Suppler.

ADA COMPLIANCE

Persons with disabilities who require reasonable accommodation to participate in City programs and/or services may call the Equal Opportunity Manager, Office of Human Resources and Risk Management at (954) 921-3218 (voice). If an individual is hearing or speech impaired, please call Florida Relay Service 1-800-955-8771.

PUBLIC ENTITY CRIMES

"A person or affiliate who has been placed on the convicted vendor list following a conviction for public entity crime may not submit a bid on a contract to provide any goods or services to a public entity, may not submit a bid on a contract with a public entity for the construction or repair of a public building or public work, may not submit bids on leases of real property to public entity, may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity, and may not transact business with any public entity in excess of the threshold amount provided in Section 287.017, for CATEGORY TWO for a period of 36 months from the date of being placed on the convicted vendor list."

A NOTICE AND INVITATION TO ALL PROFESSIONALS AND APPLICANTS
STEVE EDWARDS, CHAIRMAN AND CEO

AFFIRMATIVE ACTION AND EQUAL EMPLOYMENT OPPORTUNITY POLICY STATEMENT

Black & Veatch Corporation has been and will continue to be an equal opportunity employer. To assure full implementation of this equal employment policy, we will take steps to assure that:

a) Persons are recruited, hired, assigned and promoted without regard to race, religion, color, national origin, citizenship, sex, sexual orientation, gender identity, veteran's status, age, pregnancy status, disability, genetic information or other status protected by law.

b) All other personnel actions, such as compensation, benefits, transfers, layoffs and recall from layoffs, access to training, education, tuition assistance and social recreation programs are administered without regard to race, religion, color, national origin, citizenship, sex, sexual orientation, gender identity, veteran's status, pregnancy status, age, disability. genetic information or other status protected by law.

c) Professionals and applicants shall not be subjected to harassment, intimidation, threats, coercion or discrimination because they have: (1) filed a complaint; (2) assisted or participated in an investigation, compliance review hearing or any other activity related to the administration of any federal, state or local law requiring equal employment opportunity; (3) opposed any act or practice made unlawful by any federal, state or local law requiring equal opportunity or (4) exercised any other right protected by federal, state or local law requiring equal opportunity.

I have appointed the Director of Employee Relations to take on the responsibilities of EEO Coordinator. As EEO Coordinator, she will be responsible for the day to day implementation and monitoring of this Affirmative Action Plan. As part of that responsibility, she will periodically analyze the Company's personnel actions and their effects to insure compliance with our equal employment policy.

If you, as one of our professionals or as an applicant for employment, have any questions about this policy or would like to be considered under our Affirmative Action Plan, please see the Director of Employee Relations during regular business hours. This is also a reminder that professionals may update their disability status at any time by contacting their Human Resources Business Partner.

I have reviewed and fully endorse our Affirmative Action and Equal Employment Opportunity program. In closing, I ask the continued assistance and support of all of the Company's personnel to attain our objective of equal employment opportunity for all.

STEVE EDWARDS| Chairman and CEO
Black & Veatch | 11401 Lamar Ave., Overland Park, KS 66211
Building a World of Difference.®

DECLARATION

The aforementioned, as Proposer (herein used in the masculine singular, irrespective of actual gender and number), declares, under oath that no other person has any interest in this Proposal or in any resulting agreement to which this Proposal pertains, that this Proposal is not made with connection or arrangement with any other persons, and that this Proposal is made without collusion or fraud.

The Proposer further declares that he has complied in every respect with all the instructions to Proposers, that he has read all addenda, if any, issued prior to the opening of Proposals, and that he has satisfied himself fully relative to all matters and conditions with respect to the general conditions of the agreement and all relevant information to which this proposal pertains.

DISCLOSURE OF CONFLICT OF INTEREST

Vendor shall disclose below, to the best of his or her knowledge, any City of Hollywood officer or employee, or any relative of any such officer or employee as defined in Section 112.3135, Florida Statutes, who is an officer, partner, director or proprietor of, or has a material interest in the vendor's business or its parent company, any subsidiary, or affiliated company, whether such City official or employee is in a position to influence this procurement or not.

Failure of a vendor to disclose any relationship described herein shall be reason for debarment in accordance with the provisions of the City of Hollywood Purchasing Ordinance.

Name	Relationship
N/A	

In the event the vendor does not indicate any name, the City shall interpret this to mean that no such relationship exists.

PROJECT SUBMITTAL

FROM: Black & Veatch Corporation
3111 N. University Drive, Suite 700
Coral Springs, FL 33065

DATE: June 16, 2020

CITY OF HOLLYWOOD
Department of Public Utilities
c/o City Clerk
2600 Hollywood Blvd.
Hollywood, FL 33022-9045

RE: RFQ NO. 20-1335

To whom it may concern:

The undersigned, as Respondent, hereby declares that we have examined the Scope of Services and informed ourselves fully in regard to all conditions pertaining to the work to be done for the City of Hollywood's Consulting Services Contract – Wastewater Master Plan Update. The Respondent further declares that the only persons, company or parties interested in this Submittal or the Contract to be entered into as principals are named herein; that this Submittal is made without connection with any other person, company or companies making a Submittal; and it is in all respects fair and in good faith, without collusion or fraud.

The service to be furnished by us is hereby declared and guaranteed to be in conformance with the specifications of the City.

The undersigned agrees that should this Submittal be accepted, to execute the contract and present the same to the City for approval within twenty (20) days after being notified of the awarding of the contract.

The undersigned further agrees that failure to execute and deliver said forms of contract within twenty (20) days, will result in damages to the City.

IN WITNESS WHEREOF, I have hereunto subscribed my name on this 12th day of June, 2020, in the County of Broward, in the state of Florida.

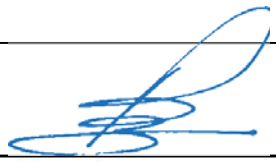
Black & Veatch Corporation
Respondent's Firm or Trade Name

Corporation, Sole Proprietorship, Partnership (Circle One)

Phone No.: (754) 229-3049

Address 3111 N. University Drive, Suite 700

City and State Zip Coral Springs, FL 33065

BY: 

Rafael Frias, III
Typed and Written Signature

Associate Vice President
Title

ENGINEERING SERVICES QUALIFICATION STATEMENT
AND SUBMITTAL QUESTIONNAIRE

PROJECT NAME: **PROFESSIONAL ENGINEERING SERVICES FOR WASTEWATER MASTER PLAN**
PROJECT NO.: **20-1335**

1. FIRM NAME & OFFICE LOCATION (Mailing Address and Street Address)

Name: Black & Veatch Corporation

Mailing Address:
Street/PO Box: 3111 N. University Drive, Suite 700
City: Coral Springs **State** FL **Zip** 33065

Physical Address (if different from above):
Street:
City: State: Zip:

Phone (754) 229 - 3044 Ext Fax ( ) -

Primary E-Mail Address: FriasRE@bv.com

Web Site Address: WWW.BV.com

Contacts:
1. Name: Rafael Frias, PE Title: Project Director
2. Name: Isabel Botero, PE Title: Project Manager

2. TYPE OF ORGANIZATION

A. Check One:

- ☑ Corporation (complete Section B and G)
- ☐ Sole Proprietorship (complete Section D)
- ☐ Other (complete Section F and G
- ☐ Partnership (complete Section C and G)
- ☐ Joint Venture (complete Section E and G

B. If a Corporation, State incorporated:

Date of Incorporation: 16 November 1998

State in which Incorporated: Delaware

If an out-of-state corporation that is currently authorized to do business in the State of Florida, give the date of such authorization: 22 December 1998

Name and Titles of Principal Officers	Date Elected
See Attached	

C. If a Partnership, State formed:

Date of Partnership: _____

Type of Partnership (General or Limited): _____

Names and Addresses of Partners:

_____

_____

D. If Joint Venture, State formed:

Date of Joint Ventureship: _____

Names and Addresses of Joint Venturers:

_____

_____

_____

E. If a Sole Proprietorship, State created:

Name and Address of Sole Proprietor:

_____

_____

F. If other than above, please describe:

G. Related Parent Company, Divisions, and Subsidiaries:
(Attach additional information on other office locations, if appropriate)

See Attached

Please attach the following:

a. Corporate Organization Chart
b. Resumes of Principal Staff
c. Corporate Family Tree
d. Company Brochure/Annual Report

3. EMPLOYEES AND PERSONNEL Provide a separate listing for personnel at the corporate (national) level, with the state (Florida) level and for the local office.

Corporate (National)

Permanent Office Staff	Number	Avg. Years With Firm		
		1-5	5-10	10+
Administrative	454	234	99	154
Project Management	1020	341	291	474
Engineers	3300	1747	928	942
Design/Drafting	949	420	256	356
Computer Services	136	80	31	25

Permanent Office Staff	Number	Avg. Years With Firm		
		1-5	5-10	10+
Clerical /Technicians	949	445	167	334
Procurement	249	132	70	64
Project Control and Estimating	332	191	67	72
Construction Management	120	82	16	22
Research and Development	****			

Local Office Location:
Coral Springs, FL

Personnel in Organization by Discipline.

Discipline	Engineers		Designers
	Reg	Total	Total
Civil	479	903	949
Sanitary	0	0	
Structural	46	179	
Mechanical	208	445	
HVAC	**	**	
Process	11	138	
Electrical	234	736	
Instrumentation	3	124	
Industrial	3	10	

Notes:

1. Black & Veatch does not classify designers by discipline. This number indicates the total number of designers.
2. HVAC staff are included in the Mechanical discipline.
3. Black & Veatch as 2436 Registered Professional Engineers.
4. Black & Veatch encourages Research and Development throughout the organization.

Discipline (*Procurement*)	**Personnel**
Capital Equipment Buyers	
Subcontract Administrators	
Bulk Material Buyers	
Inspection/Expediting	
Clerical/Technical Support	

Black & Veatch does not breakdown its staff by these categories. Please see attachment for a breakdown of Procurement and Construction Management staff.

Discipline (*Construction Management*)	**Personnel**
Field Superintendents	
Home Office Management	
Planners (Site, City, Community)	
Architects	
Other	

Maximum Man-Hours Available Per Year: 12,811,968

Current Estimated Man-Hours Per Year: 4,270,656

4. FINANCIAL INFORMATION

A. Attach a copy of current audited income statement and balance sheet.

5. WORK EXPERIENCE:

A. Types of Services Provided (Check Yes or No)

	Yes	No		Yes	No
Feasibility Studies	☑	☐	Stress Analysis*	☑	☐
Drawings					
Preparation of Specifications	☑	☐	Pipeline	☑	☐
Construction Mgmt. Services	☑	☐	Surveying	☑	☐
Process Problem Analysis	☑	☐	Direct Hire Field Construction	☑	☐
Energy Conservation Studies	☑	☐	Detailed Instrumentation & Control	☑	☐
Soil and Foundation Studies	☑	☐	Process Design	☑	☐
Foundation Design	☑	☐	Equipment Design	☑	☐
Structural Design	☑	☐	Detailed Electrical	☑	☐
Testing Capability	☑	☐	Detailed Piping Design	☑	☐
Detailed Mechanical	☑	☐	Construction Management	☑	☐

State of Florida

3. EMPLOYEES AND PERSONNEL Provide a separate listing for personnel at the corporate (national) level, with the state (Florida) level and for the local office.

Permanent Office Staff	Number	Avg. Years With Firm		
		1-5	5-10	10+
Administrative	18	9	4	5
Project Management	40	13	11	27
Engineers	94	58	23	13
Design/Drafting	22	10	3	9
Computer Services	1	1	-	-

Permanent Office Staff	Number	Avg. Years With Firm		
		1-5	5-10	10+
Clerical /Technicians	22	11	2	9
Procurement	9	7	1	1
Project Control and Estimating	16	15	-	1
Construction Management	7	7	-	-
Research and Development	****	-	-	-

Local Office Location:
Coarl Springs, FL

Personnel in Organization by Discipline.

Discipline	Engineers		Designers
	Reg	Total	Total
Civil	15	39	22
Sanitary			
Structural	1	1	
Mechanical	2	5	
HVAC			
Process		2	
Electrical	13	29	
Instrumentation		2	
Industrial			

Notes:
1. Black & Veatch does not classify designers by discipline. This number indicates the total number of designers.
2. HVAC staff are included in the Mechanical discipline.
3. Black & Veatch as 2436 Registered Professional Engineers.
4. Black & Veatch encourages Research and Development throughout the organization.

Discipline (*Procurement)*	**Personnel**
Capital Equipment Buyers	
Subcontract Administrators	
Bulk Material Buyers	
Inspection/Expediting	
Clerical/Technical Support	

Black & Veatch does not breakdown its staff by these categories. Please see attachment for a breakdown of Procurement and Construction Management staff.

Discipline (*Construction Management)*	**Personnel**
Field Superintendents	
Home Office Management	
Planners (Site, City, Community)	
Architects	
Other	

Maximum Man-Hours Available Per Year: 1,344,096

Current Estimated Man-Hours Per Year: 448,032

4. FINANCIAL INFORMATION

A. Attach a copy of current audited income statement and balance sheet.

5. WORK EXPERIENCE:

A. Types of Services Provided (Check Yes or No)

	Yes	No		Yes	No
Feasibility Studies	☑	☐	Stress Analysis*	☑	☐
Drawings					
Preparation of Specifications	☑	☐	Pipeline	☑	☐
Construction Mgmt. Services	☑	☐	Surveying	☑	☐
Process Problem Analysis	☑	☐	Direct Hire Field Construction	☑	☐
Energy Conservation Studies	☑	☐	Detailed Instrumentation & Control	☑	☐
Soil and Foundation Studies	☑	☐	Process Design	☑	☐
Foundation Design	☑	☐	Equipment Design	☑	☐
Structural Design	☑	☐	Detailed Electrical	☑	☐
Testing Capability	☑	☐	Detailed Piping Design	☑	☐
Detailed Mechanical	☑	☐	Construction Management	☑	☐

LOCAL OFFICE - CORAL SPRINGS

3. EMPLOYEES AND PERSONNEL Provide a separate listing for personnel at the corporate (national) level, with the state (Florida) level and for the local office.

Permanent Office Staff	Number	Avg. Years With Firm		
		1-5	5-10	10+
Administrative	1	1		
Project Management	4	1	1	2
Engineers	7	5	1	1
Design/Drafting				
Computer Services				

Permanent Office Staff	Number	Avg. Years With Firm		
		1-5	5-10	10+
Clerical /Technicians				
Procurement				
Project Control and Estimating				
Construction Management				
Research and Development				

Local Office Location:
Coral Springs, FL

Personnel in Organization by Discipline.

Discipline	Engineers		Designers
	Reg	Total	Total
Civil	2	4	
Sanitary			
Structural			
Mechanical			
HVAC			
Process		1	
Electrical		1	
Instrumentation			
Industrial			

Notes:
1. Black & Veatch does not classify designers by discipline. This number indicates the total number of designers.
2. HVAC staff are included in the Mechanical discipline.
3. Black & Veatch as 2436 Registered Professional Engineers.
4. Black & Veatch encourages Research and Development throughout the organization.

Discipline (*Procurement)*	**Personnel**
Capital Equipment Buyers	
Subcontract Administrators	
Bulk Material Buyers	
Inspection/Expediting	
Clerical/Technical Support	

Black & Veatch does not breakdown its staff by these categories. Please see attachment for a breakdown of Procurement and Construction Management staff.

Discipline (*Construction Management)*	**Personnel**
Field Superintendents	
Home Office Management	
Planners (Site, City, Community)	
Architects	
Other	

Maximum Man-Hours Available Per Year:	20,592
Current Estimated Man-Hours Per Year:	6,864

4. FINANCIAL INFORMATION

A. Attach a copy of current audited income statement and balance sheet.

5. WORK EXPERIENCE:

A. Types of Services Provided (Check Yes or No)

	Yes	No		Yes	No
Feasibility Studies	☑	☐	Stress Analysis*	☑	☐
Drawings					
Preparation of Specifications	☑	☐	Pipeline	☑	☐
Construction Mgmt. Services	☑	☐	Surveying	☑	☐
Process Problem Analysis	☑	☐	Direct Hire Field Construction	☑	☐
Energy Conservation Studies	☑	☐	Detailed Instrumentation & Control	☑	☐
Soil and Foundation Studies	☑	☐	Process Design	☑	☐
Foundation Design	☑	☐	Equipment Design	☑	☐
Structural Design	☑	☐	Detailed Electrical	☑	☐
Testing Capability	☑	☐	Detailed Piping Design	☑	☐
Detailed Mechanical	☑	☐	Construction Management	☑	☐

Procurement ☑ ☐ Inspection/Expediting ☑ ☐

B. Drafting Method Utilized:

*Manual ☐ Computer ☑ If Computer, What Program: AutoCAD

C. Please attach summaries for projects, related to the type of work to be awarded as a result of this submittal, completed by your firms including:

1) Location of project and client
2) Description of project
3) Your scope of involvement in project
4) Contract type (e.g. reimbursable/fixed fee/fixed price)
5) Approximate value of contract
6) Duration of work
7) Project Manager Utilized

6. EXPERIENCE WITH THE CITY OF HOLLYWOOD

A. Most Recent City of Hollywood Work Experience: (Date/Location/Description)

Automation and SCADA Improvements for Oxygen, Chlorination and Effluent Systems

City of Hollywood's Souther Regional Wastewater Treatment Plant

Data gathering, programming and commissioning to replicate the Siemens PLC and HMI for the

Oxygen Generation Plant. At the same time, Black & Veatch worked on data gathering and review,

development of control strategies, programming, commissioning, and training of Operations

staff for PLC 3 (Chlorine Facility) and PLC 6 (Effluent Pump Station).

B. Current City of Hollywood Engineering services agreement, if any: (Agreement Number/Expiration Date/Location/Description)

City Project Number 17-1324/Expiration November 2021/City of Hollywood/Description

General Engineering Consultant Services for Water Treatment Plant and Wastewater Treatment Plant Projects

7. SUBCONTRACTED SERVICES:

List Subcontractor/ Sub-consultant firms expected to be utilized, and their portion of the work below:

Name of Firm	Area of work to be Performed under this agreement
McKim & Creed	Electrical Condition Assessment and Master Planning
Tetra Tech	Condition Assessment and Risk Prioritization
300 Engineering	Lift Station Assessment

Also, provide resumes of individuals from these firms whom the Subcontractors shall utilize for completion of the construction.

Identify those subcontractors that are Minority/Women's Business Enterprises and repeat required information in "Minority/Woman Business Participation", below for said Subcontractors. (THIS REQUIREMENT FOR M/WBE INFORMATION IS VOLUNTARY)

8. BUSINESS SIZE AND CLASSIFICATION

A. Size (check one)

☐ Small
A domestic concern that normally employs less than 500 persons, or as defined by section 3 of the Small Business Act.

☑ Large
A domestic concern which, including domestic and foreign divisions and affiliates, normally employs 500 or more persons, is independently or publicly owned or controlled and operated and

which may be a division of another domestic or foreign concern.

B. Classification (check where applicable; may be more than one)

☐ Foreign:
A concern which is not incorporated in the United States or an unincorporated concern having its principal place of business outside the United States.

☐ Minority:
A business, at least 50% of which is owned by minority group members, or, in case of publicly owned businesses, at least 51% of the stock of which is owned by minority group members. For the purpose of this definition, minority group members are Black-Americans, Hispanic-Americans, American-Orientals, American-Indians, American-Eskimos, and American-Aleuts.
(THE REQUIREMENT FOR M/WBE INFORMATION IS VOLUNTARY)

☐ Women:
A business that is at least 51% owned and controlled by a woman or women.
(THE REQUIREMENT FOR M/WBE INFORMATION IS VOLUNTARY)

☐ Nonprofit:
A business or organization that has received nonprofit status under IRS Regulation 501C3.

☐ Sheltered:
A sheltered workshop or other equivalent business basically employing the handicapped.

Please indicate in the space below how your firm complies with the definitions selected above.

_____

_____

_____

_____

9. PROFESSIONAL ENGINEER'S LICENSE:

Respondent must hold a valid State of Florida Professional Engineer's License to be considered a qualified bidder.

State of Florida Professional Engineer's License No.: CA8132

Date: Exp. 2/28/2021

Primary Classification: Professional Engineers

10. QUALIFICATION FORM PREPARED BY:

Name (print or type): Rafael Frias, PE

Title: Associate Vice President

Signature: 

Address: 3111 N. University Drive, Suite 700 | Coral Springs, FL 33065

Telephone Number: (754) 229-3049

Submittal Questionnaire Attachments

2B. PRINCIPAL OFFICERS

NAME AND TITLE OF PRINCIPAL OFFICERS	DATE ELECTED
Steve Edwards | CEO	November 2013
Cindy Wallis-Lage | President-Water	January 2012
Ken Williams | CFO, President-Finance	January 2018
Angela Hoffman | Senior Financial Officer	January 2006
Timothy Triplett | President - LRMGA & Secretary	June 2008

** This only represents a partial list of Black & Veatch Corporation's officer list, which is available upon request.*

2G. RELATED PARENT COMPANY, DIVISIONS, AND SUBSIDIARIES

Black & Veatch Corporation is a subsidiary of Black & Veatch Holding Company (BVHC). Black & Veatch Holding Company is privately held through an Employee Stock Ownership Program (ESOP). We have more than 10,000 professionals located in over 110 offices worldwide, and we are the 11th largest employee-owned company in the U.S. Our ownership structure gives us the distinct advantage of being free from the pressures that drive publicly held companies (valuing short-term profits over long-term client service). We are our own stockholders, with corporate strategies supporting the continued long-term interest of our global clients.

Black & Veatch Corporation was incorporated in Delaware in 1998. The legal address for Black & Veatch Holding Company is 11401 Lamar Ave. Overland Park, KS 66210.

US LEGAL ENTITIES

Below is a list of U.S. subsidiaries and companies owned by Black & Veatch Holding Company. These entities were established to support our offices throughout the United States (and elsewhere), and to help facilitate successful project management and execution. Our objective is to help our local clients, wherever they may be located, meet their business needs.

Black & Veatch Construction, Inc.
Black & Veatch Corporation
Black & Veatch International Company
Black & Veatch LLP
Black & Veatch Ltd. Of Michigan
Black & Veatch Service Corporation

Black & Veatch Special Projects Corp.
Black & Veatch LLC
Black & Veatch Pritchard, Inc.
Black & Veatch Property Management Services
BVP Holding, LLC

Convergent Group Corporation
Enspiria Solutions Inc.
Global Procurement Corporation
infraManagement Group LLC
Overland Contracting Inc.
Tech2Staffing Inc.

Divisions

Black & Veatch serves clients in the power, oil & gas, water, telecommunications, management consulting, government, environmental and security markets. Within these markets are businesses that provide services and solutions to their respective markets. Black & Veatch's six operating businesses include:

- Power
- Water
- Management Consulting
- Telecommunications
- Special Projects
- Oil & Gas

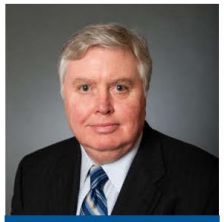
On the following pages, please find the Corporate Organization Chart, Resumes of Principal Staff, the Corporate Family Tree, as well as a company brochure.

Steve Edwards
Chairman & CEO

Human Relations
Lori Kelleher, President

Legal, Risk Management, Governmental Affairs
Tim Triplett, President

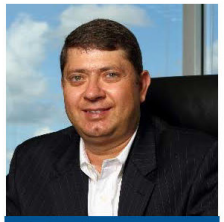
Management Consulting



John Chevrette
President

- Industry/Client Exec - Power
- Industry/Client Exec – Oil & Gas
- Industry/Client Exec - Water
- Service Offerings
- Finance & Ops Support
- Human Resources
- Marketing & Business Devel.

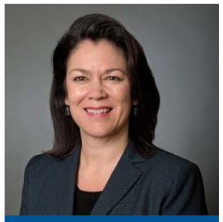
Power



Mario Azar
President

- Business Devel.
- Operations
- EPC
- Power Gen. Svcs
- Nuclear
- Power Delivery
- Renewable Energy

Water



Cindy Wallis-Lage
President

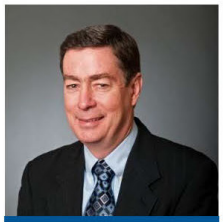
- Americas P&L
- Global P&L
- Operations
- Strategic Svcs.
- Finance & Operations
- Human Resources
- Marketing

Oil &Gas

Hoe Wai Cheong
President & CEO

- Operations
- EPC
- Americas
- Asia
- India
- EMEA
- FOG Solutions
- Tech Manager

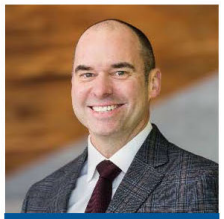
Federal



Marty Travers
President

- Safety & Security
- Legal
- Shared Services
- Operations
- Business Devel.
- Americas & Asia
- Europe / Africa Middle East
- Project Management

Telecom



John Janchar
President

- Networks
- Smart Integrated Infrastructure
- Operations
- Finance
- Safety
- Legal
- Business Devel.
- Project Management

Steve Edwards, PE

CHAIRMAN & CEO

OFFICE LOCATION
Overland Park, KS

EDUCATION
Bachelor of Science, Electrical Engineering, University of Missouri, 1979

YEARS EXPERIENCE
42

PROFESSIONAL REGISTRATION
PE - FL, MO

Steve Edwards is Chairman and Chief Executive Officer of Black & Veatch. Edwards assumed this position in November 2013 and has overall responsibility for the company's engineering, consulting, construction and related infrastructure businesses in the energy, water, telecommunications, and security markets worldwide. With revenues of $3.5 billion, Black & Veatch is consistently ranked in the top ten categories for power generation, power delivery, water infrastructure development and telecommunications in Engineering News-Record magazine and is ranked in the Top 150 of the Forbes list of Largest Private Companies. The company is the 10th largest Employee-Owned Corporation in the United States according to the National Center for Employee Ownership.

Since joining Black & Veatch in 1978 Edwards has been responsible for a variety of global projects and business lines. He was named Chief Operating Officer in March 2013 in a transition role before becoming Chairman and CEO. He was appointed to the Black & Veatch Board of Directors in 2012. Edwards is a registered professional engineer and graduated with a Bachelor of Science degree in Electrical Engineering from the University of Missouri.

Chief Executive Officer; Overland Park, Kansas

Chairman & Chief Executive Officer. Edwards has overall responsibility for the company's engineering, consulting, construction and related infrastructure businesses in the energy, water, telecommunications, and security markets worldwide.

Company Operations; Kansas

Chief Operating Officer. Acting as Chief Operating Officer during the transition period before officially assuming the responsibilities of Chief Executive Officer November 26, 2013.

Executive Director - Global Expanded Scope Business; Kansas

Executive Director - Global Engineering, Procurement, and Construction (EPC). Responsible for global expanded scope business on a P&L basis, including business development, proposals, contracts, and project execution for generation, transmission and distribution (T&D), and oil and gas clients / projects.

Member of Executive Committee, Region Executive - Americas; Kansas

Executive Vice President. Responsible for Americas region on a P&L basis, including business development, proposals, contracts, and project execution for generation, T&D, consulting, and Gas, Oil & Chemicals (GOC) clients / projects.

Director and Region Executive - Americas; Kansas

Senior Vice President. Responsible for Americas region on a P&L basis, including business development, proposals, contracts, and project execution for generation, T&D, consulting, and GOC clients / projects.

Various Projects; Energy Engineering & Procurement (E&P) Business; Kansas

Senior Vice President. Responsible for direction of all engineering and procurement activities for Energy E&P business.

Project Management; Kansas

Senior Vice President Manager of Projects. Responsible for project oversight; project implementation / standardization issues; coordination of project controls, estimating, and procurement procedures for projects; and management of the ASSIST team.

Tenaska; Frontier; Texas

Partner. Responsible partner/project manager for EPC 800 MW 3-on-1 "F" combined cycle project.

Tenaska; Gateway; Texas

Joint Venture (JV) Management Committee. Responsible for oversight on an EPC 800 MW 3-on-1 "F" combined cycle project.

Energy Initiatives; Mid-Georgia; Georgia

Project Executive - Black & Veatch. Responsible for overall EPC project coordination for a 300 MW cogeneration project.

Nippon Steel; 145 MW Coal Fired Development Project; Japan

Project Manager. Responsible for supervising design and general project coordination for a 145 MW coal fired development project.

Tenaska; Frederickson; Washington

Engineering Manager. Responsible for supervising engineering design and general EPC project coordination for a 250 MW combined cycle project.

Bangladesh Power Development Board (BPDB); Sylhet; Sylhet, Bangladesh

Engineering Manager. Responsible for supervising engineering design and general EPC project coordination for a 100 MW combined cycle project.

Kissimmee Utility Authority (KUA); Cane Island; Florida

Engineering Manager. Responsible for supervising engineering design and general project coordination for a 120 MW combined cycle project.

KUA; Cane Island; Florida

Engineering Manager. Responsible for supervising engineering design and general project coordination for a 40 MW simple cycle project.

Applied Energy Services (AES); Cedar Bay; Florida

Project Engineer - Control and Electrical. Responsible for supervising electrical and control related design for a 285 MW fluidized bed boiler cogeneration plant.

Sarawak Electricity Supply Corporation (SESCO); Bintulu; Malaysia

Project Engineer - Control. Responsible for control design of the 3 x 35 MW simple cycle generating plant.

Cindy L. Wallis-Lage, PE

PRESIDENT - WATER

OFFICE LOCATION
Kansas City, MO

EDUCATION
MS, Envir Health, Univ Kansas, 1990
BS, Civil Engineering, Kansas St Univ Manhattan, 1985

YEARS EXPERIENCE
33

PROFESSIONAL REGISTRATION
PE - KS

Wallis-Lage is an active leader and a frequent speaker at many industry forums and events. She serves on several committees for various water industry associations. She is currently on the Board of Directors for the WateReuse Association. Additionally, Wallis-Lage has authored more than 50 papers, 20 technical articles and 10 textbook chapters. She served as editor of the Fifth Edition update of the Handbook of Chlorination and Alternative Disinfectants book.

Wallis-Lage has also been a moderator, facilitator and speaker at many global Black & Veatch roundtable events developed to confront the world's most vexing water industry issues, including Overcoming Barriers to Water Reuse and Dealing with Economic Pressures in the Water Industry.

Her leadership has earned her recognition in the industry and business communities. In October 2006, she received the Professional Engineering Award from Kansas State University in 2006. In the same year she was also honored with the WEF George Bradley Gascoigne Medal for Research in Wastewater Treatment Plant Operational Improvements. In September 2009, Wallis-Lage was honored as a recipient of the Top 100 Under 50 DIVERSE EMERGING LEADERS Award from DiversityMBA Magazine. In 2013, Wallis-Lage received the Pearl Award from the central region Girl Scouts of America for STEM leadership.

Wallis-Lage is also an active supporter of educational initiatives. She has served on the Civil Engineering Advisory Council for Kansas State University and has been an invited speaker to both the KSU and University of Missouri Schools of Engineering. She is currently on the Board of Directors for the WateReuse Association and she serves on the Engineering Advisory Council for Kansas State University which provides input to all engineering disciplines. In 2013, Wallis-Lage received the Pearl Award from the central region Girl Scouts of America for STEM leadership and she was named the Alumnae Fellow for the College of Engineering at Kansas State University. An invited speaker on careers in engineering to local grade and high schools, Wallis-Lage was quoted in the book 21 Things Every Future Engineer Should Know, A Practical Guide for Students and Parents.

Wallis Lage earned a bachelor's degree in civil engineering from Kansas State University in 1985, and she holds a master's degree in environmental health engineering from the University of Kansas from 1990.

Orange County Sanitation District; Secondary Treatment Expansion and Upgrade; Fountain Valley, California

Task Leader. TM2, Facility Operation and Maintenance. As part of this task, a plant wide process model was developed to size the new 80 mgd activated sludge basins and final clarifiers. The model included all of the liquid and solids processing facilities to develop sludge quantities to account for the impact of the thickening and dewatering sidestreams on the new basins as well as assess a variety of operating conditions. The new activated sludge basins are designed to provide OCSD with the following operating flexibility: complete nitrification or BOD removal only.

Public Utilities Board; 16 mgd MBR Changi Water Reclamation Plant; Singapore

Process Specialist. PUB selected Black & Veatch to study and design the conversion of a portion of the plant which treats 106 mgd to incorporate a 16 mgd MBR within the basin to increase the plant capacity and improve water quality. Two individual basins will be converted to MBR. The MBR plant will be designed to use a biological nitrogen reduction activated sludge process with membranes for solids separation.

City of Flagstaff; 6 MGD Wildcat Hill Water Reclamation Plant Process Upgrade; Flagstaff, Arizona

Process Engineer - Black & Veatch. Design/Bid/Build project to upgrade an existing 6 mgd trickling filter facility to incorporate biological nitrogen removal. Provided process design to upgrade existing 6 mgd trickling filter facility to incorporate biological nitrogen removal. An initial evaluation considered five upgrade alternatives. The alternatives included second stage trickling filters with denitrification filters, second stage activated sludge with denitrification filters, conventional MLE process with disk filters, IFAS with denitrification filters, and an MBR. The final selection was a MLE configuration with IFAS followed by disk filters.

Irvine Water Ranch District; Michelson Water Reclamation Plant Solids Facility; Irvine, California

Process Specialist. Evaluation and design of various processes for a greenfield solids treatment facility at the Michelson Water Reclamation Play to treat solids from 33 mgd reuse plant which has PC and MBR. Processes include centrifuge thickening, acid – gas anaerobic digestion using egg-shaped digesters for the gas digesters, centrifuge dewatering, heat drying and sidestream treatment. An in-depth study and testing of WAS disintegration technology was conducted to identify the potential for increased WAS destruction/ gas production as well as to serve as a carbon source for liquid stream denitrification. Space allocated for future WAS disintegration. Various sidestream processes such as Demon, Sharon, conventional nitritation, and SBR nitritation were also evaluated. An SBR will be used. FOG addition to enhance gas production will also be included.

Melbourne Water; Eastern Treatment Plant (ETP) Tertiary Upgrade Project; Melbourne, Australia

Process Consultant. Black & Veatch is providing process, preliminary design, cost-estimation and construction expertise for Phase 1 of this project. In Phase 1, a complex pilot program evaluated various tertiary and advanced treatment technologies in various configurations to assess the optimum treatment train to meet the treatment goals. Treatment goals based meeting "fit for purpose" reuse quality water included reducing color, odor, turbidity, ammonia, viruses, bacteria and protozoa. The upgrade will be completed in two phases and is expected to be completed in 2012. In addition to the provision of design services, B&V also prepared various materials to support Melbourne Water's negotiations with its stakeholders, and assist Melbourne Water with the preparation of material supporting its business case based on a preferred final project scope. B&V is also working with the Victoria Department of Health to establish the final regulatory requirements.

Brent Reuss, PE

VICE PRESIDENT

OFFICE LOCATION
Charlotte, NC

EDUCATION
MS, Civil Engineering, University of Missouri-Columbia, 1987
BS, Civil Engineering, Bradley University, 1980

YEARS EXPERIENCE
40

PROFESSIONAL REGISTRATION
PE - NC
PE – TN
PE – NY
PE - MO
PE - VA

Brent is Senior Vice President and Managing Director of the East Region and is located in the Charlotte office. He has extensive experience serving as project manager, project engineer, and resident engineer for the design and construction of both water and wastewater treatment plant and pipeline projects.

Winston-Salem/Forsyth County Utility Commission | R.A. Thomas Water Treatment Plant; Winston-Salem, NC

Principal-in-Charge. Designed new 18 mgd water treatment plant to replace the existing plant. Design includes new operation building, basin and filter complex (rapid mix, flocculation, sedimentation, and filtration), wash water and residuals facilities (equalization basin, clarifier, residuals pumping station improvements, and residuals storage lagoons improvements), finished water pumping station, wash water supply tank, and finished water reservoirs.

Charlotte-Mecklenburg Utilities | Water Distribution System Master Plan; Charlotte, NC

Principal-in-Charge. Study services to complete a comprehensive water distribution system Master Plan for the Charlotte-Mecklenburg Utilities distribution system. Project includes water demand projections, establishment of system performance and level of service criteria based on regulatory and industry standards, installation of flow monitoring at all system pumping station, extensive field testing (insitu pump testing, c-factor testing, hydrant flow testing and system demand testing), hydraulic model development and calibration of an existing InfoWater model and development of a detailed capital improvements program for three planning periods spanning 25 years.

Charlotte Water | Water Distribution System Master Plan Update; Charlotte, NC

Project Director. Study services to complete a comprehensive water distribution system Master Plan update for the Charlotte Water distribution system. Project includes water demand projections, establishment of system performance and level of service criteria based on regulatory and industry standards, extensive field testing (In-situ pump testing, c-factor testing, hydrant flow testing and system demand testing), hydraulic model development and calibration of an existing InfoWater model.

Bedford Regional Water Authority | Smith Mountain Lake Water Treatment Plant and Forest to Lakes Pipeline; Bedford County, VA

Project Director. This Progressive Design-Build project provides engineering and construction services for a 4 MGD WTP and pipelines. Major components include: raw water intake and pump station; water treatment plant utilizing low-pressure ultra-filtration first and second stage membranes; UV disinfection of second stage permeate; GAC contactors; twenty-six miles of pipelines; new electrical equipment; and instrumentation and controls.

JEA | Main Street WTP Ozone Implementation; Jacksonville, FL

Project Director. This water plant modification project was constructed under a design-build delivery system. Responsible for the study, design, bidding, permitting and construction phase services associated with a new 3 million gallon ground storage tank and an ozone system for hydrogen sulfide treatment at this 20 mgd facility. The existing 100 year-old reservoir was replaced with a new pile supported prestressed concrete tank. Preliminary design included study of treatment technologies for hydrogen sulfide removal, comparing ozone systems to packed tower systems. Site limitations included proximity to historical buildings and flood plain encroachments.

Town of Mooresville | Water and Wastewater Master Plan Update; Mooresville, NC

Principal-in-Charge. Study services to complete a comprehensive water and wastewater system master plan for the Town of Mooresville. Project includes the development of a comprehensive sewer system model for all pipes 12" and larger using InfoWorks CS, development of a water distribution system model using MWHSoft Infowater, development of water and wastewater demand projections, system inventory updates, flow monitoring, model calibration, evaluation of existing sewer and water distribution systems and development of a detailed capital improvement plan for three future planning periods.

Charlotte-Mecklenburg Utilities | South Transmission Main; Charlotte, NC

Project Director. Provided design memorandum, drawings, specifications, permitting assistance, and construction phase services for 14,270 lf of new 36-inch, 47,300 lf of 48-inch, and 7,700 lf of 64-inch DIP finished water transmission main divided into five separate construction contracts to facilitate the best competition among contractors.

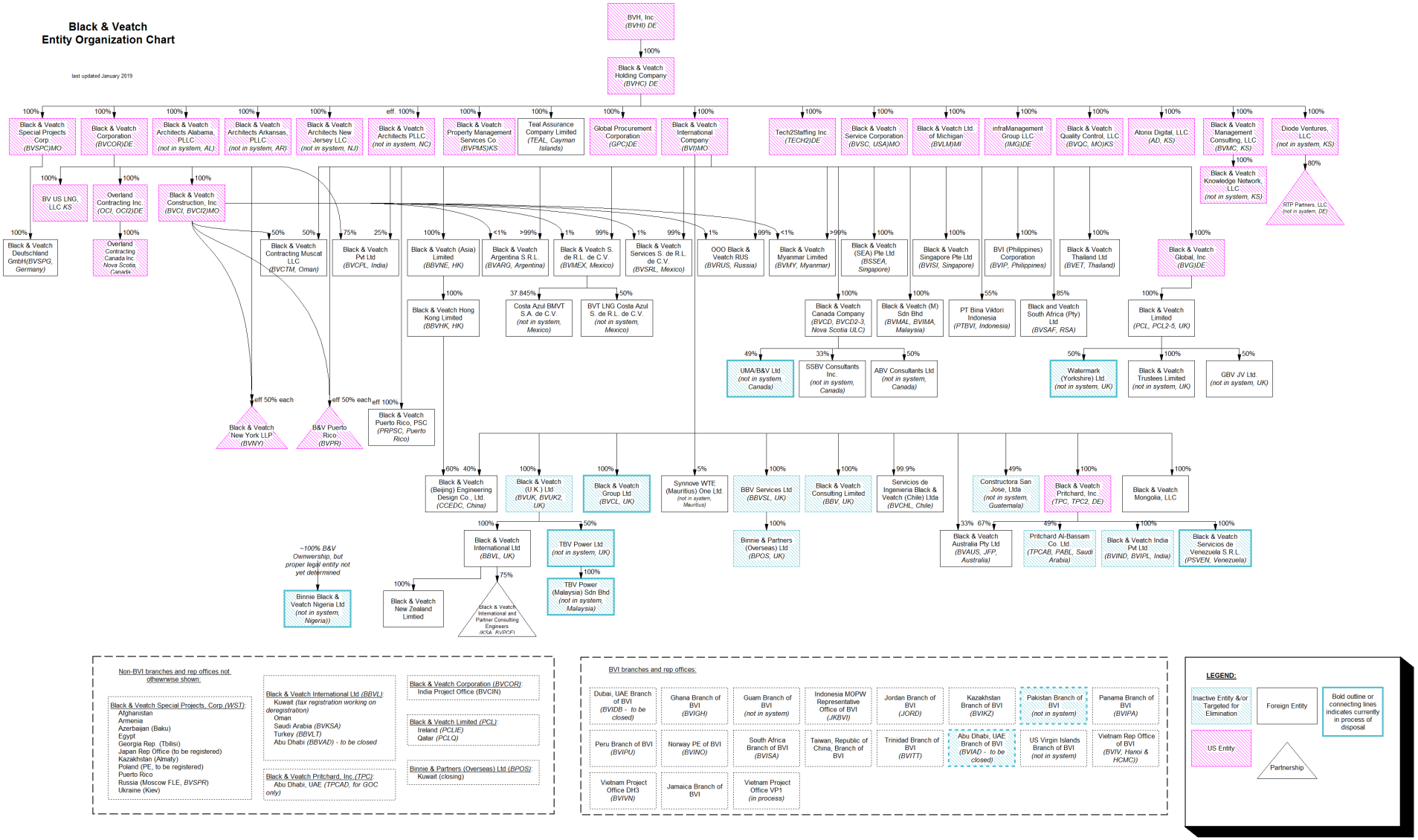
Cape Fear Public Utility Authority | Sweeney Water Treatment Plant Expansion; Wilmington, NC

Principal-in-Charge. Expansion of the existing Sweeney Water Treatment Plant to a rated capacity of 35 mgd with ability to be rerated following a period of operation to 44 mgd without further construction based upon performance. A portion of the plant with conventional treatment will be demolished and replaced with high rate clarification using Superpulsators. The existing 10 mgd portion of the plant will remain in service. Facilities include ozone preliminary treatment, coagulation using alum and polymer ahead of Superpulsators, disinfection with ozone to meet CT requirements, biological filters using granular activated carbon, UV disinfection, new finished water pumping station, and residuals storage and handling.

Cape Fear Public Utility Authority | Raw Water Transmission Main Assessment and System Master Planning; Wilmington, NC

Principal-in-Charge. Conducting both a physical condition assessment and a hydraulic assessment of the raw water transmission mains connecting the CFPUA's raw water intake/pumping station and the Sweeney WTP. The aging raw water transmission system consists of 21.5 miles of 30-inch concrete cylinder piping, 2 miles of twin 24-inch cast iron piping, and 0.5 mile of twin 48-inch concrete cylinder piping. Also conducting a raw water system master plan of the Authority's overall supply system. Alternative facility layouts for new and/or expanded intakes, pumping stations, and transmission main systems are being developed and evaluated as capacity expansion options for the Authority's Kings Bluff supply.

CORPORATE FAMILY TREE



3. EMPLOYEES AND PERSONNEL (PROCUREMENT AND CONSTRUCTION)

Black & Veatch does not breakdown its staff by these categories. Below is a breakdown of Procurement and Construction Management staff for both the United States and Florida.

ROW LABELS	#
Administrative/Office	4564
Admin Support Assistant	78
Admin Support Coordinator	24
Admin Support Supervisor	7
Administrative Coordinator	15
Administrative Manager	5
Closeout Administrator	5
Copy Editing Associate	1
Copy Editing Specialist	2
Database Administrator	12
Dept. Admin Support Specialist	8
Document Assistant	4
Document Associate	39
Document Section Leader	1
Document Specialist	13
Document Supervisor	2
Executive Support Specialist	11
Field Office Coordinator	19
General Clerk	48
Insurance Coordinator	3
Librarian	3
Library Services Manager	1
Mailroom Associate	3
Office Services Manager	3
Project Support Assistant	84
Project Support Coordinator	13
Project Support Manager	3
Project Support Specialist	5
Public Relations Coordinator	3
Receptionist	5
Regional Office Coordinator	24
Translator	6
Travel Specialist	1
Word Processing Associate	1
Word Processing Specialist	2

ROW LABELS	#
Architecture/Planning	27
Architect	23
Facilities Planner	1
Interior Designer	3
Business Development	118
Bus Development Mgr	3
Business Dev Coordinator	4
Business Dev Specialist	4
Business Devlp Director-Water	1
Client Relationship Mgr-Energy	2
Client Services Dir - Water	1
Client Services Mgr - Water	7
Dir, Strategy & Initiatives	3
Director, Global Sales -Energy	1
Mgr, Strategy & Initiatives	1
Project Development Manager	1
Proposal Specialist	21
Reg Dir, Client Serv - Water	2
Reg Dir, Client Services Water	1
Reg Gen Mgr Associate	5
Reg General Mgr - Energy	8
Sales Dir, Energy	6
Sales Dir, SE Asia - Energy	2
Sales Director	5
Sales Engineer	1
Sales Manager - Energy	2
Sales Manager - SPC	3
Sales Manager - Telecom	16
Sales Operations Specialist	2
Senior Project Development Dir	1
Senior Sales Manager	1
Sr Business Line Mgr - Energy	3
Sr Director, Sales & Marketing	3
Sr Reg General Mgr - Energy	4
Sr Sales Director - SPC	2

ROW LABELS	#
Sr Sales Mgr Bus Dev - Telecom	2
Commissioning	134
Commissioning Engineer DCIS	4
Commissioning Engineer Elec	27
Commissioning Engineer I&C	21
Commissioning Engineer Mech	20
Commissioning Engineer Proc	3
Commissioning Manager	26
Commissioning Ops Manager	3
Commissioning Ops Supv	17
Commissioning Support Mgr	5
Commissioning Tech	8
Construction Field	910
Agent	4
Area M&E Manager	1
Construction Manager	311
Constructn Engineer	12
Constructn Technician	334
Field Engineer Civil	26
Field Engineer Electrical	15
Field Engineer I&C	8
Field Engineer Mechanical	17
Field Engineering Manager	9
General Foreman Civil	2
M&E Coordinator	6
Project Field Manager	39
Section Foreman Civil	3
Section Foreman Mechanical	1
Senior Works Manager	2
Sub Agent	3
Superintendent	1
Superintendent Boilermaker	5
Superintendent Civil	22
Superintendent Electrical	38
Superintendent Mechanical	27
Superintendent Millwright	2
Superintendent Piping	10
Superintendent Struc Steel	2
Superintendent Structural St	1

ROW LABELS	#
Technical Author	4
Technical Manager	1
Works Manager	4
Technical Author	4
Technical Manager	1
Works Manager	4
Construction Support	120
Asst Field Engineer Civil	2
Asst Field Engineer Mech	3
Construction Associate	29
Construction Coord Civil	6
Construction Coord Elec	5
Construction Coord I&C	3
Construction Coord Mech	7
Construction Coord Piping	2
Construction Coord Tech	3
Construction Group Manager	7
Construction Operations Dir	1
Construction Operations Mgr	24
Construction Supp Mgr	3
Construction Support Manager	6
Construction Support Mgr	5
Construction Technician	3
Plant Auxiliary Operator	3
Project Coordinator	6
Sr Union Labor Relations Spec	1
Union Labor Relations Director	1
Consulting	207
Analyst, Consulting	17
Consultant	23
Director, Consulting	16
Executive Consultant	1
Manager, Consulting	40
Managing Director	16
Managing Principal	1
Principal Consultant	49
Sr Analyst, Consulting	28
Sr Executive Consultant	1
Sr. Managing Director	15

ROW LABELS	#
Contract Support	66
Asst Subcontracts Mgr	1
Claims Mgr	1
Claims Operations Mgr	3
Claims Support Specialist	1
Contract Adminstr	15
Contract Services Mgr	2
Contracts Coordinator	7
Contracts Manager	1
Contracts Specialist	1
Dir, Proposal Mgmt - Energy	4
Field Contract Admin	1
Proposal Coordinator	4
Proposal Manager	6
Proposal Manager - Govt	1
Proposal Mgr - Energy	8
Sr Claims Mgr	1
Sr Contracts Specialist	4
Sr Field Contract Mgr	1
Sr Proposal Mgr - Energy	3
Subcontracts Mgr	1
Craft/Operative	895
Boilermaker - Helper	1
BVCI Elec Sub Tech Inspector	1
BVCI Elec Substation Spec	2
BVCI Laborer - Foreman	2
BVCI Utility - Foreman	3
BVCI Utility - Groundman	1
BVCI Utility - Jrnymn Lineman	1
BVCI Utility - Substation Tech	1
Carpenter - Foreman	3
Carpenter - General Foreman	1
Carpenter - Helper	45
Carpenter - Journeyman	28
Carpenter - Leadman	3
Civil Foreman	6
Civil General Foreman	4
Concrete Finisher - Journeyman	6

ROW LABELS	#
Crane Operator - Cert Heavy	5
Crane Operator - Heavy	1
DAS Lead Installer	4
Electrician - Certified	1
Electrician - Foreman	14
Electrician - General Foreman	12
Electrician - Helper	51
Electrician - Journeyman	48
Electrician - Leadman	10
Electrician - Licensed	17
Equipment Specialist	14
Fiber Optic Splicing Tech	8
Ganger	6
Groundman	4
Instrument Fitter - Foreman	1
Instrument Fitter - Journeyman	5
Ironworker Struct - Gen Fore	1
Ironworker Struct - Journeyman	3
Laborer	46
Lineman - st Class	1
Mechanic - Leadman	1
Millwright - Certified	4
Millwright - General Foreman	1
Millwright - Helper	1
Millwright - Journeyman	1
Operator Equipment - Foreman	5
Operator Equipment - Gen Fore	7
Operator Equipment - Heavy	69
Operator Equipment - Leadman	5
Operator Equipment - Light	46
Operator Equipment - Medium	40
Operator Truck Driver - Heavy	2
Pipefitter - Certified	4
Pipefitter - Foreman	7
Pipefitter - General Foreman	5
Pipefitter - Helper	17
Pipefitter - Journeyman	20
Pipefitter - Leadman	1

ROW LABELS	#
Rigger - Certified	9
Rigger - Foreman	1
Rigger - Journeyman	4
Rodbuster - Foreman	2
Rodbuster - General Foreman	1
Rodbuster - Journeyman	18
Rodbuster - Leadman	1
Scaffolder	1
Skilled Labourer	2
Solar - Foreman	11
Solar - General Foreman	4
Solar - Installer	76
Solar - Leadman	5
Solar - Technician	27
Sr General Foreman	2
Substation - Leadman	6
Substation Foreman	11
Substation Helper	9
Substation Journeyman	9
Substation Welder	1
Surveyor - Helper	1
Surveyor - Instrumentman	3
Surveyor - Party Chief	7
Surveyor - Rodman	1
Telecom Operator - Foreman	4
Telecom Operator - Heavy	3
Telecom Operator - Light	2
Toolroom	1
Tower - Site Foreman	13
Tower Site General Foreman	4
Tower Tech - Helper	6
Tower Technician	18
Warehouse Foreman	3
Warehouse General Foreman	3
Warehouse Helper	9

ROW LABELS	#
Warehouse Journeyman	5
Warehouse Leadman	1
Welder - Combo Pipe	12
Welder - Structural	1
Wireman	2
Warehouse Journeyman	5
Warehouse Leadman	1
Welder - Combo Pipe	12
Welder - Structural	1
Wireman	2
Eng Tech/Designing/Drafting	949
Engineering Technician	949
Engineering	3299
Architectural Engineer	2
Chem Engineering Specialist	1
Chemical Engineer	50
Civil Engineer	871
Civil Engineering Specialist	7
Elec Engineering Specialist	18
Electrical Engineer	736
Engineer	233
Engineering Manager	10
Engineering Specialist	89
Environmental Engineer	10
Environmental Scientist	114
Envn Engineering Specialist	5
Equipment Engineer	7
Geologist	22
Geotechnical Engineer	48
GIS Specialist	41
Hydraulics Engineer	14
Hydrogeologist	5
I/C Engineering Specialist	2
Instrument Engineer	4
Instrument/Control Engineer	118

ROW LABELS	#
Irrigation Engineer	1
Materials Handling Eng	11
Mech Engineering Specialist	11
Mechanical Engineer	431
Networks Engineer	1
Nuc Engineering Specialist	1
Nuclear Engineer	1
Piping Engineer	56
Process Engineer	136
Project Engineer	15
Project Scientist	7
Safety & Risk Engineer	3
Services Consultant	39
Struc Engineering Specialist	1
Structural Engineer	178
Engineering Services	50
Design Technologist	2
Design Technologist Spec/Mgr	20
Design Technologist Sr Spc/Mgr	13
Sr/Lead Design Technologist	9
Technology Manager	6
Estimating	87
Associate Estimator	5
Chief Estimator	1
Director of Estimating	5
Estimating Analyst	3
Estimator	9
Principal Estimator	20
Principal Proposals Engineer	1
Project Estimator	17
Project Proposals Engineer	1
Senior Proposals Engineer	2
Sr Estimator	23
Faculty	61
Facilities Maintenance Mgr	1
Facilities Maintenance Spec	6
Heavy Equip & Diesel Tech	4
Warehouse Associate	33

ROW LABELS	#
Warehouse Coordinator	7
Warehouse Lead	9
Warehouse Supervisor	1
Finance/Accounting	389
Accountant	21
Accounting Associate	6
Accounting Manager	7
Accounting Operations Manager	1
Accounting Ops Accountant	8
Accounting Ops Accountant: Ben	1
Accounting Ops Assistant	4
Accounting Ops Associate	16
Accounting Ops Supervisor	4
Accounting Specialist	1
Accounting Supervisor	7
Assistant Controller	1
Assistant Dir of Gov't Admin	1
Assistant Director of Finance	17
Assistant Director of Tax	1
Asst Dir of Investor Relations	1
Asst Dir of Treasury Ops	1
Audit Specialist	2
Business Process Analyst	1
Business Process Manager	1
Chief Financial Officer	1
Corp Credit Card Sr Analyst	3
Corporate Controller	4
Corporate Finance Director	2
Corporate Planning Director	1
Cost Accountant	1
Director of Finance	4
Director of Internal Audit	1
Director of Tax	1
Division Finance Director	5
Equity Specialist	1
Expat Tax Analyst	1
Financial Analysis Manager	7
Financial Analysis Specialist	6

ROW LABELS	#
Financial Analysis Supervisor	2
Financial Analyst	4
Financial Appl Analyst	2
Financial Appl Specialist	10
Financial Associate	2
Global Payroll Manager	1
Gov't Compliance Specialist	1
Payroll Accountant	8
Payroll Associate	2
Payroll Supervisor	4
Project Accountant	42
Project Accounting Associate	14
Project Accounting Supervisor	6
Project Acctg Manager	20
Project Acctg Specialist	3
Project Billing Associate	7
Project Billing Lead	6
Sr Accountant	20
Sr Accounting Manager	7
Sr Accounting Ops Manager	1
Sr Audit Manager	1
Sr Auditor	1
Sr Business Process Analyst	1
Sr Expat Tax Specialist	1
Sr Finance Officer	4
Sr Financial Analysis Manager	8
Sr Financial Analyst	9
Sr Financial Appl Manager	3
Sr Gov't Admin Specialist	1
Sr Gov't Compliance Manager	1
Sr Payroll Accountant	1
Sr Payroll Manager	1
Sr Project Accountant	25
Sr Project Acctg Manager	7
Sr Tax Analyst	5
Sr Tax Manager	4
Sr Treasury Analyst	4
Sr Treasury Manager: Treas Op	1
Tax Analyst	3
Tax Associate	1
Tax Specialist	2
Treasury Analyst	2
Treasury Ops Specialist	1
General Management	127
Area Managing Director	2
Business Line Dir	7
Business Line Director	33
Business Strat Planning Mgr	1
Chief Executive Officer	1
Corp Services Director	1
Corp Services Mgr - ERM	1
Corporate Real Estate Dir	2
Div Operations Director	20
Division Operations Manager	13
EVP & President of B&V SPC	1
Mgr, Business Strat Planning	3
Office Operations Manager	9
President & CEO B&V Water	1
President, Mgmt Consulting	1
President, Oil & Gas	1
President, Power	1
President, Telecom Div	2
Region Managing Director	7
Region Operations Director	9
Region Operations Manager	1
Regional Ops Manager	7
Staff Member Senior	1
Technical Services Dept Head	1
VP & President, Atonix Digital	1
Human Resources	185
Div Human Resources Director	7
Human Resources Analyst	15
Human Resources Associate	4
Human Resources Director	12
Human Resources Generalist	32
Human Resources Manager	20

ROW LABELS	#
Human Resources Specialist	29
Sr Human Resources Analyst	31
Sr Human Resources Associate	20
Sr Human Resources Specialist	15
Information Systems	139
Appl. Portfolio Director	1
Appl. Portfolio Manager	11
Application Portfolio Lead	3
Application Sup Analyst - Lead	5
Application Sup Analyst-Senior	3
Application Support Analyst	6
Audio Visual Coordinator	1
Bus Proc Tech Analyst	2
Bus Proc Tech Mgr	1
Bus Proc Tech Spec	4
Bus Proc Tech Sr. Analyst	3
Bus Proc Tech Sr. Mgr	2
Chief IT Architect	1
Data Architect Sr Analyst	1
Data Science Director	1
Dir of Enterprise Tech Implem	2
Implemen Analyst - Assoc	2
Information Security &Risk Dir	1
Information Security Analyst	2
Information Tech Intern	2
Integration Development Mgr	1
IT Asset Administrator	4
IT Managing Director	1
IT Performance Mgr	8
IT Procurement Administrator	2
IT Procurement Manager	1
IT Program Manager	7
Product Director	2
Project Coordinator - General	2
Scrum Master	1
Software Analyst	10
Software Analyst - Associate	4
Software Analyst - Lead	1

ROW LABELS	#
Software Analyst - Senior	15
Software Analyst - SME	5
Solutions Architect	4
Sr IT Performance Mgr	6
Sr Network Manager	1
Sr Product Manager	1
Systems Administrator	1
Systems Sup Analyst - Assoc	5
Test Analyst	2
VMO Manager	1
Intern/Co-Ops/Trainees	45
Architecture Intern	1
Chem Eng Intern	2
Civil Eng Intern	15
Construction Intern	1
Elec Eng Intern	12
Eng Tech Intern	10
Estimating Intern	1
Intern	1
Mech Eng Intern	2
Legal	36
Assoc. Director Govt Affairs	2
Attorney	28
General Counsel	1
Paralegal	5
Marketing	134
Asst Proposals Manager	1
Creative Services Manager	4
Creative Specialist	9
Market Research Analyst	1
Market Research Manager	2
Mktg & Comm Consultant	17
Mktg & Comm Director	7
Mktg & Comm Manager	24
Mktg & Comm Representative	4
Mktg & Comm Specialist	60
Mktg & Comm Sr Director	3
Technical Communicator	1

ROW LABELS	#
Technical Editor	1
Procurement	249
Asst Project Procurement Mgr	12
Construction Equip Program Mgr	1
Diversity Program Mgr	1
DOT Administrator	1
Expediter	9
Expediting Mgr	2
Field Procurement Mgr	3
Field Procurement Rep	6
Industrial Specialist	1
Lead Sourcing Specialist	2
Logistics Analyst	4
Logistics Mgr	2
Materials Admin	5
Materials Controller	5
Materials Coordinator	16
Materials Mgr	14
Principal Project Proc Mgr	1
Procurement Coordinator	22
Procurement Director	1
Procurement Ops Mgr	5
Procurement Rep	34
Procurement Supervisor	4
Project Procurement Mgr	19
Sourcing Specialist	5
Sr Expediter	3
Sr Field Procurement Rep	2
Sr Logistics Analyst	1
Sr Materials Controller	5
Sr Procurement Coordinator	3
Sr Procurement Ops Mgr	23
Sr Procurement Rep	22
Sr Procurement Specialist	6
Sr Project Procurement Mgr	8
Sr Sourcing Specialist	1
Proj Mgmt/Commercial Mgt	1021
Assistant Quantity Surveyor	2

ROW LABELS	#
Commercial Analyst	1
Commercial Director	3
Commercial Manager	5
Deputy Program Manager	1
Insurance & Proj Risk Mgmt Dir	1
Land Services Specialist	16
Managing Quantity Surveyor	4
Project Centre Commercial Mgr	4
Project Controls Analyst	47
Project Controls Associate	34
Project Controls Lead Analyst	49
Project Controls Manager	23
Project Controls Prin Manager	6
Project Controls Specialist	2
Project Controls Sr Analyst	70
Project Controls Sr Associate	41
Project Controls Sr Manager	16
Project Controls Sr Specialist	2
Project Director	70
Project Facilitator I	35
Project Facilitator II	29
Project Facilitator III	7
Project Manager	527
Project Quantity Surveyor	4
Quantity Surveyor	1
Regional Cost Admin	3
Sr Commercial Manager	4
Sr Commercial Specialist	1
Sr Cost Administrator	4
Sr Project Controls Technician	1
Sr Project Quantity Surveyor	5
Sr Quantity Surveyor	3
Quality Assurance/Control	164
Bus Excellence Blackbelt	5
Dir Quality Management Service	1
Director, Business Excellence	1
Field Quality Control Manager	1
Lead Quality Auditor	2

ROW LABELS	#
Manager - QMS	2
Manager Project Quality Mgmt	1
Process Improvement Specialist	2
Project Quality Manager	7
Q&E Systems Manager	1
QC Supervisor	1
Quality Associate	2
Quality Auditor	1
Quality Control Coordinator	4
Quality Control Inspector	13
Quality Control Support Mgr	2
Quality Inspector	27
Quality Manager - Office/Site	2
Quality Manager-Specialized	2
Quality Specialist	2
Quality Technician	7
Resident Const Inspector	22
Site QC Inspector	8
Site QC Supervisor	14
Site Quality Control Manager	6
Site Quality Manager	10
Sr Field Quality Control Mgr	1
Sr Site QC Inspector	14
Sr Site QC Manager	3
Rotation Program	81
EDGE Associate	53
Sr EDGE Associate	28
Safety/Health/Envir Svcs	116
Division Safety & Health Mgr	12
Safety & Health Analyst	2
Safety & Health Coord	1
Safety & Health Manager	64
Safety & Health Spec/Advisor	36
Safety and Health Tech	1
Sciences	42
Asset Mgt Consultant	14
Environmental Planner	5
Hydraulics Consultant	2

ROW LABELS	#
Mgmnt Analyst	9
Networks Consultant	3
Safety & Risk Consultant	9
Security/General Services	15
Driver	7
Sec Assurance & Intel Spec	1
Security Director	1
Security Manager	6
Strategy and Innovation	13
Growth Accelerator Team Mbr	11
Growth Initiative Project Mgr	2
Telecommunications	128
Execution Manager	22
Land Services & Acq Dept Head	2
Land Services & Acq Prog Mgr	4
Land Services Associate	1
Land Services Manager	26
Land Services Supervisor	9
Land Svcs Assoc Program Mgr	1
Right of Way Agent	1
Right of Way Manager	2
ROW Permitting Specialist	1
Senior Right of Way Agent	3
Sr Land Services Associate	10
Sr Land Services Manager	15
Sr Land Services Specialist	21
Sr ROW Permitting Specialist	1
Sr Wireless Regulatory Mgr	2
Sr Wireless Regulatory Spec	2
Wireless Regulatory Associate	1
Wireless Regulatory Manager	1
Wireless Regulatory Specialist	3

4. FINANCIAL REPORT

Black & Veatch Corporation is a leading global engineering, consulting and construction company specializing in infrastructure development in the fields of energy, water and information. In our most recently completed fiscal year ended December 31, 2017, the company generated over $3.3 billion in revenues and had assets of $1.5 billion. Black & Veatch has had a long track-record of profitability during the 100 years that it has been in business. Our employee-owned company has more than 100 offices worldwide. The company's Web site address is www.bv.com.

The financial information is submitted in confidence and should be considered as proprietary information. Respectfully, we request that these documents do not receive public distribution or disclosure.

Condensed consolidated financial information for Black & Veatch Holding Company and related companies is presented below in millions.

FOR YEAR ENDED DECEMBER 30	2019	2018	2017
Revenues on Contracts	$3,654	$3,480	$3,364
Costs of Contracts	2,949	2,848	2,739
Overhead Expenses	579	533	520
Operating Income	**$126**	**$99**	**$104**
Other Expenses & Taxes	20	$19	$16
Net Earnings	**$106**	**$80**	**$87**
AT DECEMBER 30			
Cash & Cash Equivalents	$482	$383	$344
Contract Receivables	398	461	480
Costs & Estimated Earnings in Excess of Billings	342	450	437
Other Current Assets	53	67	48
Total Current Assets	**$1,266**	**$1,361**	**$1,309**
Buildings, Equipment & Other Noncurrent Assets	274	$274	$264
Total Assets	**$1,540**	**$1,635**	**$1,573**
Notes Payable & Current Portion of Long-Term Debt	7	$6	$4
Billings in Excess of Cost & Estimated Earnings	605	481	458
Accounts Payable & Other Current Liabilities	686	766	$758
Total Current Liabilities	**$1,298**	**$1,253**	**$1,220**
Long-Term Debt & Other Noncurrent Liabilities	78	$235	$234
Equity	164	147	119
Total Liabilities & Equity	**$1,540**	**$1,635**	**$1,573**
REVENUE BACKLOG	**$3,920**	**$3,727**	**$4,274**

5. WORK EXPERIENCE

Wastewater Master Plan

BROWARD COUNTY, FLORIDA

RELEVANCE TO CLIENT

- Dry and wet weather flow estimations
- Hydraulic and Transient modeling
- MPS Condition Assessment
- Pipeline Condition Assessment Technology Selection
- Adaptive Planning Tools
- Capital Improvement Plan

ORIGINAL SCHEDULE

June 2019 - June 2020

ACHIEVED SCHEDULE

June 2019 - September 2020

CONSULTING FEE

$750,000

NUMBER AND DESCRIPTION OF CHANGE ORDERS

1 Change Order Requested. Request was to add 36 LSs to the hydraulic model at the County's request

AVERAGE TURNAROUND TIME FOR REQUEST INFORMATIONS

Not applicable as project did not include construction services

OWNER'S REFERENCE

Jeremy Sieden
2555 West Copans Road, Pompano Beach, Florida 33069
(954) 8318-0799
jseiden@broward.org

Constructed in 1974 and expanded periodically, the County's North Regional Wastewater System (NRWWS) has approximately 64 miles of force mains and 11 master pump stations. Black & Veatch was selected to help the County prioritize capital funds to improve the transmission system. Using a risk-based approach to rehabilitate, repair or replace aging components in the system, the scope of work includes:

- Hydraulic modeling, based on updated GIS layers and available record drawings, to create a spatially accurate rendition of the system's pipeline network
- Modeling to evaluate the potential for hydraulic transients in the NRWWS and identify needed improvements
- Identifying rehabilitation and repair projects based on physical condition assessments to restore, update, and increase the capacities of the master pump stations
- Prioritizing based on risk future improvements to the system's pipeline network
- Developing a comprehensive Capital Improvement Plan (CIP) to identify the need for asset inspection, upgrade, and replacement
- Preparing an Emergency Response Plan to include the location of critical infrastructure, contact information, and procedural details

The Black & Veatch team included numerous County Business Enterprises (CBEs) that offered local experience in planning, public outreach, and engineering. The proposal showcased the benefits that the County could expect from the team's expertise in condition assessment, repair and rehabilitation improvements, and adaptive CIPs.

Sewer Service to Commercial Properties in Miami-Dade County

MIAMI, FLORIDA

RELEVANCE TO CLIENT
- Hydraulic Modeling
- Master Plan Development
- CIP Planning
- Funding and financing review

ORIGINAL SCHEDULE
3 months

ACHIEVED SCHEDULE
6 months

CONSULTING FEE
$179,000

NUMBER AND DESCRIPTION OF CHANGE ORDERS
None

AVERAGE TURNAROUND TIME FOR REQUESTS FOR INFORMATION
Not applicable as project did not include construction

OWNER'S REFERENCE
Daniel Edwards
3071 SW 38 Avenue
Miami, FL 33146
(786) 232-5257
djedw01@miamidade.gov

As a result of a resolution from Board of County Commissioners of Miami-Dade County directing to provide a plan to extend sewer service to commercial and industrial areas, Black & Veatch assisted the Miami-Dade Water & Sewer Department (MDWASD) with the development of a Master Plan for the expansion of sewer infrastructure to commercial properties within the MDWASD service area, currently not connected to the system. The Master Plan used MDWASD's sewer collection system models in InfoWorks, integrated with GIS, to connect non-sewered commercial properties and including planning level cost estimates and projects implementation schedules.

Planning services performed by Black & Veatch included:

Sewer System Extensions. Gravity sewer routes were developed from the commercial sites to the nearest point of connection in the existing collection system. All gravity sewers slopes were assumed to be installed at minimum slope for the appropriate diameter. Where sewer extensions were not feasible, new pump stations were developed to pump into the manifolded force main network.

Pump Station Basin Capacity Assessments. Sub-models for the specific pump station basins where the commercial sites would discharge into were extracted from MDWASD's existing collection system model for further hydraulic modeling and sewer capacity assessments. The capacity of the new sewer system was evaluated for existing and 2035 demand conditions.

Capital Improvements Planning Level Cost. Developed a capital improvement planning level cost based on the improvements identified. The opinion of probable construction cost included the construction, engineering, and land acquisition costs for each proposed improvement.

Energy Efficiency Master Planning Services

HOLLYWOOD, FLORIDA

RELEVANCE TO CLIENT
- Energy Efficiency Master Plan
- Development of CIP
- Business Case Evaluations
- Water Treatment Process Evaluations

ORIGINAL SCHEDULE
18 months

ACHIEVED SCHEDULE
18 months

CONSULTING FEE
$307,000

NUMBER AND DESCRIPTION OF CHANGE ORDERS
A small amendment for $6,908 was approved by the City to implement minor updates to the Master Plan Report.

AVERAGE TURNAROUND TIME FOR REQUESTS FOR INFORMATION
Not applicable as project did not include construction services

OWNER'S REFERENCE
Francois Domond
1621 N. 14th Ave.,
Hollywood, FL 33022
(954) 921-3258
fdomond@hollywoodfl.org

The Energy Efficiency Master Plan resulted in a CIP for the implementation of 19 ECMs for combined annual energy savings of 7 GWh or 15% of the Utility's energy use.

Energy Efficiency Master Plan

Black & Veatch developed a comprehensive Energy Efficiency Master Plan for the City of Hollywood Department of Public Utilities, including the Water and Wastewater Treatment Systems. The master plan resulted in the development of a capital improvement plan (CIP) for the implementation of 19 energy conservation measures (ECMs) for combined annual energy savings of 7 GWh or 15% of the Utility's total energy use. The CIP also results in a net present value of $4.7 million over the life of the improvements. Specific tasks included:

- Development of an existing energy use baseline for the City's water and wastewater facilities and equipment.
- Evaluation of the current and potential alternate electric utility rate structures at each facility.
- Energy efficiency assessments, including efficiency evaluations of equipment, processes, pumping systems and the buildings at each facility.
- Development and analysis of over 50 ECMs. The analyses included capital cost estimates, energy use and cost impacts, other O&M cost impacts, and non-economic factors, such as operational complexity, water quality or regulatory impacts and public acceptance.
- Development and use of an Energy Project Decision Cash Flow Model to define an implementation strategy consistent with the City's overall CIP planning and project funding capabilities.
- The Energy Efficiency Master Plan is the first step for the City's Department of Public Utilities to become a model of energy efficiency and management in the United States.

Cityworks Implementation for Utilities

HOLLYWOOD, FLORIDA

RELEVANCE TO CLIENT
- Asset Management
- Geographic Information Systems

ORIGINAL SCHEDULE
18 months

ACHIEVED SCHEDULE
18 months

CONSULTING FEE
$389,000

NUMBER AND DESCRIPTION OF CHANGE ORDERS
None

AVERAGE TURNAROUND TIME FOR REQUEST FOR INFORMATION
Not applicable as project did not include construction services

OWNER'S REFERENCE
Francois Domond
1621 N 14th Avenue
Hollywood, FL 33020
(954) 921-3930
fdomond@hollywoodfl.org

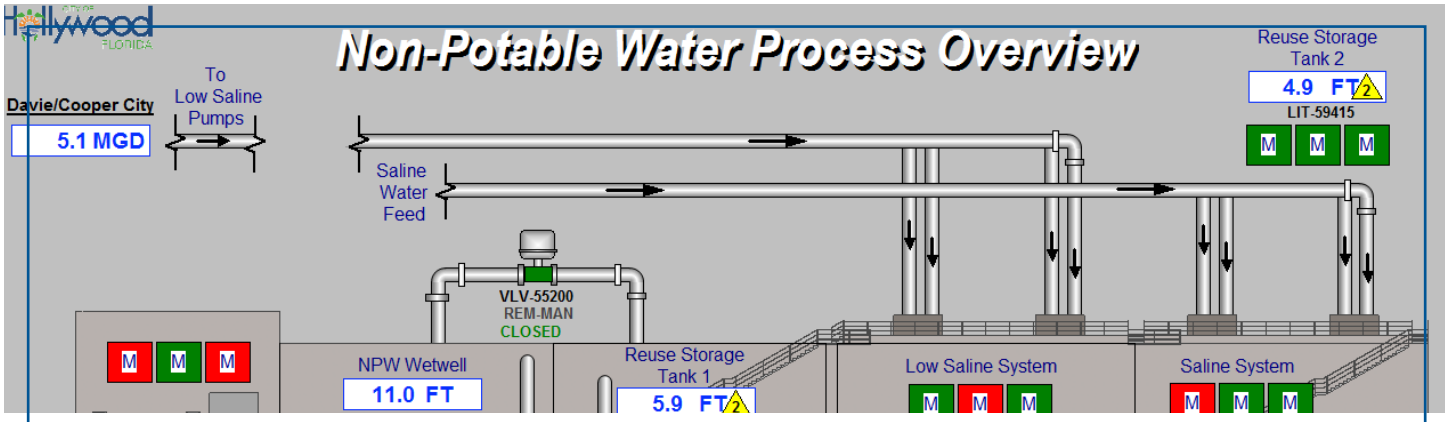
To more effectively and efficiently manage its water and wastewater utility infrastructure as part of an overarching asset management program, the City of Hollywood Department of Public Utilities sought assistance to implement a new Computerized Maintenance Management System (CMMS). CMMS solutions are utilized in a variety of industries - manufacturing, pharmaceuticals, public works, and public utilities to name a few. However, to effectively support water/wastewater operations, the selected solution must support unique industry specific functions such as water line flushing, valve exercising, and CCTV inspections.

The benefits of implementing a modernized CMMS solution include:

Increased Level of Maintenance Information. Developing the historical database that becomes readily available as critical maintenance information is used, turning data into information that can be used to manage maintenance as a business. Improved Work and Service Request Control: streamlining the work order and service request modules, providing the basis for work management, cost tracking, equipment history, and performance reporting.

Improved Planning and Scheduling. Providing the systems and procedures to establish a more effective day-to-day maintenance planning and scheduling function, which is a key contributor to improved craft labor utilization and customer service.

Extend Equipment Life. Automatic scheduling of repetitive preventive maintenance (PM) activities through a well implemented CMMS solution. PM tasks and inspection frequencies can be documented on the PM module and failure trends monitored to highlight major causes of equipment breakdowns and unscheduled repairs.



SCADA Evaluation and System Improvements

HOLLYWOOD, FLORIDA

RELEVANCE TO CLIENT

- Existing System Evaluation
- SCADA Planning Services
- SCADA Standards Development
- SCADA Programming

ORIGINAL SCHEDULE

2013 - Ongoing

ACHIEVED SCHEDULE

Ongoing

CONSULTING FEE

BV15-01 $234K, BV17-01 $300K, BV18-01 $299K, and BV19-01 $694K

NUMBER AND DESCRIPTION OF CHANGE ORDERS

N/A

AVERAGE TURNAROUND TIME FOR REQUEST INFORMATION

Not applicable as project did not include construction services

OWNER'S REFERENCE

Francois A. Domond
Deputy Director
1621 N 14th Ave Hollywood, FL 33020
(954) 921-3930
fdomond@hollywoodfl.org

SCADA System Evaluation

As part of the Energy Efficiency Master Plan, the Black & Veatch Team performed a high-level review and evaluation of the SCADA systems at both the Water and Wastewater Treatment Plants. The SCADA evaluation included automation and control system improvements related to energy conservation measures, as well as, long term SCADA recommendations for enhanced performance and optimized operations.

The existing SCADA system consists of programmable logic controller (PLC) interconnected using Ethernet network, with supervisory monitoring and control from a human machine interface (HMI) system of servers and workstations. This concept of PLC/HMI-based control system is a sound approach to SCADA and common in the water industry.

SCADA System Improvements

The SCADA system is being modified to improve automation. Black & Veatch provided the facility's operators with a step-by-step guide on the HMI and the ability to monitor the automatic or semi-automatic startup and shutdown sequences for multiple processes at the wastewater plant.

Black & Veatch developed process control strategies and I/O lists, which served as the basis for the PLC and HMI programming. To provide consistency for future programming by the City, the control strategies also included:

- PLC and HMI Standards and Conventions (including tagging and naming conventions)
- Screen Layouts
- Text Font and Color Conventions
- Analog Value Displays
- Standard Graphics
- Alarms and alarm handling
- PLC Program languages, layout and documentation

Hydraulic Modeling in Support of Planning Activities

MIAMI, FLORIDA

RELEVANCE TO CLIENT
- Hydraulic Modeling
- Wastewater System Planning
- Capacity Evaluations

ORIGINAL SCHEDULE
12 months

ACHIEVED SCHEDULE
12 months

CONSULTING FEE
$103,000

NUMBER AND DESCRIPTION OF CHANGE ORDERS
None

AVERAGE TURNAROUND TIME FOR REQUEST INFORMATION
Not applicable as project did not include construction services

OWNER'S REFERENCE
Daniel Edwards
3071 SW 38 Avenue
Miami, FL 33146
(786) 232-5257
djedw01@miamidade.gov

Black & Veatch performed multiple capacity studies initiated by the Miami-Dade Water & Sewer Department's Planning Division (Department).

Collection System Capacity Analysis. This task provided for capacity analyses for new developments requesting connection to the wastewater collection system.

- Added flow projections from new development into the hydraulic model along with future wet weather flow hydrographs
- For capacity evaluations occurring in locations beyond the Integrated Master Plan model extents, Black & Veatch reviewed as-built drawings and "donations" GIS layer to update the collection system invert/rim elevations and sewer diameters.
- Performed gravity sewer capacity assessments at the connection point with pump stations and downstream locations for wet weather conditions to avoid sanitary sewer overflows (SSOs). The wet weather conditions were analyzed for a single design condition.
- Developed capacity assessments for the system using revised loading conditions to illustrate potential capacity issues and manage SSOs, based on surcharging in the gravity system, pump station wet wells, and NAPOT hours on the basis of adequate station capacities.
- Proposed system improvements to Miami-Dade's collection system based on the revised loading conditions and their level of service requirements..

Bond Consulting Engineering

MIAMI, FLORIDA

RELEVANCE TO CLIENT
- Water system master planning
- Water treatment facilities assessments
- Prioritization and criticality evaluations

ORIGINAL SCHEDULE
2009 - 2015

ACHIEVED SCHEDULE
2009 - 2015

CONSULTING FEE
$4.6M

NUMBER AND DESCRIPTION OF CHANGE ORDERS
None

AVERAGE TURNAROUND TIME FOR REQUEST FOR INFORMATION
Not applicable as project did not include construction services

OWNER'S REFERENCE
Frances Morris
3071 SW 38 Avenue
Miami, FL 33146
(786) 552-8620

Black & Veatch served as the Bond Consultant Engineer for MDWASD since 2009. Bond Consultant Engineering services are provided to ensure that the Department remains in compliance with the Master Bond Ordinance 93-134, which specifies a number of operational and financial requirements that the Department must meet on a recurring basis and for the issuance of additional bonds. Black & Veatch has been responsible for the preparation of two reports annually.

The Annual Bond Consultant Report, which assesses the Department's overall operations and financial performance services to document the physical status of system assets, the adequacy of the Renewal & Replacement (R&R) deposit and the adequacy of the capital improvement program. As required by the Bond Ordinance, the condition of approximately one-third of MDAWSD's major water and wastewater system facilities must be evaluated. The facilities inspected include:

- Three regional wastewater treatment plants (NDWWTP, CDWWTP, and SDWWTP)
- Approximately 80 of the largest sewer system pumping stations in the system
- Three water treatment plants
- Five wellfields (93 Biscayne aquifer wells) and the five South Dade Water Systems
- Six water booster/storage facilities

In order to comply with the inspection of the entire system every three years, approximately one-third of the major assets and a representative sampling of pump stations are scheduled to be inspected as part of this report. The Bond Consultant's Annual Report focuses on the following eight primary areas of the Department:

- Department Organization and Management
- Department Accomplishments and Challenges
- Customers and Sales
- Water System
- Wastewater System
- Capital Improvements Program
- Renewal and Replacement Program
- Financial and Business Condition

Lee County Wastewater Master Plan

FT. MYERS, FLORIDA

RELEVANCE TO CLIENT

- Performance Criteria
- Population Projections
- GIS Analytics
- Flow Projections
- Treatment Capacity Evaluation
- Capital Improvement Planning
- Wastewater Collection Systems
- Pumping
- Storage

ORIGINAL SCHEDULE

August 2018 - November 2019

ACHIEVED SCHEDULE

August 2018 - November 2019, Achieved

CONSULTING FEE

$197,000

NUMBER AND DESCRIPTION OF CHANGE ORDERS

No Change Orders were requested

AVERAGE TURNAROUND TIME FOR REQUEST FOR INFORMATION

Not applicable as project did not include construction services

OWNER'S REFERENCE

Nathan Beals, Planning & Development Manager
1500 Monroe Street
Fort Myers, FL 33901
(239) 533-8157
NBeals@leegov.com

Lee County's wastewater collection system provide service to over 250,000 people and consists of 5 wastewater treatment plants and covers a service area of approximately 180 square miles. The wastewater collection system is comprised of laterals, gravity sewers, manholes, roughly 900 pump stations, and force mains that convey wastewater from the point of origin to the wastewater treatment facilities. Lee County selected Black & Veatch to provide professional services to develop an updated Wastewater Master Plan on the pressurized portions of the County's collection system.

The Wastewater Master Plan project involved many traditional system planning elements field data collection, design storm selection, including hydraulic model update (InfoWater) and calibration, demand projections, capacity evaluation, capital improvement program (CIP) development, and preparation of a master plan report. However, the project also included some unique an innovative planning approaches and tools to provide the County with a comprehensive and adaptable master plan. This included:

- Demand allocation figures to illustrate the demand concentrations and future growth patterns
- Updated hydraulic models of five separate regional wastewater service areas
- Planning level opinion of probable project costs
- Alternative improvements for various alternate operational schemes
- CIP prioritization spreadsheets training using custom tutorials demonstrate how to use the spreadsheet, and how to maintain/ update the spreadsheet1

WWTF Data Collection

POLK COUNTY, FLORIDA

RELEVANCE TO CLIENT
Facility Condition Assessment
Data Collection
Connecting condition data to CMMS systems

ORIGINAL SCHEDULE
Nov. 2019 - Feb 2020

ACHIEVED SCHEDULE
Nov. 2019 - Feb. 2020, Achieved

NUMBER AND DESCRIPTION OF CHANGE ORDERS
No Change orders were requested

CONSULTING FEE
$99,000

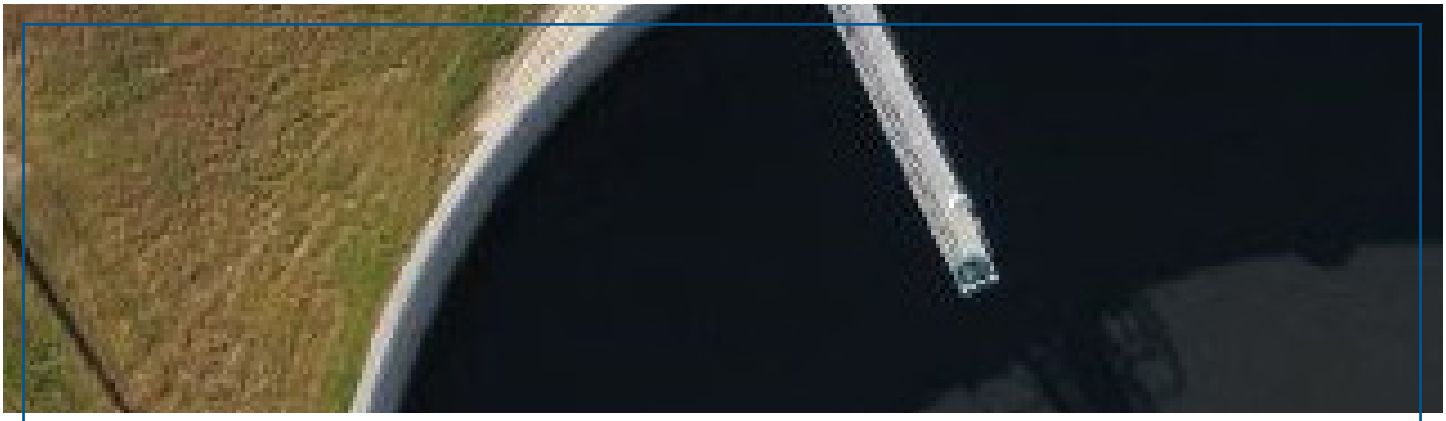
AVERAGE TURNAROUND TIME FOR REQUEST INFORMATIONS
Not applicable as project did not include construction services

OWNER'S REFERENCE
Chuck Nichols
1011 Jim Keene Blvd
Winter Haven, FL 33880
(863) 298-4215
CharlesNichols@polk-county.net

The County owns and operates seven wastewater treatment facilities (WWTFs) within six regional utility service areas, including four regional facilities and three smaller "package" plants. As part of a comprehensive asset management program, the County wished to collect asset inventory data from these facilities for use in a computer maintenance management system (CMMS). Additionally the County wished to assess asset condition in conjunction with the collection of asset inventory data.

Black & Veatch provided field data collection services to collect the desired asset inventory and condition data. The following tasks were included:

- Data Collection Plan
  - Update Survey123 Forms
  - Develop Data Collection Plan
- Data Collection: WWTF Asset Surveys
- Data Submission
  - Data Analysis and Quality Control
  - Data Submission



Wastewater Master Plan

PLANT CITY, FLORIDA

RELEVANCE TO CLIENT

- Model Update and Calibration
- Performance Criteria
- Population Projections
- Demand Projections
- Treatment Capacity Evaluation
- Capital Improvement Planning
- Software Training
- Geodatabase Update
- R&R CIP Development
- Risk Prioritization
- Wastewater Collection

ORIGINAL SCHEDULE

Dec. 2018 - Nov. 2019

ACHIEVED SCHEDULE

Dec, 2018 - June 2020
Scheduled delayed due to flow monitoring activities

CONSULTING FEE

$425,000

NUMBER AND DESCRIPTION OF CHANGE ORDERS

No change orders were requested

AVERAGE TURNAROUND TIME FOR REQUEST INFORMATION

Not applicable as project did not include construction services

OWNER'S REFERENCE

Lynn Spivey
Utilities Director
1802 Spooner Dr, Plant City, FL 33563
(813) 285-9959
lspivey@plantcitygov.com

The City of Plant City is undertaking an important project to shape the future of the City's collection system to support the vision of Imagine 2040; "transforming the City's small-town charm into a vibrant city with a new urban vibe." To aid in this effort, the City contracted Black & Veatch to develop a 25-year wastewater master plan.

The Wastewater Master Plan project involved many traditional system planning elements field data collection, updated GIS geodatabase/ shapefiles, design storm selection, including hydraulic model update (Infoworks ICM) and calibration, demand projections, capacity evaluation, capital improvement program (CIP) development, and preparation of a master plan report. However, the project also included some unique an innovative planning approaches and tools to provide the City with a comprehensive and adaptable master plan. This included:

- Demand allocation figures to illustrate the demand concentrations and future growth patterns.
- Planning level opinion of probable project costs
- Software Selection for the client
- Alternative improvements for various alternate operational schemes
- R&R CIP Development on Risk of failure using Plant City's existing Infomaster model build.
- Hydraulic model and risk models training on how to use the models and update the information for new development
- Design storm simulation to help the system avoid sanitary sewer overflows. Design storms were based on a rainfall design storms using NOAA Atlas 14 rainfall totals distributed using the Florida modified SCS Type II storm distribution.
- CIP prioritization spreadsheets training using custom tutorials demonstrate how to use the spreadsheet, and how to maintain/ update the spreadsheet

WEDWRF Master Plan / Water and Sewer Optimization Program

PINELLAS COUNTY, FLORIDA

RELEVANCE TO CLIENT

- Facility Master Planning
- Condition, Age, and Remaining Useful Life of Assets
- Hydraulic Modeling
- Process Modeling
- Population/Demand Projections
- Capital Improvement Planning
- Alternatives Evaluation
- Life Cycle Cost Analysis/Estimating
- Wastewater Treatment
- Energy Efficiency

ORIGINAL SCHEDULE

38 weeks

ACHIEVED SCHEDULE

NTP Feb 2019 – Draft Master Plan Issued in Nov 2019. Delay between draft and final due to County review. Final Master Plan submitted April 2020

CONSULTING FEE

$196,000

NUMBER AND DESCRIPTION OF CHANGE ORDERS

No change orders. We just got authorization to use Owners Allowance the present work to management on the 17th of June.

AVERAGE TURNAROUND TIME FOR REQUEST INFORMATION

Not applicable as project did not include construction services

OWNER'S REFERENCE

Margaret R. Cook
14 South Fort Harrison Blvd., 6th FL
St. Petersburg, FL 33709
(727) 453-3343

Black & Veatch has served as Pinellas County's Water & Sewer Optimization Program Consultant under a 5-year contract, working closely with County Staff to implement optimization improvements and define long-term sustainable solutions for its water and sewer facilities and systems. Black & Veatch's has a unique understanding of the County's facilities/systems, staff, and priorities through recent work with this contract.

A significant amount of the project work as at the County's William E. Dunn WRF (WEDWRF) and the South Cross Bayou Advanced WRF (SCBAWRF). Work performed under this contract, and resulting recommendations, are being captured in Master Plans that Black & Veatch is currently developing for each WRF.

The WEDWRF Master Plan was developed by leveraging background information and work completed under previous assignments; such as the treatment process modeling, energy baseline evaluation, staffing assessment, reclaimed water pump station evaluation, and filtration/disinfection system evaluation. Black & Veatch worked with the County to understand their goals / drivers that will help define future decisions.

Black & Veatch was tasked with developing a 20-year CIP for the WEDWRF. The work included: Defining Level of Service for the WRF, including defining County's goals and long-term vision for the facility.

- Regulatory review to define future, potential projects required to maintain compliance
- Hydraulic model build, using Visual Hydraulics, to identify hydraulic bottlenecks under future flows.
- Assessment on condition, age, and remaining useful life of major equipment.
- Process modeling to identify process limitations under future flow and loads.

Long Term Biosolids Master Plan

PINELLAS COUNTY, FLORIDA

RELEVANCE TO CLIENT

- Evaluation of a Regional Facility in collaboration with area utilities
- Multi facility assessment
- Alternatives Evaluation
- CIP Planning

ORIGINAL SCHEDULE

30 weeks

ACHIEVED SCHEDULE

NTP April 2018 – Draft Master Plan Issued in Jan 2019. There was again a big delay between draft and final, where County took 2 months to review. Final Master Plan submitted April 2020.

CONSULTING FEE

$200,000

NUMBER AND DESCRIPTION OF CHANGE ORDERS

No change orders.

AVERAGE TURNAROUND TIME FOR REQUEST INFORMATION

Not applicable as project did not include construction services

OWNER'S REFERENCE

Mike Engleman, PE
7401 54th Ave. N
St. Petersburg, FL 33709
(727) 453-3019
menglema@pinellascounty.org

Pinellas County (County) owns and operates two advanced water reclamation facilities (AWRFs), South Cross Bayou AWRF (SCBAWRF) and William E. Dunn AWRF (WEDAWRF). The solids treatment system at SCBAWRF currently incorporates primary and waste activated sludge blending and thickening with rotary drum thickeners (RDTs), anaerobic digestion, digested sludge storage with integral biogas storage and biosolids dewatering with centrifuges followed by conveyance to a thermal drying facility operated by a third party contractor (Syangro). SCBAWRF produces 54.5 dtpd biosolids.

The solids treatment system at WEDAWRF consists of thickening raw waste activated sludge with RDTs and dewatering with belt filter presses. The solids production is approximately 26.7 dtpd. Dewatered sludge is hauled to SCBAWRF where it is blended with digested sludge cake prior to thermal drying. The dried biosolids pellets are marketed to local entities by Synagro and the revenue is shared with the County.

County renewed its contract with Synagro in 2018 for another 5 year extension. The goal of this Master Plan was to define County's long term biosolids management strategy following the expiration of the third party contract in 2023.

The master plan work included the following.

- Assessment of the current operations at both SCBAWRF and WEDAWRF;
- Review of regulatory and emerging issues at the state (including Florida DEP's Technical Advisory Committee workshops on state's biosolids practice) and federal level (including recent developments on PFAS and microplastics);
- Developing biosolids process alternatives based on discussions during technology review workshop and developed screening criteria
- Evaluate up to four short-listed alternatives for 20-yr life cycle costs as well as non-cost criteria and present findings in a workshop
- Preparation of master plan report

Proposed Project Team & Organization

The City will receive a clear, concise and usable, trigger-based dynamic master plan that will result in defensible project alternatives and business cases by having access to Black & Veatch's proven experience delivering successful Wastewater Master Plans for utilities in Florida and beyond.

Our team represents the "stars" from amongst all of our successful wastewater infrastructure projects with relevant comparison to the City's projects to work in collaboration with City staff as An Integrated Team.

Our Team brings the City a wealth of experience in all aspects of wastewater infrastructure projects including studies, conceptual, preliminary and final design, master planning, modeling, condition assessments, permitting, construction administration management, reviews, QC and Value Engineering, best practices for optimization of existing operations, and other technical services needed to develop and implement a successful Capital Improvement Plan (CIP).

Our Team members have been selected for their experience working together on similar projects – delivering wastewater master plans and infrastructure projects that are comprehensive, innovative, implementable, and with long-term sustainable benefits.

We have developed an organizational chart that reflects how we will closely integrate City staff, our subconsultants, and the specific support of technical experts, who will work together to identify solutions that will best meet the interests of the City. We are providing the City with a highly-qualified team and **proven experience for successful delivery of the City's Wastewater Master Plan.**

HYDRAULIC MODELING IN SUPPORT OF PLANNING

Miami Dade Water & Sewer Department

Bertha Goldenberg, Retired Assistant Director, rated the Black & Veatch team the highest available rating of Excellent on the work performed for WASD on the Hydraulic Modeling in Support of Planning and Commercial Properties.

Date of Service: 2013 - 2015

CITY OF
HOLLYWOOD

PROJECT DIRECTOR
Rafael Frias, PE

PROJECT MANAGER
Isabel Botero, PE

TECHNICAL DIRECTOR
Amanda Schwerman, PE, ENV SP

QA/QC
Chris Barlow, PE

COMPREHENSIVE INTEGRATED UTILITIES MASTER PLANNING SERVICES

CONDITION ASSESSMENT

LEAD: Olena Lytvyn, PE

Process Mechanical
Tammy Martin, PE

Structural
Brad Vanlandingham, PE

Electrical
Aubrey Haudricourt, PE[1]
David Garcia

Instrumentation & Controls
Larry Brouillette, PE

Lift Stations
Chris Barlow, PE
Ana Dvorak[3]

Force Mains & Gravity
Ken Caban, PE, BCEE[2]
Ricardo Vieira, PE
Brian Ball

Deep Injection Wells
Ed Rectenwald, PG
Anamaria Sarmiento, PG

Risk Prioritization
Matt Powis

WASTEWATER TREATMENT

LEAD: Lucas Botero, PE

Process Specialist
Timur Deniz

Wastewater Treatment Design
Melissa Velez, PE

Biosolids Disposal
Greg Knight
Engin Guven

Deep Well Injection
Ed Rectenwald, PG

Operations & Maintenance
Ari Copeland

Regulatory
Jim Fitzpatrick

R&R Sufficiency Planning
Martin Jones, CEng

Reuse Treatment Systems
Arturo Burbano

Reuse Planning & Regulations
Jo Ann Jackson, PE

Utility-wide SCADA System
Laurie Kusmaul, PE

COLLECTION SYSTEM

LEAD: Amanda Zarazua, PE

Hydraulic Modeling
Steven Cook, PE

Transient Modeling
Amanda Schwerman, PE

R&R Risk Prioritization
Amanda Zarazua, PE
Brian Lendt, GISP

Population, Flow and Load Projections
Sam Miller, EIT

Emergency/Resilience Planning
Amanda Schwerman, PE

Field Data Collection
Kevin Cevallos, PE

CAPITAL PLANNING

LEAD: Robert Chambers

Capital Project Prioritization
Martin Jones, CEng
Matthew Powis, PE

Cost Estimating
Chad Barker

State Revolving Fund Compliance
Francesca McCann

Financial & Funding Plan
Robert Chambers
Giovanna Rivera

Adaptive Planning Tools
Casey Marika

Training
Amanda Schwerman, PE

ASSET MANAGEMENT

LEAD: Matt Morey, GISP

Cityworks Specialist
Mark Seastead
Traci Berlingieri

Gap Assessment
Martin Jones, CEng
Jeff Stillman, PE, BCEE

Asset Management Framework
Will Williams

Level of Service Standards
Martin Jones, CEng

Utility Platform Dashboards
Ben Cownie
Casey Marika, PE

GIS Integration
Nick Wyatt

SUBCONSULTANTS

McKim & Creed[1]
Tetra Tech[2]
300 Engineering[3]

PRINCIPAL OFFICE LOCATION

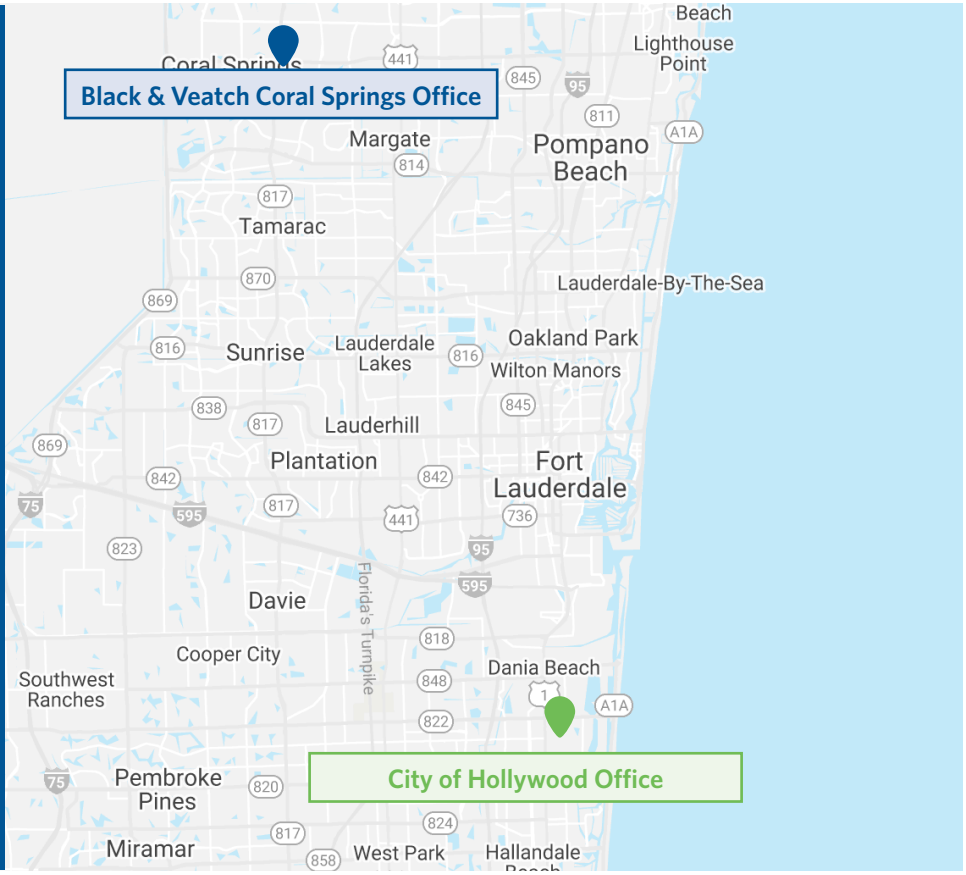
Black & Veatch will serve this contract from our local Broward County office, backed by tremendous firm-wide and global resources that are available to the City for technical expertise in the implementation of master planning projects. We will coordinate and provide our dedicated service to the City from **our full-service planning and design office, which is less than a 30-minute drive from the City's WWTP.** Additional nearby expertise and support will be provided from our other Florida office locations as required to bring the best and latest technology to the City that we have to offer. We will not hesitate in making available our best technical resources to the City.

Black & Veatch has been serving clients in Florida for over 60 years, providing engineering services from our seven Florida offices, located in Coral Springs, Miami, Lake Worth, Fort Myers, Tampa, Orlando and Jacksonville. **The firm has over 340 professionals in Florida with more than 95 professional engineers registered in the state.** These engineers are backed by Black & Veatch's more than 100 years of experience providing services in a wide range of disciplines including water, wastewater, reclaimed water, planning, asset management, condition assessment, civil, environmental, structural, geotechnical, electrical, I&C, SCADA, and mechanical engineering, as well as construction, operations, environmental science, economics, planning and finance.

The combination of having our local leadership directly engaged with City staff and our extensive global technical resources fully accessible for development of a comprehensive wastewater master plan will result in significant value to the City by implementing wastwater CIP projects only when needed.

Coral Springs is a Black & Veatch Florida regional office, where senior leadership for the state are based, therefore allowing the City the ability to easily reach out to the global Black & Veatch organization as needed.

Black & Veatch has been supporting the City of Hollywood since 2012, with the delivery of the City's Energy Efficiency Master Plan.



TEAMING AND SUBCONSULTANT UTILIZATION

As we have said before, our team consists of the "stars" of projects from the City's past and from other successful wastewater master plans across Florida and the Country. Our team is a combination of staff with institutional knowledge and a fresh perspective. We bring the best of both worlds to enable the City to have the most effective master plan with long lasting benefits. Beyond providing access to Industry Leaders, we provide access to Industry Leaders with experience with the City of Hollywood.

Our team leverages two subconsultants well known to the City; Tetra Tech and McKim & Creed. The project will be executed based on our respective expertise and experience with the City.

- Black & Veatch will lead the Overall Master Planning, Asset Management and capital improvement tasks.
- Tetra Tech will lead the force main and gravity main tasks with a focus on pipeline rehabilitation and replacement.
- McKim & Creed will lead the electrical assessment at the wastewater treatment plant both for determining the existing condition and the future needs. McKim & Creed will also lead the flow monitoring and I&I tasks.
- 300 Engineering will provide field support for data collection and emergency response planning.

Founded in 1915, **Black & Veatch** is an employee-owned company that now has more than 100 offices worldwide. Black & Veatch has been serving clients in Florida for over 55 years. We provide complete engineering and planning services from our offices in Coral Springs, Lake Worth, Miami, Fort Myers, Tampa, Orlando and Jacksonville. With more than 340 professionals in Florida, including 95+ registered professionals, we are staffed to support any size project. Our local professionals are backed by our global resources and experts who can be engaged on assignments to drive value and highest level of technical expertise.

Our success is based on principles of sustainable development, which means, we serve public and private clients of every size with a strong focus on life-cycle economy, efficiency and reliability.

We are committed to deliver the City of Hollywood Wastewater Master Plan on time and under budget.

Tetra Tech is highly ranked by Engineering News-Record (ENR), including ranked No. 1 in numerous categories including Water for 17 consecutive years. They are also highly engaged with the City and already providing high quality deliverables through the Water Main Replacement Program.

McKim & Creed plans and designs systems that treat, preserve and conserve the earth's finite water resources. Systems that include wastewater treatment facilities that prevent water loss, meet stringent regulations and improve drinking water quality. They are already engaged with the City through proposed I&I study and their staff has worked with the City for over a decade.

300 Engineering is a minority business enterprise providing a full range of civil, environmental, mechanical, instrumentation, control and electrical engineering services and business solutions. They work closely with client teams throughout the project life cycle, from inception to completion, to ensure deadlines are met, innovative solutions are found, and expectations are exceeded. Their collaborative, solution-oriented team is focused on providing efficient designs and projects while fulfilling commitment to client satisfaction.

We provide the City with a proven team that knows each other, and more importantly, knows the City.

PROJECT LEADERSHIP

The Black & Veatch management team combines a highly experienced, local project manager, Isabel Botero, who has worked for the City for years and developed the City's Energy Efficiency Master Plan, with an industry leading Technical Director, Amanda Schwerman, to provide the City with a world-class, adaptive and dynamic master plan. **These managers will provide the City with an efficient and knowledgeable team who can execute the Wastewater Master Plan on time, on budget and with a realistic and adaptable capital improvement plan.**

ISABEL BOTERO, PE

PROJECT MANAGER

Isabel Botero has over 20 years of experience executing water and wastewater projects. Isabel has been working on projects for the City's wastewater and water systems since 2012. She had hands-on involvement with the development of the City's Energy Efficiency Master Plan acquiring an in depth knowledge of the City's system and operational requirements. She has been involved in multiple master planning projects for utilities in South East Florida, including large and complex systems such as the Miami-Dade wastewater collection.

Also, Isabel has participated in multiple projects to help guide utilities in expanding their asset management programs. Her experience includes the implementation of Cityworks projects for the City of Hollywood and Delray Beach. She participated in the development of Palm Beach County's Water Utility Department's Strategic Sustainability Plan and improvements to their computerized maintenance management system, Maximo.

Isabel has led the SCADA improvements at the City's wastewater treatment plant, from initial concept planning to implementation of new SCADA standards and programming.

BENEFIT TO THE CITY:

Isabel understands the City's operational needs and goals. Isabel will ensure the City's interests are always in the forefront of the recommendations from the master plan to continue to assist the City fulfill its vision.

REFERENCE:

Name: Daniel Edwards
Project: Commercial Properties
Telephone Number: (786) 552-8354

AMANDA SCHWERMAN, PE, ENV SP

TECHNICAL DIRECTOR

Amanda Schwerman brings insights, experience and a cutting edge master planning approach to the City. She has honed her skills from work on nearly 60 planning and asset management studies and projects, which include over 20 full master planning projects. Amanda has spent her entire career located in Florida, but has also work on systems across the globe. She is attentive in the nuances of Florida wastewater collection systems and uses software like InfoWater, InfoWorks and InfoSWMM to analyze capacity, energy optimization and I&I concerns for utilities. She currently serves on the AWWA Engineering Modeling Applications Committee and was one of the authors of AWWA's M32 Computer Modeling of Water Distribution Systems.

As things have evolved in the industry, asset management has become more necessary and master plans have become a conduit to integrate with asset management programs. Amanda is a passionate champion of combining hydraulic modeling, condition assessment and asset management tasks into comprehensive master plans and delivering holistic capital improvement plans for her clients.

BENEFIT TO THE CITY:

Amanda has a holistic understanding of the various infrastructure systems to build an effective CIP. The City will received a pre-eminent master plan meeting all of needs of a municipal wastewater system.

REFERENCE:

Name: Rolando Nigaglioni
Project: Broward County Regional Wastewater Master Plan
Telephone Number: (954) 831-0882

Our team has a deep history with the City and a comprehensive knowledge of the City of Hollywood's Wastewater System.

Project Leadership and Wastewater Treatment Plant Knowledge

Since 2012, **Isabel Botero** has participated on numerous City projects, focusing at the Southern Regional Wastewater Treatment Plant (SRWWTP). Isabel participated in evaluating the existing wastewater treatment systems and provided recommendations included in the Energy Efficiency Master Plan (EEMP). The SCADA system was evaluated as part of the EEMP and its recommendations have been implemented in phases for the last five years. Isabel has lead the development of the new standards, procedures and programming efforts to continue to strengthen the SCADA systems at the SRWWTP. Isabel has also led the implementation of Cityworks for Utilities.

Utility-wide SCADA Knowledge

Laurie Kusmaul is the lead SCADA integrator on the City's system-wide SCADA Improvements Project. The Team has already begun the improvements at the wastewater treatment plant. This makes Laurie and her team the best resources for the City to conduct condition assessment of the instrumentation and control system and then provide recommendations for future improvements. This eliminates duplicate work and decision making providing consistency with the City's ongoing project, standards and goals.

Hollywood Hydraulic Model - Cityworks Integration Knowledge

Mark Seastead, Matt Morey, and their team are the Cityworks implementors for the City of Hollywood and are uniquely positioned to assist with the connection between the master plan tasks, Cityworks and building an integrated asset management program for the City.

Wastewater Main Knowledge

Tetra Tech has joined the Black & Veatch team bringing a unique depth of knowledge of the condition of the City's gravity and force mains and an understanding of the rehabilitation and replacement (R&R) needs within the collection system. Led by **Ken Caban** and **Janine Alexander**, Tetra Tech brings years of experience with pipelines and the City of Hollywood.

Wastewater Treatment Plant Electrical System Knowledge

The electrical and instrumentation discipline for the Wastewater Treatment Plant will be provided by **Aubrey Haudricourt**, with McKim & Creed. Aubrey was the lead engineer on the WTP Generator Replacement project and has been working on City projects for over a decade, His participation on the team will allow for the continuation of electrical and instrumentation disciplines for modernization of this facility.

Rafael Frias, **PE**

PROJECT DIRECTOR

Rafael will provide management oversight and commitment to make sure the team is properly resourced and the City's objectives are fully met including establishing critical success factors to measure performance.

Rafael serves as a Client and Project Director with the global water business of Black & Veatch Corporation and is responsible for management of the Company's operations in Florida and the Caribbean.

Energy Efficiency Master Plan; City of Hollywood, FL

Senior Project Manager. Black & Veatch developed a comprehensive Energy Efficiency Master Plan for the City of Hollywood's Water and Wastewater systems and facilities. The master plan resulted in implementation plan of 20 recommended energy cost savings projects and a net positive value of $4.4 million to the City.

Water & Wastewater Master Planning for Commercial Properties; Miami, FL

Project Director. Black & Veatch assisted with developing a plan, including cost estimates and project schedules for the addition of sewer infrastructure to commercial properties within the service area currently not connected to these systems. Services included sewer system extensions; pump station basin capacity assessments; and capital improvement plan level of cost.

EDUCATION
MS, Civil Engineering, University of Kansas, December 2002

YEARS EXPERIENCE
23

PROFESSIONAL REGISTRATION
PE - FL, PR, KS

OFFICE LOCATION
Coral Springs, FL

Isabel Botero, **PE**

PROJECT MANAGER

Isabel is a Project Manager with proven experience delivering projects for the City. She participated in the City's Energy Efficiency Master Plan. She leads the SCADA Improvements and Cityworks projects.

Isabel is a Project Manager with 20 years of experience and knowledge of water and wastewater systems. She has participated in the execution of multiple master plan projects for wastewater systems, including facilities planning and collection systems.

Energy Efficiency Master Plan; Hollywood, FL

Project Manager. Coordinated multiple disciplines to develop the energy costs saving projects included in the master plan. Isabel assisted creating the base line and projected energy consumption after implementation.

Master Planning for Miami-Dade County; Miami, FL

Project Manager. Led multiple projects for the planning section including: master planning for addition of commercial properties to the existing MDWASD collection system, capacity analysis for developer requests (including both water and wastewater systems), and CIP development in support of bond requirements.

SCADA Improvements - SRWWTP; Hollywood, FL

Project Manager. Isabel is leading the implementation of SCADA improvements for the PLCs controlling all of the wastewater treatment processes at the SRWWTP.

EDUCATION
MS, Environmental Engineering, University of Kansas, 2004

YEARS EXPERIENCE
20

PROFESSIONAL REGISTRATION
PE - FL, MO, PR

OFFICE LOCATION
Coral Springs, FL

Chris Barlow, **PE, CDT**

QA/QC

Chris will provide oversight to ensure that the delivery of a dynamic and adaptive Wastewater System Master Plan fully meeting all of the City's goals and needs.

Chris is an experienced project manager and engineer that has focused his practice on the analysis and designs of municipal utility projects, primarily in South Florida. This experience has been developed through the execution of numerous water, wastewater, and water reclamation projects.

Risk and Resiliency Assessment of the American Water Infrastructure Act, Water System; City of Hollywood, FL

Project Manager. Delivery of the Risk and Resiliency Assessment required by the American Water Infrastructure Improvement Act. Utilized the methods provided in AWWA J-100 Standard Practices to deliver this comprehensive assessment of the City's water system.

High Service Pump Station Upgrades, Water Treatment Plant; City of Hollywood, FL

Project Manager, Lead Design Engineer and Construction Administration Engineer. Evaluation, design and permitting of the upgrades to the pump station. The project provided for the installation of six 8,000 gpm variable speed pumps to replace ten existing various sized constant speed pumps.

EDUCATION
BS, Environmental Engineering, University of Florida, 1998

YEARS EXPERIENCE
22

PROFESSIONAL REGISTRATION
PE - FL

OFFICE LOCATION
Coral Springs, FL

Amanda Schwerman, **PE, ENV SP**

TECHNICAL DIRECTOR

Amanda provides extensive technical expertise and access to the right resources to bring to the project as she serves as the Planning & Asset Management Lead for all of Florida.

Amanda has over 15 years of experience in hydraulic modeling, planning and asset management. Some of her relevant experience includes serving as Engineering Manager on the Pinellas County Water and Sewer Optimization Program.

Broward County | Regional Wastewater Master Plan; Pompano Beach, FL

Planning Manager. Black & Veatch completed a Regional Wastewater Master Plan focusing on the regional transmission mains and master pump stations. The Master Plan allows Broward County to effectively provide risk analysis and prioritization with the objective of maintaining a desired level of service for its customers, communities and the environment at an acceptable level of risk and low cost for the rehabilitation, repair or replacement of its assets.

Polk County | WWTF Condition Assessment and Data Collection ; Polk County, FL

Engineering Manager. As part of a comprehensive asset management program, the County wished to collect asset inventory data from these facilities for use iPra computer mainten and mragsementtem used(CMMS). Additionally the Co nty witho assess and isset compition in conjunction with the collectioninfructure projects.

EDUCATION
MS, Environmental Science and Engineering, Colorado School of Mines 2006

YEARS EXPERIENCE
15

PROFESSIONAL REGISTRATION
PE - FL

OFFICE LOCATION
Tampa, FL

Olena Lytvyn, **PE**

CONDITION ASSESSMENT LEAD

Olena specializes in large diameter pipelines condition assessments and sewer systems and was chosen specifically for her experience with linear projects and ability to manage multiple projects simultaneously.

Olena specializes in design, condition assessment, and rehabilitation of large diameter water and sewer pipelines. Olena has experience with various pipeline materials, including PCCP, CIP, DIP, HDPE, PVC and steel. She served as Task Leader of the BCWWS Regional Master Plan and as Engineer IV for the Miami-Dade County Water and Sewer Department (WASD) Program Management Consultant contract to establish a Comprehensive Infrastructure Assessment and Replacement Program for the Utility.

Broward County | Regional Wastewater Master Plan; Pompano Beach, FL

Task Leader. Involved in the condition assessment that identified the regional transmission system critical assets; effectively provided risk analyses; and prioritized inspections and improvements through the development of a comprehensive CIP and an emergency response plan.

54-inch Condition Assessment Carbon Fiber Repairs; Miami, FL

Task Leader. Prepared a condition assessment report for a 54-inch carbon fiber repairs located along Red Road Ave that transfers water from the John E. Preston Treatment Plant to the City of Hialeah and other areas of North Miami-Dade County.

EDUCATION
BS, Civil and Environmental Engineering, Florida State University, 2012

YEARS EXPERIENCE
9

PROFESSIONAL REGISTRATION
PE - FL, IL

OFFICE LOCATION
Coral Gables, FL

Lucas Botero, **PE**

WASTEWATER TREATMENT PLANT LEAD

Lucas has extensive experience as project design lead for wastewater treatment systems in Florida and throughout the nation. He will bring the City a new resource and perspective to the wastewater treatment plant.

Lucas has over 20 years of experience in environmental engineering. He has a broad-based knowledge of wastewater treatment process engineering with an emphasis on plant capacity evaluations, activated sludge design including biological and chemical nutrient removal, treatment plant modeling, headworks design, effluent disinfection, and sludge processing.

Ocean Outfall Legislation Program | Central District WWTP (CDWWTP) Effluent Filtration Pilot Study and Effluent Pump Station Evaluation; Miami, FL

Project Manager. Served as Project Manager and technical lead for the CDWWTP pilot study. The project included the design of a filtration system for testing three different technologies which included outside/in cloth disk filters, inside/out disk filters, and deep bed media filtration; and supervising the installation and operation of the pilot system.

Digester Biogas Combined Heat and Power Renewable Energy Project; Palm Beach County, FL

Process Engineer. Mr. Botero worked on the conceptual evaluation of a combined heat and power system at the county's Southern Region Water Reclamation System. This system utilizes biogas from the anaerobic digesters to generate power for the plant.

EDUCATION
PhD, Environmental Engineering, University of Cincinnati, 2003

YEARS EXPERIENCE
28

PROFESSIONAL REGISTRATION
PE - FL, NV, CA
PMP

OFFICE LOCATION
Coral Gables, FL

Amanda Zarazua, **PE**

COLLECTION SYSTEM LEAD

Amanda is a Regional Asset Management Lead with 19 years of experience specializing in asset management and wastewater collection studies.

Amanda's experience includes asset management program development, ISO 55001 gap assessments and improvement plans, risk-based condition assessment and capital improvement planning, implementation and optimization of computerized maintenance management systems (CMMS) and GIS, CMMS software needs assessments, and wastewater collection system master planning.

Broward County | Regional Wastewater Master Plan; Pompano Beach, FL

Lead Asset Management Consultant. The Master Plan allows Broward County to effectively provide risk analysis and prioritization with the objective of maintaining a desired level of service for its customers, communities and the environment at an acceptable level of risk and low cost for the rehabilitation, repair or replacement of its assets.

Plant City | Wastewater Master Plan; Plant City, FL

Lead Asset Management Consultant. Plant City's Utilities Department collection system services a population of approximately 38,000 people. The goal and objective of the Wastewater Master Plan (Project) is to assist City staff in providing a reliable and robust system with adequate capacity to accommodate future growth within the City's sewer service area.

EDUCATION
MS, Environmental Engineering, Texas Tech University, 2001

YEARS EXPERIENCE
19

PROFESSIONAL REGISTRATION
PE - TX

OFFICE LOCATION
Denver, CO

Robert Chambers, **MBA**

CAPITAL PLANNING LEAD

Robert's utility knowledge covers a wide range of utility management and operating issues, including cost of service and rate analysis, financial planning, capital financing, acquisitions and valuations.

Robert contributes over 20 years of professional experience serving large and complex utilities across the United States. He has earned an MBA with a concentration in Finance.

Energy Efficiency Master Plan; City of Hollywood, FL

Capital Planning Lead. Developed the Energy Project Decision Cash Flow model to define an implementation strategy consistent with the City's overall CIP.

Strategic Sustainability Plan; Palm Beach County, FL

Capital Planning. Development of Strategic Sustainability Plan (SSP). The SSP is the WUD's 3rd generation plan and is intended to be the utility's strategic roadmap.

Water and Sewer Financial Consulting Services; Miami, FL

Capital Planning. Supported the City in completing multiple water and sewer rate studies that included the implementation of conservation based rates in order to be compliant with the SFWMD water use mandates. In addition, supported the City in successfully retaining $30.0 million in State Revolving Loan funding to upgrade the City's water treatment plant.

EDUCATION
MBA, Finance, Rollins College, 2006

YEARS EXPERIENCE
20

OFFICE LOCATION
Coral Springs, FL

Matt Morey, **GISP**

ASSET MANAGEMENT LEAD

Matt specializes in CMMS solution requirements development, systems implementation and refinement, report writing, and systems integration requirements development.

Matt is a Solutions Lead who supports Black & Veatch's Water Division. He has over 15 years of program management, consulting, and system implementation and integration experience on projects for municipal government public works and water, wastewater, and stormwater utilities clients.

CMMS Implementation for Utilities; City of Hollywood, FL

Asset Management and Information Systems Lead. Leading the implementation of the City's CMMS for Utilities. Implementation focused on the migration from the City's legacy system for linear and facility assets, and included historic data migration for all past work. The next phase of the project will include expanding Cityworks to the Public Works department.

CMMS Implementation; City of Delray Beach, FL

Asset Management and Information Systems Lead. Leading the implementation of the City's CMMS for Utilities, Parks and Recreation, and Right-of-Way divisions. Implementation focused on the migration from the City's legacy system and included historic data migration for all past work.

EDUCATION
BS, Marine Science, Coastal Geology, Coastal Carolina University, 2003

YEARS EXPERIENCE
17

PROFESSIONAL REGISTRATION
GIS

OFFICE LOCATION
Charlotte, NC

REUSE PLANNING EXPERTISE

Jo Ann Jackson, **PE**

REUSE PLANNING & REGULATIONS

Jo Ann Jackson has over 30 years of experience primarily focused on innovative water projects. She is recognized for her leadership in the water reuse practice.

Jo Ann has worked as a consultant on the planning, permitting, design, and/or implementation of nearly every type of reclaimed/recycled water project from traditional irrigation reuse systems to innovative wetland environmental enhancement projects and potable reuse. She developed the Reuse Plan for the City of Sunrise.

She has been involved in water policy and regulatory development throughout her career, most recently having served as a Director at Large for the Florida Water Environment Association Utility Council and as a utility appointee to the Florida Potable Reuse Commission, charged with developing a regulatory framework for potable reuse in Florida.

Prior to joining Black & Veatch, she worked for six years for the City of Altamonte Springs as a Division Director overseeing the City's water, wastewater and reuse systems. This experience has given her a client perspective to complement her consulting background and unique project experience from overseeing the first direct potable reuse pilot project in Florida using a non-RO based treatment train.

Project Understanding & Approach

PROJECT UNDERSTANDING

The City of Hollywood is investing in a comprehensive Wastewater System Master Plan with several focus areas that go beyond traditional capacity driven master planning approaches. The master plan must provide a roadmap for making smart investments in the wastewater system that will allow the City to continue providing reliable and cost-effective services to its customers. Success will require an approach and team that aligns with the City's vision for developing a well thought-out, comprehensive wastewater system master plan. This includes innovative planning approaches and dynamic planning tools that will continue to provide value to the City long after the master plan report is submitted.

Black & Veatch has supported many utilities in taking their wastewater system planning to the next level, and we are ready to support the City of Hollywood in achieving its key goals for this project.

Becoming "South Florida's top city to live, learn, work, invest and play."

We will align our recommendations and strategies with the City's Strategic Plan (Vision Hollywood 2020) adopted on Jan. 15, 2020. We are in full agreement that "vibrant neighborhoods are essential to the overall sustainability of the City of Hollywood." We also believe the safe, reliable and affordable conveyance, treatment and disposal of wastewater is essential to the City's sustainability.

Black & Veatch will ensure the Wastewater Master Plan and capital investment plan are aligned with the City's goals, strategies and mission. We will prepare deliverables that can be easily understood by and take into consideration the needs of all stakeholders.

Similar to the Neighborhood Master Plans, **our Wastewater Master Plan will guide City leaders in redevelopment, budgeting, strategic planning, and capital improvement.**

Comprehensive assessment of the entire wastewater system

A holistic understanding of the wastewater system, from the customer, to the treatment plant, to the reclaimed system and outfall, is required to further the City's goals and mission. Our team members, including our project manager, Isabel Botero, and asset management team have been working with the City for years and have a thorough understanding of the issues facing the City. **Our detailed understanding of the City's wastewater systems and staff will allow us to define innovative and sound solutions for protecting the environment and customers, providing reliable and cost efficient disposal of wastewater for years to come.**

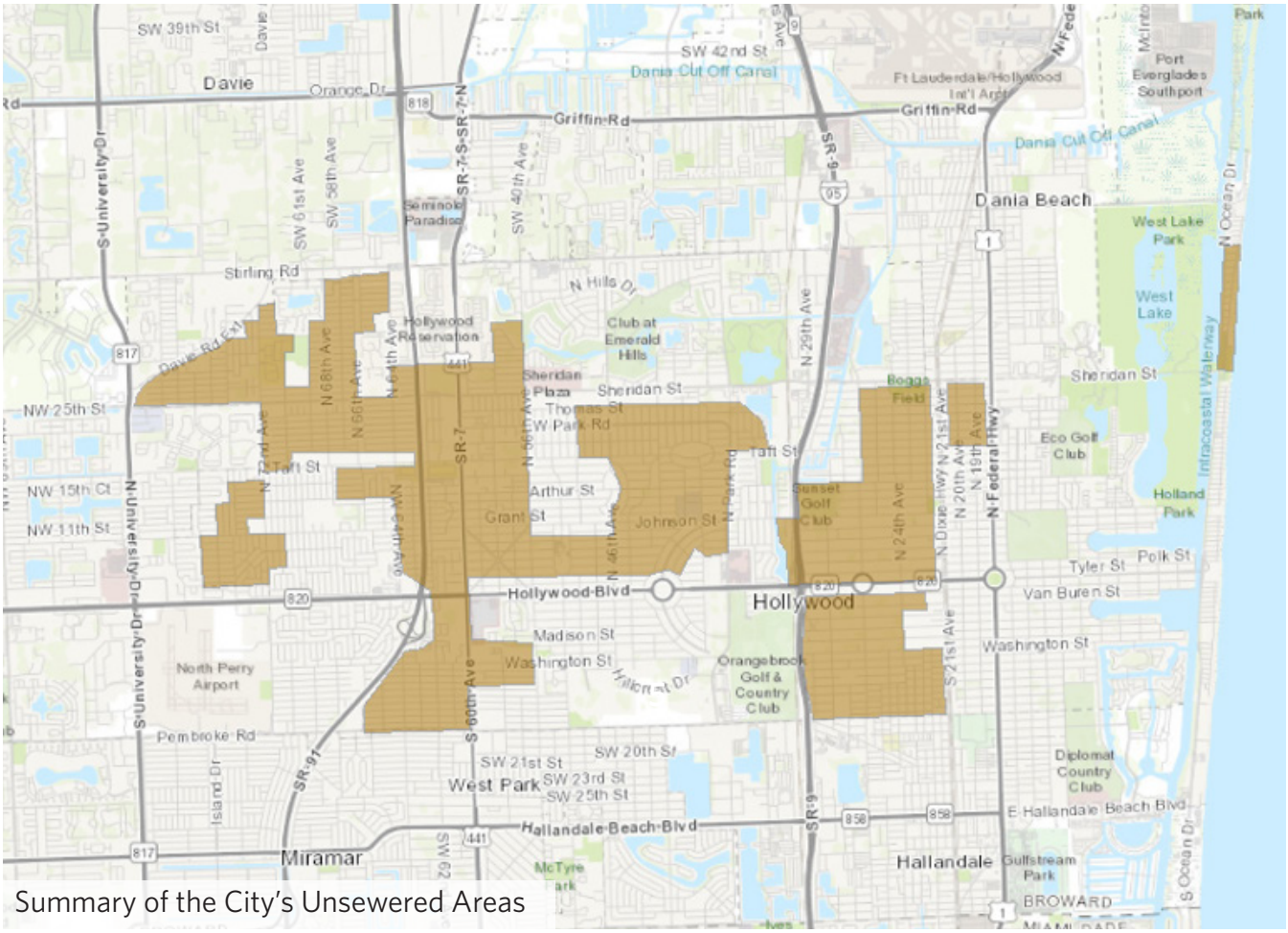
Prioritized Capital Improvement Plan projects

Black & Veatch will support the City in developing a prioritized CIP plan that is backed by robust business case evaluations that consider risks and life cycle costs. Our approach will provide the City with a **CIP plan that represents the optimum investment strategy, and one that can be confidently presented to the City Commissioners and the public.**

Provide an Affordable & Defensible Financial and Funding Plan

The City is leveraging a bond program, the State Revolving Fund and other resources to pay for the required maintenance of the water, wastewater, stormwater and reclaimed water systems, among other responsibilities. Black & Veatch understands the fiscal responsibility the City has to its customers and will provide a robust and affordable financial and funding plan. **We will use the prioritization tools at our disposal to provide a defensible plan that can be successfully presented to and accepted by the Mayor, City Manager, City Council and the public.**

KEY PLANNING CONSIDERATIONS



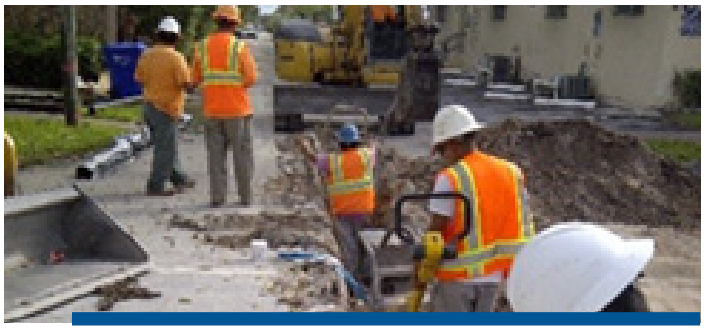
Summary of the City's Unsewered Areas

1. Eliminate private lift stations and consolidate lift stations
2. Funding Sources to pay for the recommended projects
3. Redevelopment – Increased Population Density
4. System Resilience, Sea Level Rise and Climate Change
5. Expand Gravity Main System / Eliminate Septic Tanks
6. Wastewater aging infrastructure: breaks, rear lot easement, intercoastal crossings
7. Force Main and Gravity Main Replacement Program
8. Coordinating CIP needs between systems: W, WW, SW

CITY'S ONGOING ACTIVITIES, NEEDS AND BENEFIT TO THE CITY

The Black & Veatch Team is aware of and have either been involved with or are currently involved with many ongoing activities and projects for the City of Hollywood.

Our team will capitalize on our knowledge of the City's systems and our relationships with City staff to provide the City with an comprehensive wastewater master plan that exceeds the City's expectations and needs for years to come.



Tetra Tech managing the installation of a gravity sewer main.

Cityworks Implementation

The Black & Veatch Team implemented the Public Utilities' computer maintenance management system (CMMS), Cityworks. The project was designed for flexibility and enterprise architecture that can be adapted to a Citywide program. The implementation specific to the Public Utilities department covered increasing functionality, standard business process mapping with facility and asset types, improved data collection and availability, standard reporting and robust preventative maintenance scheduling, and the implementation covered the water treatment plant, wastewater treatment plant, distribution system, collection system, lift stations and the pump station. We are also currently negotiating with the Public Works department to provide them with Cityworks access and support.

Black & Veatch took a hands-on approach to workshops and training for the City of Hollywood.

BENEFIT TO THE CITY & MASTER PLAN:

As a result of our knowledge and experience with the City's Cityworks implementation, our team will provide seamless incorporation of data, recommendations and CIP projects resulting from the Wastewater Master Plan into Cityworks and the City's decision support tools. No other team can be as efficient as the Black & Veatch Team.

Force Main and Gravity Main Replacement Program

Our team member, Tetra Tech, is one of the City's engineers providing surveying, geotechnical evaluations, design, permitting, and construction administration services on multiple projects concurrently for the Wastewater Main Replacement Program.

The City has begun to sewer portions of the unsewered areas. Some projects are currently in construction, such as the Royal Poinciana sewer system expansion. These improvement are being coordinated with the main replacement program which includes replacing existing aged gravity and force mains. The program also includes extensive maintenance of traffic (MOT), asphalt pavement, and pavement markings restoration and improvements.

Black & Veatch has provided support services for wastewater main replacement programs to utilities through master planning contracts. Our team, led by Amanda Schwerman, helped the City of Venice, FL prioritize the water and gravity main replacement and rear lot easement relocation efforts through their water master plan using risk prioritization and remaining useful life.

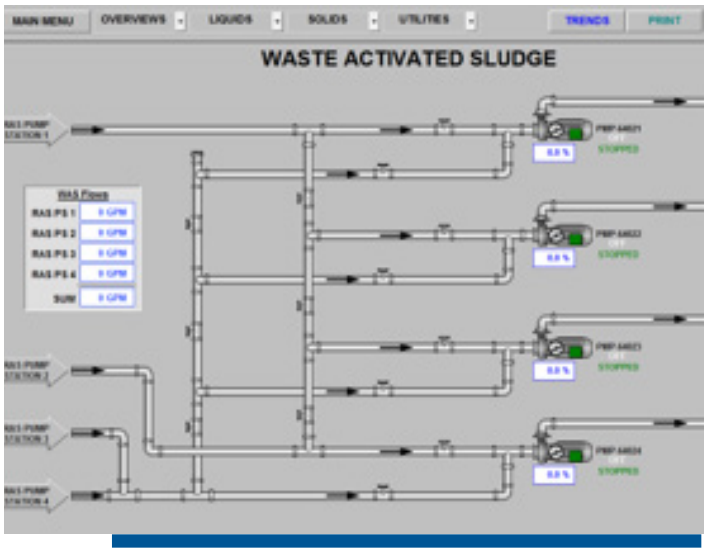
BENEFIT TO THE CITY & THE MASTER PLAN:

The Black & Veatch Team will use our experience with the City of Hollywood's collection, forcemain, and gravity main replacement program, combined with our experience for other utilities, to ensure that changes made to the system during the Program are considered and incorporated into the wastewater master plan.

SCADA Evaluation and Improvements

As part of the Energy Efficiency Master Plan, the Black & Veatch Team performed a high level review and evaluation of the SCADA systems at both the Water and Wastewater Treatment Plants. The SCADA evaluation included automation and control system improvements related to energy conservation measures, as well as, long term SCADA recommendations for enhanced performance and optimized operations.

The existing SCADA system consists of programmable logic controller (PLC) interconnected using Ethernet network, with supervisory monitoring and control from a human machine interface (HMI) system of servers and workstations. This concept of PLC/HMI-based control system is a sound approach to SCADA and common in the water industry. While the system architecture concept and approach are sound, many hardware and software components were nearing obsolescence. The City recognized this need and is in the process of implementing a number of SCADA system hardware and software upgrades that will ensure continued vendor support, ease of maintenance, and reliability. The Black & Veatch team is now in the process of implementing those changes throughout the City's infrastructure.



Black & Veatch has been successfully assisting the City of Hollywood with SCADA implementation providing easy to use dashboard as shown above.

BENEFIT TO THE CITY & MASTER PLAN:

The Black & Veatch team provides consistency and removes the potential for having "too many cooks in the kitchen." Our team brings efficiency and seamless continuity to the SCADA system upgrades and recommendations.

Project Implementation Coordination Between Water, Wastewater and Storm Water

The City of Hollywood will shortly be undergoing at least four separate master planning efforts for Neighborhoods, Water Systems, Wastewater Systems and Stormwater Systems. It is an excellent and admirable undertaking, but it also creates a need to coordinate CIP projects between all of the master plans. To most efficiently use the City's funds, it would be advantageous to coordinate as many activities as possible. Activities include things like pipeline replacement for all water, wastewater and stormwater systems in the same right of way at the same time (if replacement is needed) rather than tearing up the pavement and interrupting traffic more than once. The City will need the master plan deliverables to be flexible and adaptive to allow full coordination with other systems.

BENEFIT TO THE CITY & MASTER PLAN:

Our team has successfully included items such as paving plans and CIP programs for other utilities and we will efficiently and effectively be able to do the same thing for the City of Hollywood.

This team, led by Amanda Schwerman, executed a wastewater master plan for the City of Tampa where we used the public works paving schedule to help prioritize the pipeline replacement program. The team also provided tools and training such that the City staff took over the process and expanded the program to include the wastewater and stormwater improvements.

Our team will provide tools and training to enable the City to be able to coordinate CIP projects and repeat the planning processes yearly. The City will be able to adapt to changing conditions, funds and goals well into the future.

INFLOW AND INFILTRATION

McKim & Creed's inflow and infiltration (I&I) specialists address buried and aging infrastructure issues to develop affordable solutions, that reduces plant flow, reinstate system efficiency, effectiveness and regulatory compliance. McKim & Creed provides flow monitoring with real time access and assessment capability through cellular connections. Along with our smoke testing capability McKim & Creed is able to define flows coming into the wastewater facility and identify areas for mitigation.

For assessing wastewater gravity piping and underground structures, McKim & Creed's closed-circuit high definition TV (CCTV) inspection systems provided a full, 360-degree interior view to look inside collection systems and evaluate the relative condition and severity of deterioration.

We specialize in deliverables that are GIS centric and align with the client's computerized maintenance management systems (CMMS). McKim & Creed has the ability to collect data in the field, transmit it to a centralized database for analysis, and provide any necessary rehabilitation design.

McKim & Creed has and is currently performing condition assessments for collection and wastewater facilities in for, Cities of Clearwater Largo, Tampa, and the Counties of Hillsborough and Pinellas. We have also performed this work in Georgia, Virginia and North Carolina for several municipalities. Recently McKim & Creed spoke to the City of Hollywood about our services.

Our electrical and Instrumentation Controls group have performed many designs for other City of Hollywood facilities, that included medium and low voltage transmission, distribution, and standby power. Our instrumentation group has performed installation programming and oversite for the City and is fluent in all major HMI and PLC software.

Both of our groups have performed master planning in Florida for the Cities of Tampa, St. Petersburg, Daytona, and Counties of Sarasota, Citrus, Charlotte, and Pinellas.

INCORPORATING ASSET MANAGEMENT AND MASTER PLANNING:
Cityworks works Collaboratively with the Utility Management Platform

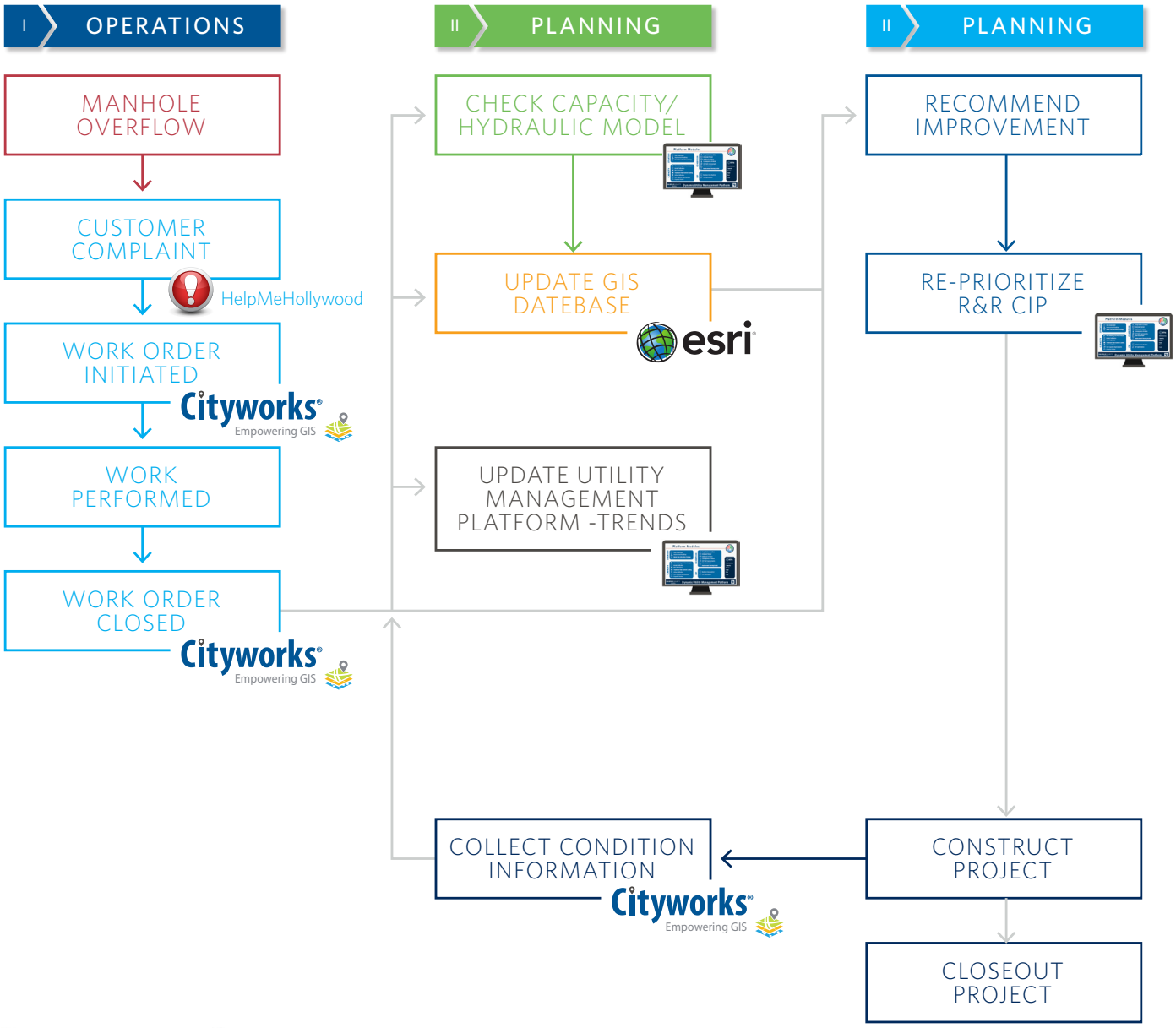
The City's Utilities Department has made a fundamental investment in its asset management program with the implementation of Cityworks and the establishment of GIS as the source of truth of asset data. The enterprise architecture encourages data sharing and access across multiple platforms including an integrated utility management platform.

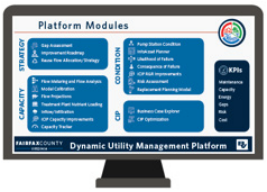
Black & Veatch's implementation of Cityworks for the Utility Department has opened the door to more tightly integrate Operations, Planning and Capital Improvements by providing a single platform using commonly shared data. This will facilitate transparency and increased confidence in asset data across the Utility.

Combining the utility management platform with real-time operations management and Cityworks will allow planners to visualize the direct impact of work. This work could include routine preventive maintenance, condition inspections on critical metrics that impact rehabilitation and replacement, capacity, and long-term capital planning in a manner not previously available. This concept will help transform Utilities into data driven decisions as a function of everyday operations. The ability to prioritize maintenance, rehab, and replacement of assets based on risk, predictive technologies and strategic asset management framework constitute the core pillars of adaptive planning which utilize your existing Cityworks implementation as the base.

CITYWORKS CONNECTS TO ALL FACETS OF PLANNING

Cityworks is an integral component to the City's Asset Management Program and long-term system planning needs as shown in the manhole overflow flow diagram on this page. Black & Veatch is uniquely qualified to ensure the processes and workflow is configured properly for the City's needs and goals.





MASTER PLAN COMPONENT

ADVANCING ASSET MANAGEMENT THROUGH MASTER PLANNING

The City of Hollywood has made important progress in advancing its asset management program by implementing the Cityworks computer maintenance management system (CMMS) and initiating this master plan which includes many elements needed to deploy an asset management program. **The City is now ready to expand and enhance its asset management program to bring it in line with global best-practices and meet State Revolving Fund requirements.** The program should meet asset performance requirements through the appropriate evaluation of risk, with a primary focus on managing infrastructure to minimize total ownership costs while continuing to deliver a high level of service to customers.

Although the prospect of enhancing an asset management program to meet the current best-practices can seem daunting, a good plan can help you take the first steps in the right direction.

Using Master Planning to Advance Asset Management

The tasks highlighted to the right are a summary of an Asset Management Plan components as recommended by the EPA. Many of these tasks were already addressed when the City implemented Cityworks and many more will be completed as part of the Wastewater Master Plan. The City may consider adding a couple scope items to the Master Plan to complete the few remaining items and efficiently expand its asset management program.

To highlight which tasks are covered by the Cityworks implementation and the Master Plan, and which tasks would be remaining, we have added a column to the far right and placed symbols to illustrate the mechanism the City has or may use to further the asset management program. The computer screen symbol illustrates where the Utility Management Platform and business intelligence dashboards will be useful.

EPA ASSET MANAGEMENT PLAN COMPONENTS	EXECUTION MECHANISM
SET TARGET LEVELS OF SERVICE (LOS)	OPTIONAL TASK
ASSESS PERFORMANCE, FAILURE MODES	CONDITION ASSESSMENT (MP)
DEVELOP ASSET REGISTRY	Cityworks® Empowering GIS
LIFE CYCLE & REPLACEMENT COSTS	COST ESTIMATING (MP)
DETERMINE BUSINESS RISK (CRITICALITY)	R&R RISK EVALUATION (MP)
DETERMINE RESIDUAL LIFE	ESTIMATED USEFUL LIFE (MP)
BUILD ASSET MANAGEMENT PLAN	OPTIONAL TASK
OPTIMIZE O&M INVESTMENT	OPTIONAL TASK
OPTIMIZE CAPITAL INVESTMENT	10-YR CIP PRIORITIZATION (MP)
DETERMINE FUNDING STRATEGY	FINANCE AND FUNDING PLAN (MP)

PROJECT APPROACH

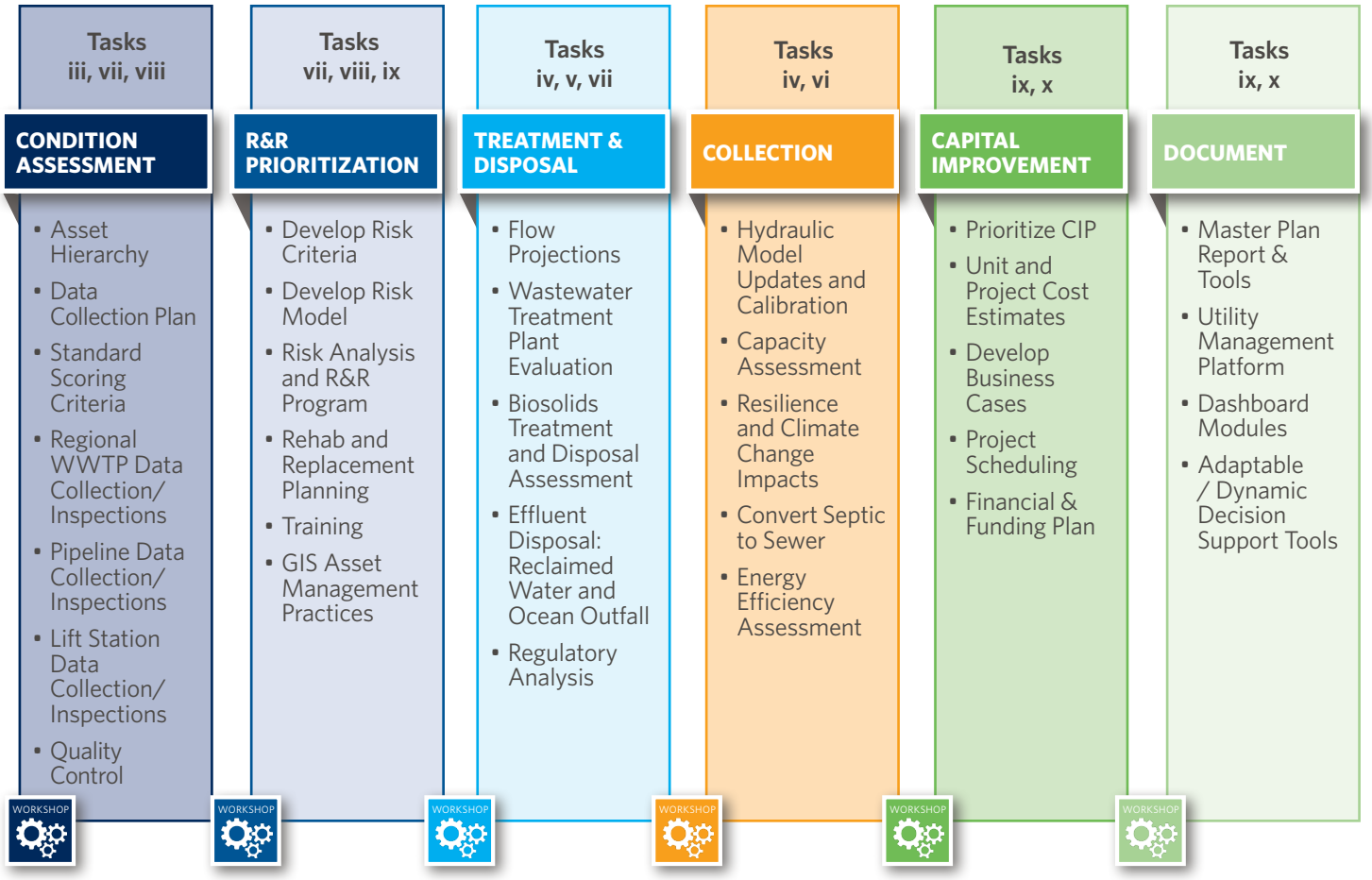
The City of Hollywood Wastewater Master Plan will support the City in proactively addressing the needs for collecting, treating and disposing of wastewater and water reclamation for the next planning horizon and beyond. Black & Veatch understands the City has identified 10 tasks in the RFQ scope of services to complete the master plan. Our understanding of the City's needs has identified the following key goals for successful development of the Wastewater Master Plan:

- Address immediate and long-range needs in the wastewater system with a comprehensive capital improvement plan.
- Understand the current condition of the Southern Regional WWTP, lift stations and other facilities as needed to properly prioritize capital funds.
- Identify critical assets through risk-based prioritization
- Coordinate between capacity needs and rehabilitation and replacement (R&R) needs.
- Identify the condition assessment needs, if any

Black & Veatch's innovative master planning approach and dynamic planning tools will allow the City to continue using and benefiting from the master plan for many years to come.

The following sections explain in detail the 10 tasks identified in the RFQ and how each will be executed by our project team to ensure a successful project.

Our approach includes six phases: Condition Assessment, R&R Prioritization, Treatment and Disposal, Collection, Capital Improvement and Document, as shown in the graphic below. There are several phases which will be occurring simultaneously for expedited Wastewater Master Plan development. Each proposed project phase and the respective associated tasks identified in the City's RFQ is illustrated below.



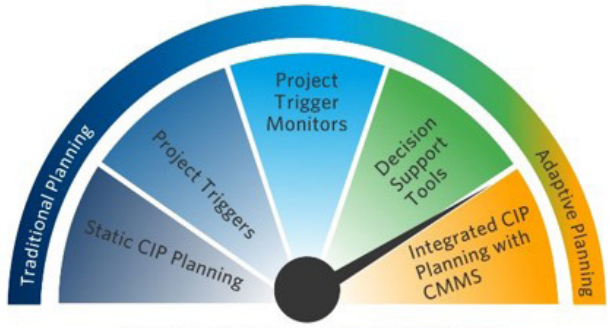
Adaptive Master Planning Approach

We understand the City's CIP planning is dynamic, with budgets and priorities changing regularly as issues and opportunities arise. Thus, it is essential the Master Plan is also dynamic to support the City's planning. No longer will the City need to wonder if the Master Plan's recommended CIP projects and schedules are still valid in five years, struggle to decide how to adapt with changing conditions, or worry that the implementation schedule for projects is behind or ahead of the actual system needs. Now, the City can easily adapt to the changing conditions, have a continuously updated CIP and effectively communicate changes with the City's leadership.

Black & Veatch has developed an adaptive and dynamic planning approach for our master plans. This approach will allow the City to make regularly make updates and optimize the CIP after the initial master planning effort is completed. This is made possible through Black & Veatch's innovative approach and use of project triggers and dynamic planning tools as part of the master planning process.

The Adaptive Planning approach combines project triggers and decision support tools to provide the City with information on why a project needs to be implemented (the "trigger"), combined with a method to track the trigger (the "decision support tools"). With these two items, the City can easily re-assess planned CIP projects on an annual basis to optimize and re-prioritize the CIP plans when project drivers or conditions change.

The City will benefit from our experience with adaptive and dynamic tools and training approach. Black & Veatch has led the industry in providing adaptive and dynamic master planning as our standard approach for utilities. We have successfully delivered adaptive plans to over 20 utilities and will bring that world-class experience to the City.



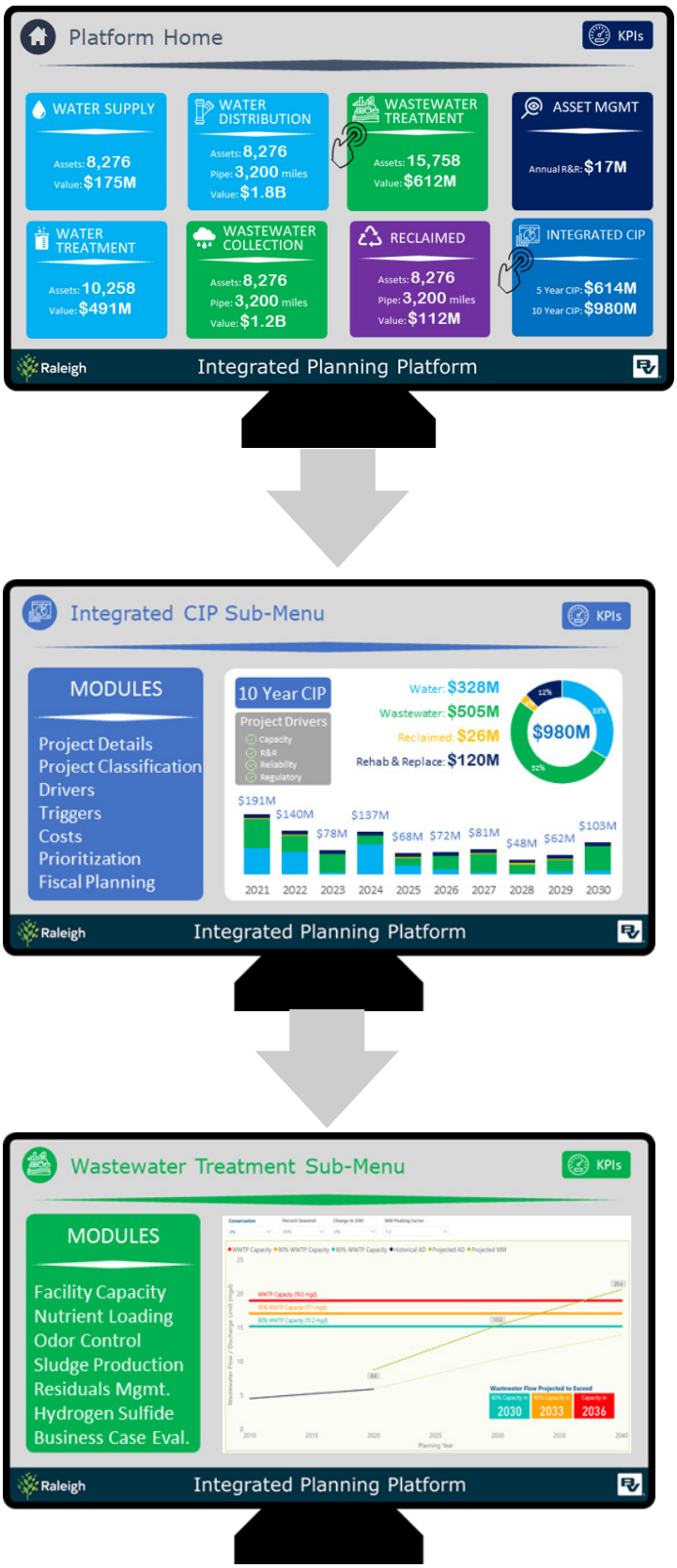
Adaptive & Dynamic Planning Gauge

Utility Management Platform

One of the fastest and easiest ways to monitor triggers is through our most powerful decision support tool, the Utility Management Platform. This is a compilation of dashboards designed to monitor system conditions, monitor project triggers and present data in a dynamic and easy to understand manner. The final deliverable will connect directly to the City's data and system conditions will be updated automatically.

UTILITY MANAGEMENT PLATFORM

Utility Management Platform



Accessible at the click of a button

Each component of the ***Utility Management Platform*** features a sub-menu which consolidates key info and links to focused Platform Modules

Smart Triggers

Specific KPIs are identified to enable the implementation of smart triggers, which will automatically alert City staff when KPIs are in exceedance of their threshold even if they are not viewing all KPIs on a daily basis.

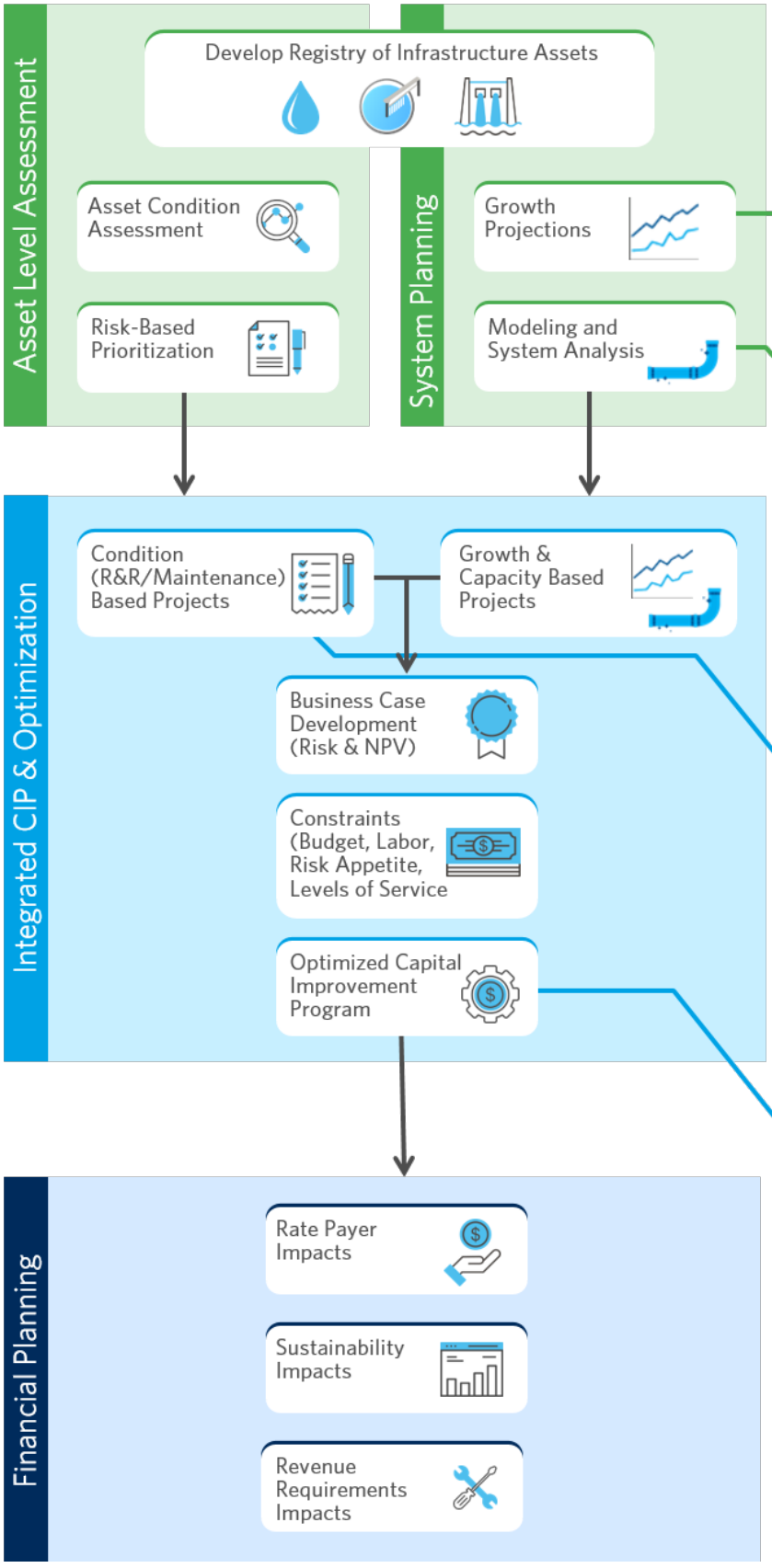
User and Experience and Accessibility

Black & Veatch understands that the key to leveraging data and succeeding with adaptive utility planning is the human element. All too often we have seen utilities with access to tools that can technically do the job but are difficult to access or cumbersome to use — as such they are rarely used. Modules are designed with the end user experience in mind, and the knowledge that the easier they are to use, the more often they will be used, and the greater value delivered. Modules will be purpose-built and designed to aggregate complex information and data sources into concise and impactful visualizations and KPIs which will deliver the key insights, while minimizing their cognitive load and maximizing their productivity.

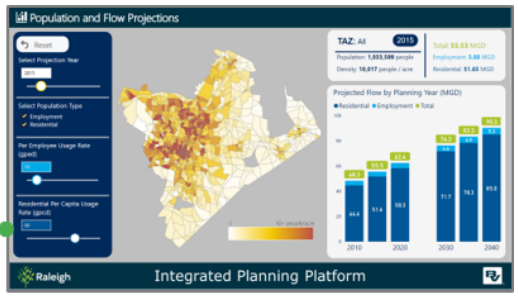
Modular and Expandable Design

As illustrated above, the Utility Management Platform launch screen is a compilation of modules which are focused on managing all aspects of the utility and can be added over time, enabling the gradual development of a fully comprehensive utility-wide Utility Management Platform.

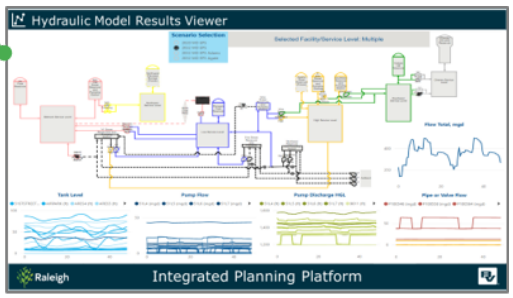
CIP DEVELOPMENT PROCESS



PLATFORM MODULES

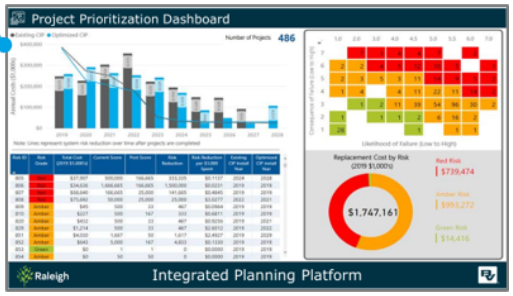


Wastewater flow projections based on a consistent source of population projections.



Viewing hydraulic model results will no longer require specialized software.

A detailed, risk-based Rehab and Replacement Forecast will help Hollywood maintain existing assets at the lowest life-cycle cost.



The portfolio of Wastewater CIP and R&R projects will be brought together in a single dashboard.

PHASE 1 Condition Assessment

FACILITY CONDITION ASSESSMENT

Condition assessment starts with the right plan and tools. Black & Veatch has worked with hundreds of utilities collecting condition information on assets. Our plans clearly document what data is to be collected (condition scores, asset management data for CMMS systems, criticality and urgent needs), we always include a safety plan and ensure everyone on the team is safe while onsite. **This is a key step in developing the City's Asset Management program and the requirements of the State Revolving Funds.** We have also embraced technology to help us do the job faster, more efficiently and with more connectivity to the City's existing systems.

Black & Veatch will perform the following subtasks to align with the City's condition assessment needs, ongoing efforts and projects.

- Condition Assessment of all wastewater system components such as:
  - Wastewater Treatment Processes
  - Storage Facilities
  - Pumping Facilities
  - Lift Stations
  - Force Mains
  - Gravity Mains
- We will use a multi-discipline approach including the following disciplines:
  - Process Mechanical
  - Electrical
  - Instrumentation and Controls
  - Structural
  - Architectural
  - Site Civil

REVIEW ASSET INVENTORY AND HIERARCHY

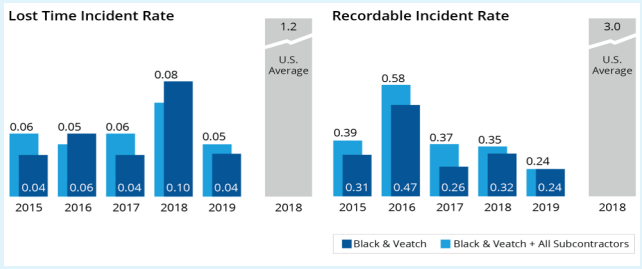
We will ensure all of the data collected is in a format consistent with the City's CMMS system, Cityworks. We will follow the asset hierarchy standards and ensure that we are collection data on all of the assets to include in the asset inventory. **Black & Veatch is perfectly aligned to bring the most efficiency in the task and the most connectivity to ongoing efforts to minimize the investment required by the City.**

The Health & Safety of Our Team and Yours is a Priority, ALWAYS.

Black & Veatch places the highest importance on the safety and health of its professionals and contractors during the performance of their work. The Condition Assessment Tasks have a higher risk of injury. Our goal is to provide an efficient and productive effort that incorporates safe working methods and strong safety consciousness by all our professionals, supervisors, contractors, and suppliers. Our safety and health programs, policies, and procedures incorporate best practices and lessons learned based on our understanding of regulatory and legal considerations as well as our experiences from all over the globe.

With a history of outstanding safety and health performance, Black & Veatch continues to be an industry leader as illustrated in the incident rates below. Our rates are based on global work hours, which include Black & Veatch and subcontractor hours. When compared to our peers and Bureau of Labor Statistics rates, Black & Veatch remains an industry leader in safety and health.

Our Team will implement Safety Planning Checklists, wear appropriate personal protective equipment (PPE) and hold each other accountable for safety. Additional measure will be take to protect against the spread of COVID 19.



EFFICIENT AND CONSISTENT DATA COLLECTION FORMS

Black & Veatch has adopted the use of Survey123 to standardize the numerous data collection forms required to collect condition information on all of the assets at a wastewater treatment plant. The forms are divided into disciplines and a team of experts will spend several days onsite collecting the data.

DATA COLLECTION PLAN

Our experience and lessons learned has reinforced the importance of pre-planning and organization before our staff every step foot on site. The first thing Black & Veatch will do is prepare a Data Collection Plan. We will solicit feedback and approval from each discipline inspector and from the City's staff. The Data Collection Plan will contain:

- Field procedures describing:
  - Approach to data collection,
  - Data fields to be collected,
  - Facilities/processes to be assessed.
- Condition scoring criteria
- Quality Control Plan
- Safety protocols to be followed on-site
- Inspection team contact information
- Schedule

Electronic Data Collection Reduces Errors in Data

STANDARDIZED CONDITION SCORING

Prior to the field data collection, Black & Veatch will work with the County to create a standard condition assessment score applicable to all asset types. This will be discussed in workshops with operations and maintenance and provided in a technical memorandum. All discipline leads will follow the Condition Scoring Guidelines.

QUALITY CONTROL

At the end of each data collection day and before any data is provided to the City for upload to the Cityworks CMMS system, the data will under go two levels of quality control. The daily quality control includes ensuring all forms are completely filled out, photos have been captured to document the condition and specific data. The second step is reviewing the data in the office for outliers, inconsistencies and adherence to the Condition Scoring Guidelines.

Very Good
No rehabilitation or renewal actions are required at this time.

Good
Only scheduled rehabilitation or renewal actions are required at this time.

Fair
Approaching the end of its life and will need moderate R&R.

Poor
At the end of its estimated useful life and will need to be replaced or rehabilitated.

Very Poor
Exceeded its useful life and replacement is needed right away.

PIPELINE CONDITION ASSESSMENT

Black & Veatch will use the results of the risk-based prioritization work during the Master Planning tasks to prioritize the condition assessment of the pipelines and to select the right inspection technology for the level of risk.

Specific to preparing and conducting a Condition Assessment Program for the Force Mains, Gravity Mains, Black & Veatch will complete the following tasks:

- Develop Inspection Parameters
- Technology Selection
- Coordination and Inspection Scheduling
- Procurement of Inspection Technologies
- Coordinate Pre-Inspection Activities with the City
- Execute Inspection Plan
- Analyze Inspection Data

Technology Selection

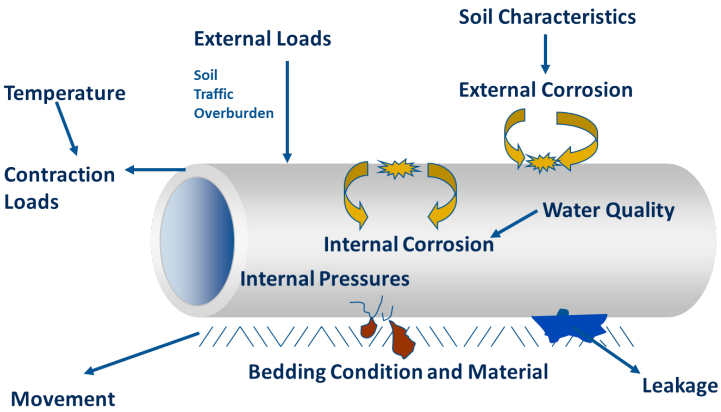
Black & Veatch has developed a risk based GIS tool for use in selecting the appropriate inspection technologies for a pipeline given specific elements such as: Risk Ranking, Flow Type, Pipe Material, Pipe Size, Presence of Coatings or Linings and Accessibility.

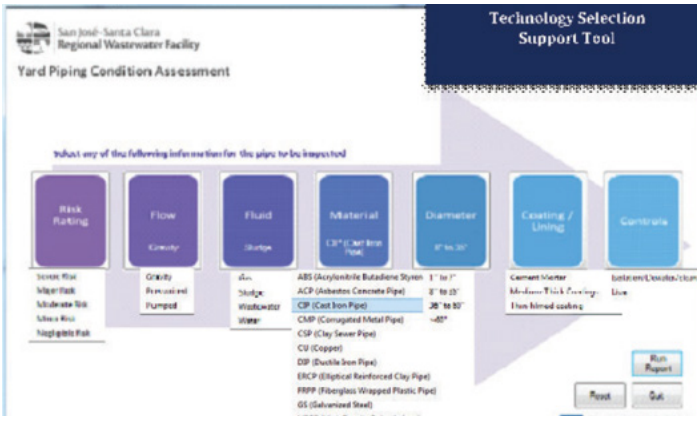
The City will get cost savings, a repeatable and defensible, fast technology selection, through utilizing our not proprietary, open source software, risk-based tool, coupled with Black & Veatch's technology suitability evaluation.

Pipe Inspection

The goal is to develop a phased inspection strategy to utilize noninvasive, low-impact inspection techniques early in the process as a way to screen for more costly invasive tools. These lower risk and lower cost pipe assessments will provide a better understanding of risk and uncertainty for a given pipeline, reserving the highest resolution inspection techniques for only the highest risk pipe.

Additionally, data collected from higher resolution inspection can be utilized to extrapolate condition of uninspected pipe or pipe inspected with lower resolution techniques. This will reduce uncertainty allowing for more effective management solutions.

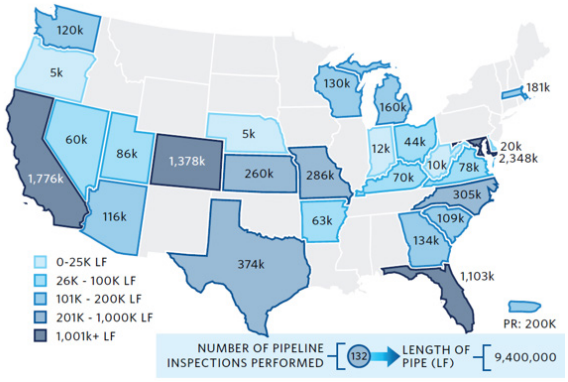




This risk-based tool, combined with our technology suitability evaluation, allows us to select the most appropriate and cost-effective technologies.

MANAGEMENT OF CONDITION ASSESSMENT PROGRAM

Our approach to pipeline condition assessment is to collect as much data as possible at the lowest cost to the City. We leverage lower cost condition assessment techniques, such as leak detection, corrosion surveys, and walkover inspections of the alignment to determine if the high costs of in-line pipe inspection are warranted. The additional data collected during the lower costs inspections is typically directly applicable to designing the necessary rehabilitations.

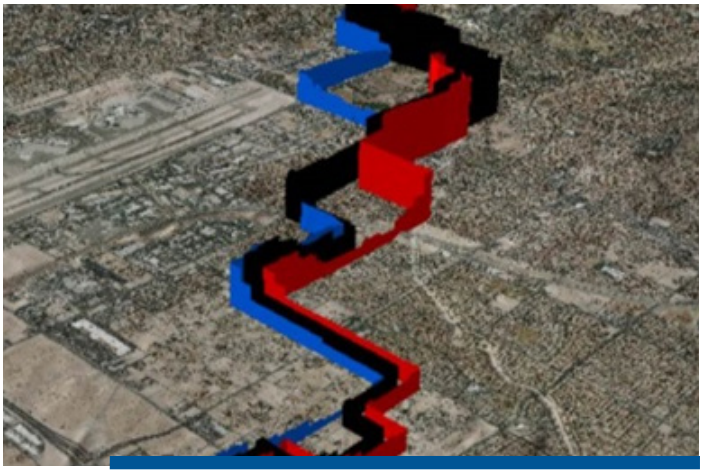


Black & Veatch leads the competition with 9.4 million pipes inspected in 130+ condition assessments in the past 20 years. Our proven inspection process will facilitate a transparent data management process for reliable business case evaluations and capital planning. Our team's experience and qualifications provide the depth and breadth of qualifications to address key challenges of the City of Hollywood.

FORCE MAIN ALTERNATE ROUTE – EXISTING TRUNK LINE ALONG TAFT STREET

A major trunk line is one the most critical components of a sewer collection system. The existing 30-inch/48-inch line along Taft Street is one of those major trunk lines in the Hollywood's collection system which currently needs additional backup. Creating redundancy and reliability to sewer systems can be expensive.

However, routes can be carefully selected to minimize costs and optimize the payback cycle. **Black & Veatch developed a GIS based Pipeline Route Optimization Method (PROM) Tool to help utilities analyze numerous routes at a fraction of the time and cost as traditional methods.** An additional benefit to this approach is that any data point that can be displayed can be in GIS can be included in the analysis and weighted for importance such as: road re-pavement schedules, water, sewer or stormwater pipeline replacement plans, critical customers, etc.



Constructability: Comparing depth of cover on alternative pipeline routes.

INSPECTION PLANNING

PROGRAMMING

- Collect System Data & Records
- Identify Customer & Facility Impacts in Hydraulic Model
- System Improvements
- Select Assessment Method
- Schedule Inspection
- Alignment Walkover & Valve Exercising

ACCESS PLANNING

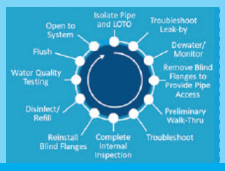
IN SERVICE
- Determine Access Requirements
- Determine Operational Modifications

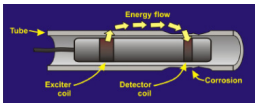
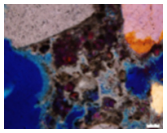
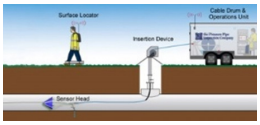
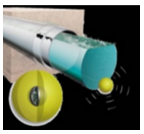
OUT OF SERVICE
- Determine Entry & Ventilation Access
- Dewatering Locations & Permit Requirements
- Refilling Source
- Disinfection Plan
- Flushing Location &Permit Requirements
- Outreach Plan
- LOTO Plan
- TC Plan
- Test shutdown
- MOPO

INSPECTION EXECUTION

IN SERVICE
- Provide Access - Inspect - Restore Operations

OUT OF SERVICE



TECHNOLOGY	RESOLUTION	TESTING EQUIPMENT	VENDOR	APPLICABILITY TO WUD
Electromagnetic (Remote Field Eddy Current/ Transformer Coupling)	Internal High Resolution		Pure Technologies	■ Multiple platforms available ■ Pipe can be in service for untethered method ■ Pipe out of service a robotic method with CCTV ■ Provides indication of condition of pipe
Ultrasonic Testing (UT)	External High Resolution		Pure Technologies, PICA, and B&V	■ Pipe out of service a robotic method with CCTV ■ Provides indication of condition of pipe ■ Detects and quantifies wall loss
Guided Wave Scanning (UT)	External Medium Resolution		Pure Technologies and PICA	■ Provides wall loss profile for localized areas ■ Pipe remains in operation ■ Detects corrosion and other flaws
Ultrasonic (Phased Array)	External High Resolution		Pure Technologies and PICA	■ Provides wall loss profile for localized areas ■ Pipe remains in operation ■ Detects corrosion and other flaws
Ultrasonic Testing With A & B-Scan	External High Resolution		Pure Technologies and PICA	■ Scans along length of the pipe to provide greater coverage ■ Adjustments to the transducer spacing allow modification for different conditions ■ Pipe remains in operation
Coupon Testing	External High Resolution		Pure Technologies, PICA, and B&V	■ Portable system that provides easy access ■ Data can be observed on site ■ Provides mapping of pipe wall, internal and external
Electromagnetic (Remote Field Eddy Current)	Internal High Resolution		Pure Technologies and PICA	■ Portable system provides wall loss profile for localized areas ■ Pipe remains in operation ■ Provides scanning for hard to access areas
Broad Band Electromagnetic or Pulsed Eddy Current	External High Resolution		Pure Technologies and PICA	■ Provides wall loss profile for localized areas ■ Pipe can remain in operation ■ Scans through coatings
Materials Testing of Mortar (Petrographic Testing)	External Medium Resolution		Black & Veatch	■ Requires sample of the mortar ■ Provides information on mortar condition and ability to protect steel
Tethered Leak and Gas Pocket/Pipe Location	Internal Medium Resolution		Pure Technologies	■ Pinpoints leaks for repair and gas pockets for evaluation ■ Provides precise location of the pipe alignment ■ Testing while pipe is in operation
Untethered Leak and Gas Pocket Detection	Internal Medium Resolution		Pure Technologies, PICA, and Hydromax	■ Identifies leaks and pockets of trapped gas ■ Minimal impact and logistical problems of performing a leak detection survey ■ Testing while pipe is in operation

COMPREHENSIVE WASTEWATER TREATMENT EVALUATIONS: 3X3 CHECK-UP

Condition assessment goes beyond just equipment useful life. Our Team understands the role of functions and components involved in the complex wastewater treatment systems that the City requires. Our Team will evaluate how the SRWWTP is currently being operated to develop strategies that continue to farther enhance the SRWWTP over time.

Black & Veatch will perform a thorough review of the SRWWTP system operations in a short period of time, conducted by wastewater treatment and operations experts. The Team will deliver a report that informs the City how the system is operating and where the City might consider strengthening the processes to assure reliable, efficient, and cost-effective operations in the future. A 3X3 Check-Up is a comprehensive evaluation of an entire wastewater system. In this exercise, Black & Veatch reviews:

Black & Veatch Innovative 3x3 Program

BLACK & VEATCH REVIEWS:

3X3 CHECK-UP	FUNCTIONS AND COMPONENTS
3 Key Functions of the Water System's Operations	■ Collection ■ Treatment ■ Disposal
3 Critical Components of Each Function	■ Effluent Water Quality Management ■ Operations and Maintenance

A review of these functions and components will reveal critical information that may be used to help the City make important cost-saving decisions by:

- Comparing the existing system operations to best operating practices.
- Identifying where the system is meeting best practices.
- Identifying where the City might consider strengthening its operations to meet best practices.
- Developing an action plan to make necessary improvements.

In summary a 3X3 Check-Up will involve the following steps:

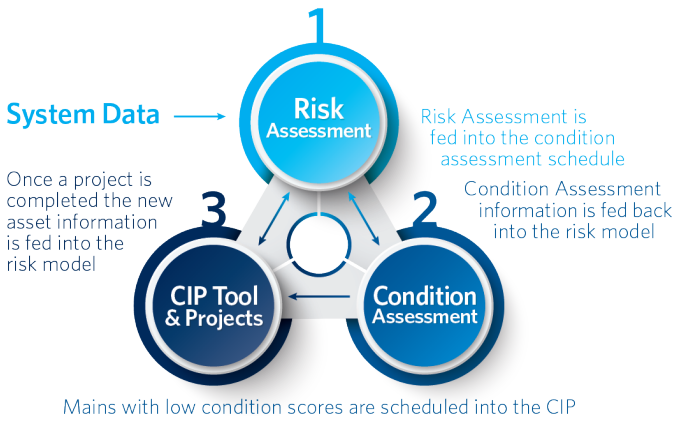
- Obtaining and reviewing existing information and data about the utility and its operations.
- Conducting a three to five day site visit of the utility to tour the wastewater system, primarily the treatment facility, review additional data, and interview key utility staff.
- Preparing a brief PowerPoint presentation on our observations and recommendations for review with the City staff at the end of the site visit.
- Preparing a brief report summarizing our visit.

PHASE 2 R&R Risk Based Prioritization

Black & Veatch will perform the following subtasks to align with the City's asset management needs, ongoing efforts and projects.

- Risk analysis and R&R Program Development
- Risk and Prioritization Criteria
- Rehabilitation and Replacement Planning
- GIS Asset Management Practices
- Training

Risk based prioritization is iterative and will be closely tied to the City's planning activities and condition assessment activities.



DEVELOPING RISK AND PRIORITIZATION CRITERIA

A risk model will be developed and based on the GIS network used to build the hydraulic model. This will provide consistency between the City's GIS system, hydraulic model, and risk based prioritization assessment tool, which will help the City to avoid issues with future CIP planning updates.

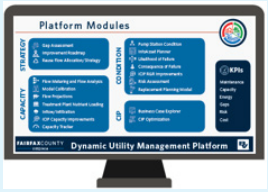
The risk-based methodology will be a function of likelihood of failure (LOF) and consequence of failure (COF) criteria to determine a risk score (LOF x COF = Risk) and risk classifications. Black & Veatch will review available data and identify initial LOF and COF criteria, scoring strategy, and weighting factors to support the risk calculations for rehabilitation planning. Black & Veatch will conduct collaborative review sessions with the City to review the criteria and results to support the risk model development

Integrated Capital Improvement Plan (iCIP), Risk Module

Black & Veatch has developed a risk analysis tool which is non-proprietary, GIS and spreadsheet based and will connect to the City's capital improvement plan tool. The iCIP Risk Module uses weighted consequence and likelihood of failure criteria to calculate the risk of failure of pipelines, valves and any distributed asset. The module can pull in any geospatial data for use in the risk calculation and associates to the City's GIS database so it can be connected to Cityworks and all of the City's asset management programs.

The City will be able to use this decision support tool to provide data driven results and recommendations and will be able to use it on a yearly basis to Update the Capital Improvement Plan..

Risk Assessment Module developed for the Milwaukee Metropolitan Sewerage District (MMSD) which includes a summary or LoF, CoF and Risk for more than $1.5B of sewer pipeline and pump station assets.



RISK ANALYSIS AND R&R PROGRAM DEVELOPMENT

When selecting the risk criteria, we will provide a repeatable, consistent, and defendable framework for determining asset criticality that will provide a foundation for the City to use long-term. Management strategies will be developed with the City to support rehabilitation planning efforts for continuous improvements to the wastewater system.

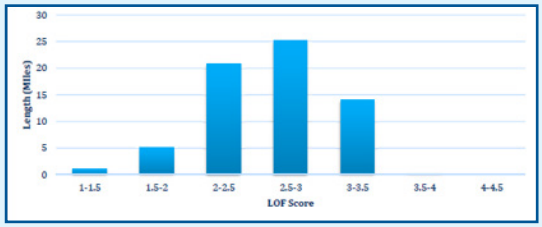
System Risk Understanding. Knowing the likelihood of an asset failing and the consequence of failure can help define strategies for more proactive rehabilitation planning and improved coordination with emergency response plans for critical pipe failures.

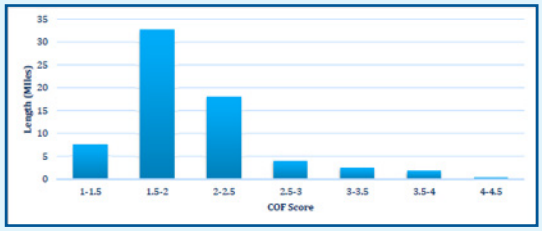
Definitive Rehabilitation Plans. Defining consistent rehabilitation methods and using decision trees that incorporate the risk criteria to define repair or replace options will position the City to make quick and informed decisions on a consistent basis.

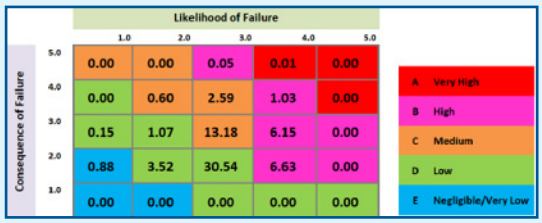
Optimized Capital Plan. Focusing improvements on high risk areas and hydraulic capacity needs to develop a manageable and achievable CIP plan. Having the right plan in place to address long-term needs will continue to build confidence with your customers.

Collaborative System Improvements. Communicating high risk areas to other departments identify opportunities to collaborate improvements with other infrastructure systems (such as street paving projects) can save time and money and reduce impacts to the community.

BROWARD COUNTY - RISK PRIORITIZATION







Black & Veatch performed a risk prioritization of Broward County's Regional Transmission System to support the selection of condition assessment technologies, R&R prioritization and emergency response planning. **This provided the County with repeatable and defensible decision support tools to justify the recommended capital program.**

REHABILITATION AND REPLACEMENT PLANNING

In coordination with the City, Black & Veatch will develop a decision tree to support rehabilitation improvement planning for the City. The decision process will help guide rehabilitation (repair or replacement) and/or condition assessments/ inspection activities. For each of the management strategies, priorities can be defined, and project costs estimated.

TRAINING

Black & Veatch will develop a customized training guide based on the risk model and will document the set-up and configuration process, specific risk criteria, prioritization parameters, and rehabilitation methods defined. Our team will provide on-site training to City staff for the selected risk prioritization tool. We will also provide training materials to allow the City to pass down the knowledge to new staff in the future.

GIS ASSET MANAGEMENT PRACTICES

As part of our asset management assessment during the City's Wastewater Master Plan Update, we will reviewed the GIS hierarchy (geodatabase) used by Cityworks, the associated GIS asset attributes, and business rules maintained within the GIS to understand and recommend improvements to maintaining effective asset data that is supported by your Cityworks and asset management program.

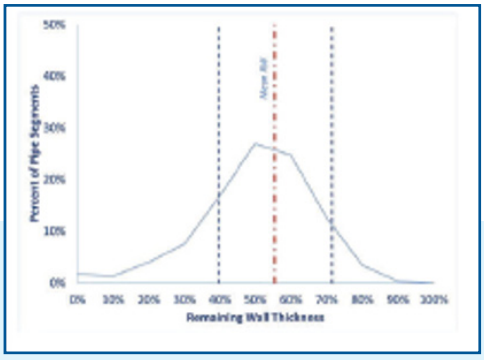
Additionally, we will review the Cityworks configuration itself to identify opportunities to optimize measuring, recording, and viewing Key Performance Indicators (KPI), key asset condition observations, and Cityworks configurations that may allow the City to further leverage its investment in Cityworks and Esri.

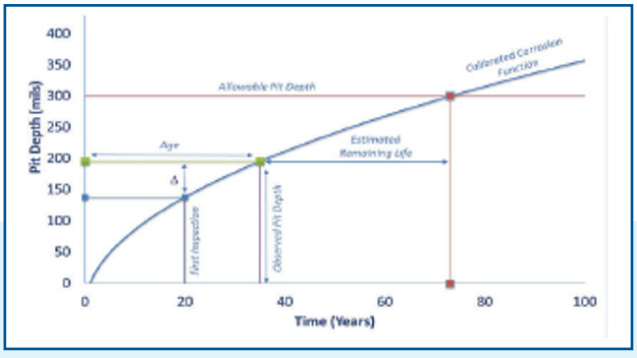
We can easily do the same thing for the wastewater assets for the wastewater master plan if desired for consistency and efficiency. This will reduce the effort on the City's staff to grant additional access to Cityworks and provide data again.

MODELING TO OVERCOME UNCERTAINTY

Estimated Remaining Service Life

Black & Veatch will prepare a statistical analysis tool to analyze the data collected from the City's various condition assessment activities. This data will enable calibration of a time-based probabilistic mode to characterize pipe deterioration and predict the remaining useful life.





Statistical analyses of assessment data will characterize the range and distribution of key parameters, which will support probabilistic analysis and communication of confident results.

Multiple data points will provide the basis for calibrating the corrosion model, which will then be used to estimate the remaining life of each pipe segment. A Monte Carlo simulation will characterize the range and confidence in the results.

PHASE 3

Wastewater Treatment Analysis

WASTEWATER FLOW AND LOAD PROJECTIONS

Understanding growth, development, system expansion, septic to sewer goals and redevelopment trends in City's services area is a critical first step in preparing wastewater flow and load projections. Our proposed tasks include:

- Review and identify trends using historic consumption data: dry and wet weather patterns, per capital flows, diurnal patterns, seasonal patterns, peaking factors
- Determine current and projected average day flows
- Determine current and projected wet weather flows
- Select a robust and reasonable design storm

Historic and Projected Population

Our approach to the population and employment projections will consider the development goals of the City and the 2020 Vision, as well as leverage available data from the Census Bureau, Traffic Area Zone (TAZ), University of Florida's Bureau of Economic and Business Research (BEBR), South Florida Water Management District (SFWMD), and the City's Planning Department.

Flow Monitoring Data

We will plan and implement a flow monitoring program to monitor the actual system flows under various conditions. Proper flow monitoring locations are key to establishing the impacts across the entire system — this is critical for model calibration and prediction of future flows.

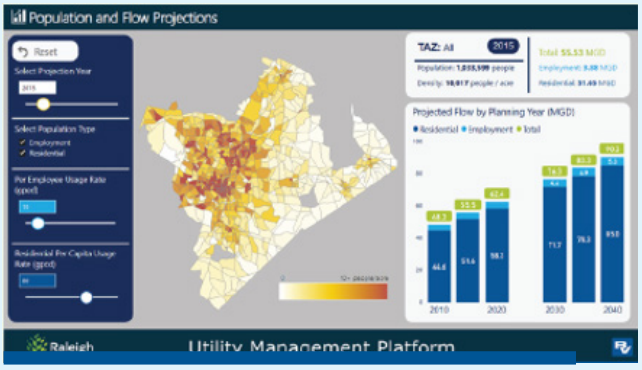
Quality collection system flow monitoring data is critical to ensuring a reliable model calibration. Regular QA/QC of flow monitoring data is essential to ensuring the collection of accurate data and reducing potential delays due to errors in flow measurement including the following tasks:

- Reviewing data monthly to identify errors in measurement and suspect data.
- Utilizing scatter plots to compare meter data to ensure the meter is recording a predictable depth to velocity relationship

Our flow monitoring QA/QC approach ensures the meter data is accurate and reliable, minimizing potential data issues associated with improper meter maintenance technology application, and potential delays to the overall project.

POPULATION AND FLOW PROJECTION MODULE

With spatial population distribution as provided by customer meter records, TAZ analyses, parcel data from the SFWMD, or the City's Planning Department, a simple population and demands dashboard will be created. Black & Veatch will build the dashboard to illustrate the existing customer consumption information and future growth. The information on the existing consumption will help enable the City to track down high water users. Then a sensitivity analysis can be performed on the population growth areas with varying per capita demand trends and triggers for system redevelopment.



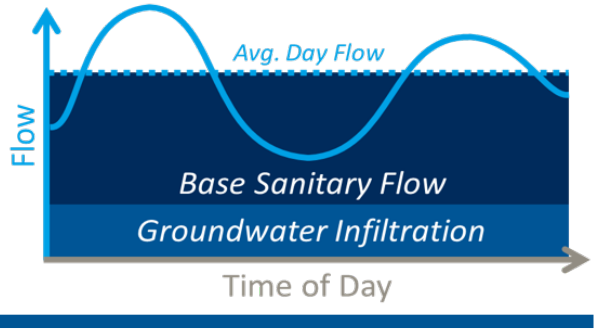
In the past, Black & Veatch built these heat maps in GIS and would prepare the total demand projection summaries in GIS. Now, we can view the spatial distribution and total projections in the same dashboard.

DRY WEATHER FLOWS

Dry weather flows consist of base sanitary flow and groundwater infiltration. The base sanitary flow is the customer contribution to the collection system, while groundwater infiltration is clean water that enters the sewer system via sewer defects at a relatively constant rate related to normal groundwater conditions and independent of rainfall.

The base sanitary flows will be established by using geocoded water consumption data with an applied return ratio that provides not only the quantity of flow but also the spatial distribution. We have successfully leveraged water consumption data, when available, for sewer planning projects across the Country. Alternatively, sewer account locations or estimates of population density can be used to allocate loadings spatially. The diurnal patterns will be developed utilizing the flow monitoring data applied to the base sanitary flow component only. To account for weekly variations, separate weekday and weekend flows and diurnal patterns will be developed and imported into the model. The base sanitary flows for each flow meter basin will then be compared to the flow metering results during dry weather periods.

The City will received a detailed breakdown of base sanitary flows per capita, groundwater infiltration per in-inch of gravity main and will be able to apply this to future growth, redevelopment and septic to sewer conversation areas.



Separating Dry Weather Flow into components allows for better understanding of the infiltration occurrence during non-rain events.

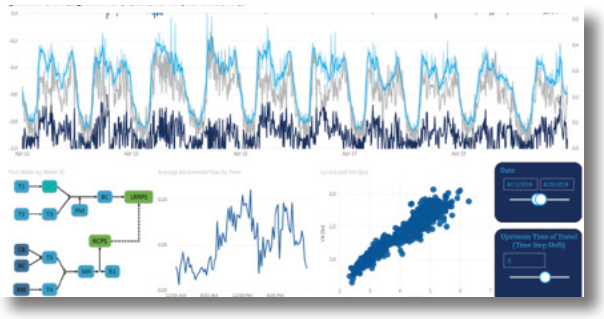
DRY WEATHER LOADS

For proper management of the wastewater treatment plant and water reclamation facility, it is important to understand the varying concentrations of pollutants and loads that will be received and will require treatment. The loadings can vary greatly depending on the flow conditions and the amount of inflow and infiltration (&I) occurring in the system. Therefore, the influent dry and wet weather loads will be determined in conjunction with the dry and wet weather flows.

When considering measures to reduce I&I, it is crucial to consider the impacts to the treatment systems as well. If the pollutant loadings are increased too much, the existing treatment systems may not be designed to effectively remove the pollutants.

Similarly, it is important to understand the per capita loadings that can be expected when expanding the collection system and converting septic sewer areas into a centralized collection system.

FLOW METERING AND FLOW ANALYSIS MODULE

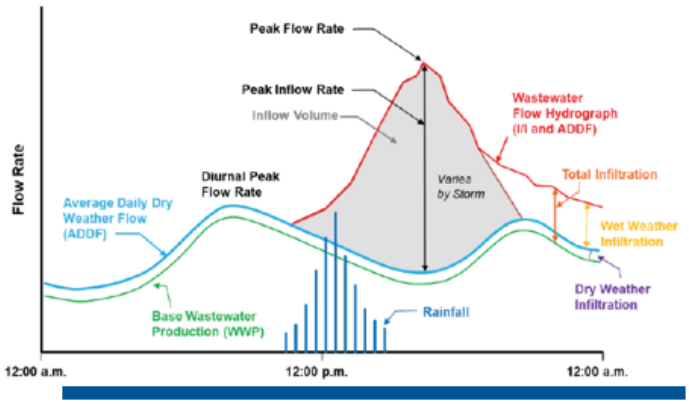


This module will provide a summary of the data collected during the temporary flow metering period. For permanent flow meter locations, the module can also include historical and up-to-date averages and peak flows. This module will provide the City with a detailed look at flow and depth levels across the collection system in a user-friendly interface.

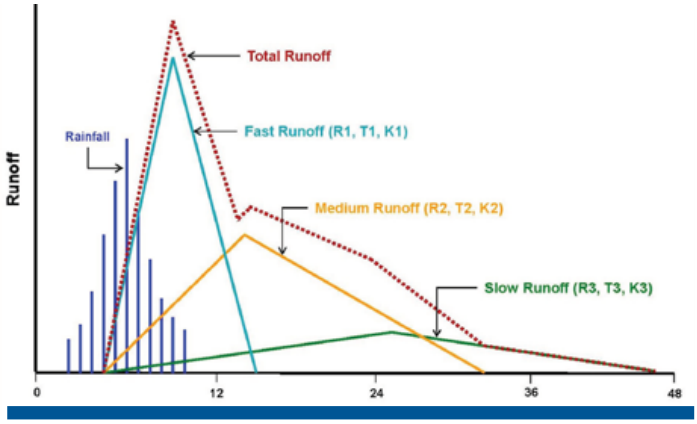
WET WEATHER FLOWS

Rain Derived Inflow and Infiltration (RDII) volumes will be determine for each storm event captured during the flow and rainfall monitoring period. The RDII hydraulic components (RTK parameters) will be used to correlate RDII response to meter basin area and rainfall depth. This correlation is critical for understanding the relative leakiness between meter basins and for projecting RDII flows under varying rainfall events during wet weather events.

Design storms are often the most sensitive parameter for modeling peak wet weather flows. To generate a more realistic design storm, reviewing radar rainfall records for significant storm events to develop a typical design storm that may occur in the South Florida area with the following considerations is proposed: Rainfall Patterns, Storm Size and Storm Movement.

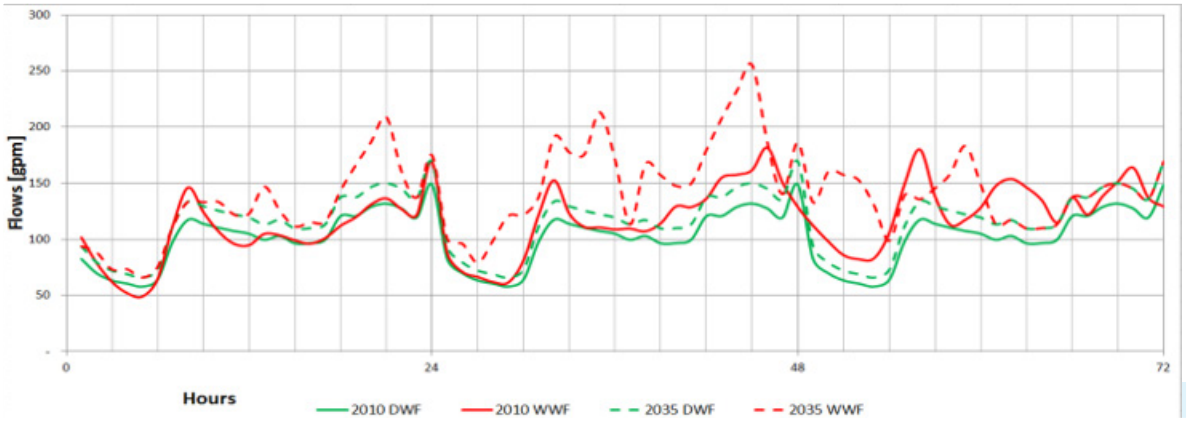


The City will benefit from updated unit flow rates that reflect observed system flows and variation in wastewater generation across the City.



RTK parameters will be developed for each meter basin to simulate fast, medium, and slow RDII responses to multiple rainfall events. R-value comparisons will help the City focus I&I reduction efforts on and high RDII areas.

LESSONS LEARNED



Sewer Service to Commercial Properties - MDWASD

The graph shows the projected wet weather flow patterns that were developed for the for MDWASD system using the wet weather hydrographs for each pump station basin. The project included the planning and definition of improvements to add multiple commercial properties to the existing collection system.

WASTEWATER TREATMENT PLANT AND DISPOSAL FACILITIES

Our team has evaluated the treatment processes at the SRWWTP and is ready to recommend improvements to enhance treatment reliability and operational flexibility.

Headworks

Influent Pump Station, Screening and Grit Removal

Both the influent pump station (IPS) and screening system are in good condition. Our Team in currently making some modifications to PLC 5 which operates the IPS to improve operational flexibility. The existing grit removal system has not been upgraded in a long time. The system is aged. A viable alternative is to retrofit the existing chambers with a vortex system with better removal benefiting the systems downstream.

The influent screens at the SRWWTP are in good condition.

BENEFIT TO THE CITY & MASTER PLAN

The City will realize capital and operations and maintenance cost savings from practical and non-maintenance intensive treatment alternatives supported by our circular economy concept that will optimize treatment at the SRWWTP.

Biological Treatment

High Purity Oxygen Activated Sludge and Secondary Clarification

The SRWWTP utilizes high purity oxygen (HPO) activated sludge. This process adds high purity oxygen (greater than 98%) into a closed reactor. Oxygen for BOD removal is transferred to the mixed liquor through the use of aerators. The design of aerators has improved in efficiency in the last 5 years. Through the use of advanced computer modeling, new aerators can reduce the energy required to mix and aerate the mixed liquor by 20-25%.

Due to technology advances over the last years, Vacuum Pressure Swing Adsorption (VPSA) is currently considered the Best Available Technology (BAT) for oxygen generation for wastewater applications, and has multiple advantages over the traditional cryogenic technology. Some key reasons are:

- Reliable, well proven technology for well over 20 years.
- Approx. 60-70% reduction in production costs due to a much less energy-intensive process than cryogenic distillation (i.e., nitrogen separation through packed media).
- Ease of operation - VPSA equipment is compact, has fewer moving parts, significant turndown ratios, and very simple PLC controls.
- Easier maintenance - as expected being a much simpler system with less moving parts and without elements for service at extremely low temperatures.

Existing high purity oxygen system (HPO) could be replaced with newer Vacuum Pressure Swing Adsorption (VPSA) technology with multiple advantages.

Another recommendation to improve the operations of the biological treatment includes surface wasting. Surface wasting has proven to be an effective strategy to manage solids. It can be done at the bioreactor of the clarifier. It removes scum form biological reactors, it improves the SVIs at the plant and allows for faster startup and recovery from upset conditions.

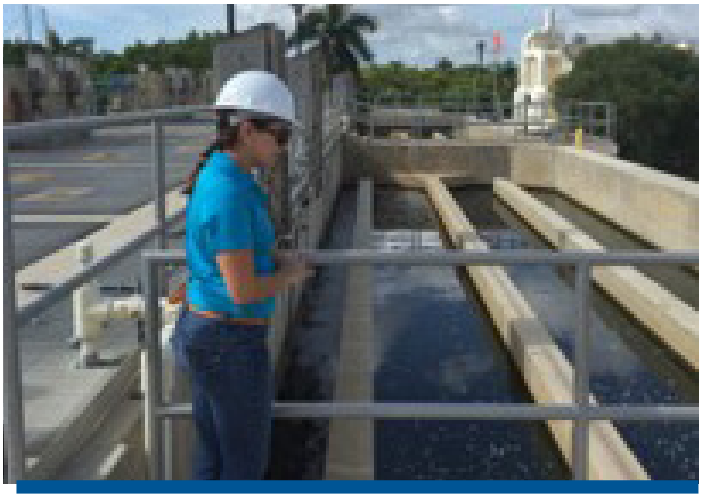
For more information, scan the QR Code.

EFFLUENT DISPOSAL

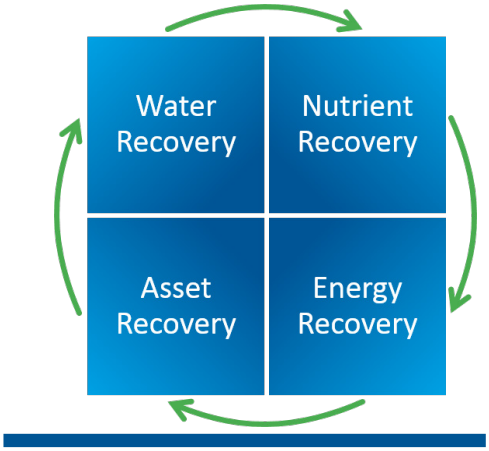
Filtration

Effluent that is placed into the effluent reuse distribution system undergoes tertiary filtration through the Parkson Dynas and continuous backwash filter complex. This system has 32 filter modules to remove effluent TSS prior to disinfection. The continuous backwash system utilizes airlift pumps to wash the sand to remove trapped particles while maintaining the design headloss across the filter. While this allows for simplified operation of the filters it does result in a high reject water flow of approximately 4%.

Parkson now includes the EcoWashTM on their new installations. The EcoWashTM system adjusts the sand washing process to match the increase in headloss from solids accumulation across the filters. This reduces the amount of reject water, along with the amount of air required to operate the airlift pumps. This process reduces the reject water rate to 1.5%, cutting the reject rate by more than 60%. The upgrade to the EcoWash™ system involves the installation of new airlift units, additional filter controls and control system. The remaining equipment would not be impacted.



Black & Veatch's recommendation to implement the EcoWash™ in the existing Dynasand filters.



Circular Economy Concept for Master Planning

Many of the recommendations presented in this section are based on the Circular Economy concept. Wastewater treatment facilities can become a resource recovery center when this concept is applied. Proactive practices to reach a resource recovery plan include strategies for reuse, aquifer recharge, biosolids land application, bio-fuels and metals recovery.

EFFLUENT DISPOSAL

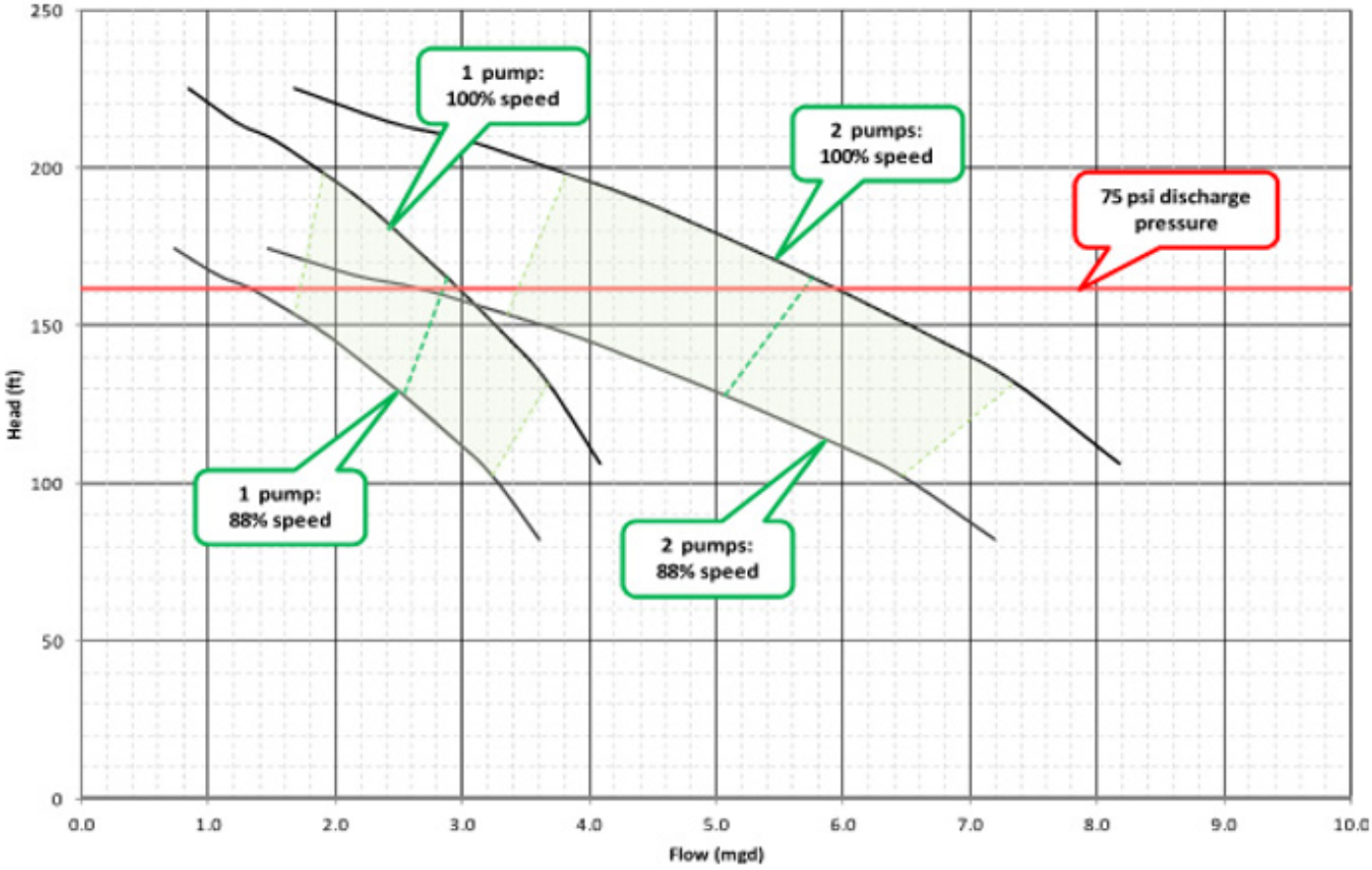
Ocean Outfall, Deep Injection Wells and Reuse Pumping Systems

Acidization cleaning of the DIWs is recommended to reduce the amount of pressure needed to pump water into the well. Over the years, the injection pressure has increased by 15-psi.

One additional 800-hp DIW well pump should be equipped with a variable frequency drive (VFD), currently only one of the pumps has a VFD. The addition of a VFD would allow for more efficient operation.

The non-potable reuse pumps would benefit from the addition of VFDs for pump control. Based on historical data reviewed, there is a large percentage of the water being pumped is immediately recirculated to the back into the clearwell. The figure below illustrate the addition of VFDs to these pumps to be maintained at 75 psi for a wide range of flows without recycling water back into the clearwell.

Deep injection well PLC was optimized by out Black & Veatch team during the SCADA improvements project.



REGULATORY CONSIDERATIONS

Familiarity with Regulations

Managing the regulatory requirements inherent with wastewater treatment and disposal involves coordination with federal, state, Broward County and other local regulatory agencies. The execution of OOL compliance projects will require involvement and coordination the Florida Department of Environmental Projection (FDEP), South Florida Water Management District (SFWMD), Miami-Dade County Department of Regulatory and Economic Resources (RER), U.S. Environmental Protection Agency (USEPA) and other local or municipal entities.

For the OOL, the effluent disposal alternative selected for a compliance project will drive the level of treatment required, which will be a function of the regulatory requirements established by these state, County and federal and agencies. The agencies and regulatory rules that will influence the selection of the wastewater treatment technologies and effluent disposal alternatives for a compliance projects are illustrated in the Figure X1.

The Black & Veatch team will successfully navigate these processes with the associated agencies through pre-application meetings held prior to beginning any planning work so that regulatory concerns can be identified and fully understood up-front; and necessary permit application meetings to discuss and ensure a thorough understanding of the application content. Such process guarantees close coordination with the appropriate agencies, and in every experience where this process has been utilized, the outcome has been mutually beneficial.

The agencies and regulatory rules that will influence the selection of the wastewater treatment technologies and effluent disposal alternatives for a compliance projects are illustrated below.

Broward County Environmental Protection and Growth Management Department

Broward County Environmental Protection and Growth Management Department (EPGMD) will be involved in the review of construction documents and the issuance of construction permits for treatment plant improvements, water distribution, wastewater collection and reclaimed water system modifications. Broward County EPGMD will also be involved with the compliance of plant effluent water quality standards that must be met for groundwater and surface water discharge, per Chapter 27 of the County statues.

REGULATORY AGENCY COORDINATION TEAM

- Regional Water Availability Rule | **SFWMD**
- Statewide Stormwater Rule | **SFWMD**
- Lower East Coast Water Supply | **SFWMD**
- Consumptive Use Permit Compliance | **SFWMD**
- Water Reuse and Ocean Outfall Legislation | **FDEP/SFWMD**
- National Pollutant Discharge Elimination System | **FDEP**
- Wells, Water Systems, Wastewater Systems | **DOH**
- Statewide Numeric Nutrient Criteria | **USEPA**
- All Construction Projects | **WPB BUILDING DEPT**

FDEP	STATE OF FLORIDA	BROWARD COUNTY	US ENVIRONMENTAL AGENCY
• Chapter 62-610 Florida Administrative Code (FAC) – Water Reuse • Chapter 62-528 FAC- Underground Injection Control • National Pollutant Discharge Elimination System • Statewide Stormwater Rule	• Ocean Outfall Legislation – Florida Legislature through FDEP/SFWMD	• Chapter 24 – Environmental Protection	• Statewide Numeric Nutrient Criteria • Section 1424€ Safe Drinking Water Act – Sole Source Aquifer Protection Program (G1)

Reuse

Now, FDEP's rules for reclaimed water also contemplate the potential for impact from reclaimed wastewater (62-610, FAC). For all slow-rate reuse systems involving irrigation of sod farms, forests, fodder crops, pasture land, or similar areas, the reclaimed water must meet secondary treatment and basic disinfection levels before the land application. If the reuse system is a subsurface application system, it is limited to 10 mg/L of Total Suspended Solids (TSS).

More traditional public-access reuse systems involve the irrigation of areas that are intended to be accessible to the public, including residential lawns, golf courses, cemeteries, parks, landscape areas, and highway medians. Such reclaimed water cannot contain more than 5 mg/L of TSS before the application of high-level disinfection (HLD). Filtration is required for TSS control and serves as the primary barrier for removal of protozoan pathogens (Cryptosporidium, Giardia, and others).

Wells injecting reclaimed water into groundwater containing greater than 3,000 mg/L of total dissolved solids (TDS), e.g. Floridan aquifer recharge, require principal treatment and disinfection requirements (i.e. advanced water treatment, AWT). AWT in Florida is defined as:

Carbonaceous Biochemical Oxygen Demand CBOD5:	5 mg/L
Total Suspended Solids (TSS):	5 mg/L
Total Nitrogen (as N):	3 mg/L
Total Phosphorus (as P):	1 mg/L
Total Organic Halogens (TOX):	2 mg/L

Piloting of AWT technologies for the implementation of reuse for groundwater and surface water recharge may be needed to identify the most efficient and cost-effective treatment technologies to be implemented. Our Team is ready to evaluate options for future expansion of the reuse customer base that the City currently serves.

Reuse Strategy

The City of Hollywood anticipates to supply with 10 mgd of reuse capacity by the year 2025 per its latest Ocean Outfall Compliance Report (2019). At this time, the City has 4 mgd of reuse treatment onsite. The City is committed to develop additional reclaimed water supply and new committed customers demand to satisfy an additional 1.5 mgd of expanded reuse capacity. The additional capacity will include system extensions for irrigation applications including local parks, medians, schools, community centers and cemeteries. A constraint to the City's availability to expand its actual reuse within its services area is the limited availability of suitable quality effluent (low chlorides secondary effluent). The City currently has agreements with the City of Cooper City and the Town of Davie to supply effluent of suitable quality for treatment and reuse but will require an expansion of available suppliers to meet the increased potential demand. The City plans to obtain contracted reuse. An additional 4.5 mgd of reuse supply would be provided by an interlocal agreement of contracted reuse with the City of Miramar. Miramar will treat and supply 4.5 mgd of reuse water to potential customers west of I-75.

Black & Veatch engineering team developed the permitting strategy for the very stringent requirements of the Cudjoe Key Advanced Water Reclamation Facility.

BENEFIT TO THE CITY & MASTER PLAN

Our local Team will leverage our relationships, experience and familiarity with Broward County, State, and US EPA regulations to provide the City with projects that will meet the present and future requirements.

FDEP UIC Program

The Black & Veatch team has established a positive professional relationship with the FDEP UIC Program throughout the State of FL, to facilitate the permit process for this type of projects. Our team knows this UIC regulatory knowledge will be critical for the City to ensure the successful renewal of their injection wells permit. Our team has the experience required to fast-track the permitting process of these projects, even when additional requirements or exemptions are considered.

Some of the activities to be conducted in preparation of the UIC permit renewal, which minimize the effort to meet FDEP regulatory requirements are:

- Review of the injection well rehabilitation design documents
- Review of the monthly performance review data for Injection well systems to quickly manage inconsistencies in the data and/or verify the need for repairs of the monitoring equipment, etc.
- Validation of the mechanical integrity test data

Black & Veatch engineering team for the SDWWTP deep injection well constriction project for Miami-Dade.

RENEWABLE ENERGY CONSIDERATIONS

Black & Veatch has extensive experience with solar facilities as part of our renewal energy portfolio. This experience is particularly strong in south FL, where Black & Veatch has completed 60% of the solar farms commissioned by FPL. This experience allows the team to provide a proven design and construction approach that covers all the angles of generation and integration with the grid in the most cost-effective manner that maximizes benefits for the utility.

Throughout the City's Wastewater Treatment Plant, there are a number of opportunities to install solar PV systems. Although the facility is tightly packed with buildings and structures, the potential for a large ground-mounted solar PV array is available both north and south of the existing Sludge Building. Additionally, the City could install smaller roof-mounted arrays to generate energy and offset the amount of energy purchased from FPL, the local electric utility. The following installations are recommended.

- Ground-Mounted Solar Array North of Existing Sludge Building – Annual production of 200,000 kWh
- Ground-Mounted Solar Array South of Existing Sludge Building – Annual production of 60,200 kWh

Black & Veatch has significant experience with photovoltaicson projects from early concept through execution and operations allow us to provide value to every step of the project life cycle.

BENEFIT TO THE CITY & MASTER PLAN

The Black & Veatch Team will use our experience with the City of Hollywood's treatment facilities to recommend a solid CIP in support of the City's specific goals. We will continue to support the implementation of energy efficient strategies for lower operational costs in the future.

PHASE 4

Collection System Analysis

EXISTING SYSTEM UNDERSTANDING

The City's wastewater collection system was originally constructed in the 1950's. Since 2007, the system has expanded to over 200 miles of gravity sewer lines and 3,700 manholes. Due to the size of the system and the volume of wastewater flows conveyed, more than 15 percent of the piping is greater than 18 inches in diameter and close to 10 percent is from 36 to 72 inches in diameter.

The City owns and operates more than 85 wastewater lift stations with approximately 100 miles of force main piping. The City also receives wastewater flows from approximately 100 privately owned pump stations, mainly low-volume stations serving individual apartment buildings or businesses, as well as the six satellite Large User collection systems. The City is currently reducing the number of private lift stations where sewer systems are being expanded.

Approximately 46 percent of the City is unsewered and the City has begun to sewer portions of the unsewered areas due to concerns with rising sea water and therefore groundwater levels. Some projects are currently in construction, such as the Royal Poinciana sewer system expansion. The City's sewer expansion program is being coordinated with other infrastructure programs, such as the Water Main Replacement Program. Multiple sewer expansion projects are in various stages of planning, design, and construction, with water projects, to reduce capital costs as well as repeated inconvenience to City residents and businesses.

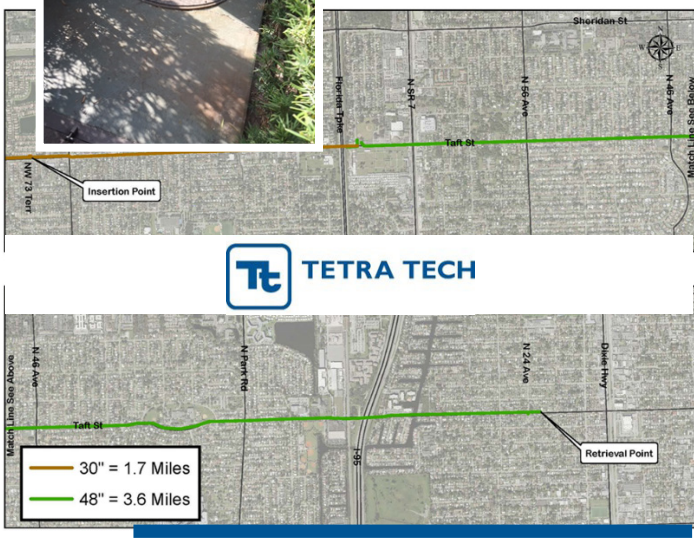
The City is expanding its gravity sewer systems and assessing existing force mains and lift stations. The City is taking these actions to prevent sanitary sewer overflows, improve groundwater and surface waters, and to reduce the cost of unexpected repairs.

The challenges being faced by the City currently with existing force mains and lift stations include the following:

- Aged and undersized infrastructure
- Groundwater quality
- Force main breaks
- Hydraulic deficiencies

Wastewater master planning must consider improving the system to address the challenges above, but must also consider future wastewater needs, in particular, increased redevelopment of existing areas. One area of interest in the City is the Federal Highway and Florida East Coast Railway corridor, which will likely experience increased density when portions are redeveloped. Understanding redevelopment patterns in the City, and the timing and impact on the wastewater system is a key consideration in wastewater planning, which our team comprehends thoroughly.

Private lift station to be abandoned as part of the Royal Poinciana Sewer Expansion Project



Limits of Taft Street Force Main Condition Assessment

COLLECTION SYSTEM ASSESSMENT APPROACH

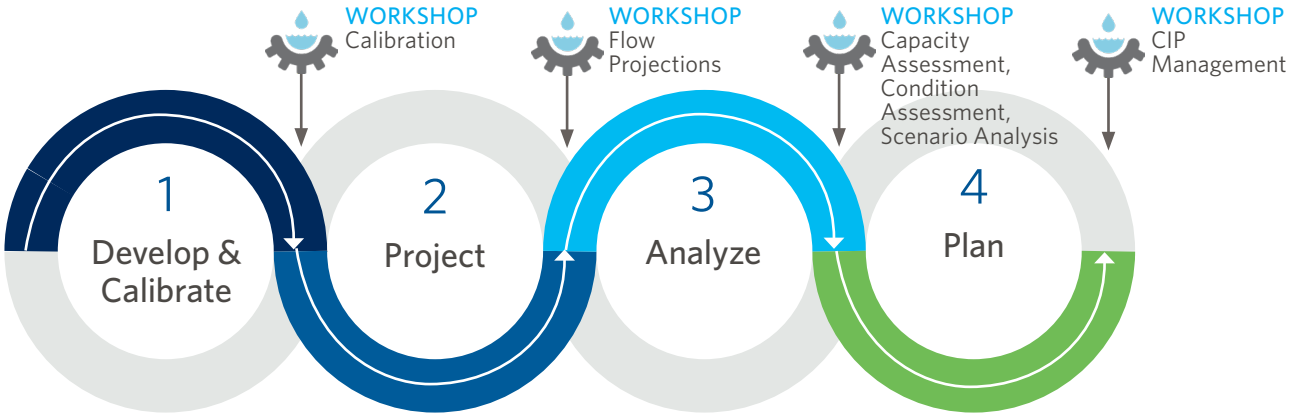
The System Capacity Analysis is important to establishing the existing and future collection system needs. Capacity assessment begins by evaluating the current system with flow and pressure monitoring and updating the existing hydraulic model to ensure an accurate hydraulic model that represents existing conditions. The approach then focuses on the next steps for the City future year capacity assessment levering the hydraulic model. The capacity assessment methodology is designed to coordinate with the other plan activities to yield an optimized, trigger-based CIP.

> The Black & Veatch team listened to our needs, communicated well with City staff and provided high quality work products allowing the City to make confident, well-informed decisions based on their recommendations, training and decision support tools."
>
> **BRIAN D. PICKARD, PE**
> CHIEF PLANNING ENGINEER
> CITY OF TAMPA WATER DEPARTMENT

Model Update

The model will be updated based on the most current GIS records to reflect what is referred to as the existing system and the baseline system. The existing system will include all existing infrastructure: force mains, lift stations and major gravity sewer pipes. This will be used for calibration. The Baseline system will include the existing infrastructure and in addition will include all immanent projects that will be constructed before the end of the master plan. This allows the team to account for the immanent projects and not duplicate the same recommendations.

If needed and based on the alternatives required, the team might include additional gravity portions to support identifying the proper sizing of recommendations.



- Field Data Collection
- Model Update
- Calibration

- Baseline TAZ Population & Employment Projections
- Projection Refinement based on Key Planning considerations
- Spatially Allocate Flow Projections

- Future Year Hydraulic Model Assessments
- Scenario Development
- Condition Risk Scores using iCIP or InfoAsset
- Preliminary Project Identification

- Project Prioritization and Schedule
- Cost Estimates
- CIP Optimization
- CIP Management Tools/ Platform Development

The Black & Veatch team will provide expedited services to the City by reusing and building upon existing knowledge of the collection system including pipeline condition information and hydraulic modeling.

MODEL CALIBRATION

Once the model is developed, it must be updated to reflect the flows and depths observed in the collection system through an iterative process. This involves comparison of the modeled and observed data.

Dry Weather Calibration

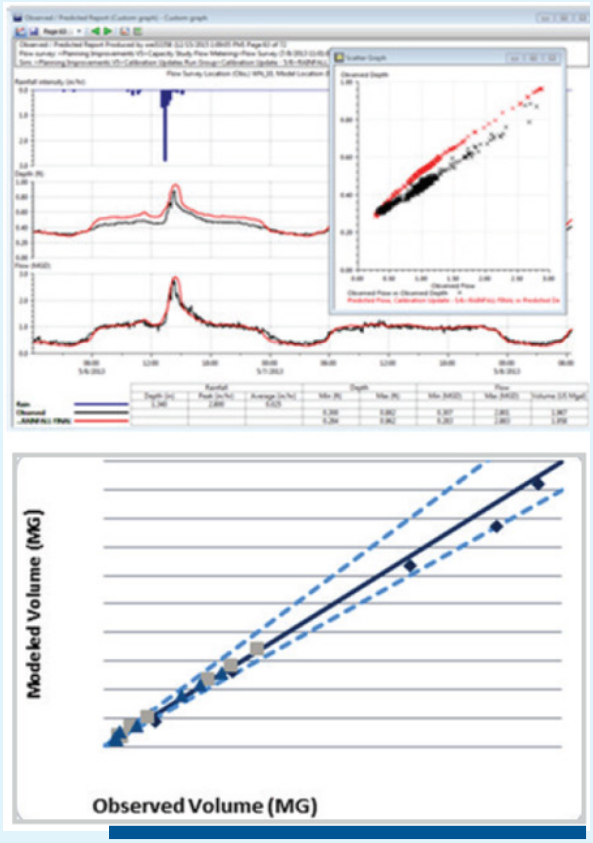
Dry weather calibration begins with importing the model updates and the dry weather flows into the model. The dry weather calibration assesses the accuracy of these updates against the monitoring data and verifies that the model routes the flow accurately. Industry standard calibration goals (using WaPUG guidelines) will be set to rate the accuracy of the model. The pipe roughness and sediment depths will be adjusted so that the modeled and observed depths match during the simulation.

Wet Weather Calibration

Our wet weather calibration process will provide the City with a model capable of predicting the performance of the collection system under a variety of storm conditions. We will utilize the hydrologic engine built within Infoworks or InfoSWMM that will yield a wet weather response that matches the flow meter data from rainfall data collected from the gauges distributed throughout the collection system as part of the flow monitoring task. The system wet weather response will be generated by assigning ratios to each flow meter basin in the model, which will represent the percentage of rainfall that enters the collection system. By using a consistent approach to assigning areas that contribute to I/I, the rainfall percentages can be directly compared across the system to identify areas of overall high I/I as well as areas with higher peaking factors due to higher Inflow, or fast-response, and percentages.

We will conduct a continuous simulation for the entire calibration period to verify the model responds to a variety of storm event depths and intensities as well as varying soil moisture conditions.

CALIBRATION



Top — Visual calibration comparison indicates agreement between model results and metered data. Bottom — Scatter plots convey overall agreement across all meters to the observed data.

The City will receive a fully calibrated and functional model to aid in decision making during the master plan and well into the future.

SYSTEM PLANNING

For the collection system planning, the calibrated model is updated with future flows to yield a tool for the City of Hollywood that can simulate the collection system operation and performance under a variety of conditions. This tool allows you to identify and plan for future system improvements.

Performance Criteria

The planning will start with the development of the performance criteria to set the desired level of operations, design storm, and improvement design. Performance criteria establish the desired operational conditions for the collection system and the design criteria for improvements. These criteria typically include the following:

- Manhole Surcharge Levels
- Design Storm
- Pump Station Capacity
- Force Main Velocity

Our team will work with the County to develop these criteria. However, the most critical and sensitive parameter in collection system master planning and modeling is the design storm. Additional analysis is recommended to select the appropriate storm.

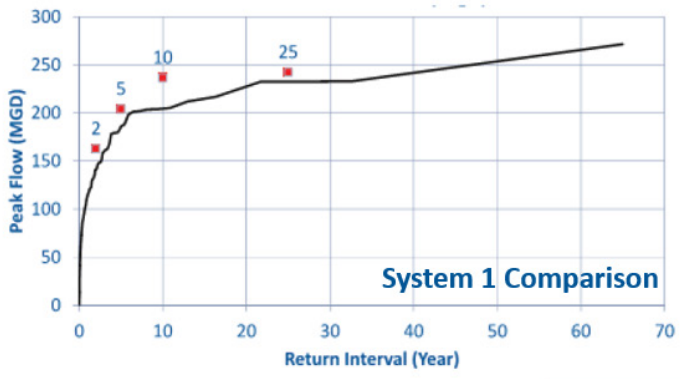
Carefully selecting the most appropriate design storm for model application will insure the system is right-sized, and funding is allocated where it is needed most.

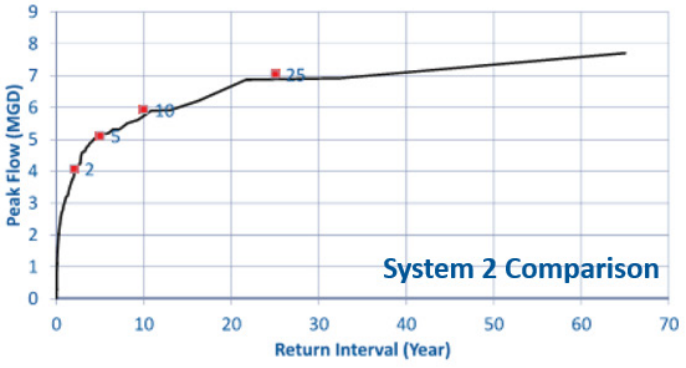
Design Storm Selection

Integral to the capacity assessment is careful selection of the design storm. Traditionally, design storms have been based on Soil Conservation Service (SCS) distributions.

While defensible and commonly applied, the City may elect to use actual historic rainfall events for the design storms. Rainfall records from the nearby National Weather Service gauges will be entered into the model for a continuous simulation over a duration to characterize the system response for each of these rainfall events yielding a peak flow recurrence interval. The responses are ranked based on performance criteria such as peak flow, manhole flooding volumes, wet weather volumes, etc. so that specific storms can be selected that cause the 1-, 2-, 5-, 10-year, etc. response. The advantage of this process is that the antecedent moisture conditions are accounted for in the historic simulation, which can dramatically impact the wet weather response.

The figures below show the results of the historical analysis on the projected peak flows compared to the peak flows from SCS storms for two different systems. One of the systems demonstrated that the SCS storm over-predicted the peak flows in the collection system compared to the historical peak flow recurrence interval. The other treatment plant figure is a case where the SCS storm yielded a peak flow close to the peak flow recurrence interval developed from historical analysis.





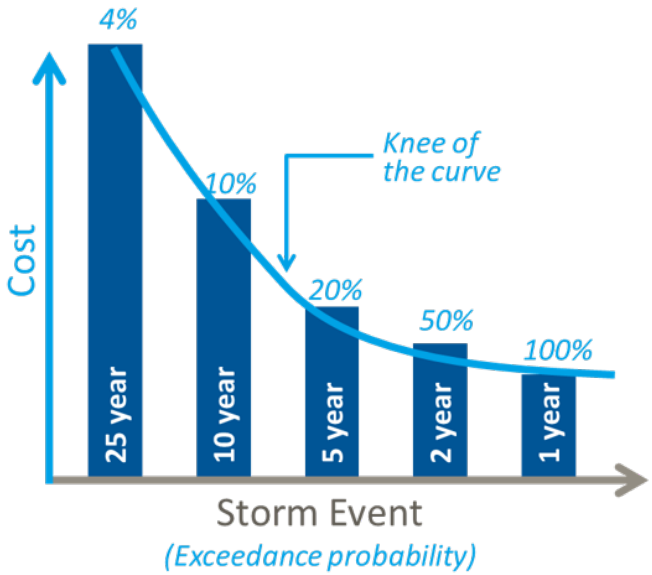
Peak Flow Return Intervals used to compare SCS storm versus historic storms. System 1 should use historic rainfall data. System 2 should use the SCS curve data.

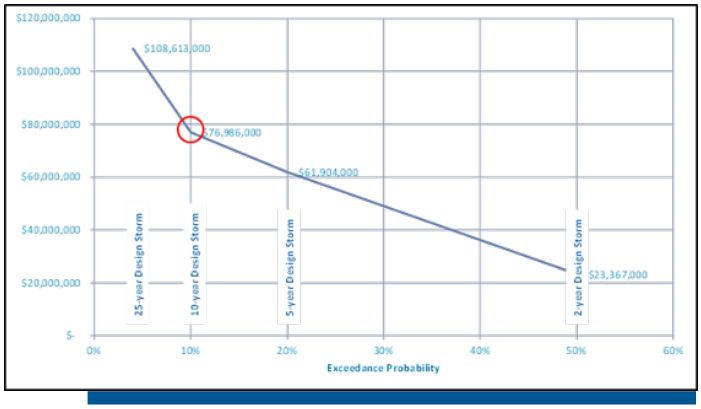
Knee-of-the-Curve

Black & Veatch will assess the system under a variety of design storms (historic or synthetic). System improvements will be developed with planning level costs. Comparison of the projected costs required to reduce surcharge conditions or likelihood of an overflow under a given storm event will allow the City to perform a risk-based analysis to select a design storm.

A graphical comparison of the costs versus the design storm will illustrate a point where the costs for the improvements drastically increase compared to the design storm intensity. This point, known as the knee of the curve, represents when the marginal cost of the improvements exceeds the benefit of conveying a larger storm event. The adjacent figure shows the justification for selecting a 5-year recurrence interval storm.

The City will make the right investment at the right time to protect the system, residents and visitors during a significant storm event.





Example of Design Storm Selection from the City of Raleigh Sanitary Sewer Capacity Study

LESSONS LEARNED

Even though dry weather flows may increase with increasingly dense development, there is no reason the same length of collection system will collect more wet weather flows.

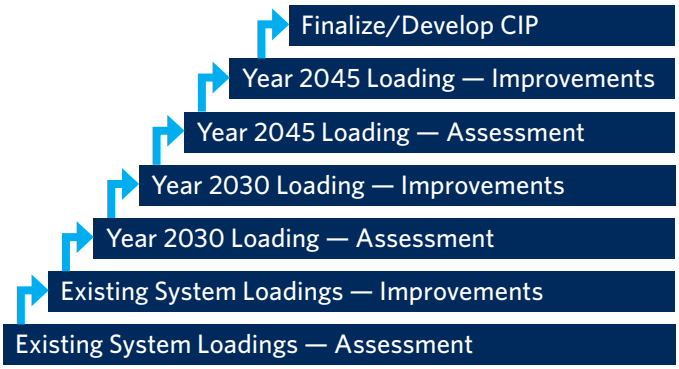
In Raleigh, NC, we locked in the wet weather response in a redevelopment area (shaded pink in the figure) to reduce the required pipe diameter. The wet weather flows were not increased for future planning years. What would have been a 72-inch parallel of an existing 48-inch trunk sewer was converted to a 60-inch replacement. The approach addressed a capacity and conditions issue with the existing pipe at a significant cost savings.

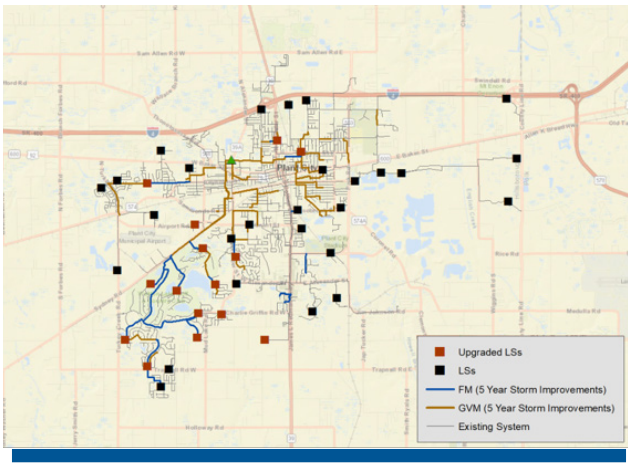
System Assessment

Model runs will be performed without system improvement under existing and future flows to highlight the locations where hydraulic bottlenecks occur, which cause the performance criteria to be violated as a part of the assessment. The system results (without improvements) will be presented in figures showing the degree of manhole surcharge (manhole freeboard at maximum HGL) as well as the sewers that are surcharged and the locations of hydraulic bottlenecks as shown in the adjacent figure for Plant City, FL. The assessment also includes a review of the pump station and force main capacities.

When implementing capacity driven improvements into the model, we will employ an evaluation to determine if a capacity limitation exists, and what measures should be taken to address the limitation. The existing collection system will be analyzed under dry and wet weather loading conditions. The implementation timing of the improvements will be based on where the system performance exceeds established "trigger" criteria such as surcharging level in the manholes. These trigger criteria will be developed in close coordination with the City. Black & Veatch separates the trigger and the design criteria. Once an improvement is identified, the design could be set to a more conservative value such as no surcharge.

A stair-step approach will be applied in which the assessment and improvement are alternated to develop not only the ultimate system improvement but also the improvement timing. Improvements will be appropriately sized to convey flows for the ultimate future planning horizon. The resulting capacity driven improvements will be combined with the system condition driven recommendations to prioritize the CIP.



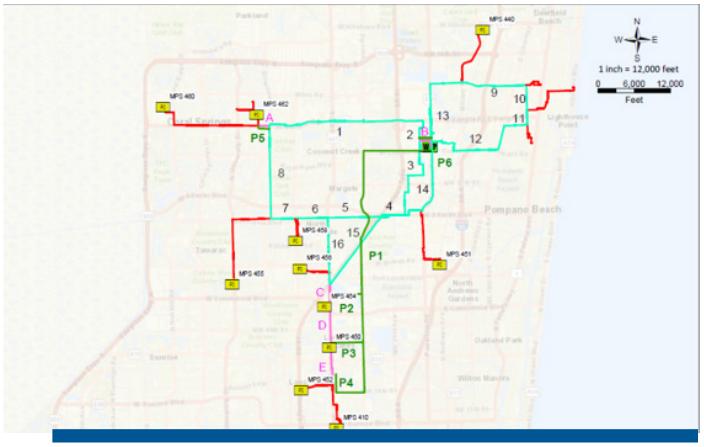


System Surcharge Figure for City of Plant City, FL Highlights Capacity Concerns for Locating Improvements.

System Resilience

System resilience covers many facets and triggers many different ideas for people. In collection system planning, we typically look for single points of failure and use a combination of hydraulic modeling and risk prioritization to determine what, if any, improvements are needed to increase system resilience due to pipe or pump asset failures.

A big focus of the Broward County project was to increase resilience and allow the County operational flexibility for maintenance and condition assessment.



Broward County Regional Transmission System Black & Veatch analyzed the looped piping and proposed relief piping to increase resilience in the force main system.

PHASE 5 Capital Improvement Planning

Black & Veatch will perform the following subtasks to align with the City's capital improvement needs, ongoing efforts and projects:

- Cost Evaluation of Proposed Improvements
- Develop a 10-year Capital Improvement Plan

Based on the recommendations developed in the prior tasks, the next step involves establishing a preliminary improvement program which includes all recommended capital improvements with a preliminary priority schedule based on the following:

- Capacity improvements
- Rehabilitation and replacement needs
- Regulatory changes
- System optimization opportunities

> "Black & Veatch Staff are adapt at listening to the needs of the County, communicating well and providing high quality deliverables. They have worked across departments and disciplines to provide the County holistic system recommendations. As a result, the County had gained increased confidence in implementing projects without the fear of negative unintended consequences from evaluating systems in silos. I recommend Black & Veatch's services to other utilities."
>
> **MARGARET R. (BECKY) COOK, PE**
> SENIOR ENGINEER, PINELLAS COUNTY

Integrated Capital Improvement Plan (iCIP) - Capital Projects and Cash Flow Module

The second module in the iCIP tool developed by Black & Veatch is the Capital Projects and Cash Flow Module. iCIP is a state-of-the-art CIP spreadsheet tool to provide consolidated CIP management with project costing, encumbrance and cash flow schedules, project phasing, and setup for easy updates based on project changes, construction cost changes, escalation, and more.

Allows multiple CIP Optimization Scenarios based on risk.

Illustrates short and long-term cash flow needs

Capital Improvement Project Prioritization

Black & Veatch's Business Case Evaluation process aims to minimize long-term system costs while maintaining required levels of service and mitigating unacceptable system risks. For the Capital Improvement Planning task and development of the CIP, Business Cases will be developed for each of the projects and programs and run through the risk weighted NPV prioritization approach presented in the figure below.

Black & Veatch will develop project business case assumptions for each identified project/program and this will be documented in the City's business case assumptions form. Black & Veatch will review this form with the City and can, as necessary, provide example business case templates that will be modified in a series of interactive meetings to capture all the necessary data in the required format for the City.

Our example templates include the following basic data for each project/program:

- Project definition and work scope
- Triple Bottom Line (TBL), Level of Service (LOS) or other non-financial scoring
- Capital cost breakdown by year
- O&M impact (before & after)
- Revenue impact (if applicable)

Once the Business Cases are developed, Black & Veatch will utilize a Portfolio Optimization and Project Scheduling tool to develop a short-term CIP.

The CIP will be optimized to maximize the NPV benefit or risk reduction per dollar spent. The tool uses the combination of the budget scenario and non-financial planning criteria constraints (Safety, Environmental, Regulatory, Customer Service, etc.) with the NPV results to maximize the NPV benefit given those constraints. In other words, it checks every combination of project installation dates that will:

- Maximize NPV benefit or risk reduction per dollar spent
- Stay within the annual budget, schedule, and non-financial constraints for each scenario

Project timing optimization is then conducted for all projects to arrive at a portfolio optimization result. Special focus is given to investments that have a significant budget impact or are being considered for delay beyond their planned installation date due to utility budget constraints.

The projects can first be scheduled based on the risk tolerance levels of the City. Next, budget constraints can be incorporated into the scheduling process and any changes to install years due to budget constraints are then recalculated. The final step of the prioritization process is to incorporate planning criteria scores, project rankings, and budget constraints into the implementation schedule and going over the results in a planned workshop with the City.

- Based on condition assesement
- AMPs and EAMPs
- Other investment needs (growth, regulatory, safety, etc.)
- Include asset operator recommendations

Input Assumptions

- Planning Criteria
- Capital Costs
- O&M Impact
- Growth Assumptions
- Revenues
- Schedule Constraints
- Failure Probability

Key Results

- Financials Template
- NPV Benefit - Avoided Case
- Financial Efficiency
- Balance Scorecard
- Project Ranking/ Prioritization

Optimization Model

- Financial Efficiency
  - Risk Tolerance
  - Budget Constraints
- Criteria Scoring
- Regulatory & Environmental
- Safety
- Customer Service

FINANCIAL AND FUNDING PLAN

Black & Veatch's approach to understanding the impact of traditional and non-traditional sources of funding is pragmatic and complete. Typically, a utility that sources any funding that will adjust the capital structure of that utility must employ certain goals and objectives that will philosophically assist in balancing the need for funding and the ability to service the requisite sources of funding. Our approach to funding is embedded in understanding the impact to the existing customers served by the utility, preserving the stability and predictability of revenues and cost on the system, and developing a plan that is understandable and simple to implement across the entire organization.

Revenue Sufficiency

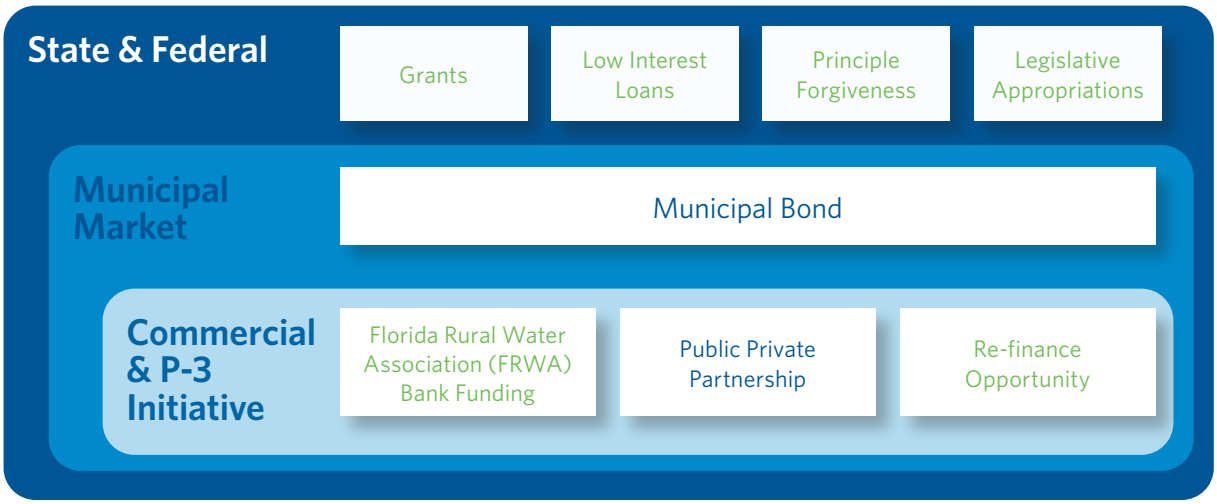
To assess the City's aptitude to procure certain sources of funding, existing utility rates should generate adequate revenues to meet the operating and capital costs and ensure the financial stability which includes the compliance with applicable regulatory requirements and rate covenants. The revenues must support the City's growth and capital programs in a stable manner. The challenges and/or progress associated with revenue sufficiency must be communicated to customers, elected officials, and other stakeholders, so that they understand the reasons, justifications, and business case associated with the decisions made by utility operators. Black & Veatch will support the City in appropriately understanding the City's funding capacity and clearly communicating this message to existing stakeholders.

The Black & Veatch team will provide the City with several options to fund the CIP and meet the goals of the project.

Alternative Financing

Black & Veatch maintains an Alternative Financing group that can support the City in procuring and administering potential grants and low-interest loan funding for pre-construction and construction activity associated with the City's capital improvement program (CIP). Our approach to alternative financing is embedded in identifying funding resources for long-term capital improvement program (CIP) elements while simultaneously partnering a comprehensive program of grantsmanship, planning, financial assessment, engineering, and administrative services to provide solutions. The concept is to provide complete financial solutions that match the client's: infrastructure needs, customer demographics, financial condition, environmental goals, proposed customer service levels.

The Black & Veatch team will seek to understand the basic operating and demographic characteristics of the organization in order to appropriately identify funding options. The diagram below outline potential funding options:



Long-Range Financial Planning

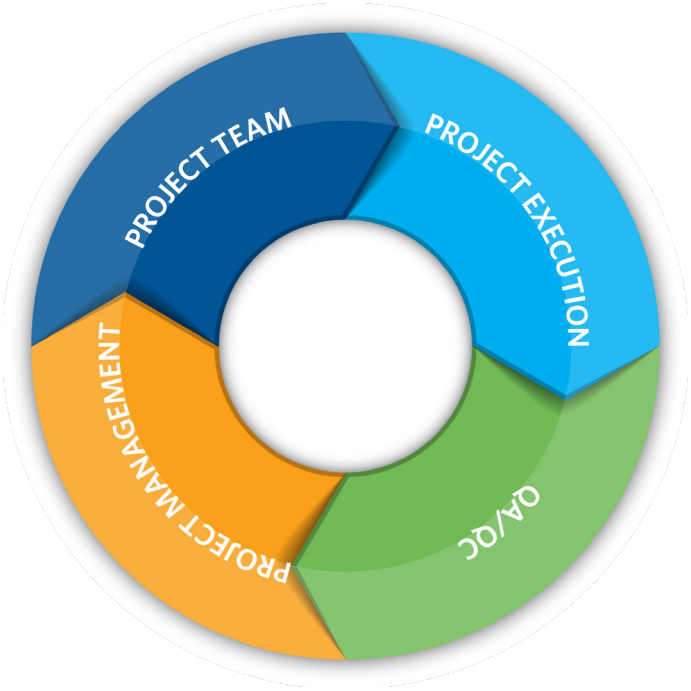
In supporting the City in the preparation of their long-range financial plan, Black & Veatch's approach is comprehensive in analyzing the City's policies and practices for funding operations, capital facilities plans, and the ability of the City to maintain established financial metrics and rate covenants. Understanding these components of a financial plan, will be critical in understanding financing options and assessing the impact of these financing options on the financial integrity of the utility system. Ultimately, Black & Veatch will assist the City in assessing a suitable balance among the available financing options.

Typical Funding Objectives:

- Cost of Service Recovery
- Minimize Customer Bill Impact
- Legality
- Rate & Revenue Stability
- Ease of Understanding
- Ease of Implementation
- Utility Level Affordability

Quality Control

Black & Veatch maintains strict internal quality control procedures on all engagements. These procedures ensure that project tasks are properly executed and the established financial planning objectives of the utility are met. Black & Veatch philosophically views quality assurance/control as an essential and multi-faceted task. Our process incorporates "lessons learned" from past performances on projects throughout Black & Veatch. Black & Veatch is firmly committed to providing high quality work and advice that creates value to the City. With over 80 percent of our projects performed for repeat clients, the frequency with which we perform additional services for existing clients is a testimony to our consistency, reliability, and quality controls standards.



FUNDING SUCCESS

For Winston-Salem, Black & Veatch secured and managed six CWSRF loans valued at $110M including $20M of 0% interest loans to support implementation of nine critical wastewater master plan projects programmatically. Black & Veatch took full control over funding application in securing the loans for this important project but through their efforts we were also able to secure loans for three additional wastewater collection system projects completed by others.

PHASE 6 Master Plan Documentation

Documenting the master plan process, assumptions, data sources and results, and summarizing the findings and recommendations is an extremely important part of the master planning process. Black & Veatch recommends preparing technical memorandums throughout the entire process to receive input from the City and to ensure assumptions and decisions made have buy-in before the Master Plan report is prepared and presented to the City. This also allows the final report to reference the technical memorandums as appendices and to be a more clear and concise document that isn't bogged down with the technical content necessary in the technical memorandums.

Providing Clear and Useful Deliverables

The Black & Veatch team believes that deliverables need to be both technically precise and easy to understand. We understand how to communicate complex technical information to audiences with varied needs – from rate payers and stakeholders to detailed technical team members. Our approach will be tailored to the City's specific preferences with a recommendation for a layperson (graph-centric) executive summary, core master planning document with appropriately referenced material, and appendices housing detailed technical back-up material.

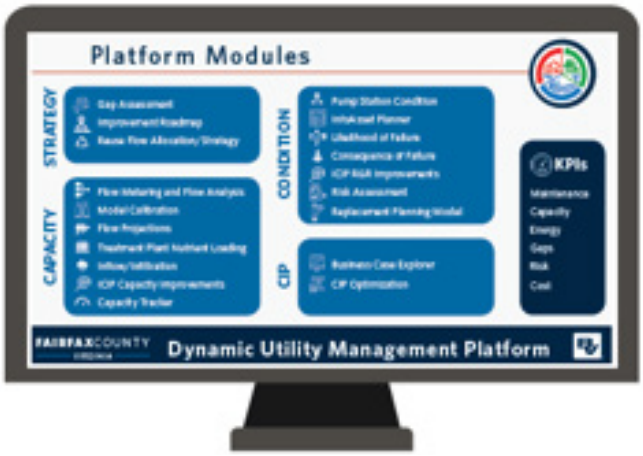
Adaptive Planning and Utility Management Platform

The Black & Veatch team believes that a master plan is so much more than the report document at the end of the project. A modern, adaptive and dynamic master plan should live on, be useful every year, and provide tools for the City to rely on independent of consultants.

We have created the Utility Management Platform as a series of decision support tools to assist the City in benefiting from all of the data that is already being collected daily, the tools already being created for master planning analysis and the inexpensive technology already available to all parties. In addition to the final Master Plan Report, Black & Veatch will deliver a Utility Management Platform to the City for continued planning and adaptability into the future. The platform will also be used to support the Program Management efforts moving forward.

> "I had a vision for what a dynamic asset management plan could be, but I wasn't sure that it could become a reality. Black & Veatch listened to my vision and developed a dynamic platform using Power BI which was designed to reference our enterprise data for our Atlantic Treatment Plant. The platform is easy to navigate and includes concise, streamlined dashboards which gave us unprecedented access to our data, including the calculation and tracking of more than 40 KPIs. The dynamic platform provides us with actionable insights at-a-glance and has greatly enhanced out ability to effectively manage our utility."

ANAS MALKAWI
CHIEF OF ASSET MANAGEMENT
HAMPTION ROADS SANITATION DISTRICT



Utility Management Platform Module Examples

The potential Platform Modules available for the City are endless. The Black & Veatch team envisions including modules for each task described in this project approach including a few summarized below.

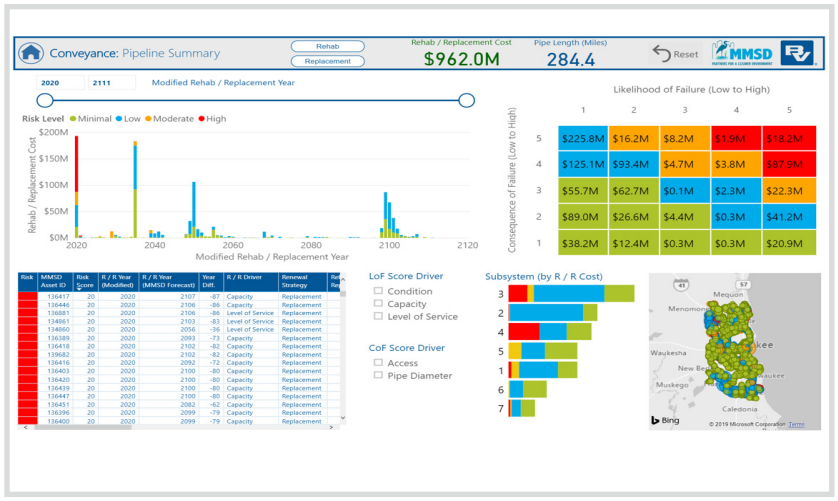
We will rely on and incorporate the following:

- Smart Triggers
- User Experience and Accessibility
- Modular and Expandable Design
- Training of County Staff

Pump Station Condition Assessment

In November of 2019, Black & Veatch delivered a Condition Assessment Module to Fairfax County that concisely and effectively conveyed the results of the displayed the results for more than 900 assets across 20 pump stations in a single, easy-to-use dashboard screen.

Our team can provide something similar for Hollywood that connect to Cityworks, SCADA and includes analytics on energy efficiency information and remaining useful life beyond simply using age.



Collection System Risk Assessment

Risk Assessment Module developed for the Milwaukee Metropolitan Sewerage District (MMSD) which includes a summary of LoF, CoF and Risk for more than $1.5B of sewer pipeline and pump station assets.

The City will receive something similar to this on the Wastewater System. It will incorporate projects which include areas of high risk wastewater force mains and wastewater treatment plant components.

Replacement Planning

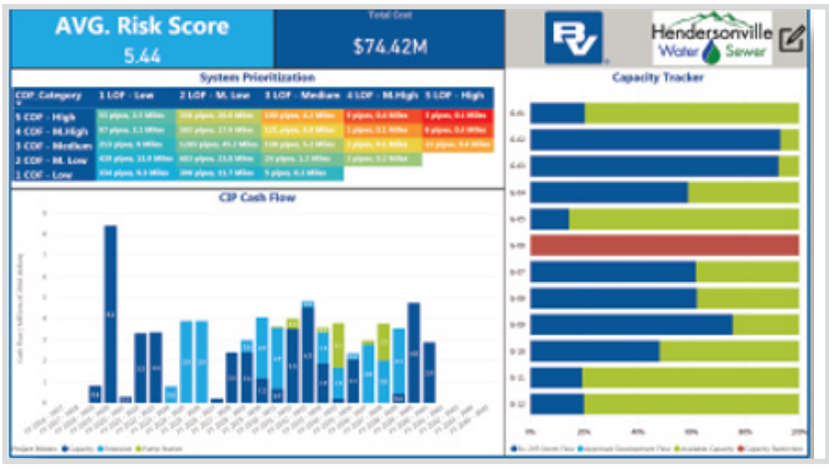
The Replacement Planning Model Module which was developed for HRSD provides a clear, risk-based picture of anticipated rehab/replacement spending over time, which enhanced HRSD's ability to effectively budget spending.

Using the risk calculations combined with unit cost information and the hydraulic modeling results the Black & Veatch team will prepare recommendations on replacement versus renewal projects. The City will be able to drill down into the details on why a recommendation was made and when the action should be taken.

CIP Dashboard

Black & Veatch created a CIP Dashboard for Hendersonville, NC that summarized the CIP data and showed the impact of each recommendation on the projected cash flow.

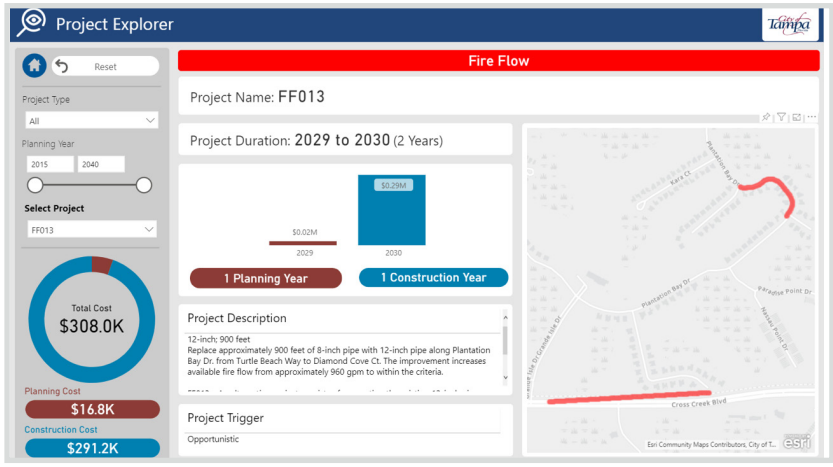
The Black & Veatch Team will prepare the recommended CIP to the City with prioritized projects based on current data, but which can be adapted as the Plan is implemented and system conditions change in coming years.

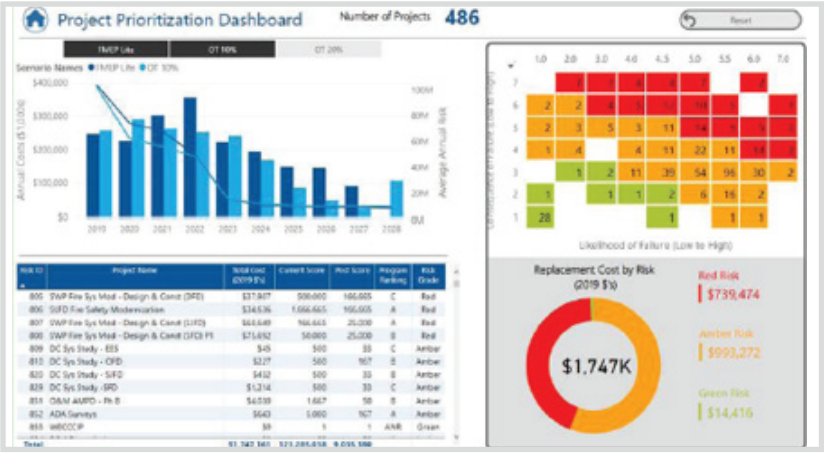


Project Explorer

This is an example Project Explorer dashboard from the City of Tampa iCIP module will detail each project in addition to the overall CIP cash flow.

Each proposed project for the City will have a similar dashboard detailing the intent of the project, the project trigger, and other pertinent information needed to execute the project and allow the City to adapt to any new conditions.

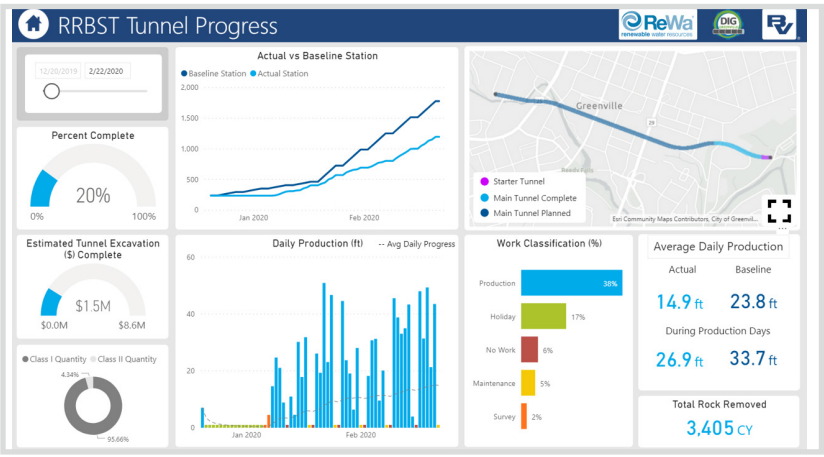




CIP Optimization

This is an example of a CIP Optimization Module which allows for comparison of multiple CIP Optimization Scenarios based on different investment constraints to view impact on risk reduction over time.

With this dashboard the City can examine and optimize the CIP based on overall system risk. This combines information from the hydraulic modeling capacity results, the R&R risk prioritization and vertical asset risk analysis. We will create packages of projects which reduce the risk to the system overall.



Condition Assessment – Schedule Tracking

We recently used a Power BI Dashboard to coordinate multiple engineering firms and contractors on a major tunneling project for ReWa. This tool allows for ReWa and the project team to track progress on the schedule and distance the tunnel has been drilled.

The Black & Veatch Team will use something similar for the condition assessment portion of the project. We will be able to pull in information for multiple inspectors and locations to help the City track the overall program schedule and ensure the goals are being met.

Pipeline Condition Assessment Management – Cost Tracking

In the same Management Platform for ReWa, a cost tracking module was provided.

The Black & Veatch team will pull in data from all of the contractors and inspection teams to be able to trend their progress and correct problems before they become a bigger issue.

PHASE 7 Asset Management Program (Optional)

The City many consider adding a couple scope items to the Master Plan to complete the few remaining items and efficiently expand its asset management program.

SET TARGET LEVELS OF SERVICE (LOS)

Levels of Service (LOS) set out what a utility intends to deliver to its customers and other stakeholders. They should be aligned with the utility's strategic goals as part of a structured hierarchy. Typically specific performance measures and targets are developed for each LOS.

LOS and performance measures are used to monitor and evaluate performance against targets. Black & Veatch will first review the City's existing LOS standards and performance measure, compare them against industry standards like the AWWA benchmarking and SMRP maintenance metrics, and recommend any additional measures to use.

Black & Veatch will then use the City's available performance data to build dashboards using the Utility Management Platform to report LOS and performance measures.

BUILD ASSET MANAGEMENT PLAN

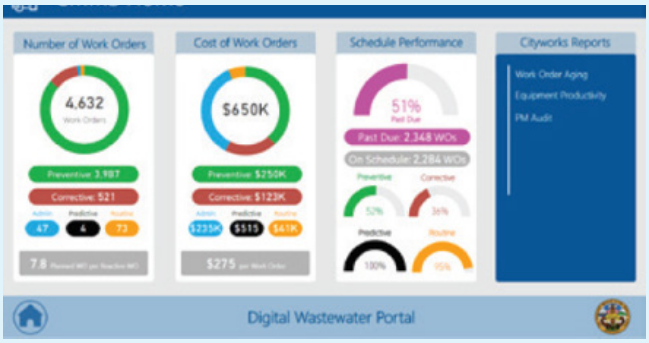
Black & Veatch's Utility Management Platform can be also be used to create a dynamic asset management plan using the components of the different tasks, including the asset inventory, risk assessment and KPIs.

OPTIMIZE O&M INVESTMENT

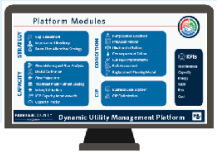
Black & Veatch is an industry leader in engineering consulting for water and wastewater treatment plants. We provide services such as master planning, process evaluations, permitting and regulatory assistance, preliminary and detailed design, bidding services, construction phase services and inspection, startup and commissioning, operational assistance and training, and a host of related services. Using this experience we will be able to thoroughly analyze the Wastewater System Operations and Maintenance practices and optimize the investment in those systems.

> "Far-reaching strategic projects like the Utility Enterprise Initiative require a wide variety of technical and soft skills as well as the leadership to focus these diverse skills on a common goal. The professionals at Black & Veatch have consistently met these challenging demands and we look forward to continuing our progress with them through the remainder of the Initiative and beyond."

CLAYTON EDWARDS, PE
DIRECTOR, WATER AND SEWER DEPARTMENT
TULSA METROPOLITAN UTILITY AUTHORITY (TMUA)



The Utility Management Platform is a perfect fit to monitor and track Key Performance Indicators (KPI) for the City of Hollywood. KPIs can vary from work order completion as shown above to pressures in the distribution system. Anything that is connected to SCADA, Cityworks, GIS and the hydraulic model can be shown at the same time on the same dashboard.



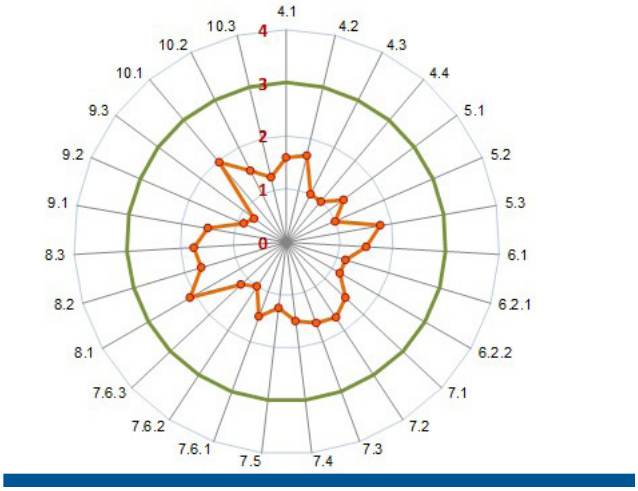
Asset Management Program Development

Black & Veatch's Asset Management team brings best practices from around the world to help our clients improve their asset management approaches. As an Institute of Asset Management (IAM) Endorsed Assessor for International Standards Organization (ISO) 55001, we have assisted numerous clients in the United States and internationally with the implementation of asset management (AM) programs.

The first stage in the AM program development is to perform a gap assessment against the ISO 55001 standard by interviewing staff and reviewing existing processes.

Black & Veatch has a standard approach for the assessment and a tool to score maturity. The gap assessment will identify improvements to be made and will be used to develop an AM Improvement Roadmap.

Black & Veatch has been assisting TMUA implement an AM Program over the last 7 years. TMUA has developed a documented AM Framework and is considering certification to ISO 55001. Some of the benefits reported by TMUA staff include better collaboration and decision making, and improved knowledge sharing and retention. Stated benefits include "everyone is on the same page now;" "asset management is more transparent:" and "a lot more consistent documentation."

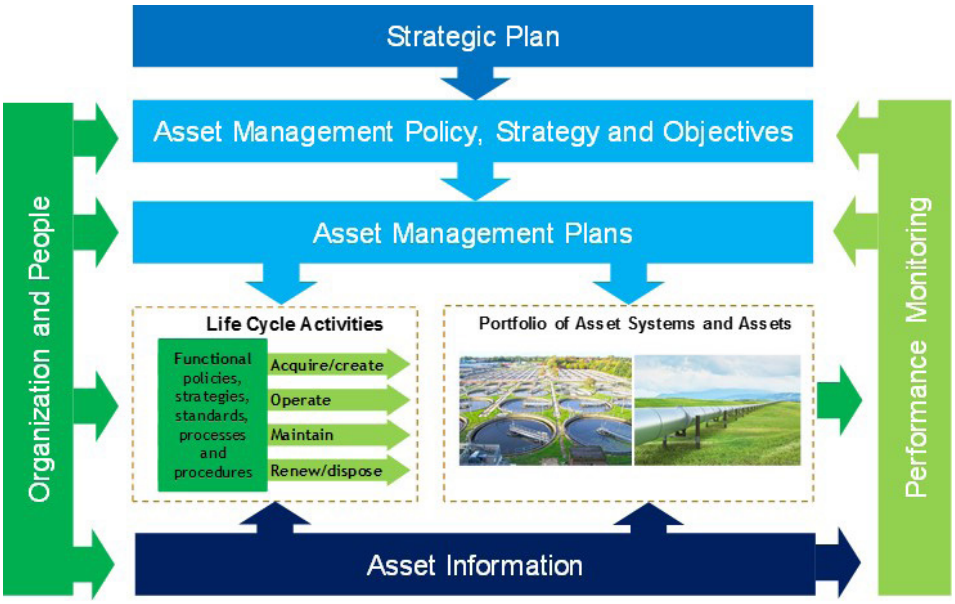


The radar plot shows the results of an ISO 55001 assessment. Maturity is assessed against 27 requirements and scored on a scale of 0 to 4, where a score of 3 is compliance with the requirements.

Asset Management Program Implementation

Black & Veatch's approach to implementing an AM program is to develop the components of an Asset Management Framework. The framework provides a structure to the development of the program, requires clearly defined strategies, and enables the documentation of key processes.

The first component of the AM framework is the AM policy, strategy and objectives, and Black & Veatch can assist the development with facilitated workshops, examples and templates.



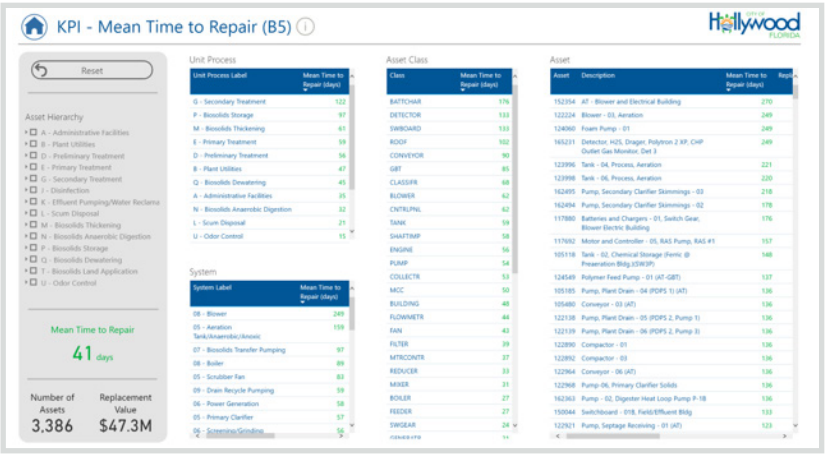
Other tasks could include:

- Program management
- Management of change
- Asset management training
- AM organizational design
- Business process mapping and SOP development
- Maintenance management strategy development
- Enhanced data analytics

In support of the optional Asset Management Program, the Black & Veatch team can prepare a series or key performance indicator dashboards to support the City's goals.

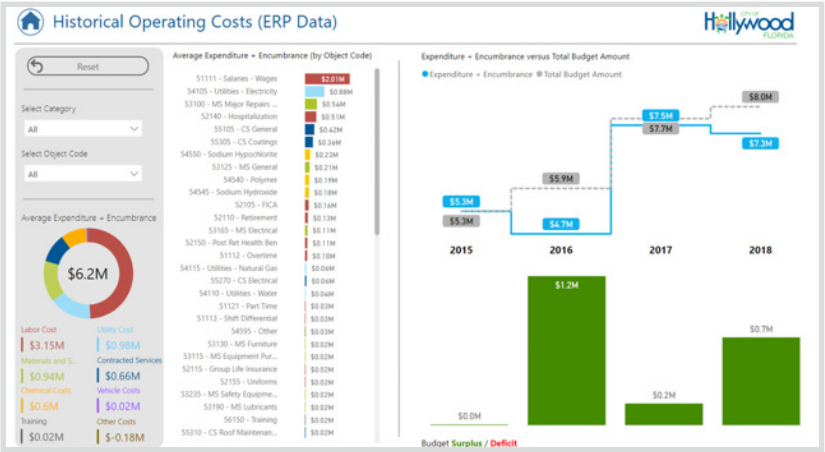
Maintenance Work Orders (Optional)

An important KPI for the City is tracking the number of active work orders, corrective versus preventative work orders and duration of open work orders. A dashboard like this can be prepared to help City staff view and manage their progress without having to have Cityworks on their computers.



Meant Time to Repair (Optional)

Through analyzing trends and data in Cityworks regarding work orders and specific equipment, a dashboard will be created to calculate the mean time to repair various asset types and classes. This information can be used to more effectively schedule future work orders. It can also be used to help determine when assets should be replaced.

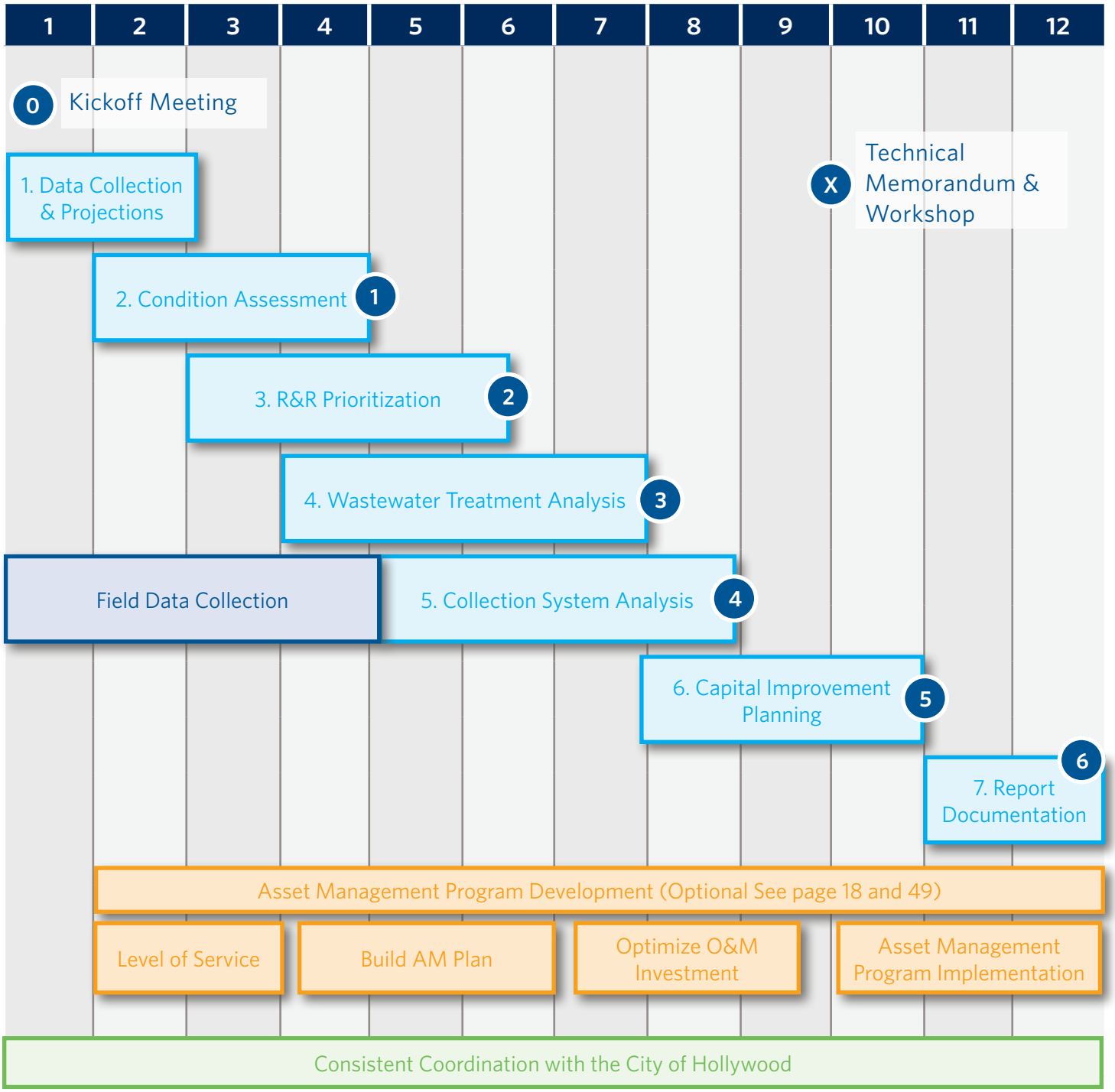


Historic Operating Costs (Optional)

Data from multiple sources can be pulled together to calculate the operating and maintenance costs for different assets and classes. This can be used to help identify large cost sinks and potentially recommend cost savings improvements either through capital projects or operational changes.

SCHEDULE

Black & Veatch fully understands and can successfully deliver the wastewater master planning and engineering services requested by the City in the RFQ. The Project Workflow figure and Schedule illustrated below provides an overview of our Technical Approach and the coordination and timing for successfully executing key elements and tasks of the Wastewater Master Plan.



Summary of Experience

Infrastructure planning is one of the most valuable activities undertaken by our clients. As our nation's wastewater systems continue to age and deteriorate, and new performance standards and regulations are established, a comprehensive planning approach that focuses on optimizing the system's performance, cost and risk is more important than ever.

Black & Veatch is an industry leader in providing wastewater utilities, like the City of Hollywood comprehensive master plans and dynamic planning tools that they can continue to use after delivery of the master planning project.

Black & Veatch has completed hundreds of Wastewater System Master Planning projects for utilities throughout the United States, and has pioneered the development and use of dynamic, adaptive and interactive planning tools to support these efforts. While each wastewater system is unique, many face similar challenges and have the same primary goals of providing a safe, reliable and affordable wastewater collection and treatment for their communities. Our team will leverage the experience gained from supporting numerous wastewater utilities throughout Florida and the United States to deliver a Wastewater System Master Plan to the City that is implementable and optimized to meet the City's needs. Due to our integrated local and national resources the City will benefit from all the wastewater master plans we have done before.

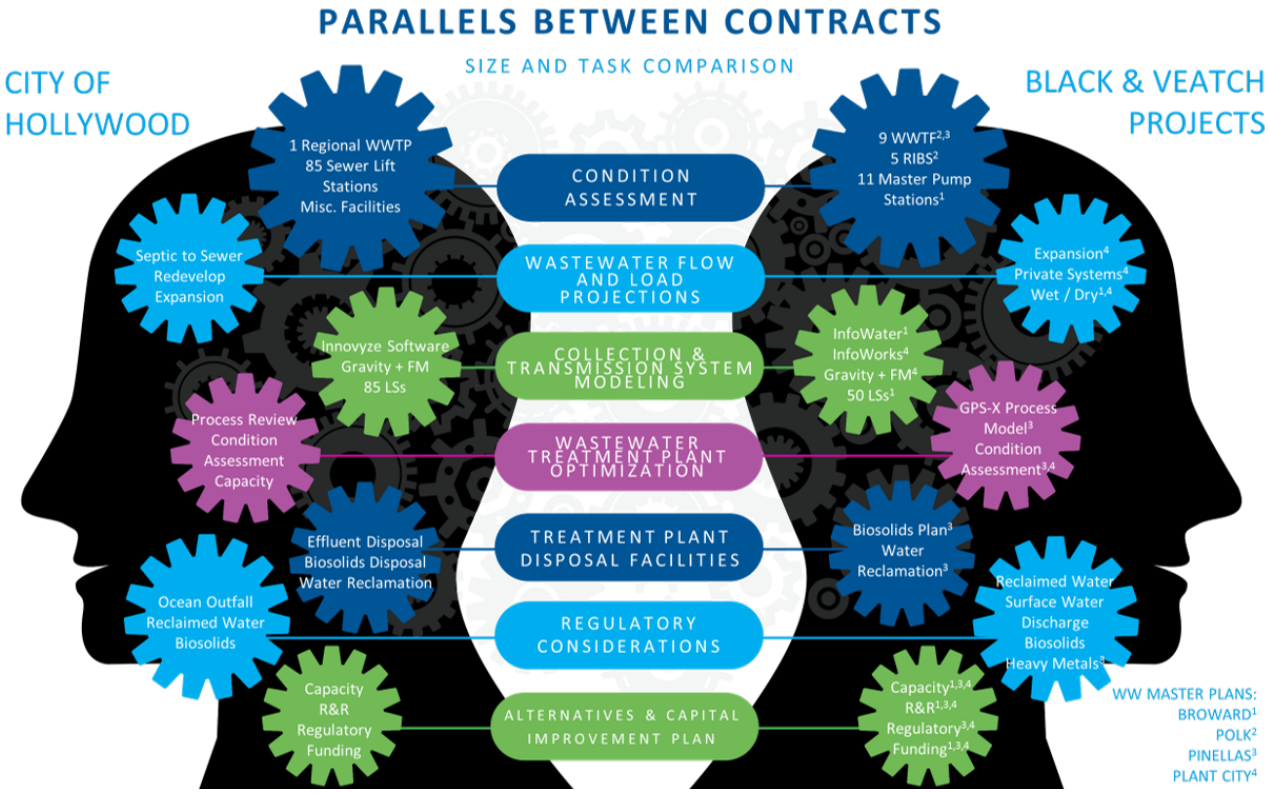


TABLE 1. SELECT BLACK & VEATCH TEAM'S RISK-BASED PRIORITIZATION; HYDRAULIC AND TRANSIENT MODELING; AND CONDITION ASSESSMENT EXPERIENCE

PROJECT	CONDITION ASSESSMENT EVALUATION	FLOW AND LOAD PROJECTIONS	WASTEWATER TREATMENT EVALUATION	WASTEWATER TREATMENT DISPOSAL	COLLECTION SYSTEM EVALUATION	ASSET MANAGEMENT PROGRAM	CONDITION ASSESSMENT DATA ANALYSES	RISK-BASED PRIORITIZATION & CAPITAL PLANNING	DYNAMIC MASTER PLANNING & CIP DEVELOPMENT	EMERGENCY RESPONSE PLANNING	REGULATORY REVIEW	TRAINING
Polk County, FL; WWTF Data Collection	■					■	■					
Broward County, FL; Regional Wastewater Master Plan	■	■			■	■	■	■	■	■		■
Pinellas County, FL; WEDWRF Master Plan	■		■	■			■		■		■	
Pinellas County, FL; Long-Term Biosolids Master Plan			■	■					■		■	
Plant City, FL; Wastewater Collection System Master Plan		■			■	■	■	■	■			■
Lee County, FL; Wastewater Master Plan		■	■		■				■			■
Miami-Dade WASD, FL; Infrastructure Assessment and Replacement Program								■		■		
Miami-Dade WASD, FL; Sewer Service to Commercial Properties		■			■							■
Miami-Dade WASD, FL Hydraulic Modeling Support of Planning Activities		■			■							
City of Raleigh, NC; Sanitary Sewer Capacity Study and On-Call Services		■			■				■			■
Shreveport, LA; Wastewater Master Plan	■	■	■	■	■	■	■	■			■	
Trinity River Authority, TX; Northern Regional Wastewater System Projects		■			■	■			■			■
Winston-Salem, NC; Wastewater System Master Plan		■			■	■		■	■			■
DeKalb County, GA; CIP Program Management		■			■				■			■
Union County, NC; Comprehensive Water and Wastewater Master Plan	■	■			■	■	■		■			■
Peace River MRWSA, FL; R&R Sufficiency Funding Study	■					■	■	■	■			
City of Tulsa, OK; Water and Sewer Risk Prioritization	■					■	■	■				
Charlotte Water, NC; Risk Based Pipeline Prioritization		■			■	■	■	■	■			
City of San Jose, CA; Process Piping Condition Assessment	■					■	■	■				
Tampa Bay Water, South Central Hillsborough Regional Wellfield Surge Analysis					■							
Tampa Bay Water, Enhanced Surface Water System Surge Analysis					■							
Tampa Bay Water, FL Regional System Transient Analysis					■							
City of Wilmington, DE; Water and Wastewater Rate Studies					■	■	■	■	■			

Wastewater Master Plan

BROWARD COUNTY, FLORIDA

RELEVANCE TO CLIENT

- Dry and wet weather flow estimations
- Hydraulic and Transient modeling
- MPS Condition Assessment
- Pipeline Condition Assessment Technology Selection
- Adaptive Planning Tools
- Capital Improvement Plan

ORIGINAL SCHEDULE

June 2019 - June 2020

ACHIEVED SCHEDULE

June 2019 - September 2020

CONSULTING FEE

$750,000

NUMBER AND DESCRIPTION OF CHANGE ORDERS

1 Change Order Requested. Request was to add 36 LSs to the hydraulic model at the County's request

AVERAGE TURNAROUND TIME FOR REQUEST INFORMATIONS

Not applicable as project did not include construction services

OWNER'S REFERENCE

Jeremy Sieden
2555 West Copans Road, Pompano Beach, Florida 33069
(954) 8318-0799
jseiden@broward.org

Constructed in 1974 and expanded periodically, the County's North Regional Wastewater System (NRWWS) has approximately 64 miles of force mains and 11 master pump stations. Black & Veatch was selected to help the County prioritize capital funds to improve the transmission system. Using a risk-based approach to rehabilitate, repair or replace aging components in the system, the scope of work includes:

- Hydraulic modeling, based on updated GIS layers and available record drawings, to create a spatially accurate rendition of the system's pipeline network
- Modeling to evaluate the potential for hydraulic transients in the NRWWS and identify needed improvements
- Identifying rehabilitation and repair projects based on physical condition assessments to restore, update, and increase the capacities of the master pump stations
- Prioritizing based on risk future improvements to the system's pipeline network
- Developing a comprehensive Capital Improvement Plan (CIP) to identify the need for asset inspection, upgrade, and replacement
- Preparing an Emergency Response Plan to include the location of critical infrastructure, contact information, and procedural details

The Black & Veatch team included numerous County Business Enterprises (CBEs) that offered local experience in planning, public outreach, and engineering. The proposal showcased the benefits that the County could expect from the team's expertise in condition assessment, repair and rehabilitation improvements, and adaptive CIPs.

Sewer Service to Commercial Properties in Miami-Dade County

MIAMI, FLORIDA

RELEVANCE TO CLIENT
- Hydraulic Modeling
- Master Plan Development
- CIP Planning
- Funding and financing review

ORIGINAL SCHEDULE
3 months

ACHIEVED SCHEDULE
6 months

CONSULTING FEE
$179,000

NUMBER AND DESCRIPTION OF CHANGE ORDERS
None

AVERAGE TURNAROUND TIME FOR REQUESTS FOR INFORMATION
Not applicable as project did not include construction

OWNER'S REFERENCE
Daniel Edwards
3071 SW 38 Avenue
Miami, FL 33146
(786) 232-5257
djedw01@miamidade.gov

As a result of a resolution from Board of County Commissioners of Miami-Dade County directing to provide a plan to extend sewer service to commercial and industrial areas, Black & Veatch assisted the Miami-Dade Water & Sewer Department (MDWASD) with the development of a Master Plan for the expansion of sewer infrastructure to commercial properties within the MDWASD service area, currently not connected to the system. The Master Plan used MDWASD's sewer collection system models in InfoWorks, integrated with GIS, to connect non-sewered commercial properties and including planning level cost estimates and projects implementation schedules.

Planning services performed by Black & Veatch included:

Sewer System Extensions. Gravity sewer routes were developed from the commercial sites to the nearest point of connection in the existing collection system. All gravity sewers slopes were assumed to be installed at minimum slope for the appropriate diameter. Where sewer extensions were not feasible, new pump stations were developed to pump into the manifolded force main network.

Pump Station Basin Capacity Assessments. Sub-models for the specific pump station basins where the commercial sites would discharge into were extracted from MDWASD's existing collection system model for further hydraulic modeling and sewer capacity assessments. The capacity of the new sewer system was evaluated for existing and 2035 demand conditions.

Capital Improvements Planning Level Cost. Developed a capital improvement planning level cost based on the improvements identified. The opinion of probable construction cost included the construction, engineering, and land acquisition costs for each proposed improvement.

Energy Efficiency Master Planning Services

HOLLYWOOD, FLORIDA

RELEVANCE TO CLIENT
- Energy Efficiency Master Plan
- Development of CIP
- Business Case Evaluations
- Water Treatment Process Evaluations

ORIGINAL SCHEDULE
18 months

ACHIEVED SCHEDULE
18 months

CONSULTING FEE
$307,000

NUMBER AND DESCRIPTION OF CHANGE ORDERS
A small amendment for $6,908 was approved by the City to implement minor updates to the Master Plan Report.

AVERAGE TURNAROUND TIME FOR REQUESTS FOR INFORMATION
Not applicable as project did not include construction services

OWNER'S REFERENCE
Francois Domond
1621 N. 14th Ave.,
Hollywood, FL 33022
(954) 921-3258

The Energy Efficiency Master Plan resulted in a CIP for the implementation of 19 ECMs for combined annual energy savings of 7 GWh or 15% of the Utility's energy use.

Energy Efficiency Master Plan

Black & Veatch developed a comprehensive Energy Efficiency Master Plan for the City of Hollywood Department of Public Utilities, including the Water and Wastewater Treatment Systems. The master plan resulted in the development of a capital improvement plan (CIP) for the implementation of 19 energy conservation measures (ECMs) for combined annual energy savings of 7 GWh or 15% of the Utility's total energy use. The CIP also results in a net present value of $4.7 million over the life of the improvements. Specific tasks included:

- Development of an existing energy use baseline for the City's water and wastewater facilities and equipment.
- Evaluation of the current and potential alternate electric utility rate structures at each facility.
- Energy efficiency assessments, including efficiency evaluations of equipment, processes, pumping systems and the buildings at each facility.
- Development and analysis of over 50 ECMs. The analyses included capital cost estimates, energy use and cost impacts, other O&M cost impacts, and non-economic factors, such as operational complexity, water quality or regulatory impacts and public acceptance.
- Development and use of an Energy Project Decision Cash Flow Model to define an implementation strategy consistent with the City's overall CIP planning and project funding capabilities.
- The Energy Efficiency Master Plan is the first step for the City's Department of Public Utilities to become a model of energy efficiency and management in the United States.

Cityworks Implementation for Utilities

HOLLYWOOD, FLORIDA

RELEVANCE TO CLIENT
- Asset Management
- Geographic Information Systems

ORIGINAL SCHEDULE
18 months

ACHIEVED SCHEDULE
18 months

CONSULTING FEE
$389,000

NUMBER AND DESCRIPTION OF CHANGE ORDERS
None

AVERAGE TURNAROUND TIME FOR REQUEST FOR INFORMATION
Not applicable as project did not include construction services

OWNER'S REFERENCE
Francois Domond
1621 N 14th Avenue
Hollywood, FL 33020
(954) 921-3930

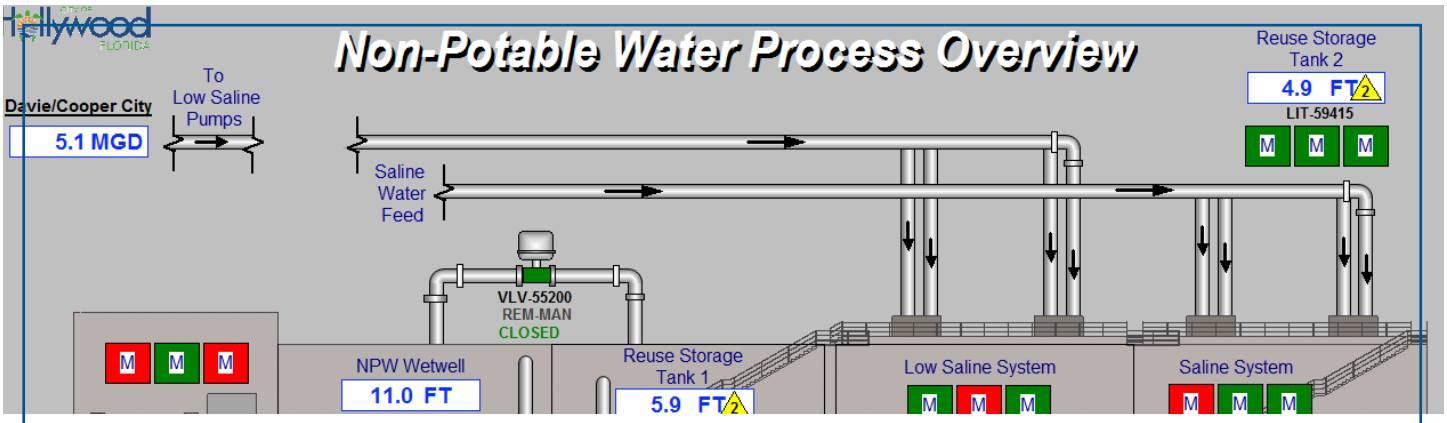
To more effectively and efficiently manage its water and wastewater utility infrastructure as part of an overarching asset management program, the City of Hollywood Department of Public Utilities sought assistance to implement a new Computerized Maintenance Management System (CMMS). CMMS solutions are utilized in a variety of industries - manufacturing, pharmaceuticals, public works, and public utilities to name a few. However, to effectively support water/wastewater operations, the selected solution must support unique industry specific functions such as water line flushing, valve exercising, and CCTV inspections.

The benefits of implementing a modernized CMMS solution include:

Increased Level of Maintenance Information. Developing the historical database that becomes readily available as critical maintenance information is used, turning data into information that can be used to manage maintenance as a business. Improved Work and Service Request Control: streamlining the work order and service request modules, providing the basis for work management, cost tracking, equipment history, and performance reporting.

Improved Planning and Scheduling. Providing the systems and procedures to establish a more effective day-to-day maintenance planning and scheduling function, which is a key contributor to improved craft labor utilization and customer service.

Extend Equipment Life. Automatic scheduling of repetitive preventive maintenance (PM) activities through a well implemented CMMS solution. PM tasks and inspection frequencies can be documented on the PM module and failure trends monitored to highlight major causes of equipment breakdowns and unscheduled repairs.



SCADA Evaluation and System Improvements

HOLLYWOOD, FLORIDA

RELEVANCE TO CLIENT

- Existing System Evaluation
- SCADA Planning Services
- SCADA Standards Development
- SCADA Programming

ORIGINAL SCHEDULE

2013 - Ongoing

ACHIEVED SCHEDULE

Ongoing

CONSULTING FEE

BV15-01 $234K, BV17-01 $300K, BV18-01 $299K, and BV19-01 $694K

NUMBER AND DESCRIPTION OF CHANGE ORDERS

N/A

AVERAGE TURNAROUND TIME FOR REQUEST INFORMATION

Not applicable as project did not include construction services

OWNER'S REFERENCE

Francois A. Domond
Deputy Director
1621 N 14th Ave Hollywood, FL 33020
+1 954 921 3930
fdomond@hollywoodfl.org

SCADA System Evaluation

As part of the Energy Efficiency Master Plan, the Black & Veatch Team performed a high-level review and evaluation of the SCADA systems at both the Water and Wastewater Treatment Plants. The SCADA evaluation included automation and control system improvements related to energy conservation measures, as well as, long term SCADA recommendations for enhanced performance and optimized operations.

The existing SCADA system consists of programmable logic controller (PLC) interconnected using Ethernet network, with supervisory monitoring and control from a human machine interface (HMI) system of servers and workstations. This concept of PLC/HMI-based control system is a sound approach to SCADA and common in the water industry.

SCADA System Improvements

The SCADA system is being modified to improve automation. Black & Veatch provided the facility's operators with a step-by-step guide on the HMI and the ability to monitor the automatic or semi-automatic startup and shutdown sequences for multiple processes at the wastewater plant.

Black & Veatch developed process control strategies and I/O lists, which served as the basis for the PLC and HMI programming. To provide consistency for future programming by the City, the control strategies also included:

- PLC and HMI Standards and Conventions (including tagging and naming conventions)
- Screen Layouts
- Text Font and Color Conventions
- Analog Value Displays
- Standard Graphics
- Alarms and alarm handling
- PLC Program languages, layout and documentation

Hydraulic Modeling in Support of Planning Activities

MIAMI, FLORIDA

RELEVANCE TO CLIENT
- Hydraulic Modeling
- Wastewater System Planning
- Capacity Evaluations

ORIGINAL SCHEDULE
12 months

ACHIEVED SCHEDULE
12 months

CONSULTING FEE
$103,000

NUMBER AND DESCRIPTION OF CHANGE ORDERS
None

AVERAGE TURNAROUND TIME FOR REQUEST INFORMATION
Not applicable as project did not include construction services

OWNER'S REFERENCE
Daniel Edwards
3071 SW 38 Avenue
Miami, FL 33146
(786) 232-5257
djedw01@miamidade.gov

Black & Veatch performed multiple capacity studies initiated by the Miami-Dade Water & Sewer Department's Planning Division (Department).

Collection System Capacity Analysis. This task provided for capacity analyses for new developments requesting connection to the wastewater collection system.

- Added flow projections from new development into the hydraulic model along with future wet weather flow hydrographs
- For capacity evaluations occurring in locations beyond the Integrated Master Plan model extents, Black & Veatch reviewed as-built drawings and "donations" GIS layer to update the collection system invert/rim elevations and sewer diameters.
- Performed gravity sewer capacity assessments at the connection point with pump stations and downstream locations for wet weather conditions to avoid sanitary sewer overflows (SSOs). The wet weather conditions were analyzed for a single design condition.
- Developed capacity assessments for the system using revised loading conditions to illustrate potential capacity issues and manage SSOs, based on surcharging in the gravity system, pump station wet wells, and NAPOT hours on the basis of adequate station capacities.
- Proposed system improvements to Miami-Dade's collection system based on the revised loading conditions and their level of service requirements..

Bond Consulting Engineering

MIAMI, FLORIDA

RELEVANCE TO CLIENT
- Water system master planning
- Water treatment facilities assessments
- Prioritization and criticality evaluations

ORIGINAL SCHEDULE
2009 - 2015

ACHIEVED SCHEDULE
2009 - 2015

CONSULTING FEE
$4.6M

NUMBER AND DESCRIPTION OF CHANGE ORDERS
None

AVERAGE TURNAROUND TIME FOR REQUEST FOR INFORMATION
Not applicable as project did not include construction services

OWNER'S REFERENCE
Frances Morris
3071 SW 38 Avenue
Miami, FL 33146
(786) 552-8620

Black & Veatch served as the Bond Consultant Engineer for MDWASD since 2009. Bond Consultant Engineering services are provided to ensure that the Department remains in compliance with the Master Bond Ordinance 93-134, which specifies a number of operational and financial requirements that the Department must meet on a recurring basis and for the issuance of additional bonds. Black & Veatch has been responsible for the preparation of two reports annually.

The Annual Bond Consultant Report, which assesses the Department's overall operations and financial performance services to document the physical status of system assets, the adequacy of the Renewal & Replacement (R&R) deposit and the adequacy of the capital improvement program. As required by the Bond Ordinance, the condition of approximately one-third of MDAWSD's major water and wastewater system facilities must be evaluated. The facilities inspected include:

- Three regional wastewater treatment plants (NDWWTP, CDWWTP, and SDWWTP)
- Approximately 80 of the largest sewer system pumping stations in the system
- Three water treatment plants
- Five wellfields (93 Biscayne aquifer wells) and the five South Dade Water Systems
- Six water booster/storage facilities

In order to comply with the inspection of the entire system every three years, approximately one-third of the major assets and a representative sampling of pump stations are scheduled to be inspected as part of this report. The Bond Consultant's Annual Report focuses on the following eight primary areas of the Department:

- Department Organization and Management
- Department Accomplishments and Challenges
- Customers and Sales
- Water System
- Wastewater System
- Capital Improvements Program
- Renewal and Replacement Program
- Financial and Business Condition

Lee County Wastewater Master Plan

FT. MYERS, FLORIDA

RELEVANCE TO CLIENT

- Performance Criteria
- Population Projections
- GIS Analytics
- Flow Projections
- Treatment Capacity Evaluation
- Capital Improvement Planning
- Wastewater Collection Systems
- Pumping
- Storage

ORIGINAL SCHEDULE

August 2018 - November 2019

ACHIEVED SCHEDULE

August 2018 - November 2019, Achieved

CONSULTING FEE

$197,000

NUMBER AND DESCRIPTION OF CHANGE ORDERS

No Change Orders were requested

AVERAGE TURNAROUND TIME FOR REQUEST FOR INFORMATION

Not applicable as project did not include construction services

OWNER'S REFERENCE

Nathan Beals, Planning & Development Manager
1500 Monroe Street
Fort Myers, FL 33901
(239) 533-8157
NBeals@leegov.com

Lee County's wastewater collection system provide service to over 250,000 people and consists of 5 wastewater treatment plants and covers a service area of approximately 180 square miles. The wastewater collection system is comprised of laterals, gravity sewers, manholes, roughly 900 pump stations, and force mains that convey wastewater from the point of origin to the wastewater treatment facilities. Lee County selected Black & Veatch to provide professional services to develop an updated Wastewater Master Plan on the pressurized portions of the County's collection system.

The Wastewater Master Plan project involved many traditional system planning elements field data collection, design storm selection, including hydraulic model update (InfoWater) and calibration, demand projections, capacity evaluation, capital improvement program (CIP) development, and preparation of a master plan report. However, the project also included some unique an innovative planning approaches and tools to provide the County with a comprehensive and adaptable master plan. This included:

- Demand allocation figures to illustrate the demand concentrations and future growth patterns
- Updated hydraulic models of five separate regional wastewater service areas
- Planning level opinion of probable project costs
- Alternative improvements for various alternate operational schemes
- CIP prioritization spreadsheets training using custom tutorials demonstrate how to use the spreadsheet, and how to maintain/ update the spreadsheet1

WWTF Data Collection

POLK COUNTY, FLORIDA

RELEVANCE TO CLIENT
Facility Condition Assessment

Data Collection

Connecting condition data to CMMS systems

ORIGINAL SCHEDULE
Nov. 2019 - Feb 2020

ACHIEVED SCHEDULE
Nov. 2019 - Feb. 2020, Achieved

NUMBER AND DESCRIPTION OF CHANGE ORDERS
No Change orders were requested

CONSULTING FEE
$99,000

AVERAGE TURNAROUND TIME FOR REQUEST INFORMATIONS
Not applicable as project did not include construction services

OWNER'S REFERENCE
Chuck Nichols
1011 Jim Keene Blvd
Winter Haven, FL 33880
(863) 298-4215
CharlesNichols@polk-county.net

The County owns and operates seven wastewater treatment facilities (WWTFs) within six regional utility service areas, including four regional facilities and three smaller "package" plants. As part of a comprehensive asset management program, the County wished to collect asset inventory data from these facilities for use in a computer maintenance management system (CMMS). Additionally the County wished to assess asset condition in conjunction with the collection of asset inventory data.

Black & Veatch provided field data collection services to collect the desired asset inventory and condition data. The following tasks were included:

- Data Collection Plan
  - Update Survey123 Forms
  - Develop Data Collection Plan
- Data Collection: WWTF Asset Surveys
- Data Submission
  - Data Analysis and Quality Control
  - Data Submission

PERFORMANCE RATING:

SCORE	RATING
81 - 100%	EXCELLENT
60 - 80%	SATISFACTORY
31 - 59%	NEEDS IMPROVEMENT
0 - 30%	UNSATISFACTORY

TOTAL SCORE: 91.25

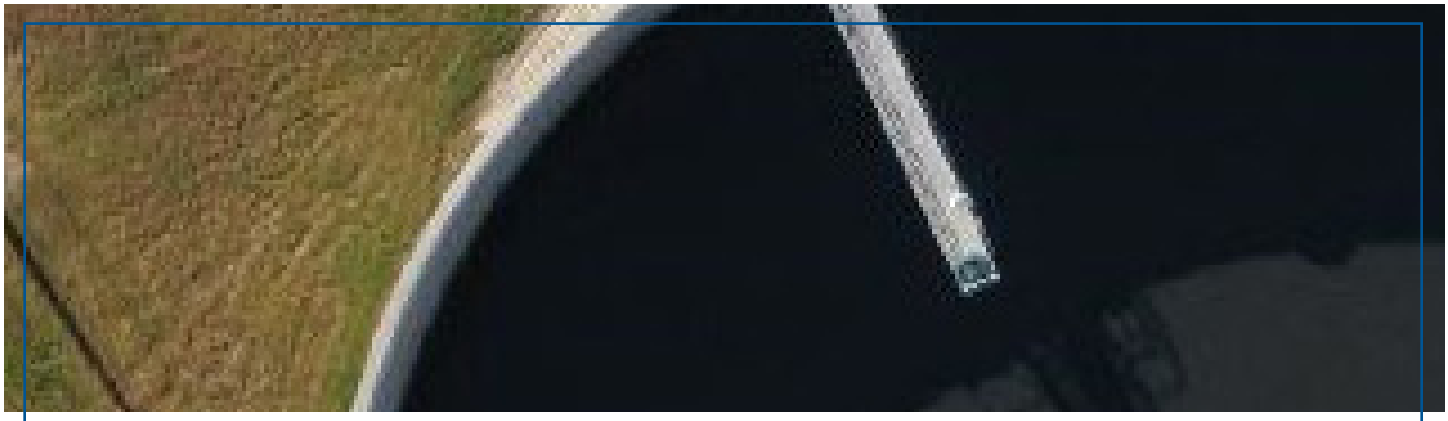
BoCC Project Mgr. Signature: Charles Nichols

Division Director Signature: Tamara Richards

Procurement Specialist Signature: 04/01/2020

Mailing Date: 04/01/2020

Black & Veatch received an "Excellent" score from Polk County on their work on the Project.



Wastewater Master Plan

PLANT CITY, FLORIDA

RELEVANCE TO CLIENT

- Model Update and Calibration
- Performance Criteria
- Population Projections
- Demand Projections
- Treatment Capacity Evaluation
- Capital Improvement Planning
- Software Training
- Geodatabase Update
- R&R CIP Development
- Risk Prioritization
- Wastewater Collection

ORIGINAL SCHEDULE

Dec. 2018 - Nov. 2019

ACHIEVED SCHEDULE

Dec, 2018 - June 2020

Scheduled delayed due to flow monitoring activities

CONSULTING FEE

$425,000

NUMBER AND DESCRIPTION OF CHANGE ORDERS

No change orders were requested

AVERAGE TURNAROUND TIME FOR REQUEST INFORMATION

Not applicable as project did not include construction services

OWNER'S REFERENCE

Lynn Spivey
Utilities Director
1802 Spooner Dr, Plant City, FL 33563
(813) 285-9959
lspivey@plantcitygov.com

The City of Plant City is undertaking an important project to shape the future of the City's collection system to support the vision of Imagine 2040; "transforming the City's small-town charm into a vibrant city with a new urban vibe." To aid in this effort, the City contracted Black & Veatch to develop a 25-year wastewater master plan.

The Wastewater Master Plan project involved many traditional system planning elements field data collection, updated GIS geodatabase/ shapefiles, design storm selection, including hydraulic model update (Infoworks ICM) and calibration, demand projections, capacity evaluation, capital improvement program (CIP) development, and preparation of a master plan report. However, the project also included some unique an innovative planning approaches and tools to provide the City with a comprehensive and adaptable master plan. This included:

- Demand allocation figures to illustrate the demand concentrations and future growth patterns.
- Planning level opinion of probable project costs
- Software Selection for the client
- Alternative improvements for various alternate operational schemes
- R&R CIP Development on Risk of failure using Plant City's existing Infomaster model build.
- Hydraulic model and risk models training on how to use the models and update the information for new development
- Design storm simulation to help the system avoid sanitary sewer overflows. Design storms were based on a rainfall design storms using NOAA Atlas 14 rainfall totals distributed using the Florida modified SCS Type II storm distribution.
- CIP prioritization spreadsheets training using custom tutorials demonstrate how to use the spreadsheet, and how to maintain/ update the spreadsheet

WEDWRF Master Plan / Water and Sewer Optimization Program

PINELLAS COUNTY, FLORIDA

RELEVANCE TO CLIENT

- Facility Master Planning
- Condition, Age, and Remaining Useful Life of Assets
- Hydraulic Modeling
- Process Modeling
- Population/Demand Projections
- Capital Improvement Planning
- Alternatives Evaluation
- Life Cycle Cost Analysis/Estimating
- Wastewater Treatment
- Energy Efficiency

ORIGINAL SCHEDULE

38 weeks

ACHIEVED SCHEDULE

NTP Feb 2019 – Draft Master Plan Issued in Nov 2019. Delay between draft and final due to County review. Final Master Plan submitted April 2020

CONSULTING FEE

$196,000

NUMBER AND DESCRIPTION OF CHANGE ORDERS

No change orders. We just got authorization to use Owners Allowance the present work to management on the 17th of June.

AVERAGE TURNAROUND TIME FOR REQUEST INFORMATION

Not applicable as project did not include construction services

OWNER'S REFERENCE

Margaret R. Cook
14 South Fort Harrison Blvd., 6th FL
St. Petersburg, FL 33709
(727) 453-3343

Black & Veatch has served as Pinellas County's Water & Sewer Optimization Program Consultant under a 5-year contract, working closely with County Staff to implement optimization improvements and define long-term sustainable solutions for its water and sewer facilities and systems. Black & Veatch's has a unique understanding of the County's facilities/systems, staff, and priorities through recent work with this contract.

A significant amount of the project work as at the County's William E. Dunn WRF (WEDWRF) and the South Cross Bayou Advanced WRF (SCBAWRF). Work performed under this contract, and resulting recommendations, are being captured in Master Plans that Black & Veatch is currently developing for each WRF.

The WEDWRF Master Plan was developed by leveraging background information and work completed under previous assignments; such as the treatment process modeling, energy baseline evaluation, staffing assessment, reclaimed water pump station evaluation, and filtration/disinfection system evaluation. Black & Veatch worked with the County to understand their goals / drivers that will help define future decisions.

Black & Veatch was tasked with developing a 20-year CIP for the WEDWRF. The work included: Defining Level of Service for the WRF, including defining County's goals and long-term vision for the facility.

- Regulatory review to define future, potential projects required to maintain compliance
- Hydraulic model build, using Visual Hydraulics, to identify hydraulic bottlenecks under future flows.
- Assessment on condition, age, and remaining useful life of major equipment.
- Process modeling to identify process limitations under future flow and loads.

Long Term Biosolids Master Plan

PINELLAS COUNTY, FLORIDA

RELEVANCE TO CLIENT

- Evaluation of a Regional Facility in collaboration with area utilities
- Multi facility assessment
- Alternatives Evaluation
- CIP Planning

ORIGINAL SCHEDULE

30 weeks

ACHIEVED SCHEDULE

NTP April 2018 – Draft Master Plan Issued in Jan 2019. There was again a big delay between draft and final, where County took 2 months to review. Final Master Plan submitted April 2020.

CONSULTING FEE

$200,000

NUMBER AND DESCRIPTION OF CHANGE ORDERS

No change orders.

AVERAGE TURNAROUND TIME FOR REQUEST INFORMATION

Not applicable as project did not include construction services

OWNER'S REFERENCE

Mike Engleman, PE
7401 54th Ave. N
St. Petersburg, FL 33709
(727) 453-3019
menglema@pinellascounty.org

Pinellas County (County) owns and operates two advanced water reclamation facilities (AWRFs), South Cross Bayou AWRF (SCBAWRF) and William E. Dunn AWRF (WEDAWRF). The solids treatment system at SCBAWRF currently incorporates primary and waste activated sludge blending and thickening with rotary drum thickeners (RDTs), anaerobic digestion, digested sludge storage with integral biogas storage and biosolids dewatering with centrifuges followed by conveyance to a thermal drying facility operated by a third party contractor (Syangro). SCBAWRF produces 54.5 dtpd biosolids.

The solids treatment system at WEDAWRF consists of thickening raw waste activated sludge with RDTs and dewatering with belt filter presses. The solids production is approximately 26.7 dtpd. Dewatered sludge is hauled to SCBAWRF where it is blended with digested sludge cake prior to thermal drying. The dried biosolids pellets are marketed to local entities by Synagro and the revenue is shared with the County.

County renewed its contract with Synagro in 2018 for another 5 year extension. The goal of this Master Plan was to define County's long term biosolids management strategy following the expiration of the third party contract in 2023.

The master plan work included the following.

- Assessment of the current operations at both SCBAWRF and WEDAWRF;
- Review of regulatory and emerging issues at the state (including Florida DEP's Technical Advisory Committee workshops on state's biosolids practice) and federal level (including recent developments on PFAS and microplastics);
- Developing biosolids process alternatives based on discussions during technology review workshop and developed screening criteria
- Evaluate up to four short-listed alternatives for 20-yr life cycle costs as well as non-cost criteria and present findings in a workshop
- Preparation of master plan report

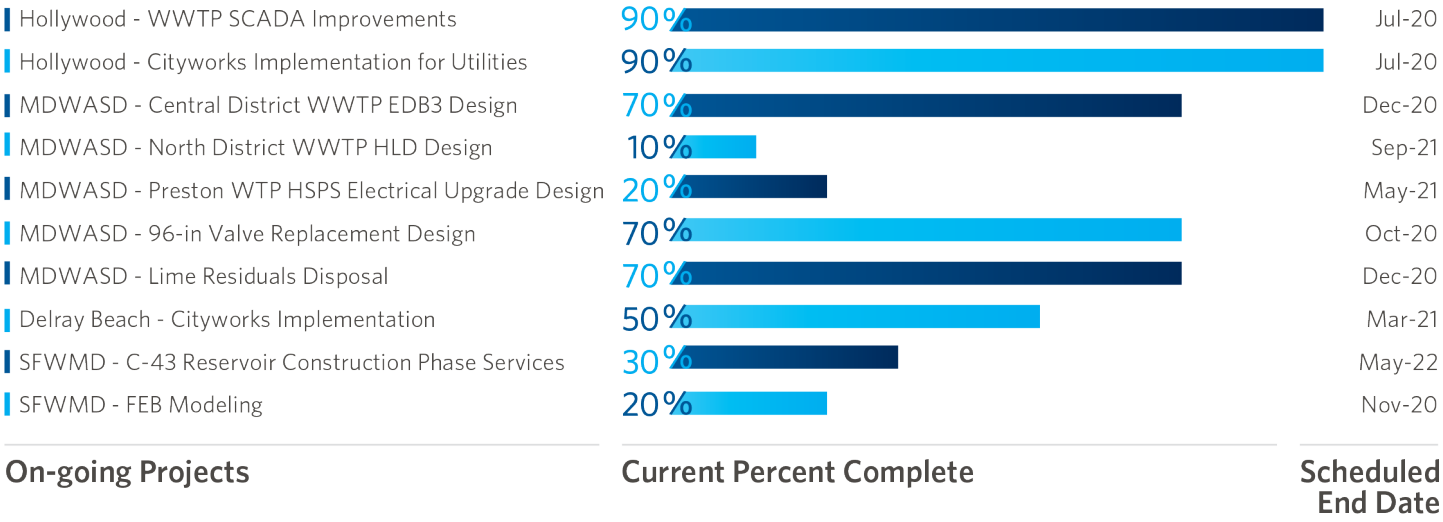
REFERENCES

NO.	LAST 10 PROJECTS COMPLETED BY BROWARD COUNTY OFFICE	CONTACT NAME	PHONE NO.	EMAIL
1	Hollywood - SCADA Improvements Phase 2	Francois Domond	(954) 921-3522	fdomond@hollywoodfl.org
2	Delray Beach - Cityworks Implementation Phase 1	Don Marese	(561) 243-7146	marese@mydelraybeach.com
3	Broward County - Clarifier Rehabilitation	Carlos Garcia	(954) 831-0920	cbgarcia@broward.org
4	Broward County - Master Pump Stations Rehab	Carlos Garcia	(954) 831-0920	cbgarcia@broward.org
5	Broward County - In-House Electrical O&M Services	Carlos Garcia	(954) 831-0920	cbgarcia@broward.org
6	SFWMD - S-127 CCC North Shore Automation Construction Phase Services	Tony Rosato	(561) 682-2604	arosato@sfwmd.gov
7	SFWMD - GG4 Structure Construction Phase Services	Gilbert Jean-Baptiste	(561) 682-6104	gjeanbap@sfwmd.gov
8	MDWASD - Hydraulic Modeling Support	Daniel Edwards	(786) 552-8354	djedw01@miamidade.gov
9	MDWASD - Sewer Service to Commercial Properties	Daniel Edwards	(786) 552-8354	djedw01@miamidade.gov
10	Deerfield Beach - East WTP Site Improvements	Allen Fathi	(954) 298-0407	afathi@deerfield-beach.com

CURRENT AND PROJECTED WORKLOAD AND TIME SCHEDULE TO COMPLETE PROJECT

Our current workload forecast confirms that Black & Veatch has more than adequate staff availability to execute the scope of services that would result from this project. In addition, the City will have access to our over 10,000 professionals to augment availability, if needed.

The following On-going Projects listing includes the projects awarded by the City in the last five years (currently in execution) as well as the other projects being executed by our Coral Springs office. The current percent complete and final completion dates are also included.



The future projects and schedules are listed in the table below.

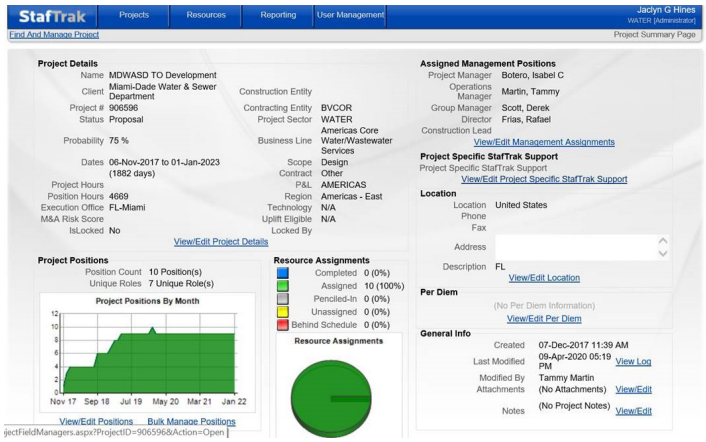
FUTURE PROJECTS	ANTICIPATED START DATE	SCHEDULED DURATION
MDWASD - Water Tanks Inspections	Sep-20	6 months
MDWASD - Hialeah Switchgear Replacement	Oct-20	4 months
MDWASD - Miami Springs Wellfield Rehabilitation	July-20	18 months
North Miami Beach Program	Aug-20	60 months
Hollywood - Cityworks Implementation for Public Works	Jul-20	18 months
Broward County WWS-Biosolids White Paper	Jun-20	6 months

Given our size, there are times when we work on projects concurrently. However, our approach to staffing projects focuses on finding the right balance between the required expertise for a project and the overall workload of our technical resources.

Black & Veatch responds to the challenges of managing concurrent projects by maintaining (and updating monthly) the StafTrak database, which includes current and upcoming projects, the specific professional resources assigned to each, and the monthly time commitment of each professional assigned to each project.

StafTrak allows our team to ensure that:

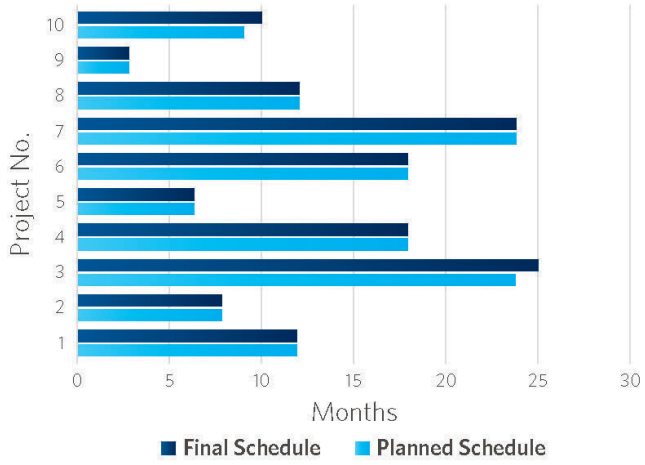
1. Each upcoming project has adequate resources and the right resources for the job
2. Each professional has an appropriate level of assignments



All our projects are managed and executed locally. However, we have the flexibility to engage our Global Integrated Workforce and to manage any occasion of unexpected increased workload.

ABILITY TO COMPLETE PROJECT ON TIME

Black & Veatch recognizes the importance of meeting schedule and budget requirements. We are prepared to devote the necessary resources to meet the most challenging schedules. We control the schedule and budget on projects through experienced and attentive project management. Development of a Work Plan at the beginning of each project and diligent adherence to the Work Plan are paramount to executing projects in an efficient and timely manner. **To the right we have provided bar charts of the last 10 projects completed by our Coral Springs office.**

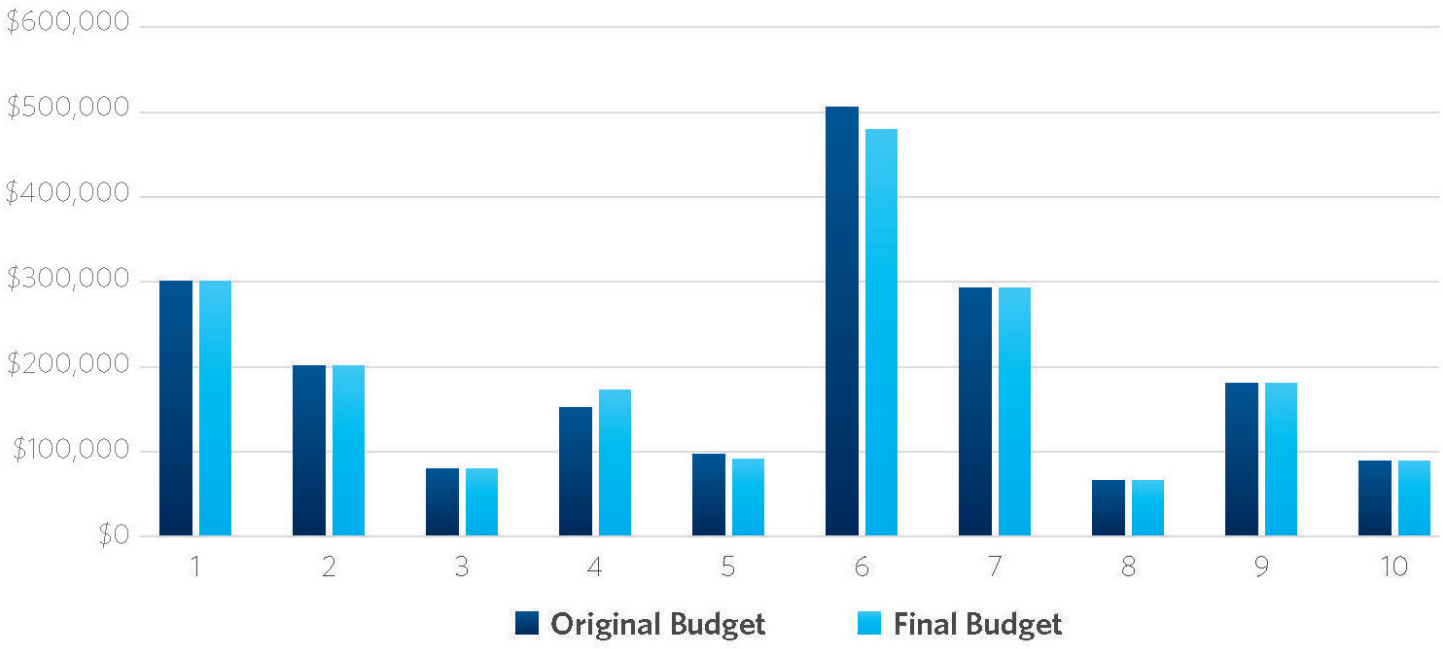


NO.	LAST 10 PROJECTS COMPLETED BY BROWARD COUNTY OFFICE	PLANNED SCHEDULE	FINAL SCHEDULE
1.	Hollywood | SCADA Improvements Phase 2	12	12
2.	Delray Beach | Cityworks Implementation Phase 1	8	8
3.	Broward County | Clarifier Rehabilitation	24	25
4.	Broward County | Master Pump Stations Rehab	18	18
5.	Broward County | In-House Electrical O&M Services	6	6
6.	SFWMD | S-127 CCC North Shore Automation Construction Phase Services	18	18
7.	SFWMD | GG4 Structure Construction Phase Services	24	24
8.	MDWASD | Hydraulic Modeling Support	12	12
9	MDWASD | Sewer Service to Commercial Properties	3	3
10.	Deerfield Beach | East WTP Site Improvements	9	10

ABILITY TO COMPLETE PROJECT ON BUDGET

It is standard practice for Black & Veatch project managers to develop a project budget at the onset of every project. Through our Business Intelligence Center (BIC), data on project charges is available to the Project Manager within one-day of time reporting.

This supports timely adjustments to ensure the work is completed on time and under budget. **The following project listing and chart summarizes our successful financial execution of the last 10 projects completed in the Coral Springs office.**



NO.	LAST 10 PROJECTS COMPLETED BY BROWARD COUNTY OFFICE	ORIGINAL BUDGET	FINAL BUDGET
1.	City of Hollywood | SCADA Improvements Phase 2	$299,970	$299,970
2.	Delray Beach | Cityworks Implementation Phase 1	$202,334	$202,334
3.	Broward County | Clarifier Rehabilitation	$79,711	$78,546
4.	Broward County | Master Pump Stations Rehab	$151,431	$170,246
5.	Broward County | In-House Electrical O&M Services	$95,245	$88,226
6.	SFWMD | S-127 CCC North Shore Automation Construction Phase Services	$503,288	$477,896
7.	SFWMD | GG4 Structure Construction Phase Services	$290,556	$290,556
8.	MDWASD | Hydraulic Modeling Support	$58,766	$58,766
9	MDWASD | Sewer Service to Commercial Properties	$178,662	$178,662
10.	Deerfied Beach | East WTP Site Improvements	$84,052	$84,052

VOLUME OF WORK PREVIOUSLY AWARDED TO THE FIRM IN THE LAST FIVE YEARS

YEAR	WORK ORDER NUMBER	PROJECT NAME	FEE
2015	BV15-01	SCADA Improvements for Sludge Process Control	$234,280.00
2017	BV17-01	Automation & SCADA Improvements for Oxygenation, Chlorination & Effluent Systems	$299,973.00
2018	BV18-01	SRWWTP SCADA Improvements - Phase II	$299,460.00
2018	BV18-02	Phase I Implementation of Cityworks Server Asset Management (AMS) Premium Software within the City of Hollywood, Utilitites Department	$388,852.00
2019	BV19-01	Automation & SCADA Improvements - Phase III	$693,994.00
		Total	$1,916,559.00

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RAFAEL E. FRIAS III, PE

PROJECT DIRECTOR

OFFICE LOCATION
Coral Springs, FL

EDUCATION
MS, Civil Engineering, University of Kansas, December 2002

BS, Biological Engineering, LA State University, December 1997

YEARS EXPERIENCE
23

PROFESSIONAL REGISTRATION
PE – 2004, FL, 61912

PE – 2011, PR, 24726

PE – 2003, KS, 17469

PROFESSIONAL ASSOCIATIONS
American Water Resources Association

Water Environmental Federation

American Water Works Association

WateReuse

Mr. Frias serves as a Client and Project Director with the global water business of Black & Veatch Corporation and is responsible for the management of the Company's operations in Florida and the Caribbean. Rafael specializes in the management of water resources projects, including water supply, water treatment, hydropower and stormwater planning and design. Mr. Frias is also experienced in incorporating sustainability principles into project designs and in the development of sustainable water planning technologies for the management of watersheds and ecosystems, water scarcity and wet-weather conditions. Rafael is a national Board member of the American Water Resources Association (AWRA), and an active member of the Water Environment Federation (WEF) and American Water Works Association (AWWA), for which he as published papers and delivered presentations on comprehensive water resources issues, including sustainable water planning, surface water management, water treatment technologies, aquifer storage and recovery (ASR) and small hydropower.

Some of Mr. Frias' key assignments with the City of Hollywood include:

- Automation and SCADA Improvements for Optimization of the SRWWTP Oxygenation, Chlorination, and Pumping Systems
- Automation and SCADA Improvements for Optimization of the SRWWTP's Sludge Process Control System
- Development of the City of Hollywood Energy Efficiency Master Plan

PROJECT EXPERIENCE

City of Hollywood | Automation and SCADA Improvements for Optimization of the SRWWTP Oxygenation, Chlorination, and Pumping Systems; Hollywood, FL

Senior Project Manager. Led the development and implementatilon of automation and SCADA improvements at the City's Southern Regional Wastewater Treatment Plant (SRWWTP) to optimize the Oxygenation, Chlorination, and Pumpint Systems. These unit processes are comprised of several large and complex treatment areas, including influent distribution and flow splitting, high purity oxygen aeration, oxygen generation plant, Return Activated Sludge (RAS) pump stations, chlorination facility, and effluent pumping. Most of this equipment is currently controlled manually by Operations professionals, as the existing SCADA system within the unit processes lacks the necessary level of automation to monitor and control the processes from a Human Machine Interface (HMI) in the control room.

City of Hollywood | Energy Efficiency Master Plan; Hollywood

Senior Project Manager. Black & Veatch developed a comprehensive Energy Efficiency Master Plan for the City of Hollywood's Water and Wastewater systems and facilities. The master plan resulted in an implementation plan for 20 recommended energy cost savings projects and strategies with a net positive value of $4.4 million to the City over the life of the improvements. Specific tasks included: development of an existing energy use baseline for the City's water and wastewater facilities and equipment; evaluation of the current and potential alternate electric utility rate structures at each facility; energy efficiency assessments; operations optimization evaluation for the raw water supply, treatment and potable water distribution systems; feasibility assessment for the development of renewable energy sources, including solar PV; development and analysis of over 50 energy conservation measures; development and use of an "Energy Project Decision Cash Flow Model;" and completion of a Master Plan Report that provides a roadmap for the City to implement the recommended energy cost savings projects and strategies over the planning horizon.

Our systematic and holistic approach to energy master planning resulted in the identification and evaluation "best fit" energy conservation measures (ECMs) for a combined annual energy savings of approximately 7 GWh, or 15% of the Utilities Department total energy use in 2012.

Hillsborough County | South/Central Wastewater Service Area Wastewater Master Plan Update Report; Tampa, FL

Engineering Manager. Managed support services for the production of the South/Central Service Area Wastewater Master Plan Update Report for Hillsborough County. The updated report evaluates different configuration alternatives for a wastewater and reclaimed water system. Support services included technical and editorial review, quality control, cost evaluation and development of GIS schematics for each evaluated alternative.

Palm Beach County Water Utilities Department | Sustainability and Strategic Planning Services; Palm Beach County, FL

Project Director. Currently, leading Black & Veatch's efforts for the development of a Strategic Sustainability Plan (SSP) for PBCWUD to shape the future state of the utility and support it in continuing to be a leader in the water and wastewater utility industry. As part of the SSP, Black & Veatch is using our Pathfinder strategic planning process, which was developed based on our proven experience working with clients within the water and energy industries. The Pathfinder methodology uses a collaborative approach to meld bottom-up initiatives with top-down strategic intent. The methodology combines sustainability, financial, and operational analytics with technical depth and insights for development of the PBCWUD SSP.

MDWASD | Hydraulic Modeling in Support of Planning Activities; Miami, FL

Project Director. Black & Veatch is currently performing multiple capacity studies initiated by the Miami-Dade Water & Sewer Department's (Department) Planning Division. The services being performed include: Water and Wastewater Capacity Analyses Orientation; Water Hydraulic Model Operation and Maintenance using the Department's existing distribution system model (InfoWater); and Collection System Capacity Analyses using the Department's existing collection system model (Infoworks CS).

PRASA | Evaluation of 39 (plus 1) Priority Wastewater Treatment Plants; Puerto Rico

Water Resources Engineer. Assisted in the inspection and evaluation of 40 priority wastewater treatment plants for the Puerto Rico Aqueduct and Sewer Authority (PRASA) for a period of 2 weeks. The facilities were evaluated on the basis of capital improvements status, treatment process efficiency, and overall plant operating conditions. A report listing all field observations and recommendations was provided to the client as a final deliverable.

ISABEL BOTERO, PE

PROJECT MANAGER

OFFICE LOCATION
Sunrise, FL

EDUCATION
MS, Environmental Engineering, University of Kansas, 2004

BS, Civil Engineering, University of Missouri, 1999

YEARS EXPERIENCE
17

PROFESSIONAL REGISTRATION
PE - 25626, 2013

PE - 67176, FL, 2007

PE - 2005001044, MO, 2005

PROFESSIONAL ASSOCIATIONS
Water Environmental Federation

Florida Water Environment Association

Ms. Botero is a Project Manager and environmental engineer with 17 years of water systems experience and is a proven performer as a manager and technical leader for the City over the past five years. She has participated in detailed design of water and wastewater projects for alternative delivery methods (design/build/ operate). She is also experienced in developing scope documents for pricing of design/build projects.

As a member of Black & Veatch's Energy Efficiency Master Plan for the City of Hollywood's Water and Wastewater systems and facilities team, Isabel has been closely involved with the City, including the execution of tasks related to the Southern Regional Wastewater Treatment Plant operations optimization with the implementation of SCADA improvements for multiple treatment facilities.

PROJECT EXPERIENCE

City of Hollywood | Energy Efficiency Master Plan; Hollywood, FL

Engineering Manager. Ms. Botero participated in the development of a comprehensive Energy Efficiency Master Plan for the City of Hollywood's Water and Wastewater systems and facilities. The master plan resulted in an implementation plan for 20 recommended energy cost savings projects and strategies with a net positive value of $4.4 million to the City over the life of the improvements.

City of Hollywood | Automation and SCADA Improvements for Optimization of the SRWWTP Oxygenation, Chlorination, and Pumping Systems; Hollywood, FL

Engineering Manager. Led the technical execution and coordinateion with the City's ICE Manager for the implementation of automation and SCADA improvements at the City's SRWWTP. Most of the equipment at the City of Hollywood's SRWWTP is currently controlled manually by Operations professionals, as the existing SCADA system within the unit processes lacks the necessary level of automation to monitor and control the processes from a Human Machine Interface (HMI) in the control room. Black & Veatch was retained by the City to provided services for data gathering, programming and commissioning to replicate the Siemens PLC and HMI for the Oxygen Generation Plant. At the same time, Black & Veatch worked on data gathering and review, development of control strategies, programming, commissioning, and training to Operations staff for PLC 3 (Chlorine Facility) and PLC 6 (Effluent Pump Station).

City of Hollywood | Automation and SCADA Improvements for Optimization of the SRWWTP's Sludge Process Control System; Hollywood, FL

Engineering Manager. Led the technical execution and coordination with the City's ICE Manager for the implementation of automation and SCADA improvements at the City's SRWWTP to optimize Sludge Process Control System. The Sludge Process Control System is a large complex process that is currently controlled manually by City Operations professionals. The existing SCADA system lacks the necessary level of automation to monitor and control the sludge process from the Human Machine Interface (HMI) in the control room; this lack of automation has caused a number of operational issues. Black & Veatch supported the City by increasing the level of automation for the Sludge Process Control System to allow automatic or semi-automatic control of the sludge process from the HMI in the control room.

Broward County Water and Wastewater Services | Improvement Projects – General Engineering Services; Pompano Beach, FL

Engineering Manager. As part of the execution of the General Engineering Services for wastewater, Ms. Botero has participated on the design and construction phase services for multiple improvements projects at the North Regional WWTP including replacement of pump pads for the effluent pumps and improvements to the aeration basins, shorting contactors panels replacement at the outfall pump station and clarifiers rehabilitation.

Miami-Dade Water and Sewer Department | Water Service Improvement to Non-Residential Properties; Miami, FL

Project Manager. Ms. Botero assisted the Miami-Dade Water & Sewer Department (MDWASD) with developing a plan, including planning level cost estimates and project schedules for the improvements of water infrastructure to non-residential zoned properties within MDWASD's service area currently under-sized to bolster commercial re-development. Once the project is implemented, over 15,000 parcels sites will have improved water service.

Puerto Rico Aqueduct and Sewer Authority | PRASA Hydroelectric System Evaluation; Puerto Rico

Engineering Manager. Ms. Botero assisted in the evaluation of existing hydroelectric facilities. The initial phase included the assessment of the existing facilities and issuing recommendations on rehabilitation and modernization. A water availability model and operation reservoir curves were developed for the Loco, Luchetti, Guayo, Yahuecas and Prieto reservoirs. The final component of the project include an economic feasibility evaluation for the implementation of the improvements.

MDWASD | Sewer to Commercial Properties, Miami, FL

Engineering Manager. Ms. Botero assisted the Miami-Dade Water & Sewer Department (MDWASD) with developing a plan, including planning level cost estimates and project schedules for the addition of sewer infrastructure to commercial zoned properties within MDWASD's service area currently not connected to these systems to bolster commercial re-development. Over 3,000 parcels sites were analyzed for sewer system extensions.

Yucaipa Valley Water District | Wochholz Wastewater Treatment Plant Secondary Treatment Expansion; Yucaipa, CA

Project Engineer. Assisted with completing the detailed design of an integrated fixed-film/activated sludge (IFAS) aeration system, return activated sludge pumping, and UV disinfection to expand the plant from 4.5 to 8 mgd. Developed a hydraulic profile for the entire facility to include all the improvements to existing structures and the addition of new processes.

Puerto Rico Aqueduct and Sewer Authority (PRASA) | CIP Annual Inspections; Puerto Rico

Inspector. Inspected, evaluated, and collected field data of the urban San Juan potable water distribution system. The facilities inspected included potable water booster pumping stations, and reservoirs. The evaluation included existing maintenance conditions and structural integrity of the facilities visited. She also evaluated preventive maintenance and capacity of response to emergency situations.

AMANDA SCHWERMAN, PE, ENV SP

TECHNICAL DIRECTOR

OFFICE LOCATION
Tampa, FL

EDUCATION
MS, Civil/Environmental Engineering, Colorado School Mines, 2006

BS, Civil Engineering, Colorado School Mines, 2005

YEARS EXPERIENCE
12

PROFESSIONAL REGISTRATION
PE – 70751, Florida, 2014

PROFESSIONAL ASSOCIATIONS
American Water Works Association (Engineering Modeling Applications Committee, and M32 Update Contributor)

Water Environmental Federation (Collections Systems Committee, Workshop subcommittee Vice Chair)

Florida Water Environment Association

WateReuse Association

Ms. Schwerman's experience is focused on water and wastewater-related planning projects. Her expertise lies in water and wastewater hydraulic modeling, but she has experience with process/mechanical design as well. She is involved with professional societies including chairing the WEF Collections System Committee's workshop group, working on the WEF Envision Taskforce, participating with AWWAs Engineering Modeling Applications Committee (EMAC) and M32 Updates, is a Trustee and the Membership Chair for WateReuse Florida and is a certified Envision Sustainability Professional.

PROJECT EXPERIENCE

Plant City | Wastewater Master Plan; Plant City, FL

Engineering Manager. Plant City's Utilities Department collection system services a population of approximately 38,000 people. The goal and objective of the Wastewater Master Plan (Project) is to assist City staff in providing a reliable and robust system with adequate capacity to accommodate future growth within the City's sewer service area. Their collection system includes more than 140 miles of gravity pipes, 20 miles of forcemain, and 44 lift stations using InfoWorks ICM. Tasks included: field data collection, population and demand projections, sewer treatment capacity, model update and calibration, hydraulic analysis, asset management strategy development, risk-based facilities assessment, CIP planning and master plan documentation.

Broward County | Regional Wastewater Master Plan; Pompano Beach, FL

Planning Manager. In consideration of aging infrastructure and to best allocate the limited capital funds for the rehabilitation, repair or replacement of such infrastructure, which would cost significantly less than emergency mobilization repairs, Black & Veatch completed a Regional Wastewater Master Plan focusing on the regional transmission mains and master pump stations. The Master Plan allows Broward County to effectively provide risk analysis and prioritization with the objective of maintaining a desired level of service for its customers, communities and the environment at an acceptable level of risk and low cost for the rehabilitation, repair or replacement of its assets. Tasks included hydraulic and transient modeling, risk prioritization and condition assessment plan for the force mains, and inspection/condition assessment of the master pump stations.

Black & Veatch used Survey123 data collection forms to inventory the asset data and provide condition scores to each asset. The ultimate delivery is an adaptive capital improvement plan tied to project triggers tied to decision support tools to track the triggers.

Lee County | Wastewater Master Plan; Lee County, FL

Engineering Manager. Lee County's Utilities Department collection system services a population of approximately 250,000 people. The goal and objective of the Wastewater Master Plan (Project) is to assist County staff in providing a reliable and robust system with adequate capacity to accommodate future growth within the City's sewer service area. Their collection system includes 10 service areas more than 650 miles of gravity pipes, 350 miles of forcemain, and 690 lift stations. The model was developed in InfoWater because the Master Plan hydraulic analysis was only conducted for the forcemain portion of the collection system. Tasks included: field data collection, population and demand projections, sewer treatment capacity, model update and calibration, hydraulic analysis, CIP planning and master plan documentation.

Pinellas County | Water and Sewer Optimization Study; Pinellas County, FL

Engineering Manager. The County has embarked upon an Optimization Program for its water, sewer and reclaimed water systems that involves using the "Envision Process", which is an in-depth guidance and rating system used to assess and improve the sustainability metrics of infrastructure projects. The Program initially involved a comprehensive optimization study of the assets associated with or affecting the South Cross Bayou Water Reclamation Facility (SCBWRF). The objectives of the optimization study include, but were not limited to, reducing energy use, reducing O&M costs, process optimization and technology improvements, and triple bottom line sustainability (economic, environmental, and social) of the facility. The COUNTY is responsible for operating and maintaining the water, sewer, and reclaimed water systems within the designated service areas under the jurisdiction of the Pinellas County Florida Board of County Commissioners.

Miami-Dade Water and Sewer Department | CT-2 Central District Wastewater Treatment Plant – Tertiary Filtration Pilot Test and Effluent Pump Station Evaluation; Miami, FL

Lead Modeler. Provided professional services to perform a surge (a.k.a. transient or water hammer) analysis of the existing effluent pump station using Bentley's HAMMER. The primary objective of the project was to assess the transient potential of the effluent pump station to confirm that the air valves on the effluent pipeline are adequate for the increased flow rate. Tasks included: sequence of operation recommendations, inertia calculations wave speed analysis, and transient scenario development.

Tampa Bay Water | Long-Term Master Water Plan & Program Feasibility; Pasco and Hillsborough Counties, FL

Project Engineer. focused on the potable reuse feasibility tasks. Tampa Bay Water (TBW) is required to update their Long-Term Master Water Plan (LTMWP) every five years. The most recent LTMWP prior to this project was completed and approved in December 2013 and included a Feasibility Program recommendation. This project included updating both the Feasibility Program and the LTMWP, to evaluate the Board approved projects listed in the 2013 LTMWP and to narrow down the project list to one of more projects that will meet the region's drinking water demand once the demand forecast indicates more supply is needed.

Emerald Coast Utilities Authority (ECUA) | Sanitary Sewer System Model Development and Dry Weather Calibration; Pensacola, FL

Planning Engineer. ECUA operates a sanitary sewer collection system consisting of approximately 857 miles of gravity sewer mains, 268 miles of force mains, and over 360 lift stations that collect and transport wastewater to its wastewater treatment plants. In 2007, ECUA decided to address excessive inflow and infiltration (I/I) issues throughout their system. They began a short term, followed by a long term, flow monitoring program to monitor the impact of rehabilitating their sanity sewer system. The model includes 2,074 manholes, 109 lift stations, 146 miles of force mains, and 104 miles gravity sewer modeled in InfoWorks CS, V12.0.

CHRIS BARLOW, PE, CDT

QA/QC

OFFICE LOCATION
Coral Springs, FL

EDUCATION
BS, Environmental Engineering, University of Florida, 1998

YEARS EXPERIENCE
22

PROFESSIONAL REGISTRATION
PE – 2003, FL, #59256

Construction Documents Technologist (CDT) – CSI 2016

PROFESSIONAL ASSOCIATIONS
Florida Engineering Society (FES)/NSPE

American Water Works Association (AWWA)

Mr. Barlow is an experienced engineer and project manager that has focused his practice on the analysis and designs of municipal water utility projects, primarily in south Florida. This experience has been developed through the execution of numerous water, wastewater, and water reclamation projects. This experience includes the successful completion of numerous pump station design, rehabilitation, and installation projects; pipeline projects, with extensive experience in horizontal directional drill (HDD) projects (over 60,000-LF); chemical feed systems, degasification and odor control systems; hydraulic modeling and master planning of water distribution and wastewater collection systems; survey coordination, corridor evaluations, design, permitting, construction observations, construction administration and final regulatory certification of these projects.

PROJECT EXPERIENCE

City of West Palm Beach | RAS Pump Station Valve Replacement and Improvements, East Central Regional (ECR) WWTP; West Palm Beach, FL

Project Manager, Design Engineering and Construction Contract Administrator. Rehabilitation of four (4) triplex return activated sludge (RAS) pump stations serving this 55 mgd wastewater treatment plant. The Work consisted of replacing reducing swing check valves with conventional swing check valves and fitting on the discharge piping, replacing the pump suction valves with new valves equipped with electric actuators, and the installation of 30-inch line-stops on the underground discharge piping, necessary to isolate each pump station.

Martin County Utilities and Solid Waste | Permit Capacity Increase, Tropical Farms Wastewater Treatment Plant; Stuart, FL

Project Manager and Engineer of Record. Modification to the FDEP Wastewater Operating permit that increased the capacity from 5.0 mgd to 5.9 mgd. The purpose of this modification was to increase the permit capacity based on the actual plant performance utilizing the most recent operational data after commissioning and the transfer of flow from two smaller plants that were decommissioned, as part of the Master Plan for this Utility.

City of Hollywood | Risk and Resiliency Assessment of the American Water Infrastructure Act, Water System; Hollywood, FL

Project Manager. Delivery of the Risk and Resiliency Assessment required by the American Water Infrastructure Improvement Act. Utilized the methods provided in AWWA J-100 Standard Practices to deliver this comprehensive assessment of the City's water system.

City of Hollywood | High Service Pump Station Upgrades, Water Treatment Plant; Hollywood, FL | 2020

Project Manager, Lead Design Engineer, and Construction Administration Engineer. Evaluation, design and permitting of the upgrades to the pump station that was originally built in the early 1970's. The project will provide for the installation six 8,000 gpm variable speed pumps to replace ten existing constant speed pumps that sizes that range in size from 2,500 gpm to 14,000 gpm pumps.

City of West Palm Beach | Bulk Sodium Hypochlorite Feed System; West Palm Beach, FL

Project Manager and Construction Administration Engineer. Installation of a new disinfection system that utilizes sodium hypochlorite for the of the gas chlorine disinfection system at the City's water treatment plant. The existing system utilized multiple one-ton cylinders of chlorine gas. The new liquid chlorine system eliminated the risk of public exposure to chlorine gas.

City of West Palm Beach | Water Treatment Plant Automation and SCADA Improvement, Water Utility Division of Public Works; West Palm Beach, FL

Project Manager. Design to provide for the installation of a new fiber-optic communication network and field instrumentation necessary to automate the controls of this historic water treatment facility, dating back to 1894.

City of West Palm Beach | Phipps Park Booster Pump Station Rehabilitation; Palm Beach, FL

Project Manager, Construction Administration Engineer. Project consisted of rehabilitating the facility, and installation of a new flow meter. The construction added an underground by-pass facilitating the rehabilitation.

City of West Palm Beach | Five Remote Water Storage and Re-pump Facilities Conversion from Gas to Liquid Chlorine, Water Utility Division of Public Works; West Palm Beach, FL

Project Manager and Lead Design Engineer. Design to replace the gas chlorine disinfection system with a system that utilizes sodium hypochlorite at the five locations across the City's water distribution system.

City of Miramar | Miramar East Water Treatment Plant Replacement Wells, Water Treatment Plant; Miramar, FL

Project Manager. Hydrogeological services for the progressive design-build team developing the East Water Treatment Plant (WTP) modification from lime softening to Nano-filtration treatment. The well component includes the design of four replacement water supply wells and a design and UIC permitting of a Class I deep injection well system for membrane-treatment reject (concentrate) disposal.

Fort Pierce Utility Authority | Fort Pierce Utility Authority, Lift Station "C" and Lift Station "D" Rehabilitation; Fort Peirce, FL

Lead Design Engineer. Evaluation, design, permitting, and construction phase services associated with the rehabilitation of Lift Station "C" and "D" for Fort Pierce Utility Authorities' (FPUA). Lift Stations "C" and "D" were constructed on the mid-1950s, as wet well-dry well configurations. This rehabilitation consisted of converting the existing dry well into a wet well for the installation of submersible pumps, placement of a new master manhole inside the original wet well compartment and demolishing the existing building.

OLENA LYTVYN, PE

CONDITION ASSESSMENT LEAD

OFFICE LOCATION
Coral Gables, FL

EDUCATION
BS, Civil and Environmental Engineering, Florida State University, 2012

YEARS EXPERIENCE
9

PROFESSIONAL REGISTRATION
PE – 2017, FL, 82696

PE – 2017, IL, 062069139

PROFESSIONAL ASSOCIATIONS
American Water Works Association

American Society of Civil Engineers

Ms. Lytvyn has over five years of experience in civil engineering designs, including composing preliminary engineering reports, route analysis, pipeline design of various sizes, developing cost estimates and inspections. She has also served as the client manager for various clients in the Tampa Bay area.

PROJECT EXPERIENCE

Miami-Dade Water and Sewer Department | 54-inch Condition Assessment Carbon Fiber Repairs; Miami, FL

Engineer. Ms. Lytvyn prepared a condition assessment report for a 54-inch carbon fiber repairs located along Red Road Ave that transfers water from the John E. Preston Treatment Plant to the City of Hialeah and other areas of North Miami-Dade County. She performed limited manned entry assessments of the pipeline's internal condition over a 3-year period. The condition assessment portion included the following tasks: visual inspection of carbon fiber repairs and soundings to asses existing conditions, identify deficiencies. Ms. Lytvyn worked with WASD, CFRP design engineers and manufacturers to develop an appropriate approach for rehabilitating the observed deficiencies of line.

Miami-Dade Water and Sewer Department | SL-2.1; Miami, FL

Engineering Manager. Responsible for managing and coordinating the execution of design of 60-inch PCCP force main. Ms. Lytvyn was responsible for the horizontal and vertical alignment. Additionally, Ms. Lytvyn was responsible for managing subconsultants.

City of West Palm Beach | Condition Assessment of the 42-inch/48-inch PCCP Force Main; West Palm Beach, FL

Engineering Intern. Ms. Lytvyn assisted in reviewing Condition Assessment of 42-inch and 48-inch Diameter PCCP Force Main report prepared by Pure Technologies and providing recommendations on rehabilitation methods. Additionally, Ms. Lytvyn assisted in providing technical support for this project.

Miami-Dade Water and Sewer Department | Prioritization of Water System; Miami, FL

Engineer. Ms. Lytvyn served as a Project Engineer in establishing a comprehensive infrastructure assessment and replacement program for Miami-Dade water transmission and distribution system. Ms. Lytvyn reviewed and analyzed past condition assessment reports of large diameter water mains as well as various environmental and social conditions.

Ms. Lytvyn then developed a prioritization criterion, assigning different values to each factor considered in the consequence/likelihood of failure matrix, taking into account Miami-Dade's need. She was then responsible for providing appropriate recommendations on the replacement/rehabilitation/monitoring of the large diameter transmission mains with corresponding cost estimates. Ms. Lytvyn assisted in the preparation and presentation to the client of prioritization report.

Miami-Dade Water and Sewer Department | 72-inch Force Main Design Build Criteria Package; Miami, FL

Engineer. Ms. Lytvyn assisted in the feasibility study for a Pipeline Rehabilitation/Replacement for Miami-Dade County WASD. The scope of the project required recommendations for a pipeline rehabilitation method(s), preparation of the Design-Build Criteria Package for the selected alternative, assisting the County during selection process of contractor, and providing compliance reviews and support services during the design and construction phases of the replacement/ rehabilitation of the 72-inch force main Interceptor, approximately 3.5 miles long. Additionally, Ms. Lytvyn assisted in the review of proposed construction drawings, design calculation, and shop drawings to ensure compliance with WASD standards and the Design-Criteria Package.

Miami-Dade Water and Sewer Department | Route Analysis for the Replacement of 16,200 LF of 54-inch Water Main along Red Road; Miami, FL

Engineer. Ms. Lytvyn performed the duties of Project Engineer for the evaluation of route alternatives for the replacement of a 54-inch transmission main. Record drawings were obtained and reviewed from all utility companies in the area. Three routes were developed for an alignment of a 54-inch water main. Upon the completion of site reviews and cost estimates, the most optimal route was selected. The recommended route contains several canal and railroad crossings. A report was created documenting all finding and basis of recommendation. Ms. Lytvyn also assisted in the preparation of a presentation given to the Water and Sewer Department on the recommended route.

Miami-Dade Water and Sewer Department | 48-inch PCCP Condition Assessment and Assessment of Carbon Fiber Repairs; Miami, FL

Engineer. Ms. Lytvyn prepared a condition assessment report for a 48-inch PCCP located along SW 56th St. Ms. Lytvyn performed a limited manned entry assessment of the pipeline's internal condition. The condition assessment included 24 pipe sections previously rehabilitated with CFRP liner and 143 non-rehabilitated pipe sections.

Miami-Dade Water and Sewer Department | 54-inch PCCP Condition Assessment; Miami, FL

Engineer. Ms. Lytvyn prepared condition assessment report for a 54-inch PCCP located along Red Road Ave that transfers water from the John E. Preston Treatment Plant to the City of Hialeah and other areas of North Miami-Dade County. Ms. Lytvyn performed a limited manned entry assessment of the pipeline's internal condition. The condition assessment portion included a total of 102 pipe sections and had the following tasks: visual inspection of pipe interior and soundings of mortar lining to asses existing conditions, identify distressed pipe sections, and recommend an approach for rehabilitating distressed sections of line.

Miami-Dade Water and Sewer Department | 96-inch PCCP Condition Assessment; Miami, FL

Engineering Intern. Ms. Lytvyn assisted in the preparation of a condition assessment report for a 96-inch PCCP located along W Okeechobee Rd. The waterline transports raw water from Northwest Well Fields to the John E. Preston water treatment plant. Ms. Lytvyn performed a limited manned entry assessment of the pipeline's internal condition. The condition assessment portion included a total of 172 pipe sections. The assessment included: visual inspection of pipe interior and soundings of mortar lining to asses existing conditions, identify distressed pipe sections, and recommend an approach for rehabilitating distressed sections of line.

LUCAS BOTERO, PE

WASTEWATER TREATMENT

OFFICE LOCATION
Coral Springs, FL

EDUCATION
MS, Civil Engineering, California State University, Long Beach, 2000

BS, Civil Engineering, Pontificia Universidad Javeriana, Bogota, Colombia, 1996

YEARS EXPERIENCE
24

PROFESSIONAL REGISTRATION
PE – 2007, FL, 67242

PE – 2003, KS, 17687

PE – 1996, Colombia 2520260893CND

PROFESSIONAL ASSOCIATIONS
Water Environmental Federation

International Water Association

Member, Water Environment Federation, Municipal Wastewater Treatment Design Subcommittee

Chair of WEF's Grit Characterization Task Force

Board Certified Environmental Engineer (BCEE), American Academy of Environmental Engineers

Envision® Sustainability Professional (ENV SP), Institute for Sustainable Infrastructure

Mr. Botero has been involved in studies, design, construction, and resident phase engineering in several infrastructure, water, wastewater, and reuse projects. His involvement has included project development and contract preparation, project planning and budgets, preparation of construction documents and project schedules, and resident engineering services.

Lucas has over 20 years of experience in environmental engineering. He has a broad-based knowledge of wastewater treatment process engineering with an emphasis on plant capacity evaluations, activated sludge design including biological and chemical nutrient removal, treatment plant modeling, industrial waste treatment, headworks design, effluent disinfection, and sludge processing. Lucas is the primary author of Chapter 11 of the WEF Manual of Practice No. 8 "Design of Municipal Wastewater Treatment Plants," as well as other manuals of practice.

PROJECT EXPERIENCE

City of Key West | WWTP Blower Improvements; Key West, FL

Process Specialist. Mr. Botero served as process specialist lead for the WWTF Blower improvements project. The project included and evaluation of blower technologies that resulted in the selected on the "slow speed turbo blowers" for implementation to maximize efficiency at the plant. Improvement to the plant's solids cake conveyor and the plant effluent pump station were also included in the project.

Miami Dade Water and Sewer Department; Ocean Outfall Legislation Program | Central District WWTP (CDWWTP) Effluent Filtration Pilot Study and Effluent Pump Station Evaluation; Miami, FL

Project Manager. Mr. Botero served as Project Manager and technical lead for the CDWWTP pilot study. The project included the design of a filtration system for testing three different technologies which included outside/in cloth disk filters, inside/out disk filters, and deep bed media filtration; and supervising the installation and operation of the pilot system. The project also included an evaluation of the effluent pump station for the plant including vibration, thermal, and performance testing of the existing pumps and their suitability for pumping to the newly proposed filtration system. The project included a final report recommending the filter technology and the effluent pump station improvements for the OOL CDWWTP High Level Disinfection project.

Miami Dade Water and Sewer Department; Ocean Outfall Legislation Program | South District WWTP (SDWWTP) Engine Generation and Electrical Distribution Building No. 3; Miami, FL

Project Manager. Mr. Botero served as Project Manager and technical lead for the Engine Generators Replacement Project for the SDWWTP. The project included evaluating the existing engine generation capabilities for the SDWWTP, performing an alternatives evaluation for different engine generators for the plant which included low speed diesel, high speed diesel, natural gas, hybrid alternatives (selected alternative). Energy efficiency evaluation including a probabilistic life cycle assessment was developed to select the recommended hybrid alternative for implementation. The project also included an electrical distribution building for 50 percent of the plant processes designed to meet ocean rise standards set by Miami Dade.

Pinellas County | South Cross Bayou WRF Assessment and Optimization Program Development; Pinellas County, FL

Process Specialist. Mr. Botero served as process specialist for the optimization programs plan of the South Bayou WRF. Specifically, Mr. Botero helped with the optimization evaluation of the grit removal system.

Florida Keys Aqueduct Authority | WWTP Improvements; Cudjoe Key, FL

Process Specialist. Mr. Botero served as process specialist for startup phase of the Cudjoe Key WWTP improvements. This greenfield plant included fine screening, equalization, five-stage Bardenpho®, secondary clarifiers, filtration, chlorination, deep well injection, RDT thickening, aerobic digestion, and centrifuge dewatering. The plant was designed to meet TN below 3.0 mg/L and TP below 1 mg/L. The design included secondary carbon addition via methanol or MicroC. The project included modeling of different startup conditions and strategies.

Miami Dade Water and Sewer Department | South District Water Reclamation Plant (SDWRP); Miami, FL

Process Engineer. Mr. Botero was the lead process engineer for the nutrient removal systems for the 30-mgd SDWRP, which included multi-point addition chemical phosphorus removal, RO treatment, and ion exchange for ammonia removal. The work also included a pilot testing effort for the IX system.

Miami Dade Water and Sewer Department | South District Water Reclamation Plant (SDWRP); Miami, FL

Process Engineer. Mr. Botero was the lead process engineer for the evaluation of nutrient removal technologies for the 30-mgd SDWRP, which included evaluating processes capable of removing nutrients below reporting limits. The technologies evaluated were: bioaugmentation, MBBR, IFAS, nitrifying trickling filters, MBRs, ballasted flocculation, chemical phosphorus removal, conventional biological nutrient removal (BNR) processes, second pass or reduced recovery RO, ion exchange, and breakpoint chlorination.

Hillsborough County | Valrico WWTF; Pasco County, FL

Process Specialist. Mr. Botero served as process specialist for the Venice WWTF Energy Assessment project. The project included evaluating all plant processes and developing a list of energy conservation measures that included: leachate equalization management, intensifying the treatment process to reduce number of duty units, changing the process flowsheet to treat water "fit for purpose", and modification to the pump station systems among others.

Pasco County | Embassy Hills WWTF Improvements; Pasco County, FL

Process Specialist. Mr. Botero served as process specialist for the EHWWTF improvement project. The project included headworks improvements, conversion to diffused air, new PD blowers, clarifier equipment replacement, new disk filters, new MCC Building, and other miscellaneous electrical improvements.

AMANDA ZARAZURA, PE

COLLECTION SYSTEM LEAD | R&R RISK PRIORITIZATION

OFFICE LOCATION
Denver, CO

EDUCATION
IAM Certificate in Asset Management, 2019

MS, Environmental Engineering, Texas Tech University, 2001

BS, Environmental Engineering, Texas Tech University, 2001

YEARS EXPERIENCE
19

PROFESSIONAL REGISTRATIONS
PE - TX

PROFESSIONAL ASSOCIATIONS
Water Environment Federation

Ms. Zarazúa is a Regional Asset Management Lead with 17 years of experience specializing in asset management and wastewater collection studies. Her experience includes asset management program development, ISO 55001 gap assessments and improvement plans, risk-based condition assessment and capital improvement planning, implementation and optimization of computerized maintenance management systems (CMMS) and GIS, CMMS software needs assessments, and wastewater collection system master planning.

PROJECT EXPERIENCE

Plant City | Wastewater Master Plan; Plant City, FL

Lead Asset Management Consultant. Plant City's Utilities Department collection system services a population of approximately 38,000 people. The goal and objective of the Wastewater Master Plan (Project) is to assist City staff in providing a reliable and robust system with adequate capacity to accommodate future growth within the City's sewer service area. Their collection system includes more than 140 miles of gravity pipes, 20 miles of forcemain, and 44 lift stations using InfoWorks ICM. Tasks included: field data collection, population and demand projections, sewer treatment capacity, model update and calibration, hydraulic analysis, asset management strategy development, risk-based facilities assessment, CIP planning and master plan documentation.

Broward County | Regional Wastewater Master Plan; Pompano Beach, FL

Lead Asset Management Consultant. In consideration of aging infrastructure and to best allocate the limited capital funds for the rehabilitation, repair or replacement of such infrastructure, which would cost significantly less than emergency mobilization repairs, Black & Veatch completed a Regional Wastewater Master Plan focusing on the regional transmission mains and master pump stations. Black & Veatch used Survey123 data collection forms to inventory the asset data and provide condition scores to each asset. The ultimate delivery is an adaptive capital improvement plan tied to project triggers tied to decision support tools to track the triggers.

City of Tampa Water Department | Potable Water System Master Plan; Tampa, FL

Senior Asset Management Consultant. Comprehensive Water System Master Plan update including asset management program framework development and risk-based prioritization for pipeline improvements. Led workshops within the Water Department and other supporting City groups to conduct a gap assessment review based on ISO 55001 standards. Developed an asset management program implementation roadmap. Developed a dynamic risk-based prioritization model using InfoMaster software and led workshops to support development of likelihood of failure and consequence of failure criteria. The results of the model were used to support the capital improvement projects planning. Developed a customized InfoMaster guideline for the City's use to continue to maintain their model.

City of Atlanta | Small Diameter Water Mains Risk Prioritization; Atlanta, GA

Lead Asset Management Consultant. Developed a risk-based prioritization approach to support the small diameter repair and rehabilitation program. Performed a data gap assessment to populate missing attribute data including material, installation year, and diameter. Developed a risk model using InfoMaster software. Determined appropriate likelihood of failure and consequence of failure criteria to support the R&R management strategies. Developed a rehabilitation decision tree including associated replacement costs to define priority groups for rehabilitation.

Trinity River Authority of Texas| FY Annual Updates; Arlington, TX

Engineering Manager. Annual inventory and point-of-entry updates in GIS and Lucity for the Central Regional Wastewater System, Ten Mile Creek Regional Wastewater System, and Denton Creek Regional Wastewater System. Directed GPS collection efforts in regional systems. Updated interceptor alignments in GIS using GPS coordinates stored in Lucity. Coordinated efforts and prepared updates to Interceptor System Maps, Point-of-Entry Maps, Subsystem Maps, and Grid Map Books. Installed updated databases at TRA's general office twice a year.

City of Glendale Water Services Department (WSD); Enterprise Asset Management System (EAMS) Needs Assessment and Implementation; Glendale, AZ

Lead Asset Management Consultant. Glendale WSD is developing an asset management program including replacement of the CMMS software for water/wastewater treatment, water distribution, wastewater collection, water quality, pretreatment, water reuse, storm water management, irrigation system management, and warehouse and inventory management. Supported the selection and procurement of the software. Led workshops with all groups to assess current workflows and define system requirements for a new EAMS. Prepared an RFP and demonstration scripts to support system selection. Currently providing implementation services for the selected EAMS software - Lucity. Currently leading the implementation services for the selected EAMS software – Lucity for each of the WSD groups. Implementation services include work processes development, GIS review and development, Lucity configuration and testing, training, and go-live support.

Tulsa Metropolitan Utilities Authority| Utility Enterprise Initiative; Tulsa, OK

Senior Asset Management Consultant. Utility Enterprise Initiative to develop an asset management program according to ISO 55000 standards. Program activities include asset management plans and implementation of a computerized maintenance management system (CMMS) software to support water and wastewater treatment, wastewater collection, water distribution, and water supply. Developed risk methodologies in alignment with overall asset management framework including likelihood of failure and consequence of failure criteria for facilities/plant equipment to support calculation of risk at a system level and for the water distribution system.

ROBERT CHAMBERS, MBA

CAPITAL PLANNING LEAD

OFFICE LOCATION
Coral Springs, FL

EDUCATION
MBA, Finance, Rollins College, 2006

BS, Finance, University of Central Florida

YEARS EXPERIENCE
17

Mr. Chambers is a manager with extensive utility and consulting experience involving a variety public and private utility projects associated with electric, natural gas, and water and wastewater throughout the southeastern United States. His utility knowledge covers a wide range of utility management and operating issues, including cost of service and rate analysis, financial planning, capital financing, acquisitions and valuations, energy management, customer affordability, business case analysis, and strategic planning.

In addition, Mr. Chambers has served and supported municipal utilities in developing, communicating, and educating various stakeholders about the purpose and value of various business plans which have included, to name a few, long term financial plans, capital acquisition and system expansion alternatives, customer rate and affordability scenarios, and strategic plan roadmaps. Mr. Chambers has presented at national utility programs, such as the American Water Works Association – Utility Management conferences and the Southwest Florida Government Financial Officers Association conferences on topics like demand management, program development, and financial planning. In addition, Mr. Chambers he has earned a Master's of Business Administration with a concentration in Finance from the Crummer Graduate School of Business at Rollins College.

PROJECT EXPERIENCE

City of Hollywood | Energy Master Plan; Hollywood, FL

Project Manager. Mr. Chambers served as the Project Manager for the financial and economic feasibility components of an Energy Master Plan for the Water and Sewer Department of the City of Hollywood. The financial team performed detailed business case analysis to determine the feasibility of implementing the Energy Master Plan projects. At the completion of the analysis, the project team developed an implementation plan that was fully funded by the incremental revenues contribution generated from implementing the Master Plan projects.

City of North Miami | Water and Sewer Financial Consulting Services; Miami, FL

Multiple Roles. Black & Veatch supported the City in completing multiple water and sewer rate studies that included the implementation of conservation based rates in order to be compliant with the South Florida Water Management District water use mandates. In addition, Black & Veatch supported the City in applying and successfully retaining $30.0 million in

State Revolving Loan funding to upgrade the City's water treatment plant. Black & Veatch has completed various additional financial and management consulting project for the City. Through the execution of these project Mr. Chambers has served in various capacities. Currently, Mr. Chambers serves as the Client Manager.

Palm Beach County Water Utilities Department | Strategic Sustainability Plan; Palm Beach County, FL

Project Manager. Black & Veatch assisted the Palm Beach County, FL Water Utilities Department (WUD) with the development its Strategic Sustainability Plan (SSP). The SSP is the WUD's 3rd generation plan and is intended to be the utility's strategic roadmap. Mr. Chambers served as the project manager through the entirety of this engagement.

The work completed included a three step approach, Situational Analysis; Strategy Development; and Strategic Initiatives and Implementation, to developing the SSP. The project team facilitated workshops to review the goals and objectives in the previous plan, determine how well the utility met previously established goals, identify strategic opportunities, and develop the SSP. In addition, the project team utilized the Effective Utility Management (EUM) framework to provide a measure of how well the utility is performing in key areas of the utility.

Initiatives, strategic, and key performance indicators were developed in order to plan and adaptively monitor the progress of the WUD in meeting the objectives outlined in the SSP in order to provide the best water, best service, and best environmental stewardship.

At the completion of the process, the project team supported the WUD in educating stakeholders about the purpose and value of the SSP.

San Antonio Water System | Financial Consulting Services; San Antonio, TX

Project Manager. Black & Veatch was contracted to perform a comprehensive rates and charges assessment for SAWS. Mr. Chambers is serving as the project manager in completing the water and sewer system rates design and assessments related to special services charges, industrial surcharges, charges for wholesale services, and a complete review of SAWS' customer affordability program.

Puerto Rico Aqueduct and Sewer Authority | Water & Wastewater Rate Study and Economic Feasibility Assessment; Puerto Rico

Project Manager. Mr. Chambers served as the Project Manager on a team that completed an assessment of all PRASA's Hydropower facilities to determine the cost to rehabilitate, fully optimize, and potentially transfer all the facilities owned and operated by PRASA. The business case analysis entailed detailed risk evaluation around the potential operating and capital cost exposure and the incremental increases in generation. At the completion of these assessments, the project team develop a financial plan that was technically and operationally implementable and fully funded by the cost saving gained through the rehabilitation and optimization of these facilities.

Athens Clarke County | Financial Consulting Services; GA

Project Manager. Mr. Chambers serves as the project manager in providing a number of financial and consulting services to Athens-Clarke County Public Utilities Department (PUD). Black & Veatch has served as the utility's financial consultant in supporting the utility with the development of utility rates and fees for the water and sewer system in order to maintain the appropriate level of revenues to meet utility system obligations.

In addition, Black & Veatch was contracted to complete a comprehensive assessment of the utility's water business offices in order to improve all the existing services provided to customers by the office.

MATT MOREY, GISP

ASSET MANAGEMENT LEAD

OFFICE LOCATION
Charlotte, NC

EDUCATION
BS, Marine Science, Coastal Geology, Coastal Carolina University, 2003

YEARS EXPERIENCE
17

PROFESSIONAL REGISTRATION
GIS – 2010, #00066654

Mr. Morey is a Solutions Lead that supports Black & Veatch's Water Division. He has over 15 years of program management, consulting, and system implementation and integration experience on projects for municipal government public works and water, wastewater, and stormwater utilities clients. He specializes in CMMS solution requirements development, systems implementation and refinement, report writing, and systems integration requirements development.

PROJECT EXPERIENCE

City of Hollywood; CMMS Implementation; Hollywood, FL

Asset Management and Information Systems Lead. Leading the implementation of the City's CMMS for Utilities. Implementation focused on the migration from the City's legacy system for linear and facility assets, and included historic data migration for all past work. Tasks included data migration design and development, designing and configuration of the CMMS, integration design and development, report design and creation, end-user training, and implementation planning.

City of Delray Beach; CMMS Implementation; Delray Beach, FL

Asset Management and Information Systems Lead. Leading the implementation of the City's CMMS for Utilities, Parks and Recreation, and Right-of-Way divisions. Implementation focused on the migration from the City's legacy system and included historic data migration for all past work. Tasks included data migration design and development, designing and configuration of the CMMS, report design and creation, end-user training, and implementation planning.

City of West Melbourne, FL; Enterprise GIS and EAMS; West Melbourne, FL

Technical Lead. Performed a business process review; installed and configured ArcGIS Server, including ArcSDE; and implemented Azteca Cityworks for the Planning and Utilities Departments.

St Johns County, FL; Asset Inventory and CMMS Implementation; St Augustine, FL

Technical Lead. Worked with the County's project team to implement a CMMS for the pavement, roads and bridges, traffic, and fleet divisions. A geodatabase was designed and implemented to house the asset data collected by survey staff to be used within the CMMS. The project team performed the installation, data loading and tuning of the Department's enterprise geodatabase, and assisted the Department with the upgrade their enterprise RDBMS.

Gwinnett County Utilities; Maximo Enhancements; Gwinnett County, GA

Asset Management and Information Systems Lead. Lead task for Maximo system updates including merging organizational data into a single utility-wide organization. This task included merging all groups warehouse materials into a single master list, standardizing commodity codes for all items to the UNSPSC standard, and providing end-user training for the updated system.

Forsyth County Utilities; CMMS Selection Support ; Cumming, GA

Asset Management and Information Systems Lead. Provided assistance to the County's staff for selection of a new CMMS system. Responsibilities included the development and review of system requirements, procurement documentation, demonstration script, evaluation criteria, and coordination of final selection.

City of Mesa; Cityworks Implementation for Signal Butte Water Treatment Plant; Mesa, AZ

Asset Management and Information Systems Lead. Leading implementation tasks of Cityworks Asset Management System (AMS) for Signal Butte Water Treatment Plant. Project tasks include asset registry and geodatabase design for facilities/vertical assets, asset data development from BIM and construction documentation, asset data loading, Cityworks software configuration, system testing, end-user training, go-live support, SCADA integration planning, and integration with SharePoint content and document management platform for maintenance plans and O&M manuals.

Charlotte Area Transit System; Implementation Support for Customer Service; Charlotte, NC

Asset Management and Information Systems Lead. Supported City staff with the implementation of the Service Request module for their existing CMMS to transition users off a home grown CRM system. Tasks included caller and call history data migration, user-interface customization including a bus driver lookup plugin, advanced database support, and reporting support.

City of Charlotte Department of Transportation; CMMS Implementation; Charlotte, NC

Asset Management and Information Systems Lead. Leading the CMMS implementation for the Departments Streets Maintenance, Traffic Operations, Public Service, and Planning Divisions. Responsibilities include business process analysis, system installation, system design and configuration, system integration design, report design and creation and training of key staff.

City of Greenville; Asset Management Training & CMMS Gap Analysis; Greenville, SC

Asset Management and Information Systems Lead. Provided the City's engineering staff with an asset management workshop to educate key staff on asset management concepts. Engineering and public works field staff was also provided training on their existing CMMS system to better understand the capabilities of the system. A gap analysis was performed to determine how the City could better utilize their CMMS to provide better cost accounting and other efficiencies.

City of Rock Hill; CMMS Implementation; Rock Hill, SC

Asset Management and Information Systems Lead. Assisting with the upgrade of Cityworks from a desktop environment into a Cityworks Server AMS environment; updating existing configuration; creating custom training materials and "cheat sheets" for quick reference and the training of key staff.

TAMMY MARTIN, PE

PROCESS MECHANICAL

OFFICE LOCATION
Coral Springs, FL

EDUCATION
BS, Civil Engineering, Florida Atlantic University, 2005

YEARS EXPERIENCE
15

PROFESSIONAL REGISTRATION
PE – 2006, FL, 73892

PROFESSIONAL ASSOCIATIONS
Florida Engineering Society

Ms. Martin is an engineering manager and environmental engineer with thirteen years of experience and knowledge of water and wastewater engineering and pump station mechanical process design. Ms. Martin has served as project engineer on a number of environmental engineering projects including stormwater design, permitting, and construction management. She is proficient with WaterGEMS modeling, HEC-RAS modeling, and Arc GIS. She has participated in detailed design and construction of alternative delivery methods (design/build/operate).

PROJECT EXPERIENCE

City of Hollywood | Automation and SCADA Improvements for Optimization of the SRWWTP Oxygenation, Chlorination, and Pumping Systems; Hollywood, FL

Project Engineer. Supported the technical execution for the implementation of automation and SCADA improvements at the City's SRWWTP. Most of the equipment at the City of Hollywood's SRWWTP is currently controlled manually by Operations professionals, as the existing SCADA system within the unit processes lacks the necessary level of automation to monitor and control the processes from a Human Machine Interface (HMI) in the control room. Black & Veatch was retained by the City to provided services for data gathering, programming and commissioning to replicate the Siemens PLC and HMI for the Oxygen Generation Plant. At the same time, Black & Veatch worked on data gathering and review, development of control strategies, programming, commissioning, and training to Operations staff for PLC 3 (Chlorine Facility) and PLC 6 (Effluent Pump Station).

City of Hollywood | Automation and SCADA Improvements for Optimization of the SRWWTP's Sludge Process Control System; Hollywood, FL

Project Engineer. Supported the technical execution for the implementation of automation and SCADA improvements at the City's SRWWTP to optimize Sludge Process Control System. The Sludge Process Control System is a large complex process that is currently controlled manually by City Operations professionals. The existing SCADA system lacks the necessary level of automation to monitor and control the sludge process from the Human Machine Interface (HMI) in the control room; this lack of automation has caused a number of operational issues.

Black & Veatch supported the City by increasing the level of automation for the Sludge Process Control System to allow automatic or semi-automatic control of the sludge process from the HMI in the control room. Improvements included a step-by-step guide on the HMI to monitor the progress of the sequence for the automatic or semi-automatic startup and shutdown of the Sludge Process Control System, and addition of status, alarms and process variables from all sub-systems to be displayed on the HMI.

Miami-Dade County; Alexander Orr Jr. Water Treatment Plant, Chlorine Gas Onsite Generation System; Miami, FL

Project Engineer. Assisted in the design of the on-site chlorine gas (OSG) system including design calculations for the containment area and associated piping for the salt/brine storage tank area; mechanical process design calculations for the chlorine feed pumps for the eductor room; coordination with pump manufacturers and preliminary pump selection; coordination with subconsultants; report preparation; reviewing and revising specifications; and reviewing and editing project plan set. She attended and participated in client and internal project meetings.

Seacoast Utility Authority; Hood Road Water Treatment Plant Membrane Conversion and Raw Water Repump Facility; FL

Project Engineer. Designed a lift station for the Seacoast Utility Authority Water Treatment Plant (WTP) conversion project site, assisted in the preparation and filing of the lift station permit, reviewed and edited technical specifications, and created a preliminary site layout for the Hood Road Raw Water Repump Facility. Ms. Martin also revised the client's existing WaterGEMS models for their potable water distribution system and reclaimed water distribution system to include several new "what-if" scenarios assist the client with planning of future projects and presented the modeling results in a memorandum and several meetings with the clients.

BCWWS; City of Boca Raton; Water Supply Wells; Boca Raton, FL

Project Engineer. Ms. Martin created a WaterGEMS hydraulic model of three new water supply wells and their connection to the city's existing water treatment plant. She then utilized the model output to select pumps for the three water supply wells. She reviewed and revised civil and process mechanical specifications and prepared, reviewed and edited civil and process mechanical plan set.

Palm Beach County Water Utilities; Lake Region Water Treatment Plant; Palm Beach County, FL

Project Engineer. Created geographic information system (GIS) figures showing the geographic distribution of the historical development of Belle Glade, South Bay, and Pahokee using historical aerial photographs in conjunction with data from Palm Beach County. She also created GIS figures displaying the geographic distribution of large and small water meters in Belle Glade, South Bay, and Pahokee. These figures were used for analysis of the pipe network and modeling efforts

Improvement Projects – General Engineering Services; Broward County, FL

Engineering Manager. As part of the execution of the General Engineering Services for wastewater, Ms. Martin has participated on the design and construction phase services for multiple improvements projects at the North Regional WWTP including clarifier rehabilitation and the replacement of transformer number 1. She has also provided construction phase services for the painting at master lift stations 226 and 452 and design services for the wetwell refurbishment at pump stations 452, 458, and 460.

SFWMD; IT Shelter Replacement Construction Project; Palm Beach and Hendry Counties, FL

Engineerig Manager. Ms. Martin is currently assisting in the construction management of four (4) South Florida Water Management District IT shelters in Palm Beach and Hendry Counties. The project includes construction observation staff, quality control testing, and document control of submittals, RFIs, cost proposals, change orders, and pay applications.

BRAD VANLANDINGHAM, PE

STRUCTURAL

OFFICE LOCATION
Orlando, FL

EDUCATION
BS, Civil Engineering, Rose-Hulman Institute of Technology, 1985

PROFESSIONAL REGISTRATION
PE – 1991, FL, 44795

PROFESSIONAL ASSOCIATIONS
American Water Works Association

Water Environment Federation

YEARS EXPERIENCE
34

Mr. Vanlandingham has extensive experience designing a variety of projects including water and wastewater treatment plants, solid waste transfer stations, laboratories, and power stations.

Some of Bradley's key assignments have included:

- Engineering Manager for preliminary and final designs, permitting, and bid phase services for the $62M upgrade to Orange County Utilities South Water Reclamation facility. Following the bid process, construction was scheduled and commenced in the first quarter of 2016.
- Engineering Manager for multiple water supply facilities for utilities in Central Florida. Services provided included treatment process studies, ozone pilot plant, preliminary and final designs, bidding, permitting, construction phase services, as well as startup assistance.
- Engineering Manager for the design and construction of a $27M solid waste transfer in Palm Beach County.

PROJECT EXPERIENCE

Orange County Utilities | South Water Reclamation Facility; Orlando, FL

Engineering Manager. Responsible for preliminary and final design, permitting, bidding, and construction phase services. The South WRF Phase V Improvements project provides process upgrades to increase plant capacity from 43 mgd to 56 mgd AADF. Upgrades to the plant include conversion of a rectangular clarifier to a step feed BNR basin, new internal recycle pumping system and replacement of the air diffusers for an existing BNR basin, new blower building with three 800 hp blowers, and a new 165 ft. diameter secondary clarifier. Other unit process upgrades include new bar screens, screenings compactors, vortex grit removal equipment, cloth disk filters, expansion of chlorine contact basin, and two new 10 MG reclaimed water storage tanks. Sludge system improvements include new gravity belt thickeners, new centrifuges to replace existing belt presses, new sludge feed pumps, thickened sludge pumps, cake pumps, and polymer pumps. The preliminary and final design, permitting, and bidding for the Phase V Improvements have been completed. County is in the process of awarding the $62M construction contract. Construction is scheduled to begin in Jan/Feb 2016.

JEA | Buckman WRF Digester Cover Replacement Project; Jacksonville, FL

Project Engineer. Responsible for design of concrete repairs and construction phase services. The JEA Buckman Biosolids Facility, a regional biosolids processing facility, includes two 110′ diameter anaerobic digesters. The project included the replacement of the two-anaerobic digester covers with fixed concrete covers and associated rehabilitation of the digester gas mixing equipment, along with repairs to the digested sludge holding tank.

JEA | Buckman WRF Biosolids Building Column Restoration; Jacksonville, FL

Project Engineer. A number of the structural steel building support columns in the Residuals Management Facility at the Buckman WRF were in need of repairs due to corrosion. A field survey was performed to determine which columns needed to be repaired, and subsequently, detailed design drawings and specifications were provided to replace the material lost due to corrosion with steel plates welded to the columns. The construction documents were based on construction by a continuing services contractor, not advertised for public bidding. Construction phase services included review of fabrication drawings and responding to RFI's

Orange County | Southern Regional Water Supply Facility; Orlando, FL

Project Engineer. Responsible for preliminary and final design, bidding, permitting and construction phase services associated with a new 30 mgd water treatment plant. Preliminary design included study of treatment technologies for hydrogen sulfide removal. A present worth analysis of the capital and operation costs for forced draft aeration and ozone was prepared, and was followed by an ozone pilot plant. The new plant includes a 3,000 lb/day ozone system with liquid oxygen, sidestream injection, and 60 in. diameter, 430 ft. long stainless-steel contactor pipeline for hydrogen sulfide treatment, sodium hypochlorite for disinfection, fluoride, 72 mgd high service pump station, two 5-million-gallon circular prestressed ground storage tanks, and over 5000 feet of raw and finished water mains up to 48" diameter.

City of St. Petersburg | Oberly and Washington Terrace Pumping Station Improvements; St. Petersburg, FL

Project Structural Engineer. Performed detailed structural design and construction phase services for improvements to the City's 80 mgd Oberly P.S. and 45 mgd Washington Terrace P.S. to accommodate improvements that included addition of pump VFDs, replacement of emergency engine-generators, and replacement of pump switchgear.

Tampa Bay Water | System Engineer; Clearwater, FL

Project Engineer. Contributed to numerous projects as part of a $600 million expansion program for Tampa Bay Water which includes a desalination plant, a surface water treatment plant, pumping stations, and pipelines. Brad was the Project Engineer for the System Enhancements Contract 1 project at the Regional Facilities Site which included the addition of a booster pump station, sodium hypochlorite and ammonia feed systems, engine generator, and variable frequency drive for a high service pump. Brad also assisted in evaluating chemical feed improvements at the Regional Facilities Site and designed a canopy to cover the lime mixing basins in accordance with FDEP regulations concerning CT. He also designed cleaning solution storage tank at the Desal Plant and evaluated structural concerns at the Cypress Creek Pump Station.

JEA | Buckman WRF Effluent UV System Channel Rehab; Jacksonville, FL

Project Engineer. The access doors for the UV reactors are deflecting excessively and are difficult to open/close. The large double leaf doors (bombay doors), which cover the reactor channels and allow access to the UV light bulbs below are embedded into the concrete which is cracking and spalling. Detailed design drawings and specifications were provided for replacement of the doors and concrete repairs. Design and construction contract documents were developed based on JEA using one of their continuing services contractors to perform the work.

AUBREY HAUDRICOURT, PE

ELECTRICAL

McKIM&CREED
ENGINEERS SURVEYORS PLANNERS

EDUCATION
BSEE, Electrical Engineering, Old Dominion University

PROFESSIONAL REGISTRATION
PE - FL, TX, GA, VA

PROFESSIONAL ASSOCIATIONS
Institute of Electrical and Electronics Engineers (IEEE)

IEEE Power & Energy Society (PES)

Mr. Haudricourt brings 42 years of experience in both electrical and instrumentation engineering and construction. He has designed and overseen the installation of power generation, controls systems, lighting for large facilities. He has also been involved in security assessment and security design. His expertise includes evaluating existing conditions, treatment facility electrical systems, and both electrical and instrumentation systems.

PROJECT EXPERIENCE

Howard F. Curren Advanced WWTP Master Plan Phase; City of Tampa, FL

Senior Electrical Engineer. Mr. Haudricourt reviewed and evaluated the electrical equipment comprising of both low and medium voltage distribution systems, electrical coordination studies and provided an analysis and evaluation for the AWTP electrical systems master planning. Future flows projections and resiliency focused scopes and budgets for CIP projects.

South Cross Bayou WRF Grit Removal Evaluation; Pinellas County, Largo, FL

Electrical Engineer. Under a continuing services contract, McKim & Creed provided professional engineering services required to evaluate the SCBWRF Eutek TeaCup™ and Grit Snail™ grit removal equipment performance. McKim & creed conducted a non-destructive condition assessment of the appurtenances and structure that included all electrical and control equipment. McKim & Creed provided project management, data collection, equipment performance testing criteria, efficiency and facility evaluations, differing systems comparisons, that was included in a full report for the City to determine the best course of action for refurbishment or replacement.

Hollywood Wastewater Facility VFD Replacement; Hollywood, FL

Project Manager and Lead Engineer. Provided electrical design and construction documentation for Variable Frequency Drive (VFD) retrofits included demolition, new electrical equipment layouts in existing footprints with controls design to implement automation within the Bioset Lime Stabilization Process at the City of Hollywood's Southern Regional Wastewater Treatment Plant.

Deep Injection Well MS/RO Conc Disp; City of Hollywood, FL

Electrical Engineer. Lead design and project engineer for creation of a deep well injection pumping system at the City's' water treatment plant. Project included medium voltage service connection modifications with transformation, switchgear modifications, variable speed pump control and remote SCADA control network. Additional project work included demolition of existing low voltage standby generator system, complete replacement of low voltage switchgear and MCC's that supply 40mgd high service pumping for future variable speed drives for high service pumps. Design includes "Smart" MCC technology and remote power monitoring of switchgear. Project included all construction services.

Toho Water Authority Energy Master Plan; Orlando, FL

Electrical Engineer. Analysis and planning team member for comprehensive energy study for all of Toho Water Authority water and wastewater facilities. Project criteria utilized EPA "Energy Management Guidebook for Water and Wastewater Utilities". Project assessed current energy usage and created baseline energy consumption. Energy priorities were established with paths for improvements. Analysis of pumping and blower systems, operational procedures, and monitoring systems were put in place to document incremental energy usage improvements and to assist in maintaining the program.

Electrical Power Generator; City of Hollywood, FL

Electrical Engineer. Complete electrical evaluation of the water treatment plant's electrical service and distribution systems. Evaluation included discussion with power utility on quality issues and review of dual power feed service. In addition, a complete power load review and mapping was performed on all motors and breakers greater than 1hp @ 480V and 240V and less distribution panels. This information was inputted into a database for analysis of fault, coordination and arcflash reports. The load information was used to determine the future needs of the plant for standby as well as electrical distribution upgrades.

Jackson County Board of Supervisors: Hurricane Recovery Services; Pascagoula, MS

Electrical Engineer. Provided emergency response electrical support for the City of Pascagoula in the aftermath of hurricane Katrina. Responsibilities included evaluation of electrical equipment damage to city property. Project included inspections, evaluation, analysis, emergency project priority and coordination with FEMA and local authorities. Developed projects to return City facilities to operational status and performance standards. Responsible for construction documents, specifications, cost estimations, and presentation to the city council and FEMA.

DAVID GARCIA, EIT

ELECTRICAL

OFFICE LOCATION
Coral Springs, FL

EDUCATION
MS, Electrical Engineering, Florida Atlantic University, 2019

BS, Electronics Engineering, Devry University, 2008

YEARS EXPERIENCE
9

PROFESSIONAL REGISTRATION
EIT - 1100023150

Mr. Garcia is an electrical engineer with 9 years of overall experience in the manufacturing, automation, water and wastewater industries. Since joining Black and Veatch he has joined in the development of security and privacy SCADA policies for water and wastewater utilities, led and supported projects to replace low and medium voltage switchgears, as well as replacing and adding power generation to utilities.

PROJECT EXPERIENCE

MDWASD | Preston Water Treatment Plant Switchgear Replacement; Miami, FL

Lead Electrical Engineer. Mr. Garcia is the lead electrical design engineer for the Preston WTP Switchgear Replacement project. Unique challenges to this project include extreme size and access constraints. The use of gas-insulated switchgear is being consider to accommodate the small space available. The design will also consider upgrading and replacing old soft start pumps for bigger and VFD controlled pumps to eliminate the total number of pumps while maintaining the same water output.

Florida Power and Light | Advanced Reclaimed Water Project; Miami, FL

Lead Electrical Design Engineer. Mr. Garcia is the lead electrical design engineer for the advanced reclaimed plant. The plant will allow for the reuse of reclaimed water for onsite operations.

Gribetz International | Manufacturing Plant System Integration; Sunrise, FL

Lead Electrical Design Engineer. Mr. Garcia was part of a group responsible for integrating equipment from different vendors to stablish functional communication between all equipment with the goal of creating an automated manufacturing process. Tasks included bringing equipment up to NEC or IEC code and local electric code.

Gribetz International | Manufacturing Plant Automatization; Riviera Beach, FL

Lead Electrical Design Engineer. Mr. Garcia participated in the design and implementation of automatization systems in various manufacturing plants. The automatization systems included: the integration of different equipment PLCs, establishing communication to a central computer via TCP/IP, programing and adjustment of system parameters, and operator training.

Gwinnet County Department of Water Resources | SCADA Policies and Procedures; Gwinnet County, GA

Lead Electrical Design Engineer. Mr. Garcia participated in the development of SCADA security policies and procedures for the Gwinnet County Department of Water Resources (GCDWR). The policies and procedures were developed following the NIST800-53 and AWWA standards. All the policies and procedures were designed taking into consideration GCDWR's unique needs and requirements.

City of Venice | Water Treatment Plant Switchgear Replacement; Venice Beach, FL

Lead Electrical Design Engineer. Mr. Garcia is the lead electrical design engineer for the replacement of the switchgear and one engine generator at the water treatment plant in Venice Beach. The project includes evaluating the current switchgear capacity, the plant's current and future demand, and designing a new switchgear to meet the plant's future demand.

City of Venice | Water Booster Pump Station; Venice Beach, FL

Lead Electrical Design Engineer. Mr. Garcia is the lead electrical design engineer for the addition of a new water booster pump station for the City of Venice. In addition to the water booster pump station, the city requested a backup operation building with full SCADA connection and control of their water and wastewater treatment plants and a standby generator for the water booster pump and operations building.

Conserv II Orlando; Orlando, FL

Lead Electrical Design Engineer. Mr. Garcia assisted in this projected by completing the heat load addition calculations necessary for the HVAC group to accurately design the HVAC system in this new building. The information required to complete these tasks included creating a complete electrical equipment list, calculating total energy consumption and heat generation.

LAWRENCE BROUILLETTE, PE

INSTRUMENTATION & CONTROLS

OFFICE LOCATION
Coral Springs, FL

EDUCATION
BS, Electrical Engineering, University of Central Florida, 1990

YEARS EXPERIENCE
36

PROFESSIONAL REGISTRATION
PE – 2002, FL, 57973

PE – 2003, VA, 0402037398

PROFESSIONAL ASSOCIATIONS
International Society of Automation

Water Environmental Federation

Mr. Brouillette is a senior I&C engineer responsible for the process design and development of various wastewater, reclamation, and potable water, facilities. He has participated in a wide range of project activities including feasibility studies, alternative technologies review, design, construction services, final commissioning and training.

Some of Mr. Brouillette's key recent assignments have included:

- The design services for a new combined heat and power addition to an existing wastewater plant for Winston-Salem, North Carolina.
- The process design and construction services for a remediation of two water plant for City of Durham, NC.
- The process design and construction services for a new ozonated water plant for Orange County, FL.
- The process design and construction services for a plant expansion of an advanced secondary wastewater treatment plant from 7.5 mgd to 11.25 mgd for Orange County, FL.
- The process design and construction services for a new wastewater plant for Florida Keys Aqueduct Authority, FL.

PROJECT EXPERIENCE

City of Hollywood | Energy Efficiency Master Plan; Hollywood

I&C Engineer. Performed field evaluations of the SCADA system for the City of Hollywood's WTP and SRWWTP, as part of a comprehensive Energy Efficiency Master Plan performed by Black & Veatch. The evaluation included automation and control system improvements related to ECMs as well as longer term SCADA system recommendations for enhanced performance and optimized operations. Performed site visits and had discussions with Operations staff on the capabilities of the current system and opportunities for I&C improvements.

City of Fort Myers | East Wastewater Treatment Plant; Fort Myers, FL

Design Engineer. Supplied design services in the development of contract drawings and specifications for the East Waste Water Treatment Plant. The project is ongoing and includes P&ID development, the design of PLC-based process controls system for a Moving Bed Bio-reactor.

Marianna Public Works | Water and Wastewater Treatment Facilities; Marianna, FL

System Integrator. Water and Wastewater treatment facility controls and automation. The project included the design of PLC-based process controls for lift-stations, wells, transfer pumps, chemical feed system and High Service Pump operation. Implemented system-wide radio communication network for regional wastewater collection, water treatment, and distribution pumping stations. Implemented computer-based operator interface system for facility, performed field start-up and prepared construction records, and developed O&M manuals.

Florida Keys Aqueduct Authority | Cudjoe Key Advanced Wastewater Treatment Plant; Cudjoe Key, FL

Design Engineer. Supplied design services in the development of contract drawings and specifications for the Cudjoe Key Advanced Wastewater Treatment Plant. The project included P&ID development, the design of PLC-based process controls systems and a fiber optic communications network,

Orange County Utilities | Northwest Water Reclamation Facility; Orlando, FL

Design Engineer. Supplied design services in the development of contract drawings and specifications for the Northwest Water Reclamation Facility. The project includes P&ID development, the design of PLC-based process controls system for a wastewater plant expansion from 7.5 mgd to 11.25 mgd for Orange County, FL.

Florida Keys Aqueduct Authority | Cudjoe Key Advanced Wastewater Treatment Plant; Cudjoe Key, FL

Design Engineer. Supplied design services in the development of preliminary design memo for the Cudjoe Key Advanced Wastewater Treatment Plant.

Miami-Dade County | South District WWTP, Electric Building 3

Design Engineer. Design services for Miami-Dade County's South District WWTP. Duties include development of plans and specifications, factory testing, submittal review and request for information responses for the new Electric Distribution Building 3 (EDB3). Project includes 12 new generators for EDB3 and conversion of 7 existing generators in EDB 2 to dual fuel.

Orange County Utilities | Master Waste Water Pump Station Improvements Group A; Orlando, FL

Design Engineer. Supplied design services in the development of contract drawings and specifications for the Master Waste Water Pump Station Improvements, Group A. The project included P&ID development, the design of PLC-based process controls utilizing Siemens PLCs and implementation of communications over a MAS radio system.

Town of Oak Island | Wastewater Collection and Treatment; Oak Island, NC

Design Engineer. Supplied design services in the development of contract drawings and specifications for a Membrane Bio-reactor water reclamation facility servicing Oak Island.

City of Lakeland | English Oaks Accommodations Phase II; Lakeland, FL

Design Engineer. Supplied design services in the development of contract drawings and specifications for the English Oaks Accommodations Phase II SCADA system. The project included P&ID development, the design of PLC-based process controls utilizing Modicon Quantum PLCs and implementation of communications over a fiber optic WAN with radio as backup.

ANA DVORAK, ENV SP

LIFT STATIONS

300 ENGINEERING GROUP, P.A.

OFFICE LOCATION
Coral Springs, FL

EDUCATION
MSc Civil Engineering,
University of Miami-2016
BSc Chemical Engineering,
Simón Bolívar University-2011

YEARS EXPERIENCE
6

PROFESSIONAL CERTIFICATION
Envision Sustainability Professional
(ENV SP)

Ms. Dvorak has experience and solid training in design, development, assessment, simulation, planning and evaluation of water and wastewater treatment facilities, distribution systems and industrial chemical processes. Ms. Dvorak has integrated multidisciplinary teams for the design and evaluation of water and wastewater treatment facilities, participating in several major projects for both municipal and industrial sectors. She has also worked developing environmental management systems and environmental impact assessment studies for the oil and gas industry. Ms. Dvorak also has experience in academic research for projects funded by the National Science Foundation (NSF), participating in the design and operation of a pilot plant for wastewater reuse applying advanced treatment processes. Likewise, Ms. Dvorak has experience in academic research related to sea level rise and development adaptation strategies in South Florida.

PROJECT EXPERIENCE

Water, Wastewater, and Reclaimed Water Planning and Geological Services for Unsewered Commercial and Industrial Areas; Miami-Dade County, FL

QA/QC Engineer. Ms. Dvorak was part of the QA/QC team for the development of Basis of Design Re-ports (BODR) for the expansion of the gravity sewer system, and the addition of lift stations and associated force mains, as well as water distribution improvements within Miami Dade County. 300 Engineering provided BODR services to extend sewer and water services to commercial and industrial areas for two districts: Project D8-A and Project D9-A.

City of Opa-Locka | Disaster Recovery for the City of Opa-Locka; Miami-Dade County, FL

Assistant Project Manager. Assistant Project Manager for the Disaster Recovery Contract with the City of Opa-Locka. 300 Engineering is providing professional consultant and technical assistance services to the City of Opa-Locka to support the City with their post declaration disaster recovery efforts, public assistance application, hazard mitigation projects and reimbursement request through the Federal Emergency Management Agency (FEMA) and the State, Ms. Dvorak assists the Program Manager in the supervision and coordination of the activities related to the development of the projects considered within Damage Categories A-G, including but not limited to: site inspections, data collection, cost reconciliation, project work-sheet preparation, emergency and permanent work project estimates, detailed

damage descriptions, preparation of scopes of work. 300 Engineering's scope of work also includes construction management and inspection services for the permeant repair work executed under Categories C-G. Funding sources for this project include: FEMA-PA and HMG.

City of Opa-Locka | Water Distribution System Assessment and Optimization; Miami-Dade County, FL

Project Engineer. Project Engineer for the assessment and optimization of the City of Opa-Locka water distribution system. The aging infrastructure experiences a high quantity of unaccounted for water losses and system failures. In addition, the City is in the need of bringing their operations into compliance with the Florida Department of Environmental Protection (FDEP) and the Florida Department of Health (FDOH). 300 Engineering is providing assessment services including: data collection; review and analysis of water system plans, atlases, operation and maintenance procedures, leak detection re-ports, CIP projects, others; preparation of assessment and recommendations report; and on-site and on-call water operations optimization and assistance. As Project Engineer, Ms. Dvorak is providing services including but not limited to: data collection, review and analysis of water system documentation, assessment and identification of operational issues, system optimization recommendations and preparation of the assessment report.

Land Development for the Haven Luxury Resort; English Harbour, Antigua and Barbuda

Technical Advisor. Technical Advisor for design services for the land development project of the Haven Luxury Resort located at English Harbour, Antigua and Barbuda. The Haven Luxury Resort will consist of the following structures: Main Reception Building, Cottages (30), Cabana and Spa, Infinity Pool Area, Tennis Court, Private Villas (2), Tiki Bar and Grill and Service Support Building. 300 Engineering is providing engineering design services for the preparation of typical 40% US Standard level technical design drawings for the following elements: Roadway and Drainage Infrastructure; Water Supply, Treatment and Distribution System; Wastewater Collection and Treatment System; Power Distribution System; and Beach Erosion Control Wall. 300 Engineering is also providing: project management, data collection & site visits, and permitting support services.

Engineering, Procurement and Construction for the Rehabilitation of the Mariposa Drinking Water Treatment and Supply Plant; Caracas, Venezuela

Environmental Engineer. Ms. Dvorak was the Environmental Engineer in charge of: assessment and evaluation of the current treatment units, developing process recommendations to rehabilitate the treatment plant and ensure compliance with new water quality regulations and to adapt the system to a deteriorating water quality source. Considering these recommendations, a treatment system was designed, which includes upgraded current units and new treatment processes. The scope of the project included the development and actualization of all engineering documents (plans and specifications) required for the construction and future operation of the plant, such as: new P&ID for all treatment systems, process description, control and operation philosophy, hydraulic analysis, equipment descriptions and specifications, plot plan and layout, among others.

KENNETH CABAN, PE, BCEE, LEED AP

FORCE MAINS & GRAVITY

TETRA TECH

OFFICE LOCATION
Hollywood, FL

EDUCATION
MS, Environmental Engineering, Florida International University, 2007

BS, Civil Engineering, Florida International University, 1997

YEARS EXPERIENCE
25

PROFESSIONAL REGISTRATION
PE - 2003, FL, 59276

Board Certified Environmental Engineer (BCEE)

Leadership in Energy and Environmental Design Accredited Professional (LEED AP)

PROFESSIONAL ASSOCIATIONS
American Water Works Association

Mr. Caban has over 25 years of experience in the analysis, design, permitting, inspection, construction management, and program and project management of water and wastewater conveyance and treatment systems, water, wastewater, and stormwater master planning and design, site development, and capital improvement programs for various municipalities. Mr. Caban has extensive experience with water and wastewater master planning of many of the largest systems in the Country.

PROJECT EXPERIENCE

Water Main Replacement Program, City of Hollywood, FL.

Quality Manager. Oversaw the surveying, geotechnical evaluations, design, permitting, and construction administration services on multiple projects being completed concurrently. The portion of the system being overseen by Mr. Caban is comprised of over 300,000 linear feet (56 miles) of water main replacement, reconnection of over 1,000 service connections, numerous underground and overhead utilities conflicts, permitting through multiple agencies, and construction within schedule and budget. Existing aged cast iron water mains were replaced with both DIP and PVC water mains, ranging from 4-inch to 24-inch diameters. The existing water mains were located within residential streets, paved and unpaved alleys, and easements in the rear of residential lots, which had become overgrown or encroached upon by property owners. Existing water meters located within unpaved alleys or rear easements were relocated to the front of the lots and included new water services within private property. Aged fire hydrants were replaced some water mains were upsized by one nominal size. Extensive asphalt pavement and pavement markings restoration and improvements were also included.

Water Facilities Master Plan Update, Miami-Dade County, FL

Project Manager. The preparation of a comprehensive water master plan for the largest water system in the Southeast United States. The master plan included renewal and rehabilitation of existing facilities including water supply, treatment, storage, transmission, and distribution systems. The master plan also considered a 20-year planning horizon with water demand projections, water system hydraulic modeling, capital program development, financing, implementation planning, and considerations for sea level rise and climate change. This project also included extensive water use permitting and alternative water supply development and planning.

Miami International Airport Water Master Plan Update, Miami-Dade County, FL

Quality Manager for the preparation of a comprehensive water master plan the water system serving one of the largest airports in the county. The master plan included renewal and rehabilitation of existing facilities including transmission and distribution systems. The master plan also considered a 20-year planning horizon with water demand projections, water system hydraulic modeling and calibration, capital program development, implementation planning, and considerations for sea level rise and climate change.

Water Master Plan, Atlanta, GA

Quality Control. Review for the preparation of a comprehensive water master plan for one of the largest water systems in the Southeast United States. The master plan included water supply, treatment, storage, transmission, and distribution systems. The master plan included water demand projections, water system hydraulic modeling, capital program development, financing, and implementation planning.

South Miami Heights Water Treatment Plant – Reservoir and Pump Station, Miami-Dade County, FL

Project Manager. Project manager for Tetra Tech the multi-discipline construction management team (as a subconsultant) acting as the County's Engineering Representatives for the delivery phase of a new 20 MGD water treatment facility utilizing membrane treatment was proposed in the SW service area. Project was initially anticipated to be delivered through three separate construction contracts. The first of these contracts consisted of a 5.0 MG potable water reservoir and high service pumping system that completed construction in 2012 and is currently operational as a storage and re-pump facility. Construction services provided for this contract included construction administration, participation in construction meetings, schedule and change order review, and site inspections.

Owners Engineering Representative, City of North Miami, FL

Project Engineer. Served as an extension of staff for multiple projects related to the potable water system planning and rehabilitation, including water supply, treatment, storage, transmission, and distribution. Services include providing in independent reviews related to the planning and rehabilitation of the City's potable water systems.

Winson Water Treatment Plant Rehabilitation, City of North Miami, FL

Technical Reviewer. Provided independent review of reports, contract documents, and other deliverables and functions for the rehabilitation and expansion of the Winson Water Treatment Plant.

Rehabilitation of Six Biscayne Aquifer Public Water Supply Wells, City of North Miami, FL

Project Manager and Technical Reviewer. Served as an extension of staff to assist in reviewing contract documents, well rehabilitation activities, well rehabilitation videos, and post rehabilitation water quality for the rehabilitation to six Biscayne aquifer water supply wells as part of the its plans to rehabilitate and upgrade its existing water supply, treatment, storage, transmission, and distribution systems. Also provided project management and construction management assistance during rehabilitation to coordinate with the well rehabilitation contractor.

Task Authorization No. 9 – Alexander Orr Jr. Water Treatment Plant Residuals Management Plan (20-Year Water Facilities Master Plan Update), Miami-Dade County Water and Sewer Department, FL

Project Manager. Project manager for residuals management plant which incorporates residuals management plans for the Hialeah and Preston Water Treatment Plants. As part of this project, current operational and maintenance practices and equipment were evaluated, as well as current and future lime sludge production rates. An analysis of the lime sludge lagoons was performed and a lagoon cleaning program was prepared. Alternatives were developed, evaluated, and selected.

RICARDO VIEIRA, PE

FORCE MAINS & GRAVITY

OFFICE LOCATION
Coral Gables, FL

EDUCATION
BS, Civil Engineering, Universidad Central de Venezuela, 1998

YEARS EXPERIENCE
22

PROFESSIONAL REGISTRATION
PE – 2011, FL, 73166

PROFESSIONAL ASSOCIATIONS
American Society of Civil Engineers/ Underground Engineering & Surveying

American Society of Civil Engineers/ ASCE Miami Dade / UESI Chair

American Society of Civil Engineers/ ASCE Palm Beach /FAU Practitioner

Mr. Vieira is a Client Director for Black & Veatch's South Florida operation, with more than 20 years of experience in Civil Engineering. Ricardo has published many National and International papers. He is experienced in leading and completing program management, design management, project management, and task management for water, wastewater, reclaimed, and storm-water transmission and conveyance projects. Experience includes preparing and leading multiple preliminary engineering reports, construction documents, design-build criteria packages, design specifications and plans; permitting, operations and maintenance manuals, project tracking and management. His experience brings together all elements of the design process into a single coordinated effort.

Experience also includes the design of roadway improvements, storm drainage systems, site development projects, and modeling and transient analysis.

PROJECT EXPERIENCE

Miami Dade County Water and Sewer Department | Project SL-2.1 – SP-1 Transmission Force Main Phase 3; Miami, FL

Project Manager. Project SL-2.1 consists of installing approximately 12,600 ft. of 60-inch pipe and fittings for a force main in Miami-Dade County, FL.

Special elements include conventional "cut and cover" work within a narrow road right-of-way along SW 137th Avenue between SW 184th Street and SW 200th Street, a trenchless crossing to cross Black Creek Canal (C-1W), a trenchless installation along 200th Street (SR 994), a Florida Department of Transportation road right-of- way from SW 137th Avenue to SW 134th Avenue, and a trenchless installation along SW 134th Avenue from SW 200th Street to SW 208th Street. These construction techniques are proposed to avoid and minimize impacts to heavily travelled road ways, and waterways

Miami-Dade County Water and Sewer Department | Program Management Consultant Contract to Establish a Comprehensive Infrastructure Assessment and Replacement Program for the Utility; Miami, FL

Deputy Program Manager. Involved the preparation of condition evaluation, forensic analysis, risk determination and renewal options protocol. The program provided the organizational structure required for implementation of the rehabilitation of the County's water system for 30 years while maximizing the impact of available funding.

96-inch Raw Water Main Limited Manned Entry and Field Observations. Involved in the site visit during the rehabilitation of the pipe-line, performed a limited manned entry assessment of the pipeline's internal condition, and performed a quality assurance review of the ongoing CFRP efforts of this raw water line.

54-inch Water Main Limited Manned Entry and Field Observations. Involved in the preparation of condition assessment report for a 54-inch carbon fiber repairs located along Red Road Ave that transfers water from the John E. Preston Treatment Plant to the City of Hialeah and other areas of North Miami-Dade County. Mr. Vieira performed a limited manned entry assessment of the pipeline's internal condition. The condition assessment portion included a total of 12 pipe sections and had the following tasks: visual inspection of carbon fiber repairs and soundings to asses existing conditions, identify deficiencies, recommend an approach for rehabilitating distressed sections of line.

54-inch Water Main Carbon Fiber Repairs (CFRP) Condition Assessment: Mr. Vieira performed a manned entry assessment of the pipeline's existing CFRP internal condition. The condition assessment portion included a total of 12 pipe sections previously repaired with CFRP and had the following tasks: visual inspection of carbon fiber repairs and soundings to asses existing conditions, identify deficiencies, and preparation of condition assessment report with recommendations an approach for rehabilitating distressed sections of the pipeline's existing carbon fiber repairs.

On-Call Rehabilitation to Large Diameter Water Mains: Mr. Vieira was part of the team for a series of contracts to provide inspection, failure analysis, rehabilitation recommendations, and oversight of construction activities for large diameter water mains throughout the City. Projects included the evaluation and design of repairs for water lines ranging from 24-inch to 96-inch, and included steel, ductile and cast iron and concrete water line materials.

MDWASD | Design-Build Criteria for the Government Cut 20-inch Water Main and 54-inch Force Main Replacement; Miami, FL

Project Coordinator. Mr. Vieira was part of the design team developing design-build criteria package for the replacement of the existing 54-inch force main that runs from Miami Beach to the Central District Wastewater Treatment Plant (CDWWTP) and for the replacement of the existing 20-inch water main from Port Island to Fisher Island.

This project involved the horizontal and vertical alignments, identification of land rights and properties affected by the alignment, recommendation method of construction and details of water main replacement, project schedule through construction and opinion of probable construction costs, assist MDWASD through the procurement process, selection of design-build team and negotiations and provide limited construction management support to MDWASD in responding to RFIs, reviewing shop drawings, change orders and claims, and site visits and/or inspections.

Miami-Dade Water and Sewer Department | Design of a 72-inch Raw Water Main; Miami, FL

Project Coordinator. Mr. Vieira designed of a 72-inch Raw Water Main (RWM) to transport raw water from the WASD Northwest Wellfield to the Hialeah/Preston Treatment Plant. The proposed RWM will serve as a redundant pipeline to the existing 96-inch RWM running along NW 74th Street. Mr. Vieira's tasks included developing design criteria and construction constraints, and performing route and pipe material evaluations.

Miami-Dade Water and Sewer Department | Evaluation of 54-inch Red Road Water Main Failure; Miami, FL

Project Coordinator. The MDWASD experienced a catastrophic rupture of a 54-inch diameter PCCP water transmission main which provided potable water to the City of Hialeah and northern Miami-Dade County. Mr. Vieira was part of the team for the failure evaluation and report for the assessment evaluation of the 54-inch water main.

BRIAN BALL, PE

FORCE MAINS & GRAVITY

OFFICE LOCATION
Gaithersburg, MD

EDUCATION
BS, Civil Engineering, Temple University, 2009

YEARS EXPERIENCE
10

PROFESSIONAL REGISTRATION
PE – 2014, MD, 41899

PROFESSIONAL ASSOCIATIONS
Chesapeake WEA

Chesapeake Section American Water Works Association

American Water Works Association

Water Environment Federation

Mr. Ball has over 15 years of experience in engineering and construction. His focus is on linear infrastructure engineering, condition assessment, and rehabilitation of pressurized pipelines. Through his experience he has become an expert of the tools and techniques used to evaluate, monitor, and rehabilitate pressurized water and wastewater pipelines. Mr. Ball has authored industry papers and presentation to advance the knowledge of condition assessment with an aim toward educating utilities about non-destructive evaluation technologies and how to use a programmatic condition assessment plan to drive capital planning.

Prior to his consulting career Mr. Ball served as a Combat Engineer in the Marine Corps rising to the rank of Staff Sergeant. His can-do-attitude and military leadership training have cultivated an effective manager and leader of multi-disciplinary teams on complex project. Roles he has served in include: project manager, construction superintendent, and design engineer.

PROJECT EXPERIENCE

Miami-Dade County | Force Main Condition Assessment; Miami, FL

Project Engineer. Performed condition assessment of two (2) 54-inch force mains constructed of PCCP. The inspection methods included internal inspection using free-swimming electromagnetic and acoustic tools to quantify gas pockets and wire break damage. The results of the assessments provided a basis for deciding on whether to rehabilitate or replace various pipe segments along the force main alignments.

Howard County DPW | Condition Monitoring of Southwest Transmission Main; Columbia, MD

Project Manager. Long term condition monitoring of the County's most critical transmission main using acoustic fiber optics (AFO). As part of this project Mr. Ball was responsible for evaluating the condition of the PCCP based on the monitoring data collected. This included evaluating broken wire wraps utilizing finite element structural models and making repair and rehabilitation recommendations.

Baltimore City | Project 1080 Condition Assessment of the 60-inch PCCP Gwynns Falls Transmission Main; Baltimore, MD

Project Manager. Mr. Ball served as the project manager for a PipeDiver inspection of the 28,000 feet, 60-inch Gwynns Falls and 54-Inch Southwest Transmission Main. This inspection involved coordination of multiple subconsultants as well as multiple municipalities. Mr. Ball assisted in providing a plan to keep St Agnes Hospital supplied with potable water if the transmission main required shut down. Based on a combination of the inspection results and AFO monitoring data Mr. Ball identified two pipe sections that required immediate repair. Mr. Ball was part of a team that shut down the main during peak demand and successfully repair the main without any significant loss of service for customers.

Washington Suburban Sanitary Commission | Horsepen Force Main Condition Assessment; Bowie, MD

Project Engineer. Performed hydraulic evaluation, transient pressure monitoring, test pit selection, and walkover inspection, as well as QA/QC of leak and gas pocket detection inspection for the 21,000 feet, 18-inch ductile iron force main. As part of the walkover inspection ground elevations were determined. These ground elevations along with the results of the hydraulic evaluation were fed into a hydraulic model to determine the structural capacity of the force main.

Baltimore County | Force Main Inspection Program; Towson, MD

Project Manager. Managed multi-year consent decree driven project to inspect all force mains in Baltimore County. In this capacity, Mr. Ball has overseen the inspection of 41 force mains totaling over 35 miles in length. These inspections covered multiple pipe materials including prestressed concrete cylinder pipe (PCCP), Ductile Iron, Cast Iron, and Steel. The scope of the inspection program includes conducting a condition assessment of the force mains using both internal and external inspection methods and to provide repair and rehabilitation recommendations. The inspection methods utilized have included free swimming leak and gas pocket detection, manned entry visual and electromagnetic, CCTV, robotic electromagnetic, SONAR, free swimming electromagnetics, external broadband electromagnetics (BEM), external ultrasonic thickness (UT), air valve inspection, structural analyses, remaining useful life analysis, and walkover/right-of-way inspection.

WSSC; PCCP Condition Assessment BOA; MD

Engineering Manager. Engineer responsible for a multi-year condition assessment program. Responsible for the Condition Assessment of PCCP Transmission Mains ranging in size from 36-inch to 96-inch. Responsibilities include; conducting risk evaluations or PCCP containing broken wires, internal visual and sounding inspections, review of inspection data provided by others, and providing repair and replacement recommendations. To date over 60 miles of PCCP have been assessed. Mr. Ball developed reporting tools that allow WSSC to view the overall status of the program. These tools work to coordinate operations, engineering, and management staff by providing status of inspection and rehabilitation projects.

Beaufort-Jasper Water & Sewer Authority (BJWSA); McTeer Bridge Pipeline Condition Assessment; SC

Project Engineer. Remaining useful life analysis was completed for 1,400 feet of 20-inch DIP in a tidally-influenced, highly corrosive environment. Test pits were excavated from a barge to assess the pipe along the alignment and soils testing was completed to estimate useful life and provide recommendations for future monitoring. This project provided a defensible methodology for owners who must make decisions based on limited data

EDWARD RECTENWALD, PG

PRODUCTION WELLS

OFFICE LOCATION
Fort Myers, FL

EDUCATION
MS/MSc, Geology, Florida Atlantic University, Florida, 2006

BSc, Geology, University of Akron, Ohio, 1995

YEARS EXPERIENCE
25

PROFESSIONAL REGISTRATION
PG – FL, GA, LA

PROFESSIONAL ASSOCIATIONS
Groundwater Professional, American Water Works Association

Groundwater Professional, South Florida Hydrologic Society

Groundwater Professional, Everglades Geological Society

Groundwater Professional, Florida Association of Professional Geologists

Groundwater Professional, American Institute of Professional Geologists

Mr. Rectenwald has 25 years of experience in various hydrologic, geologic, environmental investigations, and expert witness testimony. This experience includes project management, design, permitting, construction and testing of Public Water Supply Wells/Wellfields (Surficial and Floridan Aquifer System) Class I injection wells, Class V Aquifer Storage, and Recovery (ASR) wells, Aquifer Recharge wells, industrial supply wells, irrigation wells, monitor wells, and rehabilitation of deteriorated wells. Mr. Rectenwald has successfully managed the projects and teams for wellfield construction and expansion projects, ASR system construction, and lead teams during Class I and Class V injection well facility construction on numerous projects. Mr. Rectenwald is also involved with regional studies of the Surficial and Floridan Aquifer System by constructing detailed subsurface hydrostratigraphy maps from data obtained from exploratory well drilling, geophysical logging, and aquifer hydraulic testing and analysis results.

PROJECT EXPERIENCE

Miami Dade WASD | Hydrogeological and Engineering Services for Production, ASR Wells Disposal, Storage, and Monitoring Well Networks; Miami, FL

Project Technical Lead. Mr. Rectenwald is the Project Technical Lead for hydrogeologic/geologic services and consultation related to WASD's Wellfields, Injection Wells, and ASR Wells, which includes geochemical studies, groundwater modeling, monitoring, testing, permitting, design, specialized hydrogeologic oversight during construction and other services as needed.

Miami-Dade WASD | CDWWTP Pump Station Design and Construction, VA Key, FL

Senior Technical Support. Mr. Rectenwald provided Senior Technical support of design of a 40 mgd pump station for injection into the two Class I Industrial Injection Wells at the Central District Wastewater Treatment Plant, VA Key, FL. The pump station will be constructed to inject non-hazardous leachate from the Virginia Key Landfill and additional process flows (scrubber gas water, centrate and treated effluent) from the plant.

City of Cape Coral | Comprehensive Water Resources Program; Cape Coral, FL

Project Technical Lead. Mr. Rectenwald is the Project Technical Lead for hydrogeologic consulting, supply well siting and permitting, injection well siting and permitting, ASR operational permitting, stormwater management, information management, and bidding and construction services for the City of Cape Coral.

Hillsborough County | Tampa Bay Regional Integrated Water Resource/Aquifer Recharge Partnership Feasibility Study, Tampa, FL

Project Technical Lead. Mr. Rectenwald contributed his expertise on this project to prepare the 2nd phase of a regional reclaimed water feasibility/master plan to continue the evaluation of the water resource benefits to the region by recharging the groundwater system in the District's Water Use Cautionary Areas (WUCAs) in the Tampa Bay Region.

City of Cape Coral | North and South Wellfield Construction/North and South Cape Coral Wellfield Design and Construction, Cape Coral, FL

Project Technical Lead. Mr. Rectenwald managed staff during construction of 22 brackish (saline) water production wells for the City's new North Wellfield to supply the new North Reverse Osmosis Water Treatment Plant (ROWTP). He reviewed lithology descriptions, adhered to specifications, and client contact. Mr. Rectenwald managed the permitting, design, and construction of three ASR exploratory wells for the City of Cape Coral. The project consisted of wellfield testing of existing North Cape Coral production wells, development of a Wellhead Protection Ordinance, wellfield design services, and design and permitting of 31 Upper Floridan aquifer production wells. Nine (9) wells were constructed in the existing Southwest wellfield, and 22 wells were installed in the new North wellfield to provide raw water to the recently constructed North Cape Coral Reverse Osmosis Water Treatment Plant. The Scope of Work included engineering and hydrogeological services for wellfield planning and locating wells, and several minor modifications to the City's PWS Water Use Permit, preparation of applications for well construction permits, preparation of design documents for bidding, and bidding services for construction of the wellfields. Engineering services during construction were provided by MWH hydrogeologist staff for all production wells.

Sarasota County | Venice Gardens Wellfield Evaluation and Rehabilitation, Sarasota County, FL

Project Technical Lead. Mr. Rectenwald is the project technical lead who managed all aspects of the wellfield evaluation and well rehabilitation for 7 Floridan production wells that have a total of 13.75 mgd permitted capacity. Mr. Rectenwald was responsible for developing specifications, selecting a contractor, management of the oversight team, analysis of existing data for identifying which wells required rehabilitation, review of specific capacity testing results post rehabilitation, and identifying an optimal pumping rate for each of the wells.

US AID | West Bank Wellfield Project

Project Technical Lead. Mr. Rectenwald wrote the well drilling and testing specifications for all wells in the West Bank. He acted as the Well Specialist for the design and construction of production wellfields in Bani Naim, Janzur, Arraba, Ashuhuda. He has also travelled to Palestine and managed the oversight during construction and testing for three production wells constructed to a depth of approximately 3,000 feet. Mr. Rectenwald has also been a QA/QC reviewer for the final casing depth selections for all production wells constructed.

City of Cape Coral | North-South Transfer Station, Canal Pump Station No. 2, and Canal Pump Station No. 2 ASR Class V Well Systems; Cape Coral, FL

Project Technical Lead. Mr. Rectenwald was the Project Technical Lead and managed the permitting, design, and construction of all three Class V ASR well systems. He was responsible for field staff providing construction oversight. Mr. Rectenwald also provided QA/QC for describing lithology samples, sample collection and testing, data evaluation, specific capacity testing, and packer testing.

ANAMARIA SARMIENTO, PG

PRODUCTION WELLS

OFFICE LOCATION
Coral Gables, FL

EDUCATION
BSc, Geoscience, Florida International University, Florida, 2013

YEARS EXPERIENCE
7

PROFESSIONAL REGISTRATION
PG - FL

PROFESSIONAL ASSOCIATIONS
- Groundwater Professional, American Water Works Association
- Groundwater Professional, South Florida Hydrologic Society
- Groundwater Professional, Everglades Geological Society
- Groundwater Professional, Florida Association of Professional Geologists
- Groundwater Professional, American Institute of Professional Geologists

Ms. Sarmiento holds a Bachelor of Science in Geoscience and has 7 years of experience which includes drilling/test pit exploration oversight, deep injection well and monitoring well installation, hydraulic testing, and multimedia sampling at public works facilities. She also has experience in construction coordination which involves providing oversight at project sites prior to, during, or after remedial construction-related activities to assess feasibility, monitor progress, and/or ensure conformance. Ms. Sarmiento is also skilled in data collection and analysis, Geographic Information System (GIS), and AQTESOLV.

Ms. Sarmiento's experience includes permitting, design, construction and testing oversight of Class V exploratory wells and Class I injection wells and rehabilitation of deteriorated wells. Ms. Sarmiento assisted with field team management during Class I and Class V injection well construction at Miami-Dade Water and Sewer Department (WASD)'s Central District Wastewater Treatment Plant (CDWWTP) and South District Wastewater Treatment Plant (SDWWTP). Ms. Sarmiento's experience also includes oversight of the drilling and installation of Biscayne Aquifer wells, as well as oversight of plugging and abandonment of Biscayne Aquifer Wells.

Ms. Sarmiento's design, permitting and specialized hydrogeologic oversight experience includes the Miami-Dade WASD's Class I Industrial Injection Well that was drilled to 10,000 feet below land surface (bls) and was completed in the boulder zone to dispose of a combined wastestream of centrate fluid, scrubber fluid, effluent and leachate from CDWWTP.

PROJECT EXPERIENCE

Miami Dade WASD | Hydrogeological and Engineering Services for Production, ASR Wells Disposal, Storage, and Monitoring Well Networks; Miami, FL

Project Support Lead. Project Support Lead for hydrogeologic/geologic services and consultation related to WASD's Wellfields, Injection Wells, and Aquifer Storage and Recovery (ASR) Wells, which includes geochemical studies, groundwater modeling, monitoring, testing, permitting, design, specialized hydrogeologic oversight during construction and other services as needed. Ms. Sarmiento is providing hydrogeologic /geologic services for the injection well expansion projects at the North, Central, and South Wastewater Treatment Plants in support of Florida's Ocean Outfall Legislation.

The project includes the planning, design, permitting, and construction of 15 deep injection wells and associated monitoring wells. Each well is designed with a capacity of 18.6 million gallons per day (MGD).

Miami-Dade WASD | Ocean Outfall Legislation Injection Well Program, Miami, FL |

Project Support Lead. Ms. Sarmiento assisted in the design and permitting of 5-20 MGD Class I Municipal Injection Wells at North District WWTP, 7-20 MGD Class I Municipal Injection Wells at Central District WWTP, 3-20 MGD Class I Municipal Injection Wells at South District WWTP, and 1 Class V Exploratory Injection Well at the planned West District WWTP.

City of Pompano Beach | Pompano Beach WTP Industrial Injection Well System, Pompano Beach, FL

Project Hydrogeologist. Ms. Sarmiento assisted in the Class I UIC Permit Renewal Application for a 7.39-mgd Class I industrial injection well, IW-1, for the City of Pompano Beach. Ms. Sarmiento provided hydrogeologic/geologic services and field oversight for the rehabilitation and plugging and abandonment of IW-1. Upon completion of the oversight activities, Ms. Sarmiento completed the Plugging and Abandonment report for submittal to the client and to the FDEP in compliance with Chapter 62-528 Florida Administrative Code and the client's FDEP UIC Permit. Ms. Sarmiento provided hydrogeologic/geologic services for the design and permitting for a 7.39-mgd Class I Industrial Injection well, IW-1R, for the City of Pompano Beach

City of Cape Coral | Injection Well Systems Hydrogeological Support

Project Hydrogeologist. Ms. Sarmiento provides hydrogeological support by analyzing the City's Injection Well Systems and completing Quarterly Technical Memorandums discussing the trends observed in their operating data and water quality for the City of Cape Coral's three injection well systems: Everest Water Reclamation Facility (WRF), North Reverse Osmosis Water Treatment Plant (NROWTP) and South West WRF and WTP.

City of Lake Worth | City of Lake Worth Beach Water Treatment Plant Injection Well System Annual Reports 2018 & 2019

Project Hydrogeologist. Ms. Sarmiento provided hydrogeological support by analyzing the City's Injection Well System and completing Annual Reports for 2018 and 2019 discussing the trends observed in their operating data and water quality for the City of Lake Worth Beach Water Treatment Plant Injection Well System for submittal to the client and to the FDEP in compliance with Chapter 62-528 Florida Administrative Code and the client's FDEP UIC Permit.

Miami-Dade WASD | Class I Industrial Injection Well Permit Application and Specialized Hydrogeologic Oversight for two Injection Wells and one Dual Zone Monitor Well

Project Hydrogeologist. Ms. Sarmiento was the Project Hydrogeologist for the permitting and specialized hydrogeologic oversight of two 20-mgd Class I industrial injection wells for the disposal of centrate fluid, scrubber fluid, and leachate. This permit was completed on-time during construction through the Boulder Zone for the Florida Department of Environmental Protection (FDEP) Class I Industrial permit application submittal. As designed, this will be the largest diameter injection well in the state with 24-inch diameter FRP tubing.

Miami-Dade WASD | Class V Injection Well CDIIW-1 Specialized Hydrogeologic Oversight

Project Hydrogeologist. Ms. Sarmiento assisted in all aspects of the design, permitting and construction of the first 10,000 feet bls deep exploratory well in the state located at the CDWWTP, Virginia Key, Florida. The well was constructed to dispose of non-hazardous leachate from the Virginia Key Landfill and additional process flows from the plant as a Class I Industrial Injection Well. The exploratory phase of the project to 10,000 feet bls was intended for identification of alternative disposal zones in the Cretaceous Age Formations below the Floridian Aquifer System.

MATT POWIS, MBA

RISK PRIORITIZATION

OFFICE LOCATION
Kansas City, MO

EDUCATION
MS, Finance, University of Missouri Kansas City, 2006

BS, Business Administration, University of Missouri Kansas City, 2004

YEARS EXPERIENCE
16

PROFESSIONAL ASSOCIATIONS
American Water Works Association

Mr. Powis serves as a manager in the Planning and Asset Management group that supports Black & Veatch's Water Division. He has project and modeling experience in helping utilities balance their revenue requirements while maintaining a strong financial position and addressing their aging infrastructure using asset and project capital prioritization and budget optimization; affordability studies; financial forecasting; cost of service rate studies; bond feasibility studies; and valuation analyses.

PROJECT EXPERIENCE

HRSD | Organizational Risk Framework; Virginia Beach, VA

Lead Consultant. The project involved the development of an ISO 55001 gap assessment and improvement roadmap. Mr. Powis assisted in implementing the program by helping develop an Organizational Risk Framework that included risk policy, roles and responsibilities, risk management processes, consequence criteria, and likelihood criteria for senior management decision making.

Milwaukee Metropolitan Sewerage District | Facilities Plan; Milwaukee, WI

Lead Consultant. Lead Consultant for the capital prioritization and optimization task for the development of a comprehensive facilities plan to meet their needs through 2050. He is assisting in the implementation of Black & Veatch's innovated and proven Risk Based Project Prioritization and Optimization solution for their wastewater projects. He is responsible for developing the model, performing the optimization simulations, and developing strategies for the Utility's CIP to manage multiple budget scenarios.

Tulsa Metropolitan Utility Authority (TMUA) | Utility Enterprise Initiative; Tulsa, OK

Lead Consultant. Lead Consultant for the Capital Prioritization and Optimization task of TMUA's Asset Management implementation initiative, Utility Enterprise Initiative. He is assisting in the implementation of Black & Veatch's innovated and proven 'Project Prioritization and Optimization' solution for several water and wastewater projects.

He is responsible for leading workshops with engineering and maintenance staff, developing business case approaches for each water/wastewater project, performing Monte Carlo and optimization simulations, and developing strategies for the utility's capital improvement plan (CIP) during a period of tight budget constraints to minimize rate increases. TMUA is currently expanding the Capital Prioritization and Optimization process to their Stormwater CIP.

Department of Water Resources (DWR) | Capital Prioritization and Optimization; Sacramento, CA

Lead Consultant. This project is for Capital Prioritization and Optimization Pilot Study that includes over 500 projects from the existing CIP. Risk reduction was developed and evaluated for each project that include capital costs and required labor. An optimization model was used to schedule projects to maximize the risk reduction benefit while maintaining existing budget and resource constraints. Several budget constraint levels will be assessed to evaluate any cost savings or risk mitigation benefits.

Indianapolis Power & Light (IPL) | Long Term Electric Transmission and Distribution Capital Plan; Indianapolis, IN

Lead Consultant. Assisted in the review and development of a long-term capital plan for IPL's electric transmission and distribution (T&D) infrastructure. Black & Veatch provided an engineer's review of a system risk model to analyze and score asset risk across the T&D system for IPL. This model highlights the risk reduction benefits achieved through IPL's long-term asset replacement program, which is focused on addressing high risk assets that are nearing the end of their useful life.

Greater Cincinnati Water Works (GCWW) | Water Rate Study and Model; Cincinnati, OH

Project Manager. Manager for the preparation of a comprehensive water rate study, which included financial planning, cost-of-service analysis and rate design. Prior study was for the development of a user-friendly financial planning and rate design model to enable ongoing use by GCWW staff.

City of St. Joseph | Revenue Requirements and Cost of Service Rate Studies; St. Joseph, MO

Project Manager. Manager for the annual preparation of revenue requirements and a cost of service rate study for the municipal wastewater utility of the city of St. Joseph, MO. Assists in providing comprehensive financial planning services for the sewer enterprise fund. Tasks include development of five-year revenue requirements, allocation of costs to functional components, and design of rates.

Johnson County Wastewater | Capital Prioritization and Optimization; Johnson County, KS

Project Manager. Manager for Capital Prioritization and Optimization Pilot Study that included 21 projects from the existing CIP. Business cases were developed and evaluated for each project that include distributions for capital costs, operations & maintenance expenses, revenue, and avoided costs (likelihood and consequence of failure). Utilizing Monte Carlo simulation, net present value (NPV) of costs distributions were calculated for each project. An optimization model was used to schedule projects to maximize NPV benefit and non-financial criteria on a portfolio basis while maintaining existing budget constraints. Several budget constraint levels were assessed to evaluate any cost savings or risk mitigation benefits.

City of Grand Rapids | Comprehensive Master Plan Update Financial Analysis; Grand Rapids, MI

Lead Consultant. Lead Consultant for an update to the city's water and sewer master plans. The city provides water and sewer utility service to multiple neighboring communities and has an established methodology for determining rates and charges. Using this methodology, Black & Veatch developed a forward-looking model that determines the impact to community revenue requirements of proposed water and sewer capital improvements that result from the master planning process. The model also estimated the impact to the city's water and sewer enterprise fund debt service coverage.

TIMUR DENIZ, PhD, PE, BCEE

PROCESS SPECIALIST

OFFICE LOCATION
Orlando, FL

EDUCATION
PhD, Environmental Engineering & Science, Clemson University, 2003

MS, Environmental Systems Engineering, Clemson University, 1997

BS, Environmental Engineering, Dokuz Eylül, University, 1993

YEARS EXPERIENCE
16

PROFESSIONAL REGISTRATION
PE – SC, FL

PROFESSIONAL ASSOCIATIONS
PROFESSIONAL ASSOCIATIONS

Water Environment Federation

American Academy of Environmental Engineers and Scientists

Dr. Deniz has 18 years of experience with wastewater treatment plant design, construction, and studies. Dr. Deniz specializes in biological nutrient (nitrogen and phosphorus) removal (BNR) processes, process and capacity evaluation, and optimization of existing BNR facilities for rerates, expansions, and upgrades. Additionally, he has extensive experience in modeling, design, and process optimization of nutrient removal processes including MLE, A2O, and four-Stage and five-Stage Bardenpho™ processes. Dr. Deniz has worked as the lead design engineer for conventional activated sludge and membrane bioreactor (MBR) wastewater treatment plants (WWTPs). Dr. Deniz has also worked on several wastewater master planning projects for small and large utilities. He is primary author of Chapter 12 of WEF Manual of Practice No 8 "Design of Water Resource Recovery Facilities", Chapter 10 and co-author of Chapter 11 of WEF Manual of Practice No 29 "Operation of Nutrient Removal Facilities", and primary author of Chapter 3 of WEF manual titled "Shortcut Nitrogen Removal - Nitrite Shunt and Deammonification".

PROJECT EXPERIENCE

Miami-Dade Water and Sewer Department (WASD) | Central District Wastewater Treatment Plant (CDWWTP) Headworks, Oxygenation Train, Secondary Clarifiers and Effluent Pump Station Improvements Design; Miami, FL

Senior Project Engineer. The CDWWTP has a treatment capacity of 143 mgd ADF. CDM Smith is tasked with designing of a new headworks, a new oxygenation train, six new secondary clarifiers, and a new effluent pump station. Dr. Deniz is serving as the process mechanical task leader for the design of Oxygenation Train No.4 which is a high-purity oxygen system and developing design drawings and specifications.

Seminole County | Water Wastewater and Reclaimed Water Master Plan; Lake Mary, FL

Senior Project Engineer. Dr. Deniz served as the task leader for the wastewater sections and assisted with the reclaimed water sections of the Seminole County Master Plan. Seminole County comprises an area of approximately 344 square miles in east-central Florida and provides utility services to approximately 425,000 residents. The master plan was developed for a planning period of 20 years. The project team coordinated with the County's existing Capital Improvement Plan (CIP) and developed an updated CIP. The updated CIP was used to develop an Integrated Financial Plan to implement the master plan.

Lee County | Three Oaks Wastewater Treatment Plant Oxidation Ditch Improvements Study; Lee County, FL

Senior Process Engineer. Dr. Deniz served as the senior process engineer for the oxidation ditch improvements study which consisted of assessing the overall treatment capacity of this 6.0 mgd facility due to increased biological loadings to the facility over the past several years. The assessment included evaluation of the facility headworks, oxidation ditches, brush aeration system, secondary clarifiers, filters, disinfection system, aerobic digesters, belt filter presses, and effluent disposal system. Dr. Deniz presented all the results and recommendations in the basis of design report for the final design.

Miami-Dade Water and Sewer Department (WASD) | South District Wastewater Treatment Plant (SDWWTP) Clarifier, Effluent Filter, Chlorine Contact Chamber, Effluent Pump Station Improvements Design; Miami, FL

Senior Project Engineer. The SDWWTP has a treatment capacity of 112.5 mgd ADF. CDM Smith is tasked with design of additional secondary clarifiers, deep bed sand filters, chlorine contact chambers, an effluent pump station. Dr. Deniz is serving as the process mechanical task leader for the design of two chlorine contact chambers and preparing a basis of design report section, design drawings and specifications.

City of Cocoa | Jerry Sellers Water Reclamation Facility (WRF) Biological Nutrient Removal (BNR) Improvements Evaluation; Cocoa, FL

Senior Process Engineer. Dr. Deniz worked as the senior process engineer for the BNR treatment capacity analysis of the 4.5mgd Jerry Sellers WRF. Dr. Deniz characterized plant influent with three weeks long sampling, and calibrated the BioWin™ model for the plant operating conditions. He used the calibrated model for treatment capacity analysis and process optimization of the existing 5-stage Bardenpho™ process. He evaluated the impact of industrial wastewater discharge on the enhanced biological phosphorus removal (EBPR). Dr. Deniz provided recommendations for the WRF to achieve Advanced Waste Treatment (AWT) standards which includes effluent total nitrogen and total phosphorus limits of 3 and 1 mg/L, respectively.

City of Knoxville | Fourth Creek WWTP Phase I Upgrades; Knoxville, TN

Senior Process Engineer. The Fourth Creek WWTP Composite Correction Program (CCP) Phase I improvements was implemented to meet the conditions of a joint EPA and TDEC Consent Decree. Treatment plant upgrades included high-rate clarification (HRC) treatment train and chemically enhanced primary treatment (CEPT). Dr. Deniz conducted mass balance for the treatment processes and evaluated primary clarifier, secondary clarifier treatment capacity, and contact basin aeration system sizing.

City of Fort Myers | Existing Treatment Capacity Evaluation and Aeration Improvements at the South Advanced Wastewater Treatment Plant; Fort Myers, FL

Senior Process Engineer. The South AWTF is an advanced nutrient removal facility permitted to treat 12 MGD AADF. The scope for this project included the evaluation of treatment capacity of the existing treatment processes for rerating the facility. Dr. Deniz lead the treatment process evaluation which included influent sampling, BioWin modeling, process sizing calculations, etc. The scope of work also included a design of supplemental aeration system for the oxidation ditches since the existing surface aerators did not provide sufficient capacity at the current operating conditions.

Miami-Dade Water and Sewer Department (WASD) | Central District Wastewater Treatment Plant Oxygen Production System Design Criteria Package Development; Miami, FL

Project Technical Leader. The CDWWTP consist of two plants which have a combined permitted treatment capacity of 143 mgd ADF. High-purity oxygen activated sludge is the secondary treatment utilized at this facility. CDM Smith was tasked with an evaluation of the oxygen delivery needs for the CDWWTP including identifying alternatives for addressing the oxygen delivery system deficiencies, identifying alternative technologies for two new oxygen generation unit, and providing recommendations to WASD.

MELISSA VELEZ, LEED AP, PE

WASTEWATER TREATMENT DESIGN

OFFICE LOCATION
Coral Springs, FL

EDUCATION
MS, Environmental Engineer, Stanford University, 2007

BS, Civil Engineer, Environmental Engineer, FL International University, 2005

YEARS EXPERIENCE
13

PROFESSIONAL REGISTRATION
PE – 2011, FL, 72508

Certification – LEED, 2009

PROFESSIONAL ASSOCIATIONS
American Water Works Association - Chair of Drop Savers Poster Contest (Florida) & Water Conservation Co-Chair (Florida Region VI)

Ms. Velez has 13 years of experience in the water and wastewater field in Florida. My experience includes design, feasibility studies, hydraulic modeling, cost estimating, and construction oversights for water and wastewater treatment plants.

PROJECT EXPERIENCE

City of Hollywood | Automation and SCADA Improvements for Optimization of the SRWWTP's Influent Distribution, Oxygenation Trains, RAS, DEEP Injection Wells; Hollywood, FL

Engineering Manager. Ms. Velez is assisting in the ongoing automation and SCADA improvements for the influent distribution box, oxygenation trains, RAS pump station 2, RAS pump station 4 and deep injection well pump station at the South Regional Wastewater Treatment Plant.

Miami-Dade Water and Sewer Department | CDWWTP - Tertiary Filtration Pilot Test and Effluent Pump Station Evaluation; Miami, FL

Engineering Manager. Ms. Velez is assisting in the on the development of the pilot test and evaluation of the Central District Wastewater Treatment Plant (CDWWTP) effluent pump station. The objective of the pilot testing tertiary filtration technologies is to confirm the capability of the considered filter treatment technologies to comply with an effluent TSS concentrations of less than 5 mg/L on a continuous basis. Her responsibilities include coordination between the sub-consultants; run and organize progress meeting with team members; organize and coordinate submittals; prepare invoices and progress reports for client.

Miami-Dade Water and Sewer Department | North District Wastewater Treatment Plant Primary Clarifiers and Odor Control Upgrades; North Miami, FL

Design Engineer/Task Manager. The project consists of replacement of primary clarifiers mechanisms, new aluminum flat covers on Primary Clarifiers 1 through 6, a new odor control system for Primary Sludge Pump Station No.1 and 2, new sodium hydroxide storage and Feed facility for the odor control system, primary scum pump station modifications. The project also includes structural repairs for primary clarifiers and distribution chambers, pipe rehabilitation, HVAC upgrades in Primary Pump Station No. 1 and 2 and electrical instrumentation upgrades. Her responsibilities include preparing construction drawings and specifications for clarifiers upgrades and scum pump station; coordinate with all the sub-consultants; run and

organize weekly progress meeting with team members; run an organize workshop with client; organize and coordinate submittals including construction drawings, specifications, and cost estimates with all team members.

City of Orlando | Stormwater Supplement Project for Lake Nona South Reclaimed Water System; Orlando, FL

Project Engineer/Project Manager. Feasibility study and conceptual design of withdrawing 2.0 mgd from the

stormwater lakes to supplement the existing reuse system. Evaluated multiple treatment processes including pressure filters, cloth media filters, and microfiber filters.

Fort Myers | East Storage Tanks and Booster Pump Station; Ft. Myers, FL

Engineering Manager. Ms. Velez is assisting on this ongoing project that involves the construction of a new Ground Storage Tank (GST) and Booster Pump Station (BPS) on existing City-owned property. The water main pipeline will be extended to connect to and fill the GST during off-peak periods. An inlet fill valve will be located on the pipeline and will be controlled remotely from the WTP Control Center. The GST will be used as a suction well for the adjacent BPS. The BPS will contain three booster pumps (2 duty, 1 standby) with provisions for a future fourth pump. The pumps will discharge back into the existing 24" water main to maintain a system pressure of at least 50 psi and will be controlled automatically when the system pressure drops below an adjustable pressure set point. The booster pumps will be located inside a building with HVAC, electrical service and instrumentation and controls for the tank and pumps.

Manatee County | Southwest Water Reclamation Facility Clarifiers Improvements; Bradenton, FL

Project Engineer. The construction phase for the rehabilitation of Clarifiers No.1 and 2. Prepared meeting minutes from monthly construction meeting, reviewed shop drawings and submittals for construction contracts.

City of St. Petersburg | Lift Station No.1 Rehabilitation Project; St. Petersburg, FL

Project Engineer. The replacement of three submersible pumps with a total capacity of 2,150 gpm, piping and wet well modifications. Design the mechanical modification to the lift station. Prepared drawings, specifications, and cost estimate for the design of the new pumps, and mechanical modifications.

Manatee County | Southwest Water Reclamation Facility Clarifiers and Headworks Upgrades; Bradenton, FL

Project Engineer. Responsible for the design of new clarifiers' mechanisms, scum pumps, RAS pumps, screening conveyors, grit cyclones, and classifiers. Prepared contract drawings, specifications, and cost estimates.

Miami-Dade Water and Sewer Department | Groundwater under the Influence of Surface Water (GWUDI) Upgrades; Miami, FL

Project Engineer. The new 165 mgd nanofiltration treatment facility. Assisted on the design of a new chemical storage and feed facility for sodium hexametaphosphate, aqueous ammonia, sodium hydroxide, fluorosilicic acid, scale inhibitor, ferric sulfate, and sulfuric acid. Prepared contract drawings, specifications, and cost estimates for the 50% design deliverable.

Palm Beach County | Magnetic Ion Exchange Resin Treatment Project at System 2 Water Treatment Plant; West Palm Beach, FL

Project Engineer. The design of a 14.5 mgd magnetic ion-exchange resin (MIEX®) treatment system proposed for System 2 Water Treatment Plant. Performed preliminary hydraulic model of the existing and proposed treatment train; coordinated and organized quantity takeoffs; and prepared cost for the 30-percent design.

GREG KNIGHT, CENG

BIOSOLIDS DISPOSAL

OFFICE LOCATION
Atlanta, GA

EDUCATION
MSc Environmental Engineering (Distinction), University of Newcastle upon Tyne, 2001

Btec Professional Diploma in Water Treatment Management, Severn Trent Water/Edexcel, 2003

BSc Physics (Hons), Univ

YEARS EXPERIENCE
23

PROFESSIONAL REGISTRATION
C.Eng Chartered Engineer (UK Equivalent of PE)

PROFESSIONAL ASSOCIATIONS
MCIWEM, Member of the Chartered Institution of Water & Environmental Management

Mr. Knight is an experienced engineer in the water industry with a well-balanced background working on wastewater, biosolids and clean water treatment projects. Greg has been involved with all stages of project delivery from initial feasibility through to detailed design, commissioning, and plant operation.

Greg has worked on a wide variety of wastewater and clean water projects, from feasibility/outline design through to detailed design for construction and commissioning. Greg's roles on projects have included Lead Process Engineer on large capital projects as well as carrying out process reviews and supervising more junior members of staff.

Greg has carried out both clean water and wastewater design and is familiar with producing all aspects of process design including process flow diagrams, P&IDs, performance modelling (e.g. using Biowin), process descriptions and control philosophies. He is accustomed to managing/liaising with subcontractors, producing specifications and dealing with performance guarantees. His experience has covered all stages of project development from initial feasibility through to detailed design, construction, commissioning, training clients' operational staff, operational management and performance optimization.

PROJECT EXPERIENCE

Pinellas County | Long-Term Biosolids Master Plan; FL

Lead Process Engineer. Leading the process evaluation to develop a biosolids master plan for the County. Current treatment is to anaerobically digest and then pelletize biosolids in a drum dryer. This study evaluated various alternatives for biosolids treatment to provide a long-term strategy for management of the County's biosolids.

City of Raleigh | Neuse River Resource Recovery Facility Bioenergy Recovery Program; Raleigh, NC

Lead Process Engineer. Preliminary and detailed design of a new advanced digestion facility for the city. Black & Veatch detailed design scope includes thermal hydrolysis, anaerobic digestion, steam system and digester gas cleaning to produce renewable natural gas for ultimate use as CNG for City buses. The project is being delivered as a construction management at risk (CMAR) contract. Black & Veatch is currently supporting the City with construction phase services, working with the CMAR contractor.

Gwinnett County | Integrated Biosolids Strategy Review; GA

Project Manager. Project Manager leading a biosolids beneficial use market assessment and biosolids masterplan to provide an integrated biosolids strategy for Gwinnett County. Work included a detailed market assessment to evaluate potential for beneficial use of biosolids products for various end uses including agriculture, silviculture, parks and recreation, nurseries, sod farms etc. Led evaluation of various biosolids processing technologies to determine the most cost effective and viable process for the County. Thermal drying was recommended as the preferred technology for implementation based on project specific drivers.

Gwinnet County | Biosolids Dewatering Evaluation, F. Wayne Hill; Atlanta, GA

Process Lead. Supporting Gwinnet County regarding selection of dewatering technology at F. Wayne Hill. Carrying out evaluation of replacement dewatering equipment for a failed centrifuge unit on site.

City of Atlanta | Sludge Management Plan; GA

Engineering Manager. Engineering Manager leading a biosolids beneficial use market assessment, biosolids strategy evaluation and production of a "Sludge Management Plan" for Georgia EPD to allow for beneficial use of the City's treated Class A biosolids for agriculture in Georgia.

City of Hendersonville | Sludge Handling & Disposal; Hendersonville, NC

Lead Process Engineer. Evaluation of options for regionalized treatment, handling, and disposal/reuse of residuals from a water treatment and wastewater treatment facility.

Gwinnet County | Biosolids Dewatering Feasibility, Crooked Creek; GA

Process Lead. Supporting Gwinnet County regarding selection of dewatering technology at Crooked Creek. Reviewing vendor pilot plant performance and preparation of life cycle costing to allow for comparison of capital improvement options.

Orange County Sanitation District | Supercritical Water Oxidation Review; CA

Technical Consultant. Conducted a detailed review of supercritical water oxidation technology including literature review and summary of the current state of the industry. Carried out a thorough review and evaluation of proposals from a supercritical water oxidation technology vendor for a demonstration facility for biosolids treatment. This included a technical review as well as evaluation of probable capital, operating and life cycle costs compared to more conventional technology.

City of Fort Wayne | Thickening Improvements; Fort Wayne, IN

Process Lead. Developed pilot trial methodology and reviewed pilot plant performance for sludge thickening improvements using rotary drum thickeners. Conducted life cycle cost evaluation of thickening alternatives. Technical support for design and installation of new rotary drum thickener system.

Charlotte Water; Long Creek Preliminary Engineering; Charlotte, NC

Lead Process Engineer. Led the process design of a new regional advanced nutrient removal wastewater treatment facility at Long Creek discharging into Lake Wylie. The BNR plant is designed to meet tight total nitrogen and phosphorus limits. Solids treatment design included thickening of primary and WAS, anaerobic digestion, struvite sequestration and final dewatering and cake storage.

Water & Sewer Authority of Cabarrus County; Concord, NC

Lead Process Engineer. Led the process evaluation of options to replace the existing high purity oxygen system for the 26MGD Rocky River Regional Wastewater Treatment Plant. Options evaluated included refurbishment of the existing cryogenic system, replacement with a new pressure swign adsorption system and replacement of high purity oxygen with conventional aeration. Developed process design for a plant expansion for an expansion 34MGD.

ENGIN GUVEN, PhD, PE

BIOSOLIDS DISPOSAL

OFFICE LOCATION
Gaithersburg, MD

EDUCATION
PhD, Civil and Environmental Engineering, Marquette University, 2004

MS, Civil and Environmental Engineering, Marquette University, 2001

MS, Environmental Engineering, Middle East Technical University, 1999

BS, Environmental Engineering, Middle East Technical University, 1997

YEARS EXPERIENCE
16

PROFESSIONAL REGISTRATION
PE – 2012, VA, 050125

PROFESSIONAL ASSOCIATIONS
Water Environment Federation (WEF)

Virginia WEA

Chesapeake WEA

Dr. Guven is an environmental engineer experienced in wastewater treatment processes with 16 years of experience in research and consulting. He has focused his career on biosolids management including master planning, process design, construction, and commissioning. His recent work encompasses thermal hydrolysis pretreatment (THP) for anaerobic digestion. Engin worked on the design of 26.5 dtpd THP facility at Pontiac WWTP in Michigan and Medina in Ohio; design of 150 dtpd solids improvements project that includes addition of three THP trains and new digesters at Trinity River Authority in Texas; and, design, construction, and commissioning of world's largest thermal hydrolysis system and anaerobic digesters to process 450 dtpd solids at DC Water in District of Columbia.

PROJECT EXPERIENCE

Pinellas County Utilities | Biosolids Master Plan; Pinellas County, FL

Process Engineer. Dr. Guven developed mass balances, process and equipment sizing and economic models to evaluate four process train alternatives for County's future biosolids management strategy. The alternatives include rehabilitating existing drum dryer facility, installing WAS-only THP at South Cross Bayou WRF, constructing a new regional dryer facility in collaboration with the other utilities in the region or utilizing available capacity at a third party operated facility. A report including an implementation plan for the selected alternative was prepared for the County.

Orange County Utilities | Biosolids Master Plan; Orange County, FL

Project Engineer. Engin served as project engineer for the Biosolids Facilities Evaluation project completed in July 2009 for Orange County Utilities. Orange County currently operates three separate water reclamation facilities and biosolids management systems the currently process a combined biosolids quantity of 21,000 dtpy. The project consisted of three components that were addressed in technical memorandums. Technical memorandum 1-1 addressed regulatory issues and anticipated changes to current biosolids management regulations, technical memorandum 1-2 addressed the evaluation of the current biosolids facilities and condition assessment, and technical memorandum 1-3 addressed the capacity of the facility and the projected changes to biosolids production over a 20-year period. A summary report was prepared, and this report sets the foundation for the regional biosolids management study that is currently in progress. Engin was responsible for the development of the solids mass balances for each facility, and for assessing the condition of the process equipment.

JEA | Buckman Residuals Management Facility (RMF) Anaerobic Digester Improvements Preliminary and Final Design, Bidding and Construction Services; Jacksonville, FL

Project Engineer. Engin and team of engineers prepared the preliminary design report and final design documents to construct a new anaerobic digester at JEA's Buckman Residuals Management Facility. Engin was part of the mechanical and civil design team who prepared the contract documents for a 2.0 Mgal concrete anaerobic digester tank, a pumped tank mixing system, a digester content heating equipment including hot water system, a membrane digester gas storage system and three new odor control units. Engin also prepared and submitted the permit applications for the proposed changes. He provided bidding and construction services for this project including producing bid documents, answering potential contractor's questions, reviewing shop drawings, issuing design clarifications and responding to request for information from the contractor.

City of Valdosta | Biosolids Master Plan; Valdosta, GA

Project Engineer. Engin prepared a biosolids master plan for the City of Valdosta's two water pollution control plants (WPCP), Withlacoochee and Mud Creek. The team evaluated five alternatives for Mud Creek WPCP and six alternatives for Withlacoochee WPCP and provided recommendations to produce Class A biosolids. Engin worked along with other engineers to evaluate the alternatives in terms of non-cost factors as well as construction and operations and maintenance (O&M) costs.

St. Johns County Utilities Department | Ponte Vedra Water, Sewer and Reuse Master Plan | St. Johns County, FL

Project Engineer. Engin evaluated the residuals production from the three WWTPs in the Ponte Vedra service area and provided recommendations to be included in the master plan.

St. Johns County Utilities Department | Northwest Wastewater Treatment Plant Design; St. Johns County, FL

Project Engineer. Engin designed the sludge processing facilities at the new 3.0 mgd Northwest Wastewater Treatment Plant in St. Johns County, FL. The facility includes a WAS holding tank with blowers for aeration/mixing, and a solids processing building that accommodates a belt filter press for dewatering, a feed pump, and a polymer feed system as well as a belt conveyor to transfer cake to the trailer.

City of Raleigh Public Utilities Department | Neuse River WWTP Bioenergy Recovery Program; Raleigh, NC

Process Engineer. Black & Veatch leads the anaerobic digestion, thermal hydrolysis, gas utilization services for gas treatment, compression and utilization through CNG, effluent pumping upgrades, and steam production for CORPUD's Neuse River WWTP bioenergy facility upgrades. Engin is working on process control approach and maintenance of plant operation strategies before, during, and after the construction of the new facilities completed.

City of Valdosta | Mud Creek Water Pollution Control Plant (WPCP) Upgrade and Expansion Biosolids Treatment Improvements Design, Bidding and Construction Services; Valdosta, GA

Project Engineer. Engin prepared the bid documents for a new dewatering facility to accommodate two new belt filter presses, two new feed pumps, two polymer systems, a belt conveyor and other associated equipment at the Mud Creek WPCP in Valdosta, GA. The design efforts also included the rehabilitation of existing aeration system at the waste sludge holding tank. He also provided bidding and construction services for the new dewatering facility and rehabilitation of the existing biosolids treatment process at the Mud Creek WPCP that included producing bid documents, answering potential contractor's questions, reviewing shop drawings and responding to request for information from the contractor.

ARI COPELAND, PO

OPERATIONS & MAINTENANCE

OFFICE LOCATION
Kansas City, MO

EDUCATION
Masters, Environmental Engineering, Water Quality, University of Cincinnati, 2005

Bachelors, Civil Engineering, Environmental Engineering, Worcester Polytechnic Institute, 2003

YEARS EXPERIENCE
18

PROFESSIONAL REGISTRATION
Professional Water Operator, 2014, #POW4-00002-0914

Water Operator - Grade IV, 2014, #W41401E

Wastewater Operators - Level B, 2011, FL, #20048

Water Treatment Operators - Level A, 2010, FL, #18735

PROFESSIONAL ASSOCIATIONS
American Water Works Association

Ari C. Copeland has 18 years of experience in water and wastewater plant design, water distribution system operations, permitting, facility assessments and benchmarking, treatment plant startup and commissioning, operator training, process control troubleshooting, conducting pilot studies, standard operating practices (SOPs), and operations and maintenance (O&M) manual preparation.

Formerly a Water Quality Engineer at the American Water Works Association (AWWA), Ari was responsible for answering all water quality and operator questions received by the Association (51,000 membership) in addition to managing large groups of mostly volunteers to write 62 percent of the Association's Manuals of Practice, which are key resources to the drinking water industry. Ari has over 2,000 hours of water and distribution operator training experience through the FL Section of the American Water Works Association (FSAWWA). Ari has helped over 100 operators obtain operator licenses, as well as operate treatment plants and distribution systems. Ari possesses a Professional Operator's designation (Water IV) awarded by the Association of Boards of Certification (ABC).

PROJECT EXPERIENCE

Hillsborough County | Falkenburg Wastewater Treatment Plant De-ragging Study; Tampa, FL

Civil Engineer II. Assisted in troubleshooting screening process operational issues. Collected data and followed up with plant manager regarding the progress of recommended operational changes to screen performance.

West Lakeland | Wasteload Reduction Facility Startup Services; Lakeland, FL

Civil Engineer II. Assisted in the pre-startup, startup, and commissioning plans of a 1.5 mgd extended air wastewater treatment facility for the City of Lakeland. Served as onsite contact for all matters related to process startup and provided operator process training. Reviewed vendor O&M manuals for complete and correct information.

Tampa Bay Water | Hydrogen Sulfide Removal Pilots; Tampa Bay, FL

Civil Engineer II. Assisted in operating four pilot plants to determine the correct process selection for the Lithia WTP and the addition to the Keller WTP for hydrogen sulfide removal from groundwater. The treatment processes included MF/UF trains, and an ozone disinfection unit followed by dual media filtration. The pilot treatment flow was approximately between 10 and 20,000 gpd. This pilot work resulted in the correct process selection for both the Lithia and Keller WTP sites.

City of Missoula | Wastewater and Stormwater System Assessment; Missoula, MT

Operations Specialist. Assisted senior level operators with onsite data collection for one BNR plant and the City's stormwater system. Drafted a report concerning the treatment process and stormwater process areas of improvement and concern.

City of Kansas City | Blue River Wastewater Treatment Plant Operation & Maintenance and Training; Kansas City, MO

Operations Specialist. Assisted in the development of incinerator O&M Manual for the Blue River Secondary WWTP. Developed fundamental operator training materials on disinfection and dechlorination.

City of St. Louis | Missouri River Wastewater Treatment Plant Operations & Maintenance; St. Louis, MO

Operations Specialist. Assisted in the development of incinerator O&M Manual for the Missouri River WWTP. Developed operator training materials for liquid treatment and the solids handing treatments at the plant site.

New Orleans Sewer and Water Board | S&WB Annual Facilities Operations Assessment; New Orleans, LA

Operations Specialist. Performed an operations review for the water, wastewater, drainage, and pump station facilities within the city limits. Conducted site visits, interviewed the staff, and wrote a final report for the operations review.

Private Investors | Facility Assessment of Wastewater Plants; Mexico

Operations Specialist. Conducted an assessment of condition of equipment and operations of three wastewater treatment plants in Mexico. Drafted report of findings to client.

Kansas City Water Services | Operations and Maintenance Assistance Contract 2; Kansas City, MO

Operations Assistance. Provides Operations assistance to Kansas City Water Services six wastewater treatment plants, developed wet weather operating procedures and QCed round sheets for each plant. This is a five-year contract.

NEORSD | Southerly Wastewater Treatment Center MACT Renewable Energy Facility SOPS; Cleveland, OH

Operations Specialist. Assisted in the development and field verification of SOPs for incinerator sludge feed process, including dewatering, polymer dosing, and various transfer pump systems. The SOPs were geared towards operators to assist in operating the sludge feed and dewatering systems.

City of Vancouver | Iona WWTP Facility Plan; Vancouver, Canada

Operations Specialist. Assisted in the development of a facility plan evaluating the Iona WWTP's current operations and asset management program. Provided recommendations to keep the facility running until 2030.

Metro St. Louis Sewer District | Missouri River WWTP Gas Detection SOPs; St. Louis, MO

Operations Specialist. Drafted Standard Operating Procedures (SOPs) for operators to follow in case a high dangerous gas level is detected in the work area.

JAMES FITZPATRICK, PE

REGULATORY

OFFICE LOCATION
Kansas City, MO

EDUCATION
M.Eng., Chemical Engineering, University of Louisville, 1993

B.S., Engineering Science, University of Louisville, 1992

YEARS EXPERIENCE
27

PROFESSIONAL REGISTRATION
PE – 1997, MO, 28631

PROFESSIONAL ASSOCIATIONS
Missouri Association of Cleanwater Agencies

Missouri Water Environment Association

Water Environment Federation

Tau Beta Pi

As a chemical engineer currently assigned to the Wastewater Treatment Technology Department of Black & Veatch's Water Technology Group, Mr. Fitzpatrick has extensive process engineering experience on water and wastewater treatment projects for municipal, utility and industrial clients. His background includes planning, piloting, studies, design, commissioning and post-construction performance testing of both conventional and advanced treatment processes and technologies, including: chemically enhanced settling (CES/CEPT), solids contact clarification/thickening (e.g. DensaDeg®), ballasted flocculation (e.g. Actiflo®), compressible media filtration (e.g. FlexFilter™), pile cloth filtration (e.g. AquaPrime®), secondary clarifiers in activated sludge and fixed-film applications, nutrient removal and recovery, ultralow phosphorus removal, oxyanion removal, and high-rate effluent disinfection alternatives.

PROJECT EXPERIENCE

Pinellas County | William E. Dunn WRF Assessment and Treatment Process Model; Pinellas County, FL

Senior Process Engineer. Assessment of existing treatment facilities, operations and practices for 9-mgd WRF. Evaluation of monitoring data, development of treatment process model using GPS-X software, and evaluation of potential operational changes and capital improvements.

Pinellas County | South Cross Bayou WRF Assessment and Optimization; Pinellas County, FL

Senior Process Engineer. Assessment of existing treatment facilities, operations and practices for 33-mgd WRF. Study of alternatives to Thioguard for odor control; evaluation of vortex grit removal alternatives; review and evaluation of monitoring data; development of treatment process model using GPS-X software; update of GPS-X model from Level 2 to Level 4 calibration; evaluation of copper removal alternatives; evaluation of potential operational changes and capital improvements.

County of Pinellas, FL | Utility Assessment and Optimization Program; Pinellas, FL

Senior Process Engineer. Multiyear consulting services program to optimize water, sewer and reclaimed water systems using the Envision Process. Facilities include the 33-mgd South Cross Bayou WRF, 9-mgd W.E. Dunn WRF, Logan Laboratory and Pumping Station, and drinking water and reclaimed water distribution systems. Tasks include onsite observations and assessments, evaluation of treatment monitoring data, dynamic treatment process modeling (GPS-X), evaluation of operational alternatives, capital improvement studies, prioritization of CIP projects, and other consulting services.

Orange County Utilities | Northwest WRF; Orange County, FL

Process Engineer. Study and design to double capacity and upgrade to 5-stage Bardenpho process. Included field testing and assessment of the existing secondary clarifiers (4 @ 105′ dia x 14′ SWD) in accordance with WERF/CRTC protocols to determine case-specific Vesilind flux curve; state point analysis; discrete and flocculated suspended solids (DSS/FSS); capacity evaluation; and upgrade recommendations.

Johnson County Wastewater | Tomahawk Creek WWTF Expansion and Upgrade; Johnson County, KS

Wet Weather Process Specialist. Study and design services to expand from 10-mgd average to 19-mgd average/172-mgd peak hourly. Upgrade trickling filter process to 5-stage Bardenpho with S2EBPR and dual-use filtration to meet 10 mg TN/L and 0.5 mg TP/L annual average goals. Design and evaluate compressible media and pile cloth media filtration alternatives in dual-purpose configurations.

City of Columbus | Overall Engineering Consultant; Columbus, OH

Senior Process Engineer. Multiyear consulting program to optimize wastewater treatment operations and evaluate capital and operational alternatives. Facilities include the 114-mgd Southerly WWTP, 68-mgd Jackson Pike WWTP, and biosolids Compost Facility. Tasks include struvite control study for dewatering centrifuges, effluent pH evaluation, influent sampling alternatives, emerging technology workshop, and other consulting services.

City of Springfield | Sanitary Sewer Overflow Control Program; Springfield, MO

Senior Process Engineer. Planning, study and conceptual designs to evaluate different wet-weather flow treatment alternatives for sanitary sewer overflow control at the 50-mgd Southwest Wastewater Treatment Plant and 7-mgd Northwest Wastewater Treatment Plant. Services include: dry-weather and wet-weather influent characterization and projections, jar testing of chemically enhanced sedimentation (CES), full-scale wet-weather stress testing of CES and compressible media filtration (CMF), dynamic treatment process modeling (GPS-X), capacity assessments, and process and technology alternatives evaluations.

Johnson County Wastewater | Tomahawk Creek Wastewater Treatment Facility Project Definition; Johnson County, KS

Wet Weather Process Specialist. Conceptual designs and advanced facility planning to expand WWTF from 10-mgd average to 19-mgd average/172-mgd peak hourly. Triple bottom line evaluation of various process and technology alternatives for treating wet-weather flows, including silicate ballasted flocculation, magnetite ballasted flocculation, compressible media filtration, and cloth media filtration in both stand-alone and dual-use applications.

MARTIN JONES, CENG

R&R SUFFICIENCY PLANNING | CAPITAL PROJECT PRIORITIZATION

OFFICE LOCATION
Alpharetta, GA

EDUCATION
MBA, University Business School, 2005

MSc, Water Resource Systems Engineering, University of Newcastle upon Tyne 1997

BEng, Civil Engineering (2:1 Hons) University of Bristol, 1996

YEARS EXPERIENCE
23

PROFESSIONAL REGISTRATIONS
CEng - UK

PROFESSIONAL ASSOCIATIONS
Member of Institution of Civil Engineers (UK)

Engineering Council (UK)

Mr. Jones is the Asset Management Services Lead in Black & Veatch's Planning & Asset Management Group, and has over 20 years' experience in the international water industry. He is an experienced project manager and specializes in water utility asset management and regulatory audit. He is also an approved assessor for International Organization for Standardization (ISO) 55001 and Publicly Available Specification (PAS) 55 under the Institute of Asset Management (IAM) Endorsed Assessor scheme, and holds the IAM Certificate in Asset Management.

Martin is a member of the American Water Works Association Asset Management Committee. He is also a Chartered civil engineer. Martin has undertaken a variety of asset management projects including asset management assessments, asset valuations, PAS 55 and ISO 55001 implementation and strategy development. Martin was also a lead auditor undertaking technical audits for certification of regulatory information for two UK water companies.

Martin also worked for Wessex Water in the UK where he gained operational experience including water company management, wastewater treatment works operation and sewerage system operation. He also has experience of business development, due diligence, bids, and transition management for water concessions, as well as experience of writing, implementing, and auditing management systems.

PROJECT EXPERIENCE

Miami Dade Water and Sewer Department | CIP Implementation and Gap Analysis; Miami, FL

Principal Consultant. Led review of MDWASD's approach to Capital Improvement Program development, budgeting and implementation, including high-level review of processes and organizational structure.

City of Tampa | Water Master Plan; Tampa, FL

Principal Consultant. Led an ISO 55001 gap assessment for the Water Department and developed the improvement roadmap.

City of Wilmington | Wastewater Asset Management Plan; Wilmington, NC

Principal Consultant. Developing an asset management plan for wastewater assets. Tasks include development of a planning framework, service levels,

data review, asset risk assessments, business case development, and development of a risk-based sewer rehabilitation program.

Palm Beach County Water Utilities Department | Asset Management Strategy; Palm Beach County, FL

Principal Consultant. First phase of project involved assessing data needs for asset management planning, and prioritizing data improvements. Second phase included an ISO 55001 assessment and development of an asset management implementation roadmap

City of Tulsa | Stormwater Utility Enterprise Initiative; Tulsa, OK

Task Lead. Led ISO 55001 assessment of the City of Tulsa's stormwater utility and developed an asset management program implementation plan.

California DWR | Asset Management Program; CA

Task Lead. Phase A of the program included an ISO 55001 gap assessment, development of an Asset Management Policy, Program Development Strategy that included an organizational review, and an Implementation Plan that included over 20 improvement initiatives and a Management of Change Plan. Phase B has now commenced with implementation of the Management of Change Plan, development of the Asset Management Framework, levels of service, Risk Framework, and Maintenance Management Strategy.

Hampton Roads Sewer District (HRSD) | Asset Management Program, Virginia Beach, VA

Technical Manager. Led an ISO 55001 gap assessment and developed the improvement roadmap. Now implementing the asset management program, developing an Asset Management Framework that includes a SAMP, Asset Management Policy and Asset Management Plans.

Trinity River Authority of Texas | Strategic Asset Management System and Reliability Centered Maintenance Program; TX

Principal Consultant. Led ISO 55001 assessment for the Central Regional Wastewater System treatment plant. Identified gaps and improvement opportunities which will was incorporated into an asset management improvement plan.

Charleston Water System | Fixed Asset Register Project, Charleston, SC

Principal Consultant. Assisted CWS develop a methodology for updating the Fixed Asset Register in RIVA software. This included developing recommended lives for asset classes, and performing a pilot inventory survey and asset valuation for assets at a water and a wastewater treatment plants.

Harford County | Comprehensive Utility Revenue Rate Study; Harford County, MD

Principal Consultant. Developing asset replacement model for all water and wastewater assets to forecast asset replacement and rehabilitation costs for use in the rate model.

Winston-Salem/Forsyth County Utilities Commission | PAS 55 Assessment; Winston-Salem, NC

Principal Consultant and Assessor. PAS 55 based assessment of the utility's approach to management of the wastewater collection system. Scope included interviews and documentation review, and gap analysis using PAS 55.

DR. ARTURO BURBANO, PhD, PE, PMP, BCEE

REUSE TREATMENT SYSTEMS

OFFICE LOCATION
Coral Springs, FL

EDUCATION
Executive MBA, Anderson School of Management, University of California, Los Angeles (UCLA), 2014

Ph.D., Environmental Engineering, University of Cincinnati, 2003

MS, Industrial Engineering, Escuela Politécnica Nacional, (Quito, Ecuador), 1998

BS/MS, Chemical Engineering, Escuela Politécnica Nacional, (Quito, Ecuador), 1992

YEARS EXPERIENCE
28

PROFESSIONAL REGISTRATION
PE - FL, CA, NV

PMP

PROFESSIONAL ASSOCIATIONS
American Academy of Environmental Engineers (AAEE)

American Water Works Association (AWWA)

Water Environment Federation (WEF) - Industrial Water Committee, Groundwater Committee

Project Management Institute (PMI)

Dr. Burbano is a Program Director and Water Treatment Technology Business Line Leader with Black & Veatch in Miami, FL. He is a senior project/manager, senior technologist and business development specialist with 28 years of experience in the water industry, including water, wastewater, water reuse and stormwater for municipal, industrial and federal clients. He has served as an Adjunct Professor of Water/Wastewater Treatment Design at the University of Southern California (USC) and the Florida International University (FIU). Dr. Burbano has extensive experience as project and program manager delivering a variety of infrastructure projects, including design and construction of treatment facilities ranging from 20 gpm to 750-mgd in capacity. His main areas of technical expertise include process selection, bench- and pilot-scale studies, conceptual and detailed engineering design, QA/QC and discipline coordination, bidding, procurement, permitting, and engineering services during construction of water and wastewater treatment plants based on conventional or advanced treatment technologies.

PROJECT EXPERIENCE

Miami Dade Water and Sewer Department (WASD) | CD2.17 Chlorination Facilities Detailed Design; Miami, FL

Project Manager. Project Manager for the detail design of the $22M chlorination facilities for the 143-MGD Central District Wastewater Treatment Plant (CDWWTP). The objective of this Consent Decree (CD) project was to replace the existing chlorine gas system with a new liquid sodium hypochlorite system. The latter was a bulk storage facility with eighteen 20,000-gallon FRP tanks, transfer and dosing pumps and a satellite facility with two 2,500-gallon HDPE day tanks and dosing pumps. The design included all the yard piping, leak detection, injection points, all monitoring and control instrumentation, and incorporated hardening considerations to protect the facility against sea level rising-induced floods.

Upper San Gabriel Municipal Water District | Conceptual Design of Advanced Water Treatment Plant and Distribution Systems for Treatment of Tertiary Wastewater Effluent for Groundwater Recharge; Whittier, CA

Technical Advisor. Dr. Burbano served as technical advisor for this indirect potable reuse (IPR) project. The objective was to evaluate the feasibility of building an advanced water treatment plant (AWTP) to produce 41-MGD of clean effluent using tertiary wastewater effluent from the San Jose Creek Water Reclamation Plant (SJCWRP). The clean effluent was intended to recharge the groundwater in the San Gabriel Basin. The AWTP treatment train included MF/RO followed by AOP using UV/H2O2, and finished water conditioning using decarbonation and lime addition for pH, alkalinity and corrosion control. Dr. Burbano conducted the following tasks: (i) conducting water quality reviews of SJCWRP effluent to identify target constituents of concern for removal, (ii) QA/QC reviews of the conceptual development plan for the AWTP, including detailed process design, site layout and Class 5 cost estimates, (iii) QA/QC reviews of potential implementation timelines and staged construction, and (iv) preparing a Local Resources Program (LRP) funding application and submittal for funding assistance from various agencies.

Brisbane Water | Western Corridor Recycled Water Program/Gibson Island Advanced Water Treatment Plant; Brisbane, Australia

Technical Advisor. Dr. Burbano served as a Technical Advisor of the preliminary and detail design of the 25-MGD Gibson Island AWTP, the largest plant in the Program. The selected treatment train for the AWTP included ACTIFLO® pretreatment, MF/RO and an AOP based on UV/H2O2. The AOP process targeted the removal of NDMA (1-log) and 1,4-dioxane (0.5-log). The finished effluent was intended for industrial reuse and IPR using storage reservoirs. Dr. Burbano supported the design of the pretreatment and AOP systems through a series of bench tests and an extensive review of vendor literature and bench results to determine the best alternatives for treatment technology and vendor selection.

Metropolitan Water District of Southern California | Design, Construction, and Long-Term Testing of Filter Modifications for the Weymouth Water Treatment Plant; La Verne, CA

Project Manager. This project for the 520-MGD Weymouth WTP involved a complete retrofit of filters that operated with almost no changes for over 50 years but had recently showed performance issues such as low filtration rates, reduced run times, and significant media loss. Dr. Burbano managed a comprehensive alternative evaluation to define suitable filter modifications to solve these issues (e.g., alternative media arrangements, replacing original troughs and underdrains with improved commercial products, and testing trough-less filters). Based on this analysis, Dr. Burbano later managed the final design and engineering services during construction of these modified filters, as well as during the long-term testing of these filters at full-scale capacity. This project defined the best performing filter configuration to be later implemented on the entire plant.

Metropolitan Water District of Southern California | Engineering Services for the Construction of Thickeners #5 and #6 at the Jensen Water Treatment Plant; Granada Hills, CA

Project Manager. Dr. Burbano served as project manager of this project to improve solids handling at the 750-MGD Jensen WTP, one of the largest in the US. Dr. Burbano oversaw the completion of all phases of this project, including coordination between Metropolitan staff and the contractor, progress meetings, processing of requests for information and submittals with civil, structural, electrical and instrumentation technical leads, contracts with subcontractors, budget monitoring, and invoicing. After a 18-month construction period, the project met all the schedule, budget and quality targets, the plant increased its solids handling capacity by 50%, and was able to thicken the solids either in batch or continuous mode.

JO ANN JACKSON, PE

REUSE PLANNING & REGULATIONS

OFFICE LOCATION
Orlando, FL

EDUCATION
ME, Environmental Engineering, University of Florida, 1982

BS, Environmental Science, Troy University, Troy Alabama, 1980

YEARS EXPERIENCE
38

PROFESSIONAL REGISTRATION
PE - 38674, FL, 1987

PROFESSIONAL ASSOCIATIONS
Water Environment Federation (WEF)

WateReuse Association

American Water Works Association (AWWA)

International Water Association (IWA)

Ms.J ackson leads Black & Veatch's National One Water Planning Practice. She has experience with planning, permitting, design, and/or implementation of nearly every type of water reuse program from traditional urban and agricultural irrigation reuse systems to innovative wetland environmental enhancement projects and potable reuse. She has completed Consumptive Use Permits within the SJRWMD and other districts. For 6 years, she worked directly for local government, as a Division Director with the City of Altamonte Spring's overseeing water, wastewater and reuse systems, which has given her a utility perspective to complement her consulting background.

PROJECT EXPERIENCE

One Water Plan; City of Winter Haven, FL.

Water Reuse Lead. Ms. Jackson is serving as Water Reuse Lead for the Development of a One Water Plan for the City of Winter Haven in west-central Florida. Black & Veatch is assisting Winter Haven with developing an integrated plan to manage the area's finite water resources for long-term resiliency, sustainability and reliability, meeting both community and ecosystem needs. The goal of the program will be to identify a sustainable future water supply, restore lakes to their historical levels, protect water quality and natural systems, create parks for the community and provide increased flood protection. Water reuse, wetlands enhancement and future potable reuse strategies will play a key role in optimizing water use in the City.

JEA | Phase 2 Water Purification Facility (Potable Reuse); Jacksonville, FL

Permitting Lead. Ms. Jackson is serving as the lead for permitting the 1 mgd JEA Water Purification Facility for potable reuse. She is leading permit negotiations with regulators as there is no existing framework for potable reuse in Florida at the time of this project. Ms. Jackson is also working closely with the public relations and visitor experience teams to create a world class visitor center/water museum as part of the public education component.

PureALTA Potable Reuse System; City of Altamonte Springs, FL

Project Manager (Owner). While serving as Division Director for Water, Wastewater and Reuse for the City of Altamonte Springs, Florida, Ms. Jackson managed the planning, design, and implementation then overseeing staff in operations for the City's potable reuse pilot, pureALTA. Knowing that there are only limited and costly alternatives for concentrate disposal in

Central Florida, the City felt it was important to test a non-reverse osmosis-based system to advance potable reuse in areas where concentrate disposal options are limited. A process configuration of ozone/BAF, UF, GAC, and UV/AOP was selected for the pilot system. Ms. Jackson was also responsible for public outreach and integrating the project in the City's STEM education program. Grants and awards include an innovative project construction grant from the SJRWMD, the 2018 Market-Changing Water Technology award from the International Water Association in Tokyo, Japan and the 2017 WateReuse Innovative Project of the Year.

County-Wide Consumptive Use Permit Consolidation; Seminole County, FL

Project Manager. Ms. Jackson was project manager for a consolidation of County's four groundwater consumptive use permits (CUPs) with the St. Johns River Water Management District into one permit to meet needs of the County for a 20-year period. The project involved developing a plan that maximized the County's utilization of groundwater and reclaimed water with anticipation of a surface water system being operational in the future.

Orlando Easterly Wetlands Reclamation; City of Orlando, FL

Project Manager. In the mid-1980's, Ms. Jackson began as project engineer then continued as project manager through 2008 for planning, permitting, design, construction management assistance, and operations assistance for the 1,200-acre man-made wetlands environmental enhancement reuse system, permitted to treat 30 mgd of reclaimed water from the City's Iron Bridge Regional Water Reclamation Facility. She was responsible for managing operations of the project during the first ten years, conducting special studies, producing annual monitoring reports, implementing design improvements, and providing public relations/ involvement assistance. The project was opened as a public park and she assisted with the implementation of park and visitor features including signage, boardwalks and visitor's center. The project is one of the largest and longest operating (since 1987) manmade wetland reclaimed water treatment systems in the nation.

LAURIE KUSMAUL

UTILITY-WIDE SCADA SYSTEM

OFFICE LOCATION
Coral Springs, FL

EDUCATION
MBA, Management Information Systems, Databases, DeVry University/ Keller Graduate, 2019

BS, Business Information Systems, IT & Networks, DeVry University, 2004

YEARS EXPERIENCE
16

PROFESSIONAL REGISTRATION
Trihedral VTSCADA Advanced Programmer – 2012, Multiple

AVEVA Wonderware System Platform – 2007, Global, CSI3781

PROFESSIONAL ASSOCIATIONS
American Water Works Association

International Society of Automation (ISA)

Ms. Kusmaul is a solutions-oriented Industrial IT Professional with proven success designing, implementing, and integrating cost-effective, high-performance technical solutions in various markets, especially the water & wastewater pumping industry. Strong background in Information Technology, Project Management, and Electrical Controls.

PROJECT EXPERIENCE

City of Hollywood | Automation & SCADA Improvements; Hollywood, FL

PLC & SCADA HMI Programmer. The Southern Regional Wastewater Treatment Plant is located in Hollywood, FL and operated by a crew of highly specialized Public Utilities staff members. The plant uses state-of-the-art technology to treat and dispose of nearly 39.1 million gallons of effluent each day (permitted at 55.5 MGD). The SRWWTP includes an on-site oxygen generation facility for the operation of a pure oxygen-activated sludge process for treatment. It is divided into two sections, East and West, both of which can operate independently. Additionally, the Department maintains a water reclamation facility, which provides an alternative water supply for irrigation for golf courses within the City.

Black & Veatch has researched and documented the entire wastewater treatment plant supervisory control and data acquisition (SCADA) system, and performed automation and control improvements, as well as update SCADA HMI screens to comply with ISA-101 guidelines. PLC CPUs were converted to Schneider Unity programming to support modern function blocks and obsolete CPUs were upgraded to Schneider M340 or M580 CPUs to support new programming standards. SCADA HMI used at this plant is GE Digital iFIX.

Pinellas County Utilities | Phase I - Radio to Cellular Modem Upgrades for Lift Stations; Pinellas County, FL

Project Manager & SCADA Engineer. Phase I of the overall upgrade of the County's SCADA system included removing analog trunked radios form 360+ lift stations and replacing and configuring cellular modems (RedLion RAM series). Startup services and training were provided for preliminary sites. Required some updates to the Wonderware System Platform application and configuration changes in the Motorola RTUs.

Orange County Utilities | SCADA Communications & Logging Optimization; Orange County, FL

SCADA Programmer. Laurie's team provided a customized Motorola program that logs more information regarding site to site communications over radio for the County's 400+ lift stations. In 2011, the County was going to make a system wide RTU change to a different undecided vendor; however, the team helped this customer gain a much deeper understanding of the existing products' capabilities, and enhanced program for more effective communications troubleshooting. The County was then able to pinpoint problem sites related to radio communications instead of experiencing faltering response on a global SCADA software level. "It's just running slow," became "We know it's a problem at xx site at this address, and the problem started at 16:00 hours on Thursday." This program downloaded to each of the RTUs allowed the customer to capitalize on their existing infrastructure. To date, there is no plan to replace the existing RTU hardware to another manufacturer.

Martin County | SCADA Services & Support; Martin County, FL

SCADA Programmer. Provided repairs, parts, and services to the Motorola RTU based SCADA system for lift stations, and upgrade Trihedral VTSCADA proprietary locked application to an open source application, upgradeable and configurable by the customer. Martin County maintains 400+ lift stations. Other system improvements included assisting utility in upgrading some lift stations from analog radios to cellular modems.

City of Orlando | Lift Station Controller and SCADA Programming; Orlando, FL

SCADA Programmer. Provided Motorola ACE 3600 RTU programming assistance at several lift station start-ups. Assisted SCADA team with upgrading telemetry equipment to cellular modems.

Mount Pleasant Waterworks | Center Street and Rifle Range Road Wastewater Treatment Plants & Wastewater Lift Station - SCADA Upgrades; Mount Pleasant, SC

Project Manager & SCADA Programmer. Migrated 2 WWTPs and 160+ lift stations from one SCADA platform (Wonderware) to a new platform in parallel (Trihedral VTSCADA) at customer's request. This involved over 100k IO points. Created a redundant server for automatic server failover. Updated some lift stations from Motorola trunked analog radio to Sierra Wireless GX450 cellular modems by Verizon Networks.

Star Controls partnered with Mount Pleasant Waterworks (MPW) in system optimization, advisory, programming, and training services; assisting MPW in the on-going improvements of its Motorola 160+ RTU SCADA system, which was experiencing wireless communication and performance problems. Before Star Controls' involvement, MPW was considering phasing out Motorola RTUs and replacing them with Allen Bradley PLCs, and migrating from a conventional 800MHz radio system to 450MHz. Star Controls provided its StaRTU software platform to MPW to replace the existing software in all the Motorola RTUs.

City of Deerfield Beach | Wastewater Lift Station SCADA Upgrades; Deerfield Beach, FL

Project & Implementation Engineer. Designed SCADA network, assisted Utility with upgrading pump station hardware (Xylem MultiSmart), radio configuration training and assistance (CalAmp UHF), Trihedral VTSCADA application creation, training, and support.

STEVEN COOK, PE

HYDRAULIC MODELING

OFFICE LOCATION
Virginia Beach, VA

EDUCATION
MS, Environmental Engineering, School of Public Health, University of North Carolina – Chapel Hill, 1999

BS, Environmental Engineering, Syracuse University 1997

YEARS EXPERIENCE
21

PROFESSIONAL REGISTRATION
PE – 2005, VA, 040654

PROFESSIONAL ASSOCIATIONS
Former Chair for the joint Virginia AWWA/WEA Conference (WaterJAM) Committee

Former Chair of American Water Works Association PVC Standards Committee

Former Chair for the Virginia Section of the AWWA Young Professionals Committee

Member of WEF

Mr. Cook serves as a Senior Planning Engineer for Black & Veatch and the Practice Lead for Collection System Planning and Modeling for North America. He has 19 years of professional experience specializing in modeling and planning of wastewater collections systems and water distribution systems and in designing water and wastewater pipelines. Steve performs flow projections, flow meter data analysis, GIS data support, system modeling in support of collection and distribution system master planning including capacity assessment and capital improvement program (CIP) development. Steve is an expert in the use of InfoWorks CS/ICM, SWMM5, InfoSWMM, SewerGEMS, PCSWMM and other water and wastewater modeling software. He has authored various technical papers and presentations related to parcel level sewershed, historic storm, and design storm applications in collection system planning and analysis. Steve is an active member (and former chair) of the American Water Works Association (AWWA) Standards Committee for PVC pressure pipe and fittings.

PROJECT EXPERIENCE

Miami-Dade Water and Sewer Department | Planning Division Support Services, Commercial Property Sewer Extensions; Miami, FL

Senior Planning Engineer. As a part of a fast-tracked project mandated by the Miami City Council, we developed planning level designs for extensions to over 3,000 properties. The analysis included hydraulic analysis and modeling of the entire system that contains over 1,200 pump stations. The analysis included identification of downstream capacity issues as well as financial feasibility. I was responsible for all hydraulic analysis and modeling.

Miami-Dade Water and Sewer Department | Planning Division Support Services, Hydraulic Modeling; Miami, FL

Senior Planning Engineer. Responsible for sewer system capacity assessment for proposed developments on an on-call basis. The model (InfoWorks CS) is an all pipe model with over 1,000 pump stations. Participated in orientation training with the department staff for a week at the department offices to learn the people and processes utilized by the utility to complete the analyses. The capacity analyses were completed in a short time frame (less than 3 days) to address developer's needs.

City of Fort Myers | Utilities Master Plan - Downtown Redevelopment; Fort Myers, FL

Project Modeler. Responsible for the expansion of the master planning model to include revised future growth scenarios in the downtown portion of the system. Recommendations were made on the infrastructure needs to accommodate the revised growth projections.

City of Fort Myers | Utilities Master Plan - Lift Station #3 (LS3) Analysis; Fort Myers, FL

Project Modeler. Responsible for the expansion of the master planning model to include the tributary area for lift station #3 (LS3) to assess the capabilities of the collection system to convey revised future loadings.

City of Fort Myers | Utilities Master Plan - South East Lift Station Analysis; Fort Myers, FL

Project Modeler. Responsible for the expansion of the master planning model to include several lift stations in the southeastern portion of the system to accommodate growth for residential developments. The project entailed us developing scenarios to convey the wastewater to the treatment plants in the most efficient manner possible.

Seminole County | Ring Plant Refurbishment; Lake Mary, FL

Design Engineer. Responsible for design of improvements for an existing wastewater treatment plant. The improvements included various pump replacement and a new blower/aeration system.

City of Hebron, Palestine | Wastewater System Master Plan; Winston-Salem, NC

Senior Planning Engineer. Responsible for the model development and analysis for a proposed pump station located along the Southern Entrance Road in the City of Hebron, Palestine. The work was a part of the USAID program to improve Palestinian infrastructure. The model included 3 pump stations with the current and future loadings developed for each station.

City of Surprise | Integrated Water Master Plan; Surprise, AZ

Senior Project Modeler. Responsible for the development of the wastewater collection system master plan as a part of the Integrated Water Master Plan for the rapidly-growing City of Surprise, AZ. Implemented an integrated approach for water resources, drinking water infrastructure, wastewater infrastructure, reclaimed water infrastructure, and groundwater recharge master planning as a part of the wastewater collection system master plan. Project included reviewing regulatory requirements, inventorying existing and potential future supplies, developing load projections, preparing hydraulic models (drinking water, wastewater, and reclaimed water systems), evaluating system alternatives, and preparing a phased capital improvements program for the City.

City of Winston-Salem | Wastewater System Master Plan; Winston-Salem, NC

Senior Planning Engineer. Responsible for system planning assessments and CIP development for the South Fork and Muddy Creek basins. The system planning included efforts for the model development (InfoWorks CS), model calibration, design storm selection, capacity assessment of the collection system, capital improvement development, and condition assessment inclusion. Steve also provided mentoring to junior staff on the modeling software and its applications for the planning activities. At the time of the project, the Winston-Salem wastewater collection system consists of 1,660 miles of piping (up to 66-inch diameter) with 60 pump stations and two wastewater treatment plant with a combined permitted capacity of 51 mgd.

City of Grand Rapids | PPC and Wastewater Modeling; Grand Rapids, MI

Senior Planning Engineer. Responsible for the model development and calibration. The project also required certification letters that recently separated areas can convey the design storm without overflow activation. The model was an all pipe model developed in InfoSWMM consisting of approximately 24,000 manholes, 54 pump stations, and 100 flow meters.

BRIAN LENDT, GISP

R&R RISK PRIORITIZATION

OFFICE LOCATION
Kansas City, MO

EDUCATION
MS, GeoSciences Certification, Northwest Missouri State University

BS, Geography, Northwest Missouri State University

YEARS EXPERIENCE
20

PROFESSIONAL CERTIFICATION
GISP (Certified GIS Professional by the GIS Certification Institute)

PROFESSIONAL ASSOCIATIONS
Association of American Geographers (GIS Specialization)

American Water Works Association

Mr. Lendt is a GIS and planning consultant specializing in areas related to information solutions and analysis for water and wastewater planning. His experience includes working with clients of various sizes to develop geospatial and information management solutions including mobile and cloud, adaptive capital improvement planning, GIS-hydraulic model integration, asset management and water and wastewater asset prioritization. Brian is a published, national expert in integrating GIS and hydraulic models and served as the lead author several publications and presentations.

Brian also has experience with energy and telecom related activities including the development and management of geo-spatial processes and solutions for fiber-to-the-home and power delivery projects.

PROJECT EXPERIENCE

City of Tampa | Portable Water Master Plan and Risk Prioritization; Tampa, FL

GIS Consultant. Ongoing comprehensive Water System Master Plan update including asset management program framework review and development and risk-based prioritization for pipeline improvements. Developed a dynamic risk-based prioritization model using Innovyze's InfoMaster software and participated in workshops to support development of likelihood of failure and consequence of failure criteria. The results of the model were used to support the capital improvement projects planning.

Coachella Valley Water District | Asset Inventory and Condition Assessment; Palm Springs, CA

GIS Consultant. Supported and developed technology for completion of asset inventory and condition assessment of over $1.2 billion in infrastructure assets encompassing water treatment, water distribution, wastewater treatment, wastewater collection, irrigation and canals, drainage, stormwater, District facilities, fleet, and small equipment. Project involves application development and deployment for both horizontal/distributed assets in map-based, GIS-enabled application as well as similar application for facilities and non-spatial asset inventory and assessment on mobile devices. Key tasks include data analysis and preparation, field planning, field team organization and deployment, data collection, condition assessment, and application development/integration in support of NEXGEN CMMS implementation for enterprise asset management program.

City of Memphis Department of Public Works | Wastewater Collection and Transmission System (WCTS) Assessment and Rehabilitation Program; Memphis, TN

GIS and Planning Consultant. Led city-wide planning effort to determine future wastewater flow projections to support hydraulic model development and master planning. Conducted workshops with surrounding communities and wastewater providers to identify flows that may enter the City's collection system in the future. Meet with local planning agencies to determine future wastewater flows derived from redevelopments and new developments throughout the City and surrounding communities. Reviewed historical treated wastewater flows to calculate base year flows which served as the foundation for incremental future flows based on population and employment projections, redevelopments, future industrial users and future contributions from surrounding communities.

Tulsa Municipal Utility Authority | Utility Enterprise Initiative: Water and Wastewater Asset Management System Improvements; Tulsa, OK

GIS Consultant. GIS Consultant on utility-wide Asset Management System Improvements for both water (about 2,300 miles of mains) and wastewater (about 2,000 miles of mains) utilities. Project includes: Pass55 GAP assessment; source data inventory; development, selection and implementation of AM/CMMS solution; design of utility GIS databases; systems integrations; data migration; Capital Improvement Program (CIP) optimization and GIS/risk based prioritization; etc. Supported development of InfoMaster risk prioritization model and development or risk-based criteria. Leveraged ArcGIS's Network Analyst to identify hydrant service areas to determine areas deficient in hydrant coverage.

Eastern Municipal Water District | Wastewater Collection System Master Plan; Perris, CA

GIS Consultant. Designed and developed dynamic CIP project cut-sheet maps for each of the five sewer service areas. Developed a user guide to assist Eastern within updating and creating new CIP cut-sheets for both water and wastewater projects.

City/County Utility Commission | Wastewater Master Plan; Winston-Salem, NC

GIS Consultant. Managed GIS data and developed a centralized location for a comprehensive countywide wastewater master plan and modeling project. Reviewed and compared historical flow projections to actual flow projections. Developed detailed GIS-based population and employment flow projections for specific planning years based on TAZ data with input with the client. Utilized GIS tools to automatically delineate sewershed boundaries to represent contributing areas of closed channel flow.

Incorporated automatic procedures to assign existing and projected flow to specific modeled manholes. Developed multiple graphic and cartographic visualizations to effectively present flow projections at various levels of detail.

Developed a GIS integrated interactive Capital Improvement Planning tool set and cost estimating tool (iCIP) to assist the Utility in maintaining a dynamic CIP program that is adaptive to changing budgets and priorities.

City of Raleigh Public Utilities | Sanitary Sewer Capacity Study Update; Raleigh, NC

GIS Consultant. Managed GIS data and developed a centralized location for a comprehensive citywide wastewater master plan and modeling project. Reviewed and compared historical flow projections to actual flow projections. Developed detailed GIS-based population and employment flow projections for specific planning years based on TAZ and Census data with input with the client. Utilized GIS tools to automatically delineate sewershed boundaries to represent contributing areas of closed channel flow.

Incorporated automatic procedures to assign existing and projected flow to specific modeled manholes. Developed multiple graphic and cartographic visualizations to effectively present flow projections at various levels of detail.

SAM MILLER, EIT

POPULATION, FLOW & LOAD PROJECTIONS

OFFICE LOCATION
Orlando, FL

EDUCATION
MEng, Energy System Engineering, Water Resources, Lehigh University, 2015

BS, Environmental Engineering, Water Treatment, Wilkes University, 2014

YEARS EXPERIENCE
5

PROFESSIONAL REGISTRATION
EIT – 2014, PA, ET020382

Mr. Miller has worked on several different types of projects ranging from solar but primarily civil/site roles and water resource project. He has developed experience in Grading, Stormwater modeling, yard piping, Site Design, master planning, environmental permitting, and construction phase services.

PROJECT EXPERIENCE

Miami-Dade Water and Sewer Department | South District Wastewater Treatment Plant – Electrical Distribution Building 3; Miami, FL

Civil Engineer. Responsibilities include site development including: Grading, Erosion Control, ADA compliance, temporary grading, sludge drying bed restoration, and ductbank plan and profile routing and coordination.

Miami-Dade Water and Sewer Department | Lime Residuals Disposal FDEP ERP Permitting and WASD Modeling Support; Miami, FL

Project Engineer. Responsibilities include permitting and Stormwater modeling utilizing XP SWMM. Other responsibilities included research into the hydrogeology of the area to establish a design exfiltration rate and utilizing ArcMap to generate contour information to determine if additional freeboard in required.

Orange County Utilities | South Water Reclamation Facility Phase V Improvements; Orlando, FL

Construction Administration. Served as point of contact for submittals, RFIs, Change Orders, and general correspondence with the contractor and client including running the monthly construction meetings.

City of Fort Myers | Lime Residuals Removal and Disposal; Ft. Myers, FL

Project Engineer. Worked with Black & Veatch RPR and environmental specialist to developed data collection system. My Responsibilities included date collection & organization, and weekly report generation.

Lee County | Wastewater Master Plan; Ft. Myers, FL

Modeler. My responsibilities included My responsibilities included design storm selection, including hydraulic model update using InfoWater and calibration, demand projections, capacity evaluation, capital improvement pro-gram (CIP) development, and preparation of a master plan report.

Florida Power and Light | Loggerhead; Port Saint Lucie, FL

QA/QC & Environmental Inspector. My responsibilities included for electrical, mechanical, and civil quality on site, including inspections, feedback, process improvements, and records. Managed site environmental, including SWPPP inspections, turbidity testing, site dewatering, engineering, and work crew management. Maintained all site quality documentation including inspections, training, startup, engineering as builds, and close out. Represented quality and environmental during client interaction including plan of day, engineering, daily meetings, and crisis management. Handled contract and craft quality improvement through behavior based quality training and constructive feedback

Private Client | Biscayne Bay, FL

Project Engineer. My responsibilities included site development including, Grading, Erosion Control, ADA compliance, temporary grading, and development of a Stormwater model using ICPR 4.0 and technical memo or permit-ting.

COSTCO | Coral Springs, FL

Project Engineer. My responsibilities included site development including, Grading, Erosion Control, ADA compliance, FDOT coordination, temporary grading, pavement design, yard piping and development of a Stormwater mod-el using ICPR 4.0 and technical memo for permitting.

Town of Mt. Pleasant | Rifle Range Road Wastewater Treatment Plant Expansion; SC

Civil Engineer. Assisted in Site Land development including: Grading, erosion control, stormwater, road design, and site coordination.

Beaufort-Jasper Water & Sewer Authority | Cherry Point WRF EQ Tank Replacement; Ridgeland, SC

Project Engineer. My responsibilities included coordination with pre-stressed tank firm, yard piping design and lay-out, and site layout and grading design.

Private Client | Monroe, NY

Project Engineer. My responsibilities included site development including site layout and zoning review.

Private Client | Grahamsville, NY

Project Engineer. My responsibilities included site septic tank design and site design for a 15-lot subdivision

KEVIN CEVALLOS, PE

FIELD DATA COLLECTION

OFFICE LOCATION
Coral Springs, FL

EDUCATION
MS, Environmental Engineering, University of Florida-Gainesville, 2019

BS, Civil Engineering, University of Florida-Gainesville, 2014

YEARS EXPERIENCE
6

PROFESSIONAL REGISTRATIONS
PE - FL

Mr. Cevallos is a Design Engineer with experience and knowledge of water and wastewater systems. Mr. Cevallos has served as Design Engineer on a number of Civil engineering projects including water and wastewater treatment plant facilities design.

PROJECT EXPERIENCE

Brown County Water and Wastewater Services | Wetwell Refurbishment at Pump Stations 452, 458, and 460; FL

Resident Engineer. As part of the implementation of the General Engineering Services for wastewater, Mr. Cevallos has participated on the design and construction phase services as a resident engineer during the construction of the Wetwell Refurbishment at Pump Stations 452, 458, and 460. The work included daily construction inspections and reporting, safety coordination including confined space training, management of submittals/RFIs, client construction meetings and possible change order requests.

South Florida Water Management District | Golden Gate 4; West Palm Beach, FL

Design Engineer. Mr. Cevallos is currently assisting the design of a new water control structure with two automated roller gates, an overflow weir structure and a new control building to replace an existing weir structure with smaller manual gates.

Broward County Water and Wastewater Services | Improvement Projects; Broward County, FL

Design Engineer. As part of the implementation of the General Engineering Services for wastewater, Mr. Cevallos has participated on the design and construction phase services for multiple improvements projects at the North Regional WWTP including replacement of pump pads for the effluent pumps and improvements to the aeration basins, shorting contactors panels replacement at the outfall pump station and clarifiers rehabilitation. In addition, Mr. Cevallos assisted in the design of clarifier rehabilitation and the replacement of transformer number 1. He also provided construction phase services for the painting at master lift stations 226 and 452 and design services for the wetwell refurbishment at pump stations 452, 458, and 460.

Broward County Water and Wastewater Services | A3 clarifier Rehabilitation; Florida

Resident Engineer. As part of the implementation of the General Engineering Services for wastewater, Mr. Cevallos has participated on the design and construction phase services as a resident engineer during the construction of the A3 clarifier at Broward County Water and Wastewater Service's North Regional Wastewater Treatment Plant. The work included daily construction inspections and reporting, management of submittals/ RFIs, safety coordination including confined space training, and client construction meetings.

Miami-Dade Water and Sewer Department | Water Service Improvement to Non-Residential Properties; Miami, FL

Design Engineer. Mr. Cevallos assisted the Miami-Dade Water & Sewer Department (MDWASD) with developing a plan, including planning level cost estimates and project schedules for the improvements of water infrastructure to non-residential zoned properties within MDWASD's service area currently under-sized to bolster commercial re-development. Once the project is implemented, over 15,000 parcels sites will have improved water service.

South Florida Water Management District | IT Shelter Replacement Construction Project; West Palm Beach and Hendry Counties, FL

Design Engineer/Construction Submittal Support. Mr. Cevallos assisted in the construction management of four (4) IT shelters in Palm Beach and Hendry County for the South Florida Water Management District. The project includes management of submittals/RFIs.

Mount Pleasant Waterworks | Rifle Range Road WWTP Rehabilitation and Expansion; SC

Design Engineer. The project consisted of improvements to Rifle Range Road Wastewater Treatment Plant (RRRWWTP) expand the treatment capacity from 6.6 mgd MM to 9.2 mgd MM. The upgrade included the following facility improvements: Construction of a new headworks facility, New influent force main piping to new headworks facility New blower building and multistage blowers with the capacity to meet the maximum month airflow requirement with one blower out of service and renovate the existing dewatering facility to alleviate existing issues with ancillary mechanical and electrical services and to house a new 2.5-meter belt filter press. Mr. Cevallos served as a design engineer in helping develop the hydraulic profile for the entire upgrade and the basis of design report for the dewatering process.

DC Water | Blue Plains Advanced Water Treatment Facility Combined Heat and Power Project; Washington, DC

Construction Submittal Support. Provided construction phase services for new combined heat and power project that produces up to 100,000 pph of steam for use in the Cambi process as well as up to 15 MW of electricity for use in the Blue Plains AWTF. Facilities included gas blowers, siloxane removal equipment, gas compressors, combustion turbines, heat recovery steam generators, and other ancillary facilities. The project is being delivered through a Design-Build-Operate contract arrangement.

Tennessee Valley Authority | Upstream Berm Design; Johnson City, TN

Design Engineer. Mr. Cevallos helped produce a final engineering package for the purpose of the construction of an upstream berm to provide risk reduction directly related to sinkhole development in the upstream embankment slope and applicable areas upstream of the embankment toe of the Boone Dam, located near Johnson City Tennessee. The objectives of the upstream filter berm design were to provide risk reduction for applicable potential failure modes identified for long-term operation post implementation of seepage remediation. Specifically, the upstream filter berm shall promote stability of the upstream slope of the dam and provide risk reduction against the development and progression of sinkhole development in the upstream embankment slope and applicable areas upstream of the toe. In addition, to provide a berm of sufficient width to safely support personnel, equipment, materials and activities associated with construction of a grout based or cut-off wall-based seepage remediation along the crest of the embankment. Mr. Cevallos coordinated, wrote, and edited the design specifications and participated in site visits as well as client meetings.

CHAD BARKER

COST ESTIMATING

OFFICE LOCATION
Orlando, FL

EDUCATION
Civil Engineering Coursework, University of South Florida

YEARS EXPERIENCE
29

PROFESSIONAL REGISTRATIONS
Florida Licensed Underground Utility and Excavation Contractor
#CUC057098
OSHA 40-Hour Training
OSHA Competent Person
Confined Space Entry
CPR and First Aid

Mr. Barker has 25 years of experience in the civil, water, wastewater, and transportation construction industry, with experience on multiple sizes and types of roadwork, sitework, pipeline, WWTP, WTP, industrial process and other major transportation infrastructure and utility infrastructure projects. In addition to developing detailed project cost estimates, he has also developed detailed cost tracking systems, effectively managed projects, and personnel, as well as operated a medium sized, self-performance contracting firm during my time in the industry.

PROJECT EXPERIENCE

City of Morro Bay | Water Reclamation Facility Design-Build; Morro Bay, CA

Principal Estimator. Replacement of an aging wastewater treatment facility near the city's waterfront with a state-of-the-art water reclamation facility on a greenfield site located 1.5 miles inland. The facility was designed to produce IPR-quality water for aquifer recharge.

California Water Service | Palos Verdes Pipeline Project Progressive Design-Build; Palos Verdes, CA

Principal Estimator. Progressive design-build project to rehabilitate water infrastructure on the Palos Verdes peninsula. Project consists of approximately 7 miles of large diameter (24-inch and 30-inch) buried potable water pipeline and a booster station. The alignment is threaded through dense neighborhoods, equestrian trails, schools and community facilities, and environmentally sensitive areas.

Parker Water and Sanitation District | Water Resources Centralization Progressive Design-Build, Phase 1B; Parker, CO

Principal Estimator. Progressive design-build of nine miles of groundwater conveyance systems, a 100,000-gallon reservoir, four miles of distribution pipeline, pump stations, and disinfection modifications to existing well houses.

Clean Harbors, Inc. | El Dorado Incinerator Expansion; El Dorado, AR

Senior Estimator. Competitive design-build of the first new hazardous waste incinerator in the US in 25 years. Project consisted of rotary kiln, secondary combustion, ash conveyance, APC systems along with accompanying structural steel supports and platforms. Mr. Barker was responsible for Civil, Structural, and Mechanical systems for hazardous waste incinerator. He also provided coordination with internal and external design teams and major equipment vendors.

NAVFAC | NAS JRB NOLA Water Distribution System; Belle Chasse, LA

Lead Estimator. Competitive design-build of new water distribution system for existing operational Naval Air Station. Project consisted of over 40K linear feet of new fire and water pipelines along with new fire pump station and refurbishing of existing storage towers and tanks. Mr. Barker was lead estimator through the pursuit development and execution of the project after award. He worked closely with the design team during proposal and final designs to provide highest project value, and negotiated and procured all project vendors and subcontractors.

California American Water | Desalination Facility; Monterey, CA

Senior Estimator. Competitive design-build of a new 9.6 MGD advanced desalinization water treatment facility. Mr. Barker was responsible for civil, structural, and mechanical systems for desalination facility. He coordinated with internal and external design teams and major equipment vendors, and procured quotes for Divisions 2 – 16.

Okaloosa County | Arbennie Pritchett Water Treatment Facility Expansion; Eglin AFB, FL

Lead Estimator. Competitive design-build of 5.0 MGD expansion to existing wastewater treatment facility. Mr. Barker was lead estimator through the pursuit development and execution of the project after award. He coordinated with internal and external design teams and major equipment vendors, and procured and negotiated quotes for Divisions 2 – 16.

USACE | JBLM WWTP Construction; Fort Lewis, WA

Lead Estimator. Competitive design-build of new 12.0 MGD wastewater treatment facility. Mr. Barker was responsible for civil, structural, and mechanical systems for desalination facility. He coordinated with internal and external design teams and major equipment vendors, and procured quotes for Divisions 2 – 16.

USACE | Ft. Irwin Advanced Water Treatment Facility; Fort Irwin, CA

Role in the project. Competitive design-build of new 6.0 MGD wastewater treatment facility. Mr. Barker was responsible for civil, structural, and mechanical systems for desalination facility. He coordinated with internal and external design teams and major equipment vendors, and procured quotes for Divisions 2 – 16.

FRANCESCA MCCANN

STATE REVOLVING FUND COMPLIANCE

OFFICE LOCATION
Washington, DC

EDUCATION
MBA, International Finance, UCLA Anderson School

BA, International Political-Economy, Colorado College

YEARS EXPERIENCE
20

Ms. McCann brings nearly 20 years of commercial and financial leadership in the water and energy sectors. Her expertise includes alternative delivery (DB, DBO, BOOT, P3, CMAR), stakeholder relations, and financial project structuring. Francesca currently serves as Business Development Director for infraManagement Group (iMG), a Black & Veatch company. Her work with iMG includes project development, asset management, and evaluation and optimization of commercial structures, financing options, and business case alternatives. Project work includes water, wastewater, stormwater and resource recovery.

Prior to joining Black & Veatch, Francesca served as CEO of Abengoa Water USA, where she led the company to successfully contract a $3.4 billion water supply project in San Antonio, Texas (SAWS Vista Ridge), the largest water public-private partnerships in the U.S. In addition, she led the commercial and financial development of industrial and municipal water supply, wastewater treatment and alternative energy projects.

Francesca has an extensive network of industry contacts that includes investors, regulatory experts, policymakers, and publicly-traded and privately-held management teams. She has been featured in print and on television including the New York Times, Business Week, Barron's, Bloomberg and MSNBC. She frequently speaks at prominent water conferences in the U.S. and abroad.

PROJECT EXPERIENCE

infraManagement Group

Business Development Director.

- Develop new business for infraManagement Group (iMG), a wholly-owned subsidiary of Black & Veatch. IMG is the P3 arm and asset management company of Black & Veatch.
- Establish innovative project finance structures for alternatively-financed water supply, water and wastewater infrastructure and reuse projects.
- Collaborate with water and wastewater utilities, local, state and national governments and utility associations (NACWA, NAWC, WDBC, etc.) to examine the application of various innovative financing mechanisms for complex infrastructure projects including municipal bond financing, project finance and public private partnerships.

Abengoa Vista Ridge Project Leadership.

- Contracted the Abengoa Vista Ridge Project in San Antonio, TX. The $3.4 billion Project is the first of its kind, large-scale water supply PPP in the U.S. The Project has an EPC value of ~$850 million and will supply 50,000 acft/year of water to the City of San Antonio over a 30-year period.
- Led public negotiations for Abengoa of the Vista Ridge contract with the San Antonio Water System (SAWS) Staff and Board.
- Managed development and negotiations of complex contracts for engineering and water rights between multiple parties over a period of nine months.
- Directed the financial and legal due diligence teams for valuation and risk analysis of the off-take contract.
- Managed public relations, community engagement and dialogue with the business community, securing critical local and political support for the Project, securing an 11-0 City Council vote in favor of the Project.

Global Water Strategies; International Finance Corporation (IFC)/World Bank Group, Washington, DC

Water Sector Expert.

- Managed sustainable water and energy programs with a focus on technology efficiency and analysis of banks' mechanisms for lending.
- Developed Water & Communities Framework, a benchmark study for companies on managing social and community-related water risk.

GIOVANNA RIVERA

FINANCIAL & FUNDING PLAN

OFFICE LOCATION
Coral Springs, FL

EDUCATION
Graduate Certificate, Financial Analysis; MA, Applied Economics, Johns Hopkins University; BS, International Economics/Political Science

YEARS EXPERIENCE
11

PROJECT EXPERIENCE

Miami-Dade Water and Sewer Department | Water and Sewer Financial Planning Services, FL

Led the financial efforts including a comprehensive water and sewer cost of service and rate study for both retail and wholesale customers, adequacy of rates and charges evaluation and bonds feasibility report.

Sewerage & Water Board of New Orleans | Comprehensive Financial Planning, Cost of Service Study and Rate Design, LA

Analyzed revenue requirements including operating expenses and capital financing, project future revenues, performed a cost allocation and design of rate schedules.

Woodruff Roebuck Water District | Water Rate Study, SC

Analyzed cost of service and rates for the water utility to enhance and sustain the financial viability of the utility. Conducted a financial plan, cost of service allocations and design of rate schedules.

City of Kansas City | Water Services Department | Revenue Requirements, Cost of Service and Rate Study for Water and Wastewater Services, MO

Analyzed future revenues of the water and wastewater utility under existing levels of charge, as well as the utility's total operating expense and capital financing requirements. Examined the adequacy of projected revenue to meet the water program's total requirements to allocate the costs of service, and develop a schedule of water and wastewater rates.

Columbia Water Department | Water and Sewer Rate Study, SC

Conducted a financial plan which included the analysis of future revenues as well as the utility's operating expense and capital financing requirements , cost of service allocations and design of rate schedules.

CASEY MARIKA, EI

ADAPTIVE PLANNING TOOLS

OFFICE LOCATION
Tampa, FL

EDUCATION
BS, Civil Engineering, Florida Gulf Coast University 2017

BS, Environmental Engineering, Florida Gulf Coast University 2017

YEARS EXPERIENCE
2

PROFESSIONAL REGISTRATIONS
EI - FL

Mr. Marika's experience is focused on water and wastewater-related planning projects. His focus lies in water and wastewater system planning, but he has experience with process/mechanical and civil design as well. He is a member of the Florida Water Environment Association and is a certified Engineering Intern

PROJECT EXPERIENCE

City of Tampa | Potable Water Master Plan; Tampa, FL

Staff Engineer. Responsible for assisting in the execution of the potable water master plan and deliverables. The project included: updating and calibrating the existing hydraulic model using InfoWater, distribution analysis and improvements for four planning years (2015, 2020, 2025, and 2035), pumping and storage facility capacity assessments, resiliency and reliability assessments, asset management program development, risk based pipeline prioritization using InfoMaster, capital improvement program and Master Plan documentation. The City of Tampa distribution service area serves a population of approximately 610,000 people across 1 pressure zone at an average day demand of approximately 70 mgd. The distribution system includes one water treatment plant, five repump stations with tanks and several interconnections with Hillsborough County and Tampa Bay Water.

City of Venice | Venice Water Master Plan Update; Venice, FL

Staff Engineer. The City of Venice's Utilities Department treats groundwater and distributes the treated water to service a population of approximately 22,000 people in the City of Venice/South Sarasota County area. The goal and objective of the Water Supply Master Plan (Project) is to assist City staff in providing a reliable and robust water system with adequate capacity to accommodate future growth within the City's water service area. The City of Venice uses an average of approximately 2.0 mgd of drinking water from one WTP. Their distribution system includes more than 76 miles of piping, 1 booster station and 2 elevated storage tanks and is and all-pipes model, using InfoWater. Tasks included: field data collection, population and demand projections, water supply and treatment capacity, model update and calibration, hydraulic analysis, water age and chlorine residual correlation, water quality evaluation, CIP planning and master plan documentation.

Tampa Bay Water | Long-Term Master Water Plan & Program Feasibility; Pinellas, Pasco and Hillsborough Counties, FL

Staff Engineer. Focused on the potable reuse feasibility tasks. Tampa Bay Water (TBW) is required to update their Long-Term Master Water Plan (LTMWP) every five years. The most recent LTMWP prior to this project was completed and approved in December 2013 and included a Feasibility Program recommendation. This project included updating both the Feasibility Program and the LTMWP, to evaluate the Board approved projects listed in the 2013 LTMWP and to narrow down the project list to one of more projects that will meet the region's drinking water demand once the demand forecast indicates more supply is needed. In addition to the Board approved projects, several potable reuse projects were included. Black & Veatch was a subconsultant to Hazen & Sawyer. The following lists the projects evaluated:

- Gulf Coast Desalination
- Seawater Desalination Expansion (with & without potable reuse)
- Thonotosassa Wellfield
- Aquifer Recharge Project
- Surface Water System Expansion
- South Hillsborough County Indirect Potable Reuse Wellfield
- Tampa Bypass Canal Augmentation with Potable Reuse

Pinellas County | Optimization Program; St Petersburg, FL

Staff Engineer. Responsible for completing project goals and executing client deliverables related to defining and implementing optimization improvements for the William E. Dunn WRF (WEDWRF) and the South Cross Bayou WRF (SCBWRF). Tasks at the WEDWRF included the development of a calibrated wastewater process model for assessing future plant modifications; a plant staffing evaluation, a treatment process optimization study; prioritization of the County's CIP projects, and an energy efficiency evaluation. Tasks at the SCBWRF included the development of a calibrated wastewater process model for assessing future plant modifications, investigation into high copper levels in the WRF effluent, a dewatering system technology alternatives evaluation, a treatment process optimization study, and an energy efficiency evaluation. Several reports and technical memorandums were developed to document findings and workshops were held to convey recommendations and define next steps.

Plant City | Wastewater Master Plan; Plant City, FL

Staff Engineer/Hydraulic Modeler. Plant City's Utilities Department collection system services a population of approximately 38,000 people. The goal and objective of the Wastewater Master Plan (Project) is to assist City staff in providing a reliable and robust system with adequate capacity to accommodate future growth within the City's sewer service area. Their collection system includes more than 140 miles of gravity pipes, 20 miles of forcemain, and 44 lift stations using InfoWorks ICM. Tasks included: field data collection, population and demand projections, sewer treatment capacity, model update and calibration, hydraulic analysis, asset management strategy development, risk-based facilities assessment, CIP planning and master plan documentation.

Lee County | Wastewater Master Plan; Lee County, FL

Staff Engineer. Lee County's Utilities Department collection system services a population of approximately 250,000 people. The goal and objective of the Wastewater Master Plan (Project) is to assist County staff in providing a reliable and robust system with adequate capacity to accommodate future growth within the City's sewer service area. Their collection system includes 10 service areas more than 650 miles of gravity pipes, 350 miles of forcemain, and 690 lift stations. The model was developed in InfoWater because the Master Plan hydraulic analysis was only conducted for the forcemain portion of the collection system. Tasks included: field data collection, population and demand projections, sewer treatment capacity, model update and calibration, hydraulic analysis, CIP planning and master plan documentation.

MARK SEASTEAD

CITYWORKS SPECIALIST

OFFICE LOCATION
Charlotte, NC

EDUCATION
MS, Resource Planning, Missouri State University, 1996

BS, Geology, The State University of New York at Fredonia, 1994

YEARS EXPERIENCE
26

PROFESSIONAL ASSOCIATIONS
American Water Works Association

Mr. Seastead is the East Region Practice Leader for Asset Management that supports Black & Veatch's Water Division. He has over 21 years of program management, consulting, and system implementation and integration experience on projects for private entities, municipal government and water, wastewater, and transportation focused clients. He specializes in work and asset management program development, CMMS solution selection, business process mapping, systems implementation and refinement, systems integration, and end user training and support. Having led both large enterprise and small departmental efforts to both private and public sector clients, Mr. Seastead provides a unique experience in leading asset management and IT program development that focuses on practical usage measurable performance.

PROJECT EXPERIENCE

Salt Lake City | EAMS Implementation - Phase 2; Salt Lake City, UT

Project Manager. Leading the full implementation of an enterprise asset management system for the Salt Lake City Water Reclamation Facility (SLCWRF). This included developing an asset hierarchy, inventorying assets, defining business processes associated with maintenance management, EAMS system configuration, end user training and support. This project also includes integration with the GE Proficy iFix and iHistorian SCADA system.

Jackson Energy Authority | EAMS Implementation; Jackson, TN

Asset Management Lead. This project is assisting the JEA Water and Sewer Departments with the implementation of a new Cityworks EAMS. Services include defining key business processes, asset hierarchy development, system configuration, integration with JEA CRM, testing, and system support. When completed the system will support field operations and maintenance of water and wastewater systems managed by JEA and provide them with real-time work and asset management performance, more effective work planning, and compliance for federally mandated wastewater asset management.

Forsyth County | EAMS/CMMS Selection; GA

Asset Management Advisor. This project is assisting the Water and Sewer Department with the creation of a CMMS selection RFP. Services include defining system requirements, assistance with development of RFP language, demonstration script development, RFP evaluation ranking criteria, and assisting client with submittal evaluations and system selection.

City of Greenville | EAMS Training; Greenville, SC

Project Manager. This project provides ongoing EAMS training on the Cityworks platform for Public Works users. Mr. Seastead is also leading asset management workshops to gather requirements for system expansion, document business processes to be incorporated into the EAMS and provide an implementation plan for system expansion.

Unified Port District of San Diego | Phase 2 Enterprise Asset Management Program; San Diego, CA

IT Technical Lead. This project is building upon the Phase 1 initiative that Mr. Seastead while employed by another company. Mr. Seastead is leading requirements gathering, business process mapping and conceptual architecture design for a new Enterprise Asset Management System (EAMS). This includes defining requirements, preparing an RFP for system selection and assisting the client with selecting, procuring and implementing the EAMS. The results of this effort will be a new EAMS that integrates with the existing SAP ERP system and deployed to over 150 new users with mobile technology.

City of Charlotte – DOT | EAMS Implementation; Charlotte, NC

Project Manager. This project is migrating CDOT from Hansen to Cityworks Enterprise Asset Management (EAM). Mr. Seastead is leading existing business process mapping, asset hierarchy development, requirements gathering for integration with the City's CRM program along with configuration, testing, and training. The results of this effort will be a fully implemented EAMS compliant with the rest of the City, improved business processes, and deployed EAMS to over 100 new users.

City of Rock Hill | CMMS Support - Facilities Management; Rock Hill, SC

Project Manager. This project is assisting the City with implementing a facilities management focused computerized maintenance management system (CMMS). Services include defining key business processes and leading the system configuration, testing, training and support for the client.

Union County | EAMS Selection & Asset Management Framework; Monroe, NC

Technical Lead EAMS. As a technical advisor Mr. Seastead assisted with the development of CMMS system functional and technical requirements, assisting with the development of RFP language, creation of vendor scripting and evaluation processes.

Water Reclamation District of Southern California | Asset Management Program; Lakwood, CA

Technical Lead IT. As a Technical Advisor Mr. Seastead assisted with the ISO 55001 based Asset Management GAP assessment. Mr. Seastead also led the CMMS selection task that included developing functional requirements, assisting with the development of RFQ language, creation of vendor scripting and evaluation processes, and assistance with developing consensus from WRD staff on final selection. Mr. Seastead also developed the framework for an Information Management Master Plan (IMMP) framework that is currently being implemented.

Salt Lake City | EAMS Implementation; Salt Lake City, UT

Project Manager. Led the pilot implementation of an enterprise asset management system for the Salt Lake City Water Reclamation Facility (SLCWRF). This included developing an asset hierarchy, inventorying assets, defining business processes associated with maintenance management, EAMS system configuration, end user training and support.

City of Fargo | EAMS Implementation; Fargo, ND

Project Manager. Senior Technology Consultant of the CMMS implementation for the City's Public Works department, with responsibilities that include business process analysis and development, asset data collection planning, configuration design, GIS planning workshops, CMMS configuration, training, report development, and system integration design.

TRACI LYNN BERLINGIERI

CITYWORKS SPECIALIST

OFFICE LOCATION
Charlotte, NC

EDUCATION
BS, Geography, Ball State University, 1997

YEARS EXPERIENCE
22

Ms. Berlingieri has 22 years of professional consulting experience in asset management implementation and GIS database design. She also has extensive experience in GIS projects with stormwater, water, and wastewater clients including field asset inventories. Traci has also implemented asset management systems for several of those clients in order to further develop their enterprise systems.

PROJECT EXPERIENCE

City of Delray Beach | Cityworks Implementation, Phase II; Delray Beach, FL

Asset Management and Information Solutions Senior Systems Analyst/ Technical Lead. Delray Beach's Cityworks Implementation Phase II includes the implementation of both the Public Works and Clean & Safe departments. Tasks included in the project are assistance with GIS geodatabase design, data migration for Public Works, Cityworks con-figuration, reporting, end-user training and go-live support. Responsibilities included overseeing the day-to-day project activities, communication with the client, weekly status meetings, Cityworks configuration, reporting in Crys-tal Reports, producing Cityworks training materials, performing Cityworks training, and providing go-live support.

Lee County | Asset Management Assistance (Lucity Reports); Lee County, FL

Asset Management and Information Solutions Senior Systems Analyst. Responsibilities include reviewing Lucity reports in Crystal Reports and documentation of the issues with the reports and Lucity data.

City of Deerfield Beach | As-built Data Conversion; Deerfield Beach, FL

GIS Analyst/Phase Manager. City of Deerfield Beach, FL requested that their as-built drawings (over 2000 individual sheets) be digitized into a GIS using ESRI's Local Government Model. Responsibilities included geodatabase design, conversion, QA/QC, delivery, overseeing team efforts to complete conversion.

Weston Public Works | Asset Management System Implementation; Weston, FL | 2014-2015

Implementation Consultant. Responsibilities include leading implementation of the asset management system, de-veloping business process workflows, conducting on-site workflow and configuration workshops, asset management system administration and configuration, developing reporting requirements, creating reports in Crystal Reports, and leading end-user and administrator training. City staff and contractors are using the asset management system in the office and field to complete service requests and work orders.

Charlotte Department of Transportation (CDOT) | Cityworks Implementation for Engineering & Operations Division; Charlotte, NC

Asset Management and Information Solutions Senior Systems Analyst. Responsibilities include configuring City-works PLL for the Implementation (Engineering) division, attending business process and configuration workshops, developing Visio workflows for business processes, assisting with AMS configuration, attending and assisting with end-user training and on-site go-live.

Rapid City Public Works | Asset Hierarchy Development/Cityworks Optimization; Rapid City, SD

Asset Management and Information Solutions Senior Systems Analyst. Created business process mapping for wa-ter and wastewater activities, submitted recommendations for improved Cityworks workflow, developed asset hier-archy for vertical assets to be used in Plantworks.

City of Alcoa Engineering/Public Works | On-going Cityworks and GIS Support; Alcoa, TN

Asset Management and Information Solutions Senior Systems Analyst. Providing on-call sup-port for City of Alcoa when needed for Cityworks or GIS issues. Created reports in SSRS and Crystal Re-port print templates for Cityworks, assisted with Storeroom and Fleet implementation, and provided direction to the client on Cityworks/GIS questions.

Jackson Energy Authority | Cityworks Implementation; Jackson, TN

Asset Management and Information Solutions Senior Systems Analyst. Responsibilities include the implementation of the asset management system for the water/wastewater department, developing business process workflows, conducting several on-site workflow and configuration workshops, asset management system administration and configuration, and leading end-user and administrator training and go-live support.

City of Alcoa Engineering/Public Works | Cityworks Implementation Upgrade and Reporting; Alcoa, TN

Asset Management and Information Solutions Senior Systems Analyst. Responsibilities include upgrading for the City's Cityworks environment to the updated version of the software. Provided recommendations for the City's next steps to their implementation. Provided reports in SSRS for their water, sewer, sanitation, streets, and stormwater divisions.

Tulsa Metropolitan Utilities Authority | Utility Enterprise Initiative (UEI); Tulsa, OK

Asset Management and Information Systems Senior Systems Analyst. Responsible for documentation of GIS geocoding of legacy work orders to be migrated to Cityworks. This program is building Tulsa's asset management capabilities according to ISO 55000 standards. Program implementation tasks include developing asset management policies, strategies, objectives, and plans, as well as other framework activities to support overall implementation of asset management. There is a large focus on developing and consolidating information systems to provide a cohesive asset management system that is aligned with the City's Business Intelligence and Performance Management Systems. The UEI and associated activities build upon the work and recommendations from TMUA's Comprehensive Assessment project and constitute a continuous program of asset management and planning activities since 2011.

JEFF STILLMAN, PE, BCEE

GAP ASSESSMENT

OFFICE LOCATION
Boston, MA

EDUCATION
MS, Civil Engineering and Environmental, North Carolina State University, 1997

BS, Civil Engineering and Environmental, University of Illinois, 1995

YEARS EXPERIENCE
23

PROFESSIONAL REGISTRATIONS
PE - MA

PROFESSIONAL ASSOCIATIONS
American Water Works Association

Water Environmental Federation

Collection Systems Committee

Mr. Stillman is a Practice Leader in Asset Management and Infrastructure Planning. He has executed a wide variety of asset management and infrastructure planning projects and programs, including risk-based facility prioritization; computerized maintenance management systems; sewer system evaluation surveys; and capacity, management, operations, and maintenance (CMOM) programs.

Throughout his career, Jeff has focused on building tools, developing processes, and conducting training and workshops to facilitate ultimate use by clients. Such tools have included hydraulic and water quality models, prioritization databases, relationships with SCADA and maintenance management systems, flow/capacity allocation, and more. He has extensive experience in utilizing asset information databases and geographic information systems (GIS) to aid development and analysis of various model software packages and prioritization databases to support master planning and development of capital improvements plans.

PROJECT EXPERIENCE

Water Services Department | Comprehensive Water System Master Plan; Kansas City, MO

Lead Asset Management Consultant. Black & Veatch was retained to provide the first comprehensive update to WSD's master plan in 15 years. The project included evaluations of supply, demand, hydraulic and treatment performance as well as physical asset condition. WSD is planning substantial investment to reduce the number of pipe breaks in its distribution system and requires a capital planning method to ensure these funds are allocated efficiently. Jeff led the implementation of a risk-based capital planning method using complimentary break and economic models. The break forecasting model was based on the I-WARP method published by the Water Research Foundation and allows the modeler to consider both static (pipe diameter, soil type, etc.) and dynamic attributes (climate, cathodic protection, etc.). The output is a predicted break frequency for each individual pipe segment. These break frequencies were then fed into an economic model that considered annual budget limits, direct and indirect break costs, and cost savings for road work coordination and adjacent pipe segment replacement. Together, these models were used to develop defensible, cost-efficient annual pipe rehabilitation projects over a 5-year planning period.

Miami-Dade Water & Sewer Department | Infrastructure Assessment and Replacement Program for Water Mains 16-inch and Larger; Miami, FL

Lead Asset Management Consultant. Managed the development of a MS Excel prioritization model for the MDWSD pipeline networks. This model – which considered factors such as age, material, diameter, location, critical customers and leak history – enabled a quantitative prioritization of all linear assets which led to the development of a targeted and effective rehab and replacement program for the water distribution system.

Tulsa Metropolitan Utilities Authority | TMUA Comprehensive Assessment; Tulsa, OK

Lead Asset Management Consultant. Managed the development of a Strategic Asset Management System (SAMS) software tool based in MS Access. This tool, capable of seamless synchronization with the Antero Computerized Maintenance Management System (CMMS) system, provides an intuitive, user-friendly interface to enhance the tracking of the consequence and probability of failure for wastewater facility assets while enhancing the ability of TMUA to make important decisions regarding their Capital Improvement Plan. As a parallel activity within the Comprehensive Assessment project, Jeff was responsible for asset management activities, including a gap assessment and development of a recommended plan for further asset management program implementation.

City of Grand Rapids, MI | Master Plan Update; Grand Rapids, MI

Asset Management Segment Leader. Responsible for coordination of asset management activities in the master planning process. Led the asset management program assessment, which was conducted according to ISO 55001 principles and was used to develop an organizational asset management strategy and subsequently in developing an asset management plan for the water distribution system.

Milwaukee Metropolitan Sewerage District | 2050 Facility Plan; Milwaukee, WI

Asset Management Task Leader. Responsible for coordinating development of asset management for each utility asset system in the 2050 Facility Plan. This has included working with the District to define levels of service, key performance indicators, and specific performance measures, which are subsequently used as a basis for triple bottom line assessment and prioritization in a business case evaluation process. The asset management plans are being developed according to principles in the International Infrastructure Management Manual.

Boston Water and Sewer Commission | High Pressure Fire System Study; Boston, MA

Project Engineer. Conducted a study of Boston's High Pressure Fire System. This study involved a comprehensive investigation of an aging fire system that was installed between 1910 and 1920, to help determine whether the system must remain in service, whether portions can be decommissioned, and how remaining sections should be rehabilitated. The study involved assessing alternatives for modifying the system. Constructability was a major concern in alternatives evaluation because the system lies in the highly congested downtown section of Boston.

United Water New York | Pipe Criticality Analysis; Rockland County, NY

Project Engineer. Jeff was responsible for developing a risk-based prioritization system that served as the basis for United Water New York's Long Term Main Replacement Program. This project involved utilizing available GIS data, asset information data, model results and customer information data to calculate likelihood of failure, criticality, and overall risk. The high-scoring facilities were then grouped into logical projects and programmed into the capital improvements program with a firm basis for rate justification.

WILL WILLIAMS

ASSET MANAGEMENT FRAMEWORK

OFFICE LOCATION
Atlanta, GA

EDUCATION
BA, Geography, Royal Holloway and Bedford New College, 1989

YEARS EXPERIENCE
30

PROFESSIONAL ASSOCIATIONS
Royal Geographical Society

International Water Association Asset Management Specialist Group

Foundation for Water Research, Wastewater Forum

Georgia Association of Water Professionals

Mr. Williams has extensive experience in asset management planning, including asset failure analysis, risk assessment, performance benchmarking, maintenance optimization, business planning, serviceability assessment, whole life costing, operational efficiency, business change management and infrastructure rehabilitation.

Prior to joining Black and Veatch, Mr. Williams served the Vice President and Global Director of Asset Management for water and power for Halcrow. He was previously Director of Asset Management and Planning at the UK Water Research Centre. Mr. Williams has more than 27 years asset management experience and is a committee member of the International Water Association Asset Management Specialist Group.

PROJECT EXPERIENCE

Miami Dade Water and Sewer Department (MDWASD) | CIP Implementation and Gap Analysis; Miami, FL

Project Director. The project undertook a review of MDWASD's approach to Capital Improvement Program development, including budgeting and project implementation, focused on high-level review of processes and organizational structure. Specific process and organizational changes were recommended to improve investment targeting and efficiency of project delivery.

Palm Beach County Water Utilities Department | Asset Management Strategy; FL

Project Director. Led the development of an ISO55001 based asset management strategy. Project involved undertaking a gap analysis, developing specific improvement recommendations and developing a prioritized improvement roadmap.

Hillsborough County | Bond Engineer; FL

Project Director. Project Director for this five-year project, which entailed assessing the operational efficiency and capital maintenance policies of Hillsborough County for Bond Rating purposes.

Gwinnett County Department of Water Resources (GCDWR) | Asset Management Strategy Development

Project Director. Project Director for this study to develop an asset management strategy for the Department of Water Resources. The project covered all aspects of the County's water, wastewater and storm water assets and was aimed at establishing Gwinnett County's current level of asset management "maturity" and comparing this to U.S. and international best practice to identify and prioritize areas for improvement. The study produced a five- year strategy and improvement roadmap to help GCDWR adopt best-in-class management approaches across its operations.

Northern Indiana Public Service Company (NIPSCO) | Long Term Electric Transmission and Distribution Capital Plan; IN

Project Director. Project Director for development of a long-term $1 billion plus capital plan for NIPSCO's electric transmission and distribution (T&D) infrastructure. Black & Veatch developed a system risk model to analyze and score asset risk across the T&D system for NIPSCO. This model highlights the risk reduction benefits achieved through NIPSCO's long-term asset replacement program, which is focused on addressing high risk assets that are nearing the end of their useful life.

Hillsborough County | Assessment; FL

Project Director. Project Director for the development of a system-level useful remaining life model, as well as a compilation of an asset inventory database with condition and data confidence grading. The project included strategic planning, field survey, asset inventory, water distribution system assets, useful remaining life, criticality, advanced condition and system improvement. Additionally, a cost benefit analysis was performed to identify priorities and scale of investment required.

Hampton Roads Sanitation District (HRSD) | Asset Management Program; VA

Project Director. Managing a three-year ISO 55001 gap assessment and Asset Management Program Implementation. The program includes, developing an Asset Management Framework that includes a Policy, Strategic Asset Management Plan (SAMP) capital prioritization, maintenance optimization, data management and the development of Asset Management Plans.

Salt River Project (SRP) | Substation Transformer Asset Investment Management Project; AZ

Project Director. Project Director for this study to review the way SRP manages its 230 and 500 kilovolt transformer fleet. The review considered the complete asset lifecycle, from how SRP engineers, specifies, procures, installs, commissions, maintains, tests and manages these critical assets. This work included a review of SRP's processes, procedures, organizational structure, data and systems to compare them to best practice and identification of any gaps that need to be filled in the short-term and whether there are any longer-term improvement opportunities. Mr. Williams' roles have included managing all Black & Veatch resources committed to the project, developing recommendations regarding SRP's transformer asset management program, and he also provided assistance with the development of an asset management-related risk management framework.

Winston-Salem/Forsyth County Utilities Commission | PAS 55 Assessment; NC

IAM Endorsed Assessor Assessor. Led a team undertaking a PAS 55-based assessment of Winston Salem's approach to management of their wastewater collection system. The project scope included undertaking staff interviews, documentation review, and a gap analysis using the PAS 55 AM standard.

BEN COWNIE, PE

UTILITY PLATFORM DASHBOARDS

OFFICE LOCATION
New York, NY

EDUCATION
BS, Engineering (Electrical Concentration), Trinity College, 2006

YEARS EXPERIENCE
12

PROFESSIONAL REGISTRATIONS
PE - NY

PROFESSIONAL ASSOCIATIONS
American Water Works Association

Mr. Cownie is an Engineer working in water distribution modeling, hydraulic analysis, transient analysis, planning and asset management. He is involved in the development and modification of water distribution and hydraulic models using software packages such as WaterGems, H20 Map, InfoWater and ArcGIS and transient modeling using software packages such as HAMMER and InfoSURGE. He also develops asset management prioritization models to enhance rehab and replacement programs as well as capital planning.

Some of Mr. Cownie's key recent assignments have included:

- Developed a surge mitigation strategy for a reclaimed water system in Henderson, NV which allowed for optimized control of pump stations and control valves, leading to a more efficient renewable resource in the area.
- Developed a Strategic Asset Management System (SAMS) software tool which streamlined the management of wastewater facility asset information for TMUA, while seamlessly integrating with their Antero CMMS.
- Involved in the water side of a comprehensive water and wastewater master plan for Union County, NC. The integrated plan consolidates all facets of utility's operation into a single efficient vision for Union County's water resources development and utilization.

PROJECT EXPERIENCE

City of Tampa | Potable Water Master Plan; Tampa, FL

Technical Advisor. Responsible for quality control of the potable water master plan and deliverables. The project included: updating and calibrating the existing hydraulic model using InfoWater software, distribution analysis and improvements for four planning years (2015, 2020, 2025, and 2035), pumping and storage facility capacity assessments, resiliency and reliability assessments, asset management program development, risk-based pipeline prioritization, capital improvement program and master plan documentation. At the time of the project, the City of Tampa distribution system served a population of approximately 610,000 people at an average day demand of approximately 70 mgd. The system includes 1 water treatment plant, 5 repump stations with tanks and several interconnections with the Hillsborough County and Tampa Bay Water systems.

TMUA | TMUA Comprehensive Assessment; Tulsa, OK

Asset Management Consultant. Involved in the development of a Strategic Asset Management System (SAMS) software tool based in MS Access. This took, capable of seamless synchronization with the Antero CMMS system, provides an intuitive, user-friendly interface to enhance the tracking of the consequence and probability of failure for wastewater facility assets while enhancing the ability of TMUA to make important decisions regarding their Capital Improvement Plan.

Miami-Dade Water & Sewer Department | Infrastructure Assessment and Replacement Program for Water Mains 16-inch and Larger; Miami, FL

Asset Management Consultant. Involved in the development of a MS Excel prioritization model for the MDWSD pipeline networks. This model – which considered factors such as age, material, diameter, location, critical customers and leak history – enabled a quantitative prioritization of all linear assets which led to the development of a targeted and effective rehab and replacement program for the water distribution system.

Union County Public Works | Water System Planning Update; Union County, NC

Hydraulic Modeling Analyst. Update of the 2011 Master Plan which included update of the all-pipes hydraulic model in Bentley WaterGEMS, development of diurnal demand patterns and calibration of the all-pipes model for the combined 853 Pressure Zone. This project also included a preliminary capacity analysis and construction phasing for the New Yadkin River WTP, which considered the iterbasin transfer (IBT) limits between the Yadkin and Catawba basins. A preliminary siting study for the new Yadkin River WTP was also completed, as well as proposed pressure zone boundary modifications and pipeline infrastructure (raw water and finished water transmission) required to enable maximum water supply reliability and resiliency for the Union County water system customers. In addition to supply, distribution system improvements (storage, pipeline, pump and valve projects) were recommended based on the results of the hydraulic modeling.

All improvement projects developed as part of this planning updated were provided within an integrated CIP which also included all Wastewater improvement projects.

Charlotte Water | Water Distribution System Master Plan; Charlotte, NC

Project Engineer/Task Leader. Responsible for preparing a 25-year Master Plan for Charlotte Water's water distribution system. Project included water system data utilization planning, development of system performance criteria and project prioritization guidelines, water demand projections, existing facilities evaluation, a comprehensive field testing program (including 40 C-Factor Tests), hydraulic model update, development of 7-day customer-specific diurnal demand patterns, a 7-day EPS calibration using InfoWater software, water quality modeling and analysis, integrated model development and management protocol, distribution system analysis, water system capacity and reliability analysis, detailed evaluation of the Central Business District (CBD), and CIP and master plan report. Customer demands at the time of the project; the CW water system served a population of approximately 864,000 people in 3 major pressure zones at an average day system demand of approximately 102 mgd. The system included 3 treatment plants, 5 zone transfer pumping stations, 3 pumped storage tanks, and 7 elevated storage tanks.

Union County | Water Quality Study; Union County, NC

Hydraulic Analyst. Involved in the conversion of the existing skeletonized WaterGEMS hydraulic model to an all-pipes reduced model utilizing the County's GIS inventory. Following the model update, a detailed demand allocation (based on 2012 consumption billing records) was completed. Water Age simulations were then conducted in order to identify operational strategies to improve water quality throughout the northeastern portion of the distribution system.

NICHOLAS WYATT

GIS INTEGRATION

OFFICE LOCATION
Tampa, FL

EDUCATION
BS, Geological Engineering, Missouri University of Science and Technology, 2018

YEARS EXPERIENCE
1

Mr. Wyatt is a member of the East Region Asset Management/Information Solutions team that supports their Water Division. He has experience in system implementation and integration on projects for municipal government public works and water, wastewater, and stormwater utilities clients. He specializes in systems implementation and refinement, report writing, GIS analysis, and workflow automation via Python.

PROJECT EXPERIENCE

City of Hollywood Florida; Cityworks Implementation; Hollywood, FL

Technical Support. Assisting with the implementation of the City's CMMS for Utilities. Implementation focused on the migration from the City's legacy system for linear and facility assets and included historic data migration for all past work. Tasks assisted on include data migration design and development, designing and configuration of the CMMS, integration design and development, report design and creation, end-user training, and implementation planning.

Pinellas County, Florida; Water Master Plan; Pinellas County, FL

Technical Support. The purpose of this Water System Master Plan Update was to evaluate the existing water system, including the source waters, water treatment facilities, pump stations and the distribution system. The project included: Hydraulic and System Analysis using WaterGEMS, Water Quality Evaluations, Asset Management (risk prioritization using iCIP, condition assessment using Survey123, CMMS analysis in Cityworks, water conservation), adaptive capital improvement planning and documentation.

Creating Survey123 forms incorporating the County's existing GIS Schema, ensuring ongoing compatibility with data collected and CMMS systems in place.

City of Delray Beach Florida; Cityworks Implementation -- Phase 2; Delray Beach, FL

Technical Support. Delray Beach's Cityworks Implementation Phase II includes the implementation of the Public Works department. Tasks included in the project are assistance with data migration for Public Works, Cityworks configuration, reporting, end-user training and go-live support. Responsibilities included Cityworks configuration, reporting in Crystal Reports, performing Cityworks training, and providing go-live support

Peace River Manasota Regional Water Supply Authority, Florida; R&R Sufficiency Study Phase 1 & 2; Arcadia, FL

Technical Support. Black & Veatch provided an asset inventory survey and condition assessment for the Authority's Water Treatment Plant, River Intake Pump Station, Reservoirs and Reservoir Pump Station, Remote Pump Station and Storage Facilities, Bulk Metering Facilities and Aquifer Storage and Recovery (ASR) wells as the first phase in developing a renewal and replacement forecast to assess the sufficiency of the Renewal and Replacement Fund.

- Created Survey123 form for asset inventory survey and condition assessment using the Authority's existing CMMS data.
- Assisted with data collection and condition assessment in the field.
- Responsible for data management and QA of field data in post-processing.
- Worked directly with the Authority to create risk assessment for Transmission Mains.

Polk County, Florida; Water Reclamation Facility Condition Assessment; Polk County, FL

Technical Support. As part of a comprehensive asset management program, Black & Veatch collected asset inventory data and condition information from these facilities for use in a Computerized Maintenance Management System (CMMS).

- Provided key insight and recommendations for Survey123 design to maximize efficiency and accuracy in the field.

City of Fallbrook, California; Cityworks Implementation; Fallbrook, CA

Technical Support. Assisting with the implementation of the city's CMMS for Utilities. Created Cityworks 3D workorder templates to be utilized as a standardized implementation tool.

Fairfax County, Virginia; Condition Assessment; Fairfax County, Virginia; 2019-In-Progress

Technical Support. The purpose of this Condition Assessment is to provide condition scores and energy audits to support the development of a rehabilitation and repair plan for twenty wastewater pumping stations. This included an analysis of the associated facilities such as odor control, electrical buildings, force mains, and manholes.

- Created unique Survey123 forms for each discipline involved in the Condition Assessment, utilizing asset data present on County's as-built drawings of each pump station.
- Perform QC on data collected.
- Created and managing additional Survey123 forms for asset data collection for thirty-four additional pump stations.

Broward County, Florida; Regional Wastewater Master Plan; Broward County, FL

Support. Black & Veatch completed a Regional Wastewater Master Plan focusing on the regional transmission mains and master pump stations. Black & Veatch used Survey123 data collection forms to inventory the asset data and provide condition scores to each asset. The ultimate delivery is an adaptive capital improvement plan tied to project triggers tied to decision support tools to track the triggers.

- Provided guidance and feedback on Survey123 form design to ensure adequate data collection and QC

City of Glendale Arizona; EAMS Implementation; Glendale, AZ

Technical Support. Currently providing implementation services for the selected EAMS software, Lucity. Implementation services include work processes development and Lucity configuration.

- Created Survey123 forms for asset data collection for various Water Treatment Plants.
- Currently providing technical support for the management and distribution of this collected field data.

Litigation Statement

Black & Veatch Holding Company, together with its affiliates ("Black & Veatch"), constitutes a large, international engineering and construction firm. Inevitably, like similarly-sized firms, at any given point in time we are involved with claims and litigation. Black & Veatch maintains a program of insurance to protect against claims arising out of its work. In the opinion of Black & Veatch management, no pending claim or litigation will have a material impact on Black & Veatch's ability to execute this project.

KPMG LLP
Suite 1100
1000 Walnut Street
Kansas City, MO 64106-2162

Independent Auditors' Report on Supplementary Information

The Board of Directors
BVH, Inc.:

We have audited the consolidated financial statements of BVH, Inc. and its subsidiaries as of and for the years ended January 3, 2020 and December 28, 2018, and have issued our report thereon dated February 24, 2020 which contained an unmodified opinion on those consolidated financial statements. Our audit was performed for the purpose of forming an opinion on the consolidated financial statements as a whole. The Financial Review 2019 document is presented for the purposes of additional analysis and is not a required part of the consolidated financial statements. Such information is the responsibility of management and, other than the Revenue Backlog amounts, was derived from and relates directly to the underlying accounting and other records used to prepare the consolidated financial statements. Other than the Revenue Backlog amounts, the information has been subjected to the auditing procedures applied in the audit of the consolidated financial statements and certain additional procedures, including comparing and reconciling such information directly to the underlying accounting and other records used to prepare the consolidated financial statements or to the consolidated financial statements themselves, and other additional procedures in accordance with auditing standards generally accepted in the United States of America. In our opinion, the information, other than the Revenue Backlog amounts, is fairly stated in all material respects in relation to the consolidated financial statements as a whole.

KPMG LLP

Kansas City, Missouri
February 24, 2020

Financial Review 2019

Condensed consolidated financial information for BVH, Inc. (in millions):

FOR THE FISCAL YEARS	2019	2018
Revenue	$3,654	$3,480
Cost of Revenue	2,949	2,848
Overhead Expenses	579	533
Operating Income	**$126**	**$99**
Other Expenses & Taxes	20	19
Net Earnings	**$106**	**$80**

AT FISCAL YEAR END		
Cash & Cash Equivalents	$482	$383
Contract Receivables	389	461
Contract Assets	342	450
Other Current Assets	53	67
Total Current Assets	**$1,266**	**$1,361**
Building, Equipment & Other Non-Current Assets	274	274
Total Assets	**$1,540**	**$1,635**
Notes Payable & Current Portion of Long-Term Debt	7	6
Contract Liabilities	605	481
Accounts Payable & Other Current Liabilities	686	766
Total Current Liabilities	**$1,298**	**$1,253**
Other Non-Current Liabilities	78	235
Equity	164	147
Total Liabilities & Equity	**$1,540**	**$1,635**

REVENUE BACKLOG	$3,920	$3,727

BLACK & VEATCH