PROJECT PROPOSAL

PROPOSAL TO PROVIDE

Contract Operation, Maintenance, and Management Services of the City of New Bedford's Wastewater Treatment Facility

CITY OF NEW BEDFORD

RFP NO. #20439047

FEBRUARY 3, 2020

Jacobs

120 St. James Avenue, 5th Floor
Boston, Massachusetts, 02116
T +61 8 8113 5400
F +61 8 8113 5440
www.jacobs.com

February 3, 2020

City of New Bedford
133 William Street
Room 208
New Bedford, MA 02740
Attention: Ms. Molly Gilfeather, Director of Purchasing

Subject: RFP #20439047 Contract Operation, Maintenance, and Management Services of the City of New Bedford's Wastewater Treatment Facility

Dear Ms. Gilfeather and Members of the Selection Committee:

The New Bedford wastewater treatment facility is beyond its 20-year-old mark and the City seeks a qualified firm to provide operations & maintenance (O&M) services in a safe, secure, effective and efficient manner, and in full compliance with all applicable federal, state, and local laws and regulations. Jacobs is a U.S.-based firm with more than 5,000 employees in the Northeast, the majority of whom are water and wastewater professionals. We have developed a proposal complete with solutions and opportunities that will exceed the City's expectations, elevate the wastewater facilities to a higher level of performance and optimize costs through efficiencies and investments.

Customized Approach Focused on City's Needs

Jacobs' approach to this partnership centers on achieving enhanced reliability in your operations through the application of best practices, maximizing the life of the City's assets through the deployment of a robust asset management program, and retaining a highly motivated workforce by providing ongoing training and career development opportunities for the existing staff. The City seeks a partner to develop specific strategies for the provision of a zero-tolerance approach to odor and noise control, nitrogen reduction control strategy, enhanced safety and security, and assurance of environmental compliance. As the largest wastewater firm in the industry, these strategies are at the core of Jacobs' services.

Compliant Proposal with Solutions that Provide Efficiencies and Savings

We offer innovative solutions and strategic investments that will elevate the performance of your system while extending the liability, budgetary, and performance guarantees and protections the City seeks in its Agreement Term Sheet. Additionally, we commit to a collaborative partnership focused on continuous improvement and offer a thoughtful approach to ensure the partnership remains focused on best practices and avoids complacency over time. Finally, we embrace the concept of the Incentive Savings Program as a vehicle to leverage Jacobs' engineering and consultancy experts to collaborate with the City and our O&M team to identify efficiencies and opportunities that improve efficiency and lower life-cycle cost of your facilities.

High Caliber Project Leadership Team that Exceeds Expectations

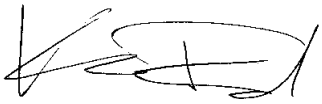
Jacobs is dedicating a project leadership team that will champion a transparent and collaborative relationship with the City and commit to the long-term success of this partnership. Our team will be led by **Project Manager Michael Arnold**, a proven leader with over 35 years of experience managing professional, technical and craft employees. He holds grade 7C wastewater operator and grade 4 collection system operator licenses. His experience includes treatment plant operation, management, laboratory management, industrial pretreatment monitoring, and program planning for WWTFs up to 40 MGD. **Operations Manager Adam Federau** is a young professional with incredible work ethics and career aspirations. He understands state and federal pretreatment regulations and has deep knowledge of 40 CFR regulations with regards to wastewater and industrial pretreatment. **Maintenance Manager Paul Horigan's** experience includes scheduling and maintenance on all mechanical, electrical and instrumentation/controls for WWTFs up to 57 MGD, and he is also a licensed grade 5C wastewater operator in Massachusetts. **Laboratory Manager Liz Tepper** possesses a high level of experience with both analytical and process chemical optimization for treatment plants, including more than 15 plants processing up to 30 MGD. The caliber of these key individuals assigned to this partnership demonstrates our commitment to the City.

As the world's only fully integrated O&M firm with engineering, design, consulting, and construction/program management experience and expertise under one roof, Jacobs is uniquely positioned to elevate the City's wastewater operations to the next level of performance. As you review our proposal, we hope you agree that Jacobs offers a value-packed proposal with innovations, including a suite of proven management and technical tools to cost-effectively and reliably manage your operations moving forward.

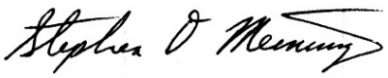
As you review our proposal, we invite you to contact Farzin Kiani at (617) 963-3085 or Farzin.Kiani@jacobs.com with any questions you may have. On behalf of all of us at Jacobs, we thank the City for the opportunity to participate in this exciting procurement, and we look forward to the next steps in the process.

Sincerely,

Farzin Kiani
Client Services Manager



Kevin Dahl, PE, CMRT
Regional Director of Operations



Steve Meininger, PE
Executive Sponsor

Contents

Section 1

Executive Summary

Section 1 – Executive Summary

Jacobs brings the breadth of our proven, full-spectrum resources to offer the City of New Bedford the best value in integrated operations and a path to implementation for realizing the full value of its infrastructure investments.

The City of New Bedford entered into a public-private partnership for the operations and maintenance (O&M) of the wastewater treatment facilities in 1993. After more than two decades with a single firm, the City seeks competitive proposals from O&M service providers who may offer greater value, preserve your capital investment, and assure the long-term reliability of your wastewater assets. **By engaging Jacobs, a world-class O&M service provider and wastewater company, the City can elevate the performance of your operations by achieving enhanced reliability in operations, maximizing the life of your assets through the deployment of a robust asset management program and retaining a highly motivated workforce by providing ongoing training and career development opportunities for the existing staff.** In your next operator, the City is seeking a partner to develop specific strategies for the provision of a zero-tolerance approach to odor and noise control, asset management, nitrogen reduction control strategy, enhanced safety and security, and assurance of environmental compliance. These strategies are at the core of Jacobs' services.

We recognize that making a change may not be an easy decision for the City. Some considerations may include the perception of a decrease in service levels or impact to existing staff working at the facilities. We thoughtfully address these concerns in our proposal and highlight the many benefits our fresh perspective and approach delivers to New Bedford and your customers.

Our diverse team of technical experts has crafted a customized approach for progressive O&M strategies and asset management through the implementation of industry best practices and new and innovative ways to build upon them. Our fresh approach includes solutions and opportunities that optimize operations, and when combined with guarantees for improved performance of your wastewater treatment facility (WWTF), will bring added value with optimized costs. Throughout our proposal we indicate these solutions and opportunities with four icons.

Opportunities for Efficiency

Following multiple site visits and evaluation of the City's operations by dozens of our foremost O&M specialists, engineering and utility management experts, Jacobs found opportunities for more efficient operations with advancement needs in the areas of energy optimization, maintenance, automation, staffing optimization, and reporting. **We found that some assets lacked necessary proactive maintenance required to lengthen the useful life.** The facility is beyond its 20-year-old mark and this is the time to perform a comprehensive asset evaluation and decide on targeted investment that will extend the useful life of this facility for current and future generations. We have put together a value-packed proposal that will deliver innovative and award-winning operations with a strong focus on asset and maintenance management to **elevate the City's wastewater program to the next level of performance.**

164_NWBD-OMM_1_DEN

Thoughtful Solutions and Investments to Elevate New Bedford's Operations to a Higher Level of Performance

Jacobs proposes creative solutions that address all the keys areas in your request for proposals (RFP) while making strategic investments that help elevate the performance of your operations. Following are some of the highlights of our offer:

- Revamping the project organization with greater emphasis on maintenance of your facilities.
- Implementing an industry-leading advanced maintenance management system and asset management program that improve performance and reliability while reducing risk, as well as optimizing financial planning and return-on-investment decision-making.
- Conducting a comprehensive odor study to establish the odor control baseline during the first contract year and repeating it every five years (**$320,000 investment** over the 20-year contract life).
- Implementing our Pro2D model to ensure reliable biological treatment, biosolids management and effluent disinfection while meeting the NPDES permit and Enhanced Limits requirements.
- Ammonia Based Aeration Control to reduce power consumption (**$3,000,000 savings** over the 20-year contract life).
- Incentive Savings Program that allows for the recovery of the capital or investment while equitably adjusting the ongoing services fee.
- Hosting an Annual Innovation Workshop with the project team and other utility experts to focus on continuously advancing the City's operations and avoiding complacency over time (**$200,000 investment** over the first 20 years).
- Implementing a robust Personnel Development Program that includes 2,000 hours of training for startup and transition and 1,200 hours per year in each subsequent year. We also plan to raise awareness of environmental career opportunities at the WWTP in the community.

Staff Optimization and Team Organization

Through a fresh look at the existing organization, we have rearranged our staffing approach to provide greater emphasis on proactive maintenance/asset management while focusing the operations staff on managing the day-to-day operational activities. **This approach allows us to offer a more efficient organization while providing a very high level of service through 26 full-time employees (FTEs) under the Base Bid and 29 FTEs for Alternatives 2 & 3.** We accomplish this efficiency by focusing the resources of the in-house laboratory staff to perform daily process and regulatory analysis. We have dedicated one FTE to manage the asset management program and oversee the Computerized Maintenance Management System (CMMS). This individual will track the City's entire asset management, predictive maintenance and corrective maintenance programs, and will work closely with the City to plan capital Repair and Replacement (R&R). Furthermore, **we are investing in two grinders at the Welby and Industrial Park pump stations to allow for more efficient and safer pump station daily checks.** Finally, we plan to work with the union and negotiate a new 12-hour shift schedule that has proven to be a win-win by both enhancing operational efficiency and providing better flexibility to the operators and improved work life balance.

Comprehensive Asset Management to Extend Facilities' Value

Another value-added aspect of our offer is the provision for implementing an industry-leading advanced maintenance management and asset management program supported by the revised organization discussed earlier. Our vision for the City is to raise the bar in maintenance and asset management best practices and significantly improve the performance, reliability and financial decision making while reducing risk. Our initial condition assessment in conjunction with the independent third-party audit will serve as a bench mark for future capital investment.

Jacobs' comprehensive R&R Plan for the City ensures protection of managed assets, system reliability, and proactive repair, renewal and replacement planning and financial forecasting. Our R&R program is a risk-based strategy that

examines not only the physical condition of an asset but also the related health and safety impacts, permit and environmental compliance, as well as customer confidence and service reliability. Applying the concept of relative risk allows for fact-based, repeatable and defensible decisions for the maintenance, rehabilitation and replacement of infrastructure assets.

We Wrote the Book on Asset Management

Jacobs was the technical advisor for development of McGraw Hill's *Water Infrastructure Asset Management: Adopting Best Practices to Enable Better Investments.* In collaboration with others, Jacobs' industry experts also published WEF's *Implementing Asset Management: A Practical Guide*, which focuses on continued improvement by managing infrastructure assets.

103_NWBD-OMM_1_DEN

Zero Tolerance Odor and Noise Mitigation and Control

In order to achieve City's goal of zero tolerance odor and noise mitigation and control, Jacobs will perform odor tests, a $320,000 value over the 20-year contract life, for the purpose of establishing the odor control baseline during the first contract year and reassessing it every five years thereafter. Samples and analysis of the results will then be inputted into our AEROMOD gaussian dispersion air model. This optimization analysis will be greatly aided by our WATS collection system odor control dynamic computer model. **Analysis and subsequent management of these upstream and downstream conditions will ensure that odor control operations for New Bedford are fully optimized and that the City's zero tolerance odor control policy will be successfully met.**

The unparalleled acoustics expertise at Jacobs allows us to provide valuable input in every phase of a facility's life cycle, from design to operational maintenance or refurbishment including the evaluation and mitigation of noise related issues. For example, a recent project utilized Jacobs' expertise in Industrial Acoustics using microphones and modeling to measure the sound levels of an operational agricultural processing plant and find the primary noise sources. This capability can be tapped into should the City desire for greater engagement in this area.

Optimization of Nitrogen Management with Existing Assets while Maintaining Environmental Compliance

The most recent NPDES permit, issued in September 2008, requires the City to identify and quantify major sources of nitrogen in the influent and develop an approach to optimize plant operation to reduce nitrogen discharges in the plant effluent. Jacobs uses software tools, such as our propriety Professional Process Design and Dynamics (Pro2D) and Replica, to create digital twins of wastewater treatment systems (plant and collection system). These tools allow operators to run what-if scenarios to identify potential impacts on the system so they can then prepare and develop contingency plans as needed. The use of the tools also allows operators to prepare for potential regulatory changes or wet weather occurrences. Jacobs will use the Pro2D model that we have created of the WWTF to optimize the control settings for each unit process to safeguard reliable biological treatment, biosolids management and effluent disinfection while meeting the NPDES permit and Enhanced Limits requirements. **Using Pro2D, our preliminary assessment indicates that we can enhance the BNR process.** We plan to work with the City and your engineering consultant to further evaluate and implement this improvement opportunity.

Savings from Enhanced Energy Management that Benefits the City While Improving BNR

Implementing an ammonia-based aeration control to reduce power consumption is another innovation that Jacobs has identified. An initial comparison of the observed dissolved oxygen (DO) compared to industry standards suggest that the facility is over-aerated. **Reducing the DO through tighter logic control will result in approximately $150,000 in energy savings annually or $3.0M over the 20-year life of the contract,** providing that the single-stage blowers can turn-down sufficiently to meet the lower aeration demand.

Incentive Savings Program

Jacobs will work with the City to create an Incentive Savings Program (ISP) that allows for the recovery of the capital or investment while equitably adjusting the ongoing services fee. Additionally, through Jacobs' engineering and consultancy services, we offer programs, including modeling and audits, that help us **identify efficiencies and/or opportunities to lower O&M services.** Our ISP allows transparency and encourages innovation and enhancement during the life of this contract.

Enhanced Safety and Security Measures

We have a long history of keeping our employees safe and consistently outperform the industry average in safety. Jacobs' Culture of Caring, called BeyondZero™, empowers our employees to create and sustain a positive, safe and healthy work environment for themselves and colleagues, and extends to the communities we serve. Jacobs will submit a Safety and Security Plan within 45 days of the Commencement Date. During our site visits, **we observed some safety issues that we will resolve as part of the transition activities in the first months of operations.** For example, we observed numerous guards missing from pumps and motors.

Personnel Development and Internship

Jacobs' project training programs are always tailored to specific project needs. We have deployed various training systems at more than 200 O&M sites, providing more than 50,000 hours of training to staff across North America. A custom training curriculum will be compiled based on everyone's assessed base skills, job descriptions and training requirements outlined in Schedule 10 of the City's service agreement. **We have budgeted approximately 2,000 hours of training for startup and transition and 1,200 hours per year in each subsequent year.** We will provide the City with an annual training report each January, documenting past year's training results and providing a schedule for the upcoming training year. Furthermore, we are committed to hiring one intern throughout the year, which will increase awareness in the community to the environmental career opportunities while assisting us in recruiting future operators and maintenance staff.

High Caliber Management and Support Teams Demonstrate Our Commitment to the City

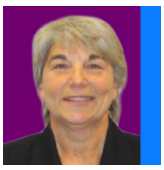
The success of this partnership hinges on the experience, leadership and commitment of the individuals responsible to oversee operations. Our philosophy is to deploy a diverse team of highly skilled and trained employees capable of working collaboratively with our clients. For this important partnership, we have handpicked an onsite leadership team made up of some of our best and brightest professionals with decades of highly relevant experience. Jacobs is committed to maintaining the staffing of the key management roles the City has identified including the Project Manager, Operations Manager, Maintenance Manager, and Laboratory Manager. Following is a brief introduction to our leadership team:

Project Manager Michael Arnold is a local, experienced operations manager with over 35 years of plant operations experience and established training expertise. He holds a grade 7C wastewater operator and grade 4 collection system operator licenses. His experience includes treatment plant operation, management, laboratory management, industrial pretreatment monitoring, and program planning for WWTPs up to 40 MGD and involving optimized nitrogen removals.

Supporting Michael and working closely with the City will be **Regional Manager Kevin Dahl, PE**, who manages Jacobs' O&M partnerships in the Northeast. He will actively monitor our performance workplan and make sure the right resources are made available to the project for ongoing success. Kevin will have a regular presence at the project to ensure we proactively address all issues and challenges while helping establish new program goals for the continuous advancement of the City's operations over the life of this partnership. He brings 20 years of relevant experience, all with Jacobs.

Operations Manager Adam Federau is a young professional with an incredible work ethic and career aspirations. He has a degree in chemistry and an Illinois Class 1 and ABC Class 3 certified wastewater operator with experience at WWTPs up to 24 MGD. Adam understands state and federal pretreatment regulations and has deep knowledge of 40 CFR regulations with regards to wastewater and industrial pretreatment.

Maintenance Manager Paul Horigan brings expertise in asset management and experience from multiple regional projects. He is a Massachusetts resident who has performed numerous condition assessments of wastewater facilities throughout New England and will be an integral part of the asset management program. Paul's experience includes scheduling and maintenance on all mechanical, electrical and instrumentation/controls for WWTFs up to 57 MGD.



Laboratory Manager Liz Tepper possesses a high level of experience and understanding in laboratory research and management. She has experience with both analytical and process chemical optimization for treatment plants, including more than 15 plants processing up to 30 MGD. Liz brings a cultural perspective and professionalism that will enhance the team and provide value to New Bedford by increasing laboratory and research skill sets to tackle any current and future issues.

This exceptional team will be supported by other staff including those currently working at the facilities that will join us to manage the day-to-day operations. Supporting the onsite staff will be a diverse group of regional and national technical experts to ensure a smooth and efficient transition and optimal operations over the term of the contract.

Seamless Transition Plan Maintains Smooth Operations and Keeps Quality Staff on Board

Jacobs recognizes that the success of this partnership will be defined, in part, by a proven transition process that delivers high quality and reliability of services and greater protection of assets. More importantly, we understand that there are several good employees currently working at the facility and our goal is to retain as many as possible. **Our transition approach is highly collaborative to ensure a seamless process that respects everyone involved.**

A smooth transition is one of the first steps in a successful partnership with Jacobs. While the physical process of the transition is significantly important, we view this step as more than a transfer of responsibilities from another firm to us. Jacobs' transition is the first step in the transformation of your operations to a high performing utility. **As such, we invest significantly in the implementation of our systems, tools and processes, coupled by a strong focus on training and the development of our culture.**

Furthermore, we have successfully transitioned a number of wastewater projects from your current operator and helped the owners improve the performance of their operations. Some of these projects include: Woonsocket, RI (16 MGD - 2012), Vancouver, WA (44 MGD - 2016), Gresham, OR (20 MGD - 2018), and we have recently been selected for a 20-year partnership which we are negotiating now with Wilmington, DE (170 MGD - 2020) - all long-standing Veolia contracts spanning up to 38 years in duration (Vancouver). We strongly urge you to contact these clients to learn firsthand their experiences in transitioning to Jacobs as their wastewater system operator.

Build on Our Commitment to Serve the New Bedford Community

Jacobs has significant experience already working in the New Bedford region. Through our work with the US Army Corps of Engineers, Jacobs is playing a significant role in the clean-up of New Bedford Harbor. We are removing close to one million cubic yards of phenanthrene degradation bacteria (PDB) contaminated sediment from the harbor. Our team completed the hybrid dredging phase sooner than anticipated, saving one month's time and nearly $3M in project costs.

Jacobs is also working for the City's Planning Department. We recently contracted with the City to provide planning and design services for a 1.4-mile segment of the Blue Lane – Working Waterfront Connector, a shared-use path along existing heavily used roadway. These two active local projects have yielded invaluable working relationships between Jacobs staff and City staff—relationships that will prove beneficial for client coordination and project management.

As part of this new partnership, we commit to be an active member of the community. From supporting local environmental educational programs and providing facility tours, to creating websites and literature, Jacobs will be an active participant in the New Bedford area and a good corporate citizen. We are excited about the vitality of the New Bedford community and have already participated in the recent Bike New Bedford Day event. We look forward to supporting and engaging with the diverse opportunities the community presents. Beyond these efforts, we intend to offer an internship to the New Bedford Vocational School. You can expect a supportive and engaged partner that will be active in meaningful community programs that make New Bedford a better place.

Jacobs—Best Choice for the City of New Bedford's Future

As the only truly integrated wastewater engineering and operations firm, we will commit the full breadth of our consulting, engineering, construction and operations capabilities, along with our unmatched onsite resources, to deliver 100% compliant operations, improved transparency, and cost-effective services to the City's wastewater program.

We understand that the City is faced with a difficult decision in evaluating if change will benefit your ratepayers and other customers and appreciate the gravity of this decision. With that in mind, we offer a value-packed proposal with a vision and focus that will elevate the City's operations and deliver best value to the customers. To that end, we are extending substantial value-added benefits including:

- ✓ Optimized project organization with greater emphasis on maintenance
- ✓ Implementation of advanced asset and maintenance management systems to improve performance and reliability
- ✓ Conducting ongoing odor studies to maintain zero tolerance odor
- ✓ Implementing our Pro2D plant-wide model for improved decision making and process optimization
- ✓ Significant power savings opportunities through Ammonia Based Aeration Control
- ✓ Focusing on an Incentive Savings Program that promotes ongoing innovation and best-practices
- ✓ Hosting an Annual Innovation Workshop for continuous advancements and avoiding complacency over time

By choosing Jacobs, the City will elevate your operations while capitalizing on the overall potential of your wastewater system. From staff transition, training and transparency, to safe and efficient operations and capital improvements, we are prepared to provide a fully comprehensive range of services for the City's System. Our commitment is to make the City our flagship O&M partner and to be your indispensable partner through a relationship built on trust and respect.

Jacobs' O&M Team is Excited to Continue Our Involvement in New Bedford Community

Jacobs recently helped sponsored the Bike New Bedford Day, put on by the City's Parks, Recreation & Beaches, and Planning departments. Jacobs staff manned an informational both and participated in the event, which highlighted the City's efforts to make New Bedford more bike and pedestrian-friendly. Our O&M team is excited to continue Jacobs' involvement and support of programs and events that benefit the New Bedford community.

123_NWBD-OMM_1_DEN

> *"As the City of Vancouver's professional service provider, Jacobs is a true partner and one that shares the same mission and vision to provide excellent customer service, quality work, and a deep appreciation for protecting the environment. The City views Jacobs not as a contractor but as an integrated part of the City and its services, and through our partnership, Jacobs has been able to provide resources to not only improve day to day operations but also assist in getting a number of much needed capital improvements completed. We appreciate the transparent, honest, and open communications we have with Jacobs and know they have the City's best interest at heart. We look forward to many years of a successful and productive relationship."*
>
> —Brian Carlson, Public Works Director
> City of Vancouver, WA; 360-487-7130

We Want to be the City's O&M Partner and We Thank the Review Committee for Your Consideration.

171_ES_NWBD-OMM_1_DEN

Jacobs

Section 2

Technical Proposal

Section 2 – Technical Proposal

A. Company/Team Information

Jacobs Engineering Group Inc. (Jacobs) is a U.S.-based company and one the largest water/wastewater operations and maintenance (O&M) services providers in North America, generating over $1.5B/year in annual revenue. As a U.S.-based company, we have more staff in the region than any other O&M firm, more water and wastewater experts than any other O&M firm, and we have performed more design-build/design-build-operate (DB/DBO) projects than any other O&M firm in the country. This base of collective experience and resources allows us to better serve the O&M needs of the City of New Bedford under this long-term partnership. As evident in our Proposer Qualifications Form in *Section 5 – Proposal Forms*, we are pleased to report that our firm and our proposed staff meet and exceed the minimum requirements of experience and financial capability required by the City.

Company Facts

Firm/Contact Information
OMI (a subsidiary of Jacobs)
Farzin Kiani
120 St. James Avenue, 5th Floor
Boston, MA 02116
Farzin.Kiani@jacobs.com
(P) 617.963.3085
(F) 617.242.9824

Type of Organization
Corporation

Tax ID No: *93-078940*

Listing of all Stockholders Owning 10% or more of Outstanding Shares
OMI is a wholly-owned subsidiary of Jacobs Engineering Group Inc.

Subcontracted Work
Laboratory services by Rhode Island Analytical Laboratories

129_NWBD-OMM_1_DEN

Jacobs: An Industry-leading O&M Provider

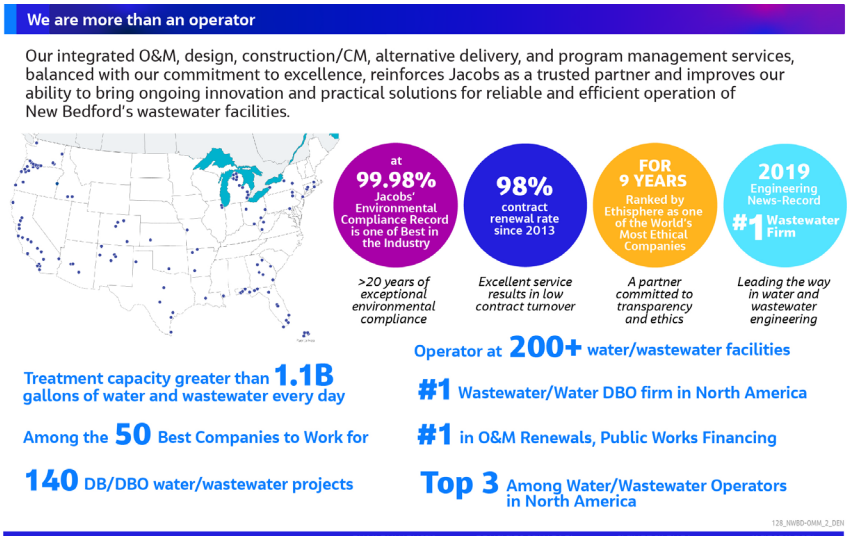
As an O&M, program management, design, and construction firm under one roof—Jacobs is more than an operator (Exhibit 2.A.1). We are the only fully-integrated water and wastewater firm in the world capable of delivering all facets of your desired services. Our broad capabilities and integrated resources significantly enhance our ability to add value to our partnership through a deep pool of diverse subject matter experts that can quickly solve challenges. Jacobs also leads the O&M industry in several important areas including environmental compliance, client satisfaction, transparency and ethics as well our leadership in design, making **Jacobs uniquely qualified to support you in cost-effectively addressing your wastewater challenges while advancing the utility to the next level of performance.**

Brief Company History

Jacobs, established in 1947 and headquartered in Dallas, Texas, is incorporated in the State of Delaware. A Fortune 500 company, Jacobs currently employs 50,000+ staff worldwide, making us one of the largest and most diverse companies in our industry. **Jacobs has a number of corporate subsidiaries, including Operations Management International Inc. (OMI),** an addition to the Jacobs family as a result of our acquisition of its parent company CH2M HILL Companies Ltd. in 2017. OMI was established in 1980 and is a wholly-owned subsidiary of Jacobs. **OMI will be the business entity under which we will contract the desired O&M services.**

More than 90 percent of Jacobs' work is repeat business. Our commitment to client value and partnership produces consistent cost advantages, profits and growth, allowing us to attract and retain the industry's top talent. Our strict dedication to safety and uncompromising ethics and integrity create a work environment that promotes employee progress and helps grow our business. **Jacobs is recognized among the 50 Best Companies to work for because we provide the opportunity for long-term employment.**

EXHIBIT 2.A.1. JACOBS IS A FULLY-INTEGRATED, AWARD-WINNING WATER/WASTEWATER FIRM.



Local Presence

Jacobs has been serving the New England area and specifically Massachusetts for more than 50 years. We support our Massachusetts clients mainly from our office in the John Hancock building in Boston, which houses more than 350 O&M, design and construction professionals. Our clients in the region recognize us for our integrated services. We are especially proud of our recent work in New Bedford working for the City on a multi-use path and with the Corps of Engineers on harbor cleanup. Our local experience has yielded us extensive knowledge of the local regulations as well as invaluable relationships with the City and federal and state agencies.

Extensive O&M Resources

The New Bedford project team is structured to leverage our firm's successful portfolio for O&M services at 200+ water and wastewater treatment facilities (WWTFs) nationwide and **more than 5,000 employees in the Northeast**—more than half are water and wastewater professionals. We have handpicked a team of on-site leadership supplemented by local support and regional/national experts with decades of highly relevant experience. Leveraging our resources, Jacobs will provide the City with the unique in-house capabilities of an industry leader with a holistic approach to operating and maintaining your facilities. The combined strengths of our individuals form one fully-integrated team focused on meeting compliance, budget and safety priorities.

Team Organization and Key Project Staff

We have customized our staffing approach to address the City's needs. Our team is set for seamless integration within the existing operations at New Bedford's facilities and to serve as an extension to City staff. Our proposed organization (Exhibit 2.A.2) provides the City with an uncomplicated reporting structure and well-defined roles, responsibilities and lines of communication for effective project delivery. Key characteristics of our organization include a single point of contact with Project Manager Michael Arnold and a large pool of off-site resources available to regularly support the project and address technical challenges. Refer to *Section 2.C – Staffing Plan* of this technical proposal for more details on our customized staffing plan.

Our management team of certified, trained and motivated leaders are supported by a strong network of on- and off-site expert resources to deliver high quality and reliable services. The caliber of these key individuals assigned to this partnership demonstrates our commitment to the City. They bring a combined total of more than **175 years of treatment operations and maintenance experience at facilities ranging from 2 to 120 MGD with multiple pump stations.** Our team also possesses **four Massachusetts (and one pending) wastewater operator certifications,** including Regional Director of Operations Kevin Dahl, PE.

Local Experience

Jacobs is committed to providing technical solutions and quality services to the community of New Bedford.

Working for the US Army Corps of Engineers, Jacobs is playing a significant role in the clean-up of New Bedford Harbor. We are removing close to one million cubic yards of phenanthrene degradation bacteria (PDB) contaminated sediment from the harbor. Our team completed the hybrid dredging portion sooner than anticipated, saving one month's time and nearly $3M in project costs.

Jacobs is also working for the City's Planning Department. We recently contracted with the City to provide planning and design services for a 1.4-mile segment of the Blue Lane – Working Waterfront Connector, a shared-use path along existing heavily used roadway.

These two active projects in New Bedford have yielded invaluable working relationships between Jacobs staff and City staff—relationships that will prove beneficial for coordinating with City departments and building a successful long-term partnership with the City.

101_NWBD-OMM_1_DEN

EXHIBIT 2.A.2. JACOBS' NEW BEDFORD PROJECT TEAM ORGANIZATIONAL CHART

* These positions are added under Alternatives 2 and 3.

Project Manager Michael Arnold (MA 7C)

With 35 years of plant operations experience, Michael is a leader in managing, training and motivating an O&M team. His experience includes treatment facility operation, management, laboratory management, industrial pretreatment monitoring, and program planning for WWTFs up to 120 MGD and involving optimized nitrogen removals. He has managed the operations of three 20+ MGD WWTFs with five or more pumping stations within a single system. For project and operations management, Michael focuses on reliability, efficiency, and minimizing negative visual, noise and odor impact to the community. One of the biggest efforts Michael led was developing a comprehensive odor control program for the North Hudson Sewerage Authority. Both the 20.8 MGD Adams Street and 10 MGD River Road WWTFs are built in the middle of heavily populated cities. Mike led the facility-wide sampling program, pilot testing and process modifications, which resulted in prioritized projects planned and scheduled for the facility. These changes along with continued operator training eliminated odor complaints within months of implementation.

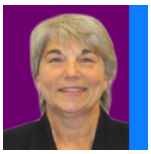
Operations Manager Adam Federau (MA Pending)

Adam Federau has a degree in chemistry and is an Illinois Class 1 and ABC Class 3 certified wastewater operator with experience at WWTFs up to 24 MGD. He has deep knowledge of 40 CFR regulations with regards to wastewater and industrial pretreatment. His project experience involves the operation, repair and maintenance for one greater than 20 MGD WWTF and several less than 10 MGD WWTFs with as many as nine pump stations in a single system. Adam understands state and federal pretreatment regulations, has led multiple industrial pretreatment and FOG programs, and spearheaded multiple NPDES permit renewal and revisions processes.

Maintenance Manager Paul Horigan (MA 5C)

With a 35-year background in electronic and mechanical technology, Paul provides scheduling and maintenance on all mechanical, electrical and instrumentation/controls for WWTFs up to 57 MGD with multiple pumping stations within a single system. His background includes staff selection and training and client interface. Paul is a resident of Sandwich, MA.

Laboratory Manager Liz Tepper



In her 17 years with the firm, Liz has managed our General Chemistry Lab and sections of the Research Soil Lab, Semi Volatile Extraction Lab, Air Lab and several pilot studies and industrial startups. She has experience with both analytical and process chemical optimization for treatment plants, including more than 15 plants processing up to 30 MGD of industrial water. Since 2007, Liz was extensively involved with proprietary onsite water treatment projects, whereby she assisted in the startup and commissioning of treatment facilities and laboratories.

Permitting Lead Michael Wilson, PE

Michael has 30 years of experience in planning, designing, and pre- and post-construction services for WWTFs up to 120 MGD, including four plants in New England, affording him a strong understanding of wastewater processes, technology and innovation. He is well-versed in permitting for upgrades and modifications to existing facilities. He also leads plant studies and technical reports. Michael is located in our Boston office.

Regulatory Compliance Lead Jeff Heroux (MA 7C)

Jeff has more than 30 years of regulatory oversite experience with wastewater and industrial pretreatment programs, including considerable laboratory, operations, management, and supervision. As a manager in Jacobs' Compliance & Reporting group, Jeff assists plant operations teams with compliance with federal and state environmental regulations, regulatory risk assessments, NPDES regulatory assistance and training, and permit renewals from his nearby Fall River location. He created and manages the companywide Project Compliance Tools SharePoint site to provide all O&M personnel easy access to pertinent regulatory guidance and tools.

Odor Control Lead Mark Smith, PE

Mark has significant experience with wastewater odor remediation, including directing numerous wastewater related odor analyses and solution implementation for zero tolerance odor control programs. This includes field monitoring for sewer ventilation and odor release conditions, comprising literally hundreds of miles of collection system piping and scores of WWTFs. He recently led a combined study of an similarly-sized collection system coupled with a study and design of corresponding odor control facilities at the treatment plant that treats flows from the collection system.

Jacobs is aware of the City's expectation for key project staff to be committed to this project. We commit our project manager, operations manager, maintenance manager, and the laboratory manager to the project for at least three years, barring events beyond our control or through retaining key existing staff. **Resumes and copies of licenses for our key individuals and qualifications of our expert resources are in Section 6.A – Supplemental Information.**

Proposer's Performance History

> *"As the City of Vancouver's professional service provider, Jacobs is a true partner and one that shares the same mission and vision to provide excellent customer service, quality work, and a deep appreciation for protecting the environment. The City views Jacobs not as a contractor but as an integrated part of the City and its services, and through our partnership, Jacobs has been able to provide resources to not only improve day to day operations but also assist in getting a number of much needed capital improvements completed. We appreciate the transparent, honest, and open communications we have with Jacobs and know they have the City's best interest at heart. We look forward to many years of a successful and productive relationship."*
>
> —Brian Carlson,
> Public Works Director
> City of Vancouver, WA
> 360-487-7130

171_NWBD-OMM_1_DEN

We are proud of our long-standing history of delivering services in an ethical manner. **Our industry leadership has consistently been recognized by the Ethisphere Institute naming us as one of the World's Most Ethical Companies for nearly a decade.** This award recognizes our advancement of best practices in business ethics, compliance practices and corporate social responsibility.

Failure to Complete Work –OMI has not failed to complete any contract or had any contract canceled for poor performance or default. Moreover, **we have a contract renewal rate of 98% since 2013** with our O&M clients.

Barred from Bidding – Neither OMI nor any affiliate has been barred from bidding on public contracts by the federal government or by any governmental entity in Massachusetts or any other state.

Criminal Conduct – OMI and our officers are in good legal standing and have no history of charges or convictions for crimes of moral turpitude, such as bribery or fraud, or for any other illegality relating to its operations.

Bankruptcy – Neither OMI nor any affiliate has been the subject of any bankruptcy action. This is made evident by our completion of the Proposer Qualifications Form in *Section 5 – Proposal Forms*.

Violations of Regulations – We have an excellent reputation among regulatory agencies, and we are committed to full disclosure and the remedying of situations that may arise, even when an excursion occurs outside of our operational control. **Every year, our projects comply with thousands of permit limits** that range from hourly, daily, weekly, monthly, and annually. The very low number of violations that we experience each year is a very, very small fraction of the total number of permit limits we are required to meet at all our projects, which lends to our **20-year compliance record of 99.98%.** We have provided 5-year compliance histories for five exemplary projects in *Section 2.D – Project Experience*. Below are additional compliance issues not covered in that section. At no time has Jacobs been fined in these instances.

Through nearly 1,000 project years (number of projects multiplied by average contract length served), we have achieved a 99.98-percent compliance record with all regulatory requirements and permit parameters. This figure is quite impressive considering the number and complexity of facilities that we manage.

In January and June 2015, the Texas Commission on Environmental Quality issued a Notice of Violation to the City of San Marcos for violations of the Texas Pollution Discharge Elimination System permit, attributed to excessive rainfall, which caused hydraulic overloading of the WWTF.

On May 8, 2018, Jacobs received a Preliminary Assessment Letter dated July 5, 2018 from the U. S. Coast Guard for a release of 3,500 gallons of 37 percent sodium bisulfite into the Norwalk River over a 30-hour period, beginning on May 8, 2018. The release was caused by a bypass valve left in the open position following a line maintenance flushing event.

For the period between July 2016 and September 2019, the City of Coos Bay, Oregon received a Notice of Violation from the Oregon Department of Environmental Quality for permit limit violations for Total Residual Chlorine, Biochemical Oxygen Demand, Total Suspended Solids and Sanitary Sewer Overflows.

B. Facility Operations and Performance Standards

Jacobs Understands the City's Values and Goals

The City of New Bedford is seeking competitive proposals that offer greater value, preserve your capital investment and assure the long-term reliability of the wastewater assets through enhanced technical reliability and viability, superior asset management and career development opportunities for all qualified plant personnel, along with moving forward your vision for the future through engaging with a world-class O&M service provider who exemplifies success in elevating treatment facilities' performance.

The contemplated scope of services under Alternative I (Base Bid), 2 and 3 supports the City's vision and encompasses reliable O&M of the WWTF. In Alternative 2, the City adds the responsibility for all 29 wastewater pump stations. In Alternative 3, the City reduces the number of lift stations to the 12 largest pump stations. Alternatives 2 and 3 also include the operation and maintenance of the WWTF. The City will determine whether it will engage the Contract Operator to be responsible for all (Alternate 2), some (Alternate 3) or none (Base Bid) of your pumping stations.

In addition, the City is looking for your new partner to develop specific strategies for the provision of a "zero-tolerance" approach to odor and noise control, nitrogen reduction control strategy, enhanced safety and security, assurance of environmental compliance, and the opportunity for professional development for the employees. These strategies are at the core of Jacobs services.

Jacobs has found opportunities for more efficient operations with advancement needs in the areas of energy optimization, maintenance, automation, and reporting. The facility is beyond its 20-year-old mark, and this is the opportune time to perform a comprehensive asset evaluation and decide on targeted capital investment that will extend the useful life of this facility into the next phase. **We have put together a value-packed proposal that will deliver innovative and award-winning operations with a strong focus on asset and maintenance management to elevate the City's wastewater program to the next level of performance.**

Jacobs Approach to Providing Superior O&M Performance Through a Well-Designed O&M Plan

Overall Management Philosophy

Jacobs has learned through decades of experience that our O&M approach must be dynamic to remain relevant to ever-changing needs and goals. Developing and implementing comprehensive and thoughtful O&M and related facilities plans establishes the foundation and expectations for performance, and they work best when approached as a team that partners together to deliver the best results. The general system management philosophy we apply to all the facilities we operate is shown in Exhibit 2.B.1. It is to leverage the full breadth of our integrated resources to cost-efficiently deliver the performance excellence our clients like the City expect.

Management Procedures and Policies

The cornerstone of our approach to delivering superior high-quality services is recruiting, selecting, training, and retaining well-qualified, experienced professional staff. Our personnel will take pride in maintaining the character and standards that protect the residents' quality of life. Jacobs recognizes the commitment required to maintain quality throughout a long-term operations contract. Our approach is to create a regular schedule of structured activities that encourage and foster quality. Furthermore, as part of this commitment, our onsite staff, executive leadership and City stakeholders will be involved in structured quality verification activities, including:

- Annual vision, alignment and expectation workshops to strengthen and evolve the partnership
- Quarterly business reviews of our activities
- Clear communication protocols
- Continuous review, evaluation and improvement of performance reporting processes

EXHIBIT 2.B.1. JACOBS' SYSTEM MANAGEMENT PHILOSOPHY LEVERAGES FULL BREADTH OF INTEGRATED RESOURCES

ASPECT	APPROACH	BENEFIT TO THE CITY OF NEW BEDFORD
Staffing	Empower our employees to think and act like owners.	Applies decision making to the actionable level
Reliability	We use a comprehensive approach to ensure all systems function as designed. Systems are interdependent and comprised of human, mechanical, process, and physical components.	Reliability leads to higher system function and delivery by aligning interdependent variables to achieve the greatest net utility, resulting in better compliance, effluent quality, and cost optimization.
Operability	We strive to make facilities more operator friendly through training, investment, innovation, intuitive control systems, and accessible, easy to use equipment that can be automated or controlled manually.	Lowers costs by increasing operator effectiveness and improves worker well-being by making the system more ergonomic.
Compliance	Our goal is perfect compliance, and when something uncontrollable occurs, accurate and timely reporting of non-compliance.	Ongoing exceptional compliance, environmental protection, protects the community, and develops positive relationships with regulators.
Safety	Target zero incidents.	Less lost time, fewer work flow interruptions.
Transparency	Provide the City full access to all desired data and information related to the project.	Assures the City has complete understanding of all aspects of your operations at all times.
Support	Provide standards, technical and management support, and training.	Extensive global resources delivered locally.

110_NWBD-OMM_MgmtPhilosophy

A key component of the quality management program is training focused on continual improvements in customer satisfaction and service delivery (e.g., timeliness, completeness, consistency, thoroughness, and responsiveness).

Jacobs will develop detailed and thoughtful operations plan that sets the foundation and expectations for performance. Plans work best when approached as a team working together to deliver the best results. We will work with the City and provide continual and transparent communications such that the City will be "up to speed" if an issue arises, so resolutions can be made quickly and without interruption to services. Using proven and rock-solid approaches help keep everything running smoothly, combined with an open, collaborative environment.

By actively applying best management practices and focusing on continuous improvement, Jacobs helps clients achieve and exceed their strategic goals. For this important partnership, Jacobs offers quality and reliable wastewater service, regulatory compliance, and innovative and cost-effective O&M systems with significant focus on complying both with the NPDES and odor/noise management for the WWTF, and also the protection of your assets. **We are confident our Operations Plan and overall approach as described in this section and throughout this proposal will not only comply with all state and federal regulations, but also help the City maximize the useful life of your system while reliably serving your customers.**

Jacobs will apply the state-of-the-art tools summarized in Exhibit 2.B.2 in order to guarantee our performance and to ensure the success of this important partnership. Detailed discussion of these tools is provided in *Section 6 – Supplemental Information* to demonstrate the depth of our capabilities and approach to the City's needs.

EXHIBIT 2.B.2. JACOBS' TOOLS FOR SUCCESSFUL OPERATIONAL COMPLIANCE

Proven O&M Plans	Plan Description	Due By	Benefit to the City
Unit Process Control Procedures (UPCPs)	UPCPs outline our operations road map, establish the key performance and parameters we track, drive process adjustments we make based on the results, direct continuous improvement, and clearly establish communication venues and related control of process adjustments. UPCPs also provide a level of detail for operators and maintenance personnel to make informed decisions.	90 days	Documented procedures and process targets that are shared with the City, management, operators, maintenance, and laboratory staff ensures that we all have a common purpose and goal. The detailed information provided maximizes efficiency and minimizes potential for errors and downtime.
Process Control Strategy	The process control strategy takes into account the facility design, influent loading, and permit requirements. From that, our operators and engineers develop a strategy that will best meet those conditions while maintaining efficient operations. Jacobs offers the unique ability among other leading O&M service provides in our ability to also design in-house completely new systems that deliver excellence. The Company-wide Process Control System (CPCS) is one of the newest innovative developments of Jacobs and far exceeds industry standard practices. Jacobs has developed CPCS that makes full use of plant data and modeling to take a fully scientific approach to Process Control. The core of the CPCS focuses on control and results.	90 days	A comprehensive and thoughtful process control strategy is key to providing the focal point for all process control activities. Jacobs CPCS system utilizes our process model, Pro2D, and our O&M capabilities to predict upper and lower operating parameters (or limits) for each unit process and then this data is utilized by the plant operations staff and regional technical specialists to assess the data and to make the necessary changes to maintain treatment performance.
Sampling Plan	The sampling plan includes a well-thought-through and understood list of sampling locations, a sampling map, and parameters to be sampled at each location. It also identifies methods to be used, proper chain of custody techniques, and proper preservation procedures.	30 days	A properly written and implemented sample plan is critical to the compliant and efficient operation of a facility. Reliable, accurate data starts with representative sampling to achieve effective solids balances and process control.
Data Management	The data management software (HACH WIMS) is tied to the sampling plan. Each sample point has associated parameters that are used to track the process directly or through calculations. The data for the parameters are based on laboratory analysis or online instrumentation and are entered manually or directly from SCADA. The database is the foundation for regulatory reporting, process control, and standard or custom reports.	60 days	Direct access to the data management software will allow the City to "mine" the database for specific data, as desired. In addition, periodic reports will provide the City with a quick summary of how the plants are performing with regards to the discharge permits and how the individual processes are performing.
Standard Operating Procedures (SOPs)	Standard Operating Procedures (SOPs) are developed to ensure that safe work practices and consistent operations of equipment and systems are implemented and followed by operations and maintenance staff. SOPs typically contain precautionary safety steps followed by startup, shutdown and routine monitoring of the equipment.		Development of SOPs is an ongoing process. Critical SOPs will be developed first and as new SOPs are required these will subsequently be developed by the operations and maintenance staff. SOPs will ensure that consistent and standard procedures are followed by the staff to ensure staff safety, operations performance and equipment reliability.

Proven O&M Plans	Plan Description	Due By	Benefit to the City
Operator Round Sheets	One of the most effective ways to maintain control of the treatment process and operational equipment is to perform at least daily rounds on the treatment process. Daily round sheets consist of readings, observations and preventive maintenance tasks that will typically identify potential upsets or problems with equipment before anything happens – basically allow the Operator to make any necessary process adjustments or create maintenance work orders to proactively correct a maintenance item. In addition, Operator round sheets identify general housekeeping actions for keeping the facility safe and clean for all staff and potential visitors to the site.		Round sheets are printed out daily through the CMMS and completed by the Operator at least daily or twice a day, as necessary. Unusual observations are document and recorded on the round sheet and the data is uploaded into the CMMS. In addition, any unusual observations or readings are reported immediately to the Operations Supervisor so that the appropriate action can be taken in a timely manner.
Sample Tracking Tool	Jacobs has a Sample Tracking Tool that is utilized by plant operations and laboratory staff to monitor and track all process and regulatory sampling and analytical requirements. This Sample Tracking Tool is developed and implemented at the start of each year and as samples are taken and analyzed in-house or sent to a third-party laboratory, the sample is checked-off by the person that has pulled the sample and then is checked-off the same day by a second independent party to ensure that all process and compliance samples are taken as per the regulatory permit.		Jacobs takes seriously the NPDES requirements outlined in the City's discharge permit for the wastewater treatment plant. A key element to this compliance is ensuring that the samples and analyses are performed at the locations and frequencies outlined in the permit. It is unacceptable for our staff to miss a permit compliant and/or test result and the Sample Tracking Tool provides the necessary quality assurance to ensure that no samples or parameters are missed by the project team.

We begin with an understanding of your permit requirements and your objectives as stated in the RFP. We will then develop and document an overall operating strategy. The strategy identifies critical aspects of the treatment process, details how unit processes will be monitored and controlled, and establishes our strategic and tactical approaches to achieve the treatment goals in the most efficient and reliable manner. Operating strategies are updated quarterly based on revised process and electrical models. During each review cycle, we explore opportunities for innovation and adjust our operations strategy accordingly. Once a strategy has been established, it is supported by specific documentation. **Our plans have been developed to avoid process upsets and maintain high-quality, steady-state operations.**

A critical aspect of Jacobs' holistic approach to process control is holding weekly project coordination meetings with all operations and maintenance staff. The purpose is to review performance over the previous week, make process control adjustments, discuss maintenance concerns, and plan for upcoming maintenance activities. The results are documented and posted for all staff. We have found that these weekly meetings are critical to building our overall O&M team and to improve communication, planning and performance throughout the operations.

Asset Management Approach

Jacobs' effective asset management will guide the repair and replacement process to maximize the City's return on investment.

Jacobs' has written the book for effective asset management. Literally. Jacobs has partnered with multiple agencies including Water Environment Federation, U.S. Environmental Protection Agency, National Association of Clean Water Agencies, and Association of Metropolitan Water Agencies to author several asset management guidance documents. Jacobs is a leader in asset management best practices and applies our industry best practices to every asset management project that we perform.

We Wrote the Book on Asset Management

Jacobs was the technical advisor for development of McGraw Hill's *Water Infrastructure Asset Management: Adopting Best Practices to Enable Better Investments.* In collaboration with others, Jacobs' industry experts also published WEF's *Implementing Asset Management: A Practical Guide*, which focuses on continued improvement by managing infrastructure assets.

103_NWBD-OMM_1_DEN

Jacobs has been helping customers effectively manage wastewater assets for decades. We have continually developed specialized practices to help optimize day-to-day the operation, maintenance and capital improvement of our clients' infrastructure. Specific tools including our Asset Condition Assessment Evaluation System (ACES) and Asset Replacement Model (ARM) will be customized for the City's managed assets.

These tools will be used to manage the wide range of assessment information developed for the City, integrate with the Computerized Maintenance Management System (CMMS), and deliver the complex reporting necessary to support the repair and replacement (R&R) decision processes. Each process area and location will be assessed for its consequence and likelihood of failure resulting in a Risk Score that is specifically developed for the City. This is followed by a comprehensive condition assessment where **individual assets are assessed and also receive a Total Risk Score**. The result is a relative Risk profile of unit process areas from highest to lowest and a ranking of assets within those areas from highest risk, poorest condition to lowest risk, best condition. This Risk profile drives the R&R scheduling and planning process.

Initial Condition Assessment Establishes the Baseline

The condition assessment (CA) process used by Jacobs is a core component of the rehabilitation and replacement planning program. Within the first six months of operation, **Jacobs will perform a condition assessment for managed plant and pump station assets. This process is continued on an annual basis for required high risk assets with a three-year maximum inspection interval for all managed assets.**

130_NWTRRP2_1_DEN

The basis for assessing the condition of assets is the development of a set of asset-specific questions that focus on the visual and measurable indicators of an asset's condition. To accomplish this, a registry of the assets to be assessed is reviewed and arranged into asset-type classifications.

"Jacobs has seamlessly integrated engineering, construction, and contract operations to deliver several equipment and controls system in a cost-effective manner. For Vancouver's major control system upgrade, each part of the organization is working hand-in-hand to provide smart state-of-the-art improvements that meet long-term needs for O&M while minimizing impacts to the current operation during construction; maintain treatment plant level-of-service; and maintain or extend service life of assets."

—Frank Dick, PE,
Sewer and Wastewater
Engineering Supervisor,
City of Vancouver, WA
360.487.7179

172_NWBD-OMM_1_DEN

The next step is to apply assessment criteria or a set of questions and answers that spans the range of likely conditions that may be observed or measured to effect remaining useful life. (See Exhibit 2.B.3 for an example.) For each condition assessment criteria question that is developed for an asset a score of 1 to 5 is assigned to each answer. The answers are arranged so the best condition is given a score of 1, and the worst condition is given a score of 5. The number of answers to each question varies depending on the granularity of the inspection. Therefore, some questions will simply be YES (1) or No (5) questions, while others may have five separate answers with scores ranging from 1 to 5. By rolling up the scores of each question for an asset, an overall score for the asset is calculated. Since not all questions may be as significant an indicator of the condition of an asset, questions may also be weighted. For example, where applicable, Infrared Thermography Tests, Volt-Amperage Balance, and Motor Insulation Resistance are considered major factors for asset Physical Condition in this assessment and carry a heavier weight than other assessment questions for the particular asset class. Also, Performs Intended Function is used to determine whether an asset is operating in the capacity that was originally intended regardless of condition.

EXHIBIT 2.B.3. JACOBS USES MOBILE ASSESSMENT FORMS WITH THE ABILITY TO ATTACH PHOTOGRAPHS TO DEVELOP ASSESSMENT SCORES

ASSET TYPE **PUMP-CENT**

Question	Condition Weight	Overriding?	Answer	
Absense of Leaks	2			
			1	Yes
			5	No
Absense of Pump Cavitation	1			
			1	Yes
			5	No
Acceptable Oil/Grease	1			
			1	Yes
			5	No
All Safety Features Present	0			
			1	Yes
			5	No
Bearings	1			
			1	Excellent
			2	Minor Wear
			3	Moderate Wear
			4	Major Wear
			5	Failure Imminient
Belt/Direct Drive/Couplings	1			
			1	Excellent
			2	Minor Wear
			3	Moderate Wear
			4	Major Wear
			5	Failure Imminient
Check Value	1			
			1	Opens, Closes, Seats, No Defects
			2	Opens, Closes, Seats, Minor Defects
			5	Opens, Closes, Leaks, Doesn't Seat
Corrosion - Metal	1			
			1	Like New

133_NWBD-OMM_1_DEN

Condition Score
3

Total Score
46.690

Consequence Score
8.0500

Likelihood Score
5.8000

Elevating Levels of Performance – Going Beyond with a Risk Assessment Approach

Risk can be defined as the potential for realization of unwanted, adverse consequences to organizational and service delivery strategies. While the current condition of an asset is widely accepted as the primary indicator of its likelihood of failing, there are additional risk factors specific to the City's wastewater facilities that can more accurately help define the optimal rehabilitation or replacement strategy and timeline. These specific risk factors, like adherence to O&M procedures and performance, will be used to create a managed asset risk profile that is relative to the needs of the City's assets. **Applying the concept of relative risk allows for fact-based, repeatable and defensible decisions for the maintenance, rehabilitation and replacement of infrastructure assets**. This defines the risk-based assessment, which leads to development of a more comprehensive asset replacement methodology and schedule.

In the context of utility asset management, the focus is on the risk of asset failure, where failure is not only the physical breakdown of an asset, but the inability of an asset to meet its intended purpose. The risk of an asset failure is quantified as a function of the consequence of the asset failure and the likelihood that the asset will fail, as shown by the risk equation: ***Risk = Consequence x Likelihood***

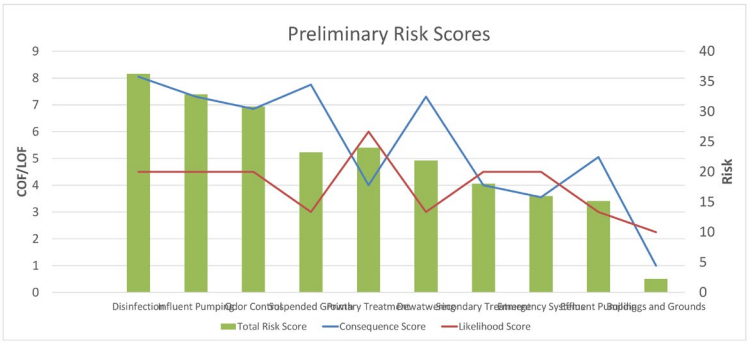
Consequence of Failure: The consequence of an asset failure focuses on the impact a failure may have on a process area or lift station's ability to meet its established level of service targets. The consequences of an asset failing are usually static, unless there is a change to an asset required level of service, permit, regulation or there is a redesign of the facility. The static nature of the consequence of failure also makes the consequence score for a process or asset a potential way of assigning criticality or priority to the assets.

The Consequence of Failure matrix criteria (Exhibit 2.B.4) that will be developed for the City's Managed Assets establishes levels of service categories and the range of consequences, negligible to severe, with applicable scoring. Each category is weighted in terms of its relevance to the City operational goals and shows as a percentage out of one hundred in the table. Consequence of Failure is calculated as a sum of the products scored.

EXHIBIT 2.B.4. CONSEQUENCE AND LIKELIHOOD TABLES WITH RISK SCORING THAT IS SPECIFIC TO THE CITY'S MANAGED ASSETS

Consequence by Level of Service Category				WWTP	
LOS Category	Wt.	Negligible = 1	Low = 4	Moderate = 7	Severe = 10
Safety of public and employees	25%	No injuries or adverse health effects	No lost-time injuries. Medical attention required	Lost-time injury or medical attention required	Loss of life or widespread outbreak of illness
Financial impact	10%	Can be repaired within project budget (<$5,000).			
Service Delivery	25%	No impact			
Customer confidence	15%	No social or economic impact to customers. No reactive media coverage. Any media coverage is a result of proactive announcements by Utility. No complaints.			
Regulatory/Environmental compliance	25%	No State or local permit violations			

Likelihood by Category						WWTP
Likelihood Category	Wt	Negligible = 1	Unlikely = 3	Possible = 5	Likely = 7	Very Likely = 10
Physical Condition	75%	Grade 1. Very good. New or nearly new. Only n mainte (95% l	Grade 2. Good.	Grade 3. Fair. Major wear impacting level of	Grade 4. Poor. Unable to meet level of service	Grade 5. Very poor. Requires complete
O&M Protocols	15%	Compl written access being				
Performanc e	10%	Suffici meet a peak fl require Appro and fu				



Likelihood of Failure: Similar matrix criteria will be developed and weighted for the City scoring the Likelihood of Failure (LoF). Each likelihood category is assigned a weighted value based on its contribution to the overall likelihood of an asset failing to meet its intended purpose over a range of likelihood (negligible to very likely) with scores (1-10). Since the current physical condition of an asset is considered to be the leading factor in predicting the likelihood that an asset will fail, the Physical Condition carries the highest weighting. O&M protocols, the documented procedures the station is operated by and historical reliability receive a lower weight. **The likelihood of an asset failing is the most common factor in changing the total risk an asset poses to the operation.** While changing the consequence of a failure usually requires a process or permit change, likelihood is dynamic and will change more frequently based on operation and maintenance of the asset. Each LoF category is weighted in terms of its relevance and is shows as a percentage out of 100 in the table.

Estimated Remaining Life Determination

Based on information from the International Infrastructure Management Manual, the condition rating of an asset can be used to make assumptions about the immediate maintenance needs of the assets and to calculate the remaining useful life as described in Exhibit 2.B.5

EXHIBIT 2.B.5. CONDITION RATINGS AND DESCRIPTIONS

Condition Rating	Condition Description	Estimated % of Remaining Service Life
1	Indicates that the asset is in like-new condition. Continuation of current maintenance and operating procedures is recommended.	90% or greater
2	Indicates that the asset is in good condition. Some minor additional maintenance may be required; continue the current maintenance and operating procedures.	75%
3	Indicates that the asset is in fair condition. The asset has one or more issues that require immediate attention. The current maintenance and operating procedures or intervals may need to be modified or adjusted to avoid recurrence of identified issues.	50%
4	Indicates that the asset is in poor condition. Planning for a major overhaul or replacement should begin. Review of current maintenance practices and procedures is recommended. If this is a critical asset, a predictive maintenance program should be evaluated to prevent the asset from reaching this condition in the future.	30%
5	Indicates that the asset is in very poor condition. Failure of the asset is imminent or has already occurred. Greater than 50% of the asset requires replacement. If this is a critical asset, a comprehensive maintenance program should be evaluated to prevent the asset from reaching this condition in the future.	10% or less

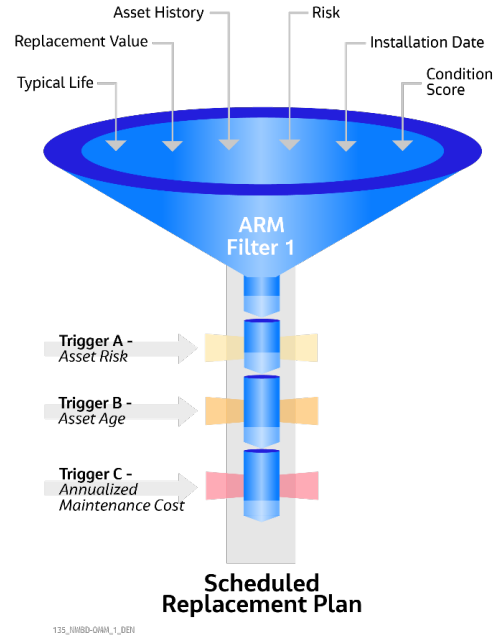
Through the Asset Replacement Model (ARM), Jacobs will develop a comprehensive, annual rehabilitation and replacement for managed assets.

Jacobs developed the **ARM** to conduct capital replacement prioritization and planning and to determine an overall asset replacement schedule. Using comprehensive input from the condition and risk assessment process, ARM can generate triggers that signal rehabilitation and replacement decision points, as shown in Exhibit 2.B.6. These triggers produce a prioritized list of assets for R&R consideration that are further reviewed for the planning and scheduling. The ARM process creates an objective, repeatable process for developing the R&R schedule.

Features of the ARM tool include:

- Identifies R&R triggers based on actual asset condition, annual maintenance costs, and remaining useful life
- Includes replacement asset value so a preliminary prioritized R&R plan may be developed
- Able to use existing condition assessment information as a starting point
- Highlights troubled assets and discovers proactive maintenance optimization opportunities through the condition assessment process
- Identifies candidate assets for further net present value analysis to determine action on high-risk or costly asset replacements

EXHIBIT 2.B.6. REHABILITATION AND REPLACEMENT TRIGGERS GENERATED BY JACOBS ARM TOOL



Jacobs' proposed asset management approach maximizes the City's return on existing and future investments

Asset Management Plan

With decades of experience at operating facilities, Jacobs' comprehensive, integrated asset management and maintenance management approach provides the City consistency, transparency, proven tools, and resources that will deliver superior protection of your assets. **Our proven program will ultimately result in a financially efficient system with better planning capabilities and reduced financial and environmental risk.**

As part of our commitment to the success of this project, we will implement our proven, advanced asset management program, coupled with industry best maintenance management practices with highly trained managers, to maximize the life of existing assets and ensure that new assets meet or exceed expected service lives. Exhibit 2.B.7 depicts our implementation approach to developing the comprehensive asset management program for the City's wastewater managed assets.

The benefits derived from a well-organized and well-delivered asset management and maintenance program include **improved performance and reliability, extended equipment service life, reduced maintenance costs, more efficient use of labor, improved aesthetics of the site, reduced environmental risks, improved long-term planning, and improved workforce morale.** We will keep the City's assets in a proper state of repair, addressing items in a proactive rather than reactive manner. To do this, we employ proven preventive maintenance (PM), reliability centered maintenance, and predictive maintenance (PdM) programs managed through the CMMS.

Award-Winning Cincinnati Asset Management Program

For the second consecutive year, the Metropolitan Sewer District (MSD) of Greater Cincinnati was recognized for excellence in maintenance and reliability practices, receiving Uptime Magazine's Best Maintenance Reliability Award as the 2014 Best Asset Condition Management Program. Jacobs has worked with the MSD for more than 9 years to help the District develop and implement a sustainable, low-cost, in-house asset condition monitoring (ACM) program. Using the ACM, the 3-year return on investment is 123 percent, based on maintenance cost reduction and actual budgeted expenditures. MSD is predicted to see a total return of 214 percent, or $1.76 million, over 5 years.

162_NWBD-OMM_1_DEN

EXHIBIT 2.B.7. ASSET MANAGEMENT IMPLEMENTATION APPROACH AND SCHEDULE

Proven AM Building Blocks	Description	Due By	Benefit to the City
Implement CMMS	Jacobs, as part of our asset management best practices, will implement Maintenance Connection as the CMMS for the Managed Assets.	120 days (continuous improvement thereafter)	Jacobs will implement industry best practice software, our CMMS business process, and workflow mapping.
Condition Assessment and Asset Registry Development	Jacobs will perform a baseline condition assessment and physically assess all relevant plant equipment. Jacobs will also use this opportunity to validate and complete the asset registry in the CMMS.	180 days (every 3 years thereafter)	Results of our continuous maintenance program will drive annual repair and replacement planning, as well as assisting the City with their CIP and generate innovative ideas and solutions for optimization and potential cost savings.
Risk Assessment	At the conclusion of the condition assessment and in accordance with the International Infrastructure Management Manual, Jacobs will assign Risk scores to process areas and assets within those processes.	180 days	Risk is used as a tool to assist in the prioritization of repair, rehabilitation, and replacement decisions
Develop Updated Renewal/ Replacement Plan	Jacobs will provide a schedule of these needs following the plant condition and risk assessment.	180 days (annually thereafter)	Jacobs will provide a defensible updated renewal and replacements plan for the Managed Assets. This will be coupled with any a long-term CIP development that the City plans.

Proven AM Building Blocks	Description	Due By	Benefit to the City
Spare Parts Inventory	Jacobs will prepare and submit an inventory of the spare parts, tools, chemicals, and rolling stock transferred to our ownership at contract start date.	90 days	This activity provides for a baseline of inventory and value at the beginning of the contract. It is used to determine quantities and value upon project closeout.
Maintenance Skills Training	Jacobs provides hands-on, in person instruction for vibration analysis, alignment, oil analysis, CMMS best practices, ultrasound, and troubleshooting— taught by Jacobs regional maintenance experts in each subject area.	Continuous	Jacobs will provide skills training from basic Mechanic-in-Training up through advanced predictive maintenance training as part of our efforts for continuous improvement of our staff and maintenance processes.
O&M Manual	Jacobs will create an Operation and Maintenance Plan for the plant from the UPCPs and Maintenance Procedures in the CMMS.	90 days (updated annually thereafter)	Jacobs will assemble our Unit Process Control Plans and maintenance practices into an O&M plan for the plant to be used for training current staff and new hires.

Condition-Based Maintenance

An important enhancement to our maintenance strategy is the introduction of condition-based maintenance practices (Exhibit 2.B.8). Most asset maintenance and replacement strategies are based on age-related failures and rely on simple time-based methods for defining PM intervals or replacement, even though only a minority of failures are time related. Current asset failure models demonstrate a nearly 90% degree of randomness, rendering simple, time-based strategies inadequate. **The best mitigation against random failure is to monitor the condition of the assets through non-destructive testing such as ultrasonic, vibration, oil, and infrared imaging analysis. Jacobs uses all these technologies to monitor the condition of critical assets, mitigating the risk of random failures that can occur at any time of an asset's life.**

EXHIBIT 2.B.8. JACOBS' CONDITION-BASED MAINTENANCE (CBM) PRACTICES INCREASE SYSTEM RELIABILITY

Routine	• First line of defense • Operator-driven based on daily observations • Early detection of problems
Preventive	• Driven by the equipment manufacturer or industry best practices • Critical line of defense
Condition-based	• Assigned to all major electrical and mechanical equipment • Routine testing to observe trends that predict failure
Corrective	• Proactive corrective maintenance is the goal of condition-based maintenance • Reactive corrective maintenance responds to failures that have already occurred, and our goal is to minimize time spent here

110_NWBD-OMM_MgmtPhilosophy

We use Augury vibration analytics, which is precision vibration measurement coupled with technical experts, to help us to evaluate machine vibration at several of our sites with critical, high dollar equipment. This has led to the discovery of imbalances and misalignments, which we have been able to correct and prevent major equipment failures, but which traditional RMS vibration measurement cannot detect.

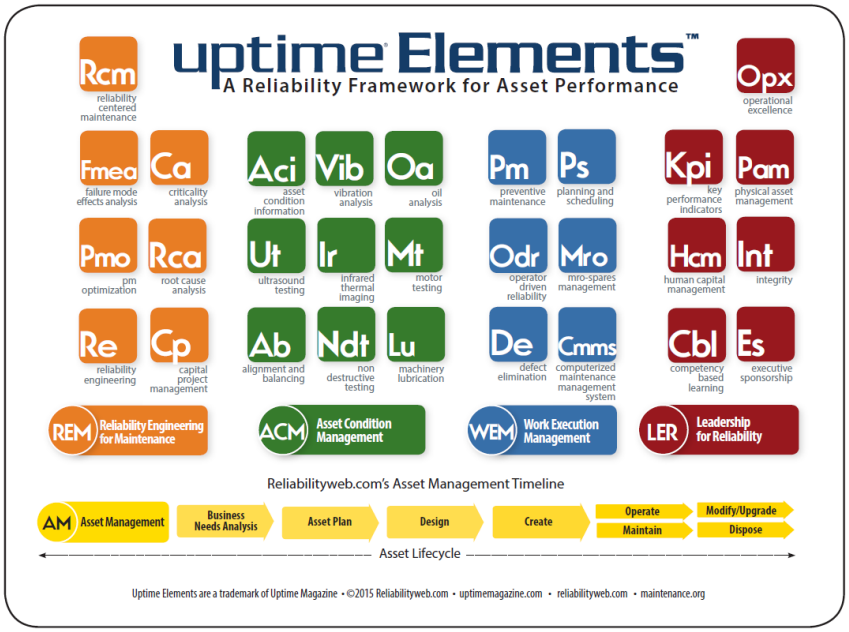
161_NWBD-OMM_1_DEN

Condition-based maintenance is a key step in the cycle of maintenance management and provides the data necessary to make efficient decisions about work priorities, repair and replacement needs, and capital planning. Given the importance of this step, and how often we conduct condition assessments nationally, we have developed efficient and award-winning techniques that translate to better data and less cost through targeted maintenance expenditures. **While condition-based maintenance decision making is industry best practice, the default approach using a time schedule (monthly, quarterly, annual, etc.) for several classes of critical equipment has value, especially for recently replaced or renovated assets. Most equipment manufacturers still base their warranty agreements on meeting time-based PM tasks, therefore, we consider both schemes when making decisions on the frequency and nature of proactive maintenance work.**

As part of a company-wide initiative that began in 2016, we carefully studied the maintenance practices at dozens of the treatment plants we operate, and then developed our corporate maintenance standards around an industry best practice model to address the gaps identified. We now use the Uptime Elements model for our maintenance program and have reinvented the company standards accordingly with the publication of our Maintenance Resources Guide for plant staff to follow

A key finding of this initiative was that most of our equipment failures were the result of just a handful of factors: equipment alignment, lubrication, and CMMS data management gaps. As a direct result of this, **we now actively promote maintenance skills training with approximately 300 hours per year of local, hands-on, in person instruction for vibration analysis, alignment, oil analysis, CMMS software, ultrasound and troubleshooting, taught by our own regional maintenance experts in each subject area.**

Jacobs' approach to maintenance skills training and predictive maintenance techniques improve uptime and reduce corrective maintenance.



Routine Preventive, Corrective and Predictive Maintenance

Routine Maintenance (RM)

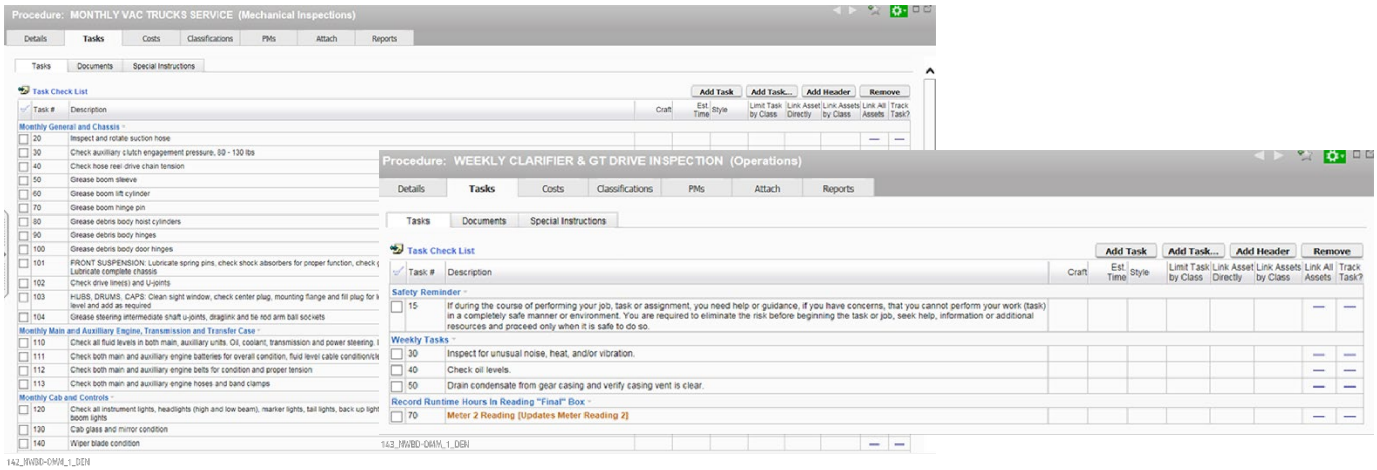
RM is the first line of defense and provides many benefits to the overall maintenance management plan. RM is performed by staff members who operate the processes and equipment daily as they make rounds during their assigned shifts. They visit and observe each process and equipment area to inspect equipment condition and performance using a "stop, look, and listen" approach, which in many cases can provide early detection of potential failures or malfunctions.

Preventive Maintenance (PM)

PM is repetitive activity required or recommended by the equipment manufacturer or industry best practices performed to optimize the service life of the equipment, vehicle, facility, or other asset. Proper PM is a critical line of defense against equipment deterioration and failure, and includes activities specified by the manufacturers' maintenance recommendations as outlined in the vendors' O&M manuals; these may be superseded by client-accepted practices established though the Asset Management process. Work orders generated by the CMMS outline the required PM; upon completion of a work order, the following information is logged in the CMMS:

- Work order issue date
- Completion date
- Staff performing the task
- Description of all tasks completed
- Labor hours and estimated labor cost
- Materials quantity and cost

EXHIBIT 2.B.9. PM PLAN FOR SINGLE ASSET EXAMPLE



We have an established PM approach that includes a list of specific activities to be performed for the various components of infrastructure (i.e., assets) that comprise the facilities, as well as the recommended frequency of performance. Exhibit 2.B.9 is an example of a preventive management plan for a single asset.

Asset task descriptions include the manufacturers' recommended procedures and their corresponding appropriate interval for the maintenance activities to be performed. The recommended intervals for task performance are evaluated for PM optimization, and validated through our asset management program, which analyzes the following criteria:

- Condition-based information from non-destructive testing
- Manufacturers' O&M manual recommendations for specialized equipment and equipment under warranty
- Age, condition, and function of the equipment
- Risk and consequence of failure
- Severity of service and rate of wear and corrosion
- Cost of maintenance as compared to replacement cost, if failure does not risk the safety of personnel or create a process upset

Our CMMS provides asset registry, maintenance scheduling, documentation, tracking, and equipment condition history into a computerized database that enables Jacobs to maximize equipment performance and minimize downtime. Jacobs utilizes Maintenance Connection® (MC) as our computerized maintenance management system (CMMS), with cloud-based reporting for enterprise level metrics analysis. Using a centralized CMMS provides several quality tools that, when used effectively, facilitate better decision making, such as determining whether it is more cost effective to replace an older asset based on maintenance costs versus replacement costs.

Corrective Maintenance and Root Cause Analysis

Equipment does not last forever, but it is valuable to understand why a failure occurs, especially if it is unexpected, and to predict failure modes on critical systems. Jacobs' O&M group boasts several Reliability Centered Maintenance (RCM2) certified practitioners with the knowledge and experience to perform a thorough analysis of potential failure modes at the site, using SAE JA1011 standards. These practitioners share their knowledge and experience through our communities of practice similar to other Jacobs experts and technologists and are included and available on demand to assist the on-site team when issues arise. The analysis looks at the ways assets and systems can fail, the causes and results, and preventive measures to mitigate the associated risks.

Sometimes these failures can be very hidden indeed, as was the case with a simple 2-inch sample tap in a concrete vault that our team identified on a massive transmission line for the Central Arizona Project - an unmanaged failure could have jeopardized water delivery to millions of customers.

Root cause analysis of maintenance failures is addressed in two ways: for major failures, it follows a prescribed process that may involve a team of engineers and maintenance experts to determine causes, both "root" and "contributing".

Failures of non-critical assets still receive attention, but with a less formal "5 Why's" approach (Exhibit 2.B.10), like how we conduct safety incident investigations. For every "explanation" of a failure, we ask why again. After the fifth "why", the root cause is typically discovered. Jacobs works to minimize maintenance and repair expenses and focuses on investments in the facilities that provide the greatest potential for avoiding costly repairs and service interruptions.

EXHIBIT 2.B.10. JACOBS' "5 WHY'S APPROACH TO ROOT CAUSE ANALYSIS

The benefits derived from Jacobs' well-organized and well delivered asset management and maintenance program include improved performance and reliability, extended equipment service life, reduced maintenance costs, more efficient use of labor, reduced environmental risks, improved long-term planning, and improved workforce morale. **Our fully developed asset management program will keep the City's Managed Assets in a proper state of repair, addressing items in a proactive rather than reactive manner**

Predictive Maintenance (PdM)

Predictive Maintenance (PdM) techniques are designed to help determine the condition of in-service equipment in order to predict when maintenance should be performed. A key component of our preventive maintenance plan and asset management approach, PdM tasks are assigned to all major electrical and mechanical equipment. They are routinely tested to confirm all components are in good working order and verify that no negative trends exist that reduce the equipment's overall life expectancy and integrity. All data collected during testing will be collected and entered into CMMS and ACES databases so that trends can be easily identified. In consideration of the City's managed assets, the Jacobs onsite staff will be trained in specific testing procedures and have access to specialized equipment for PdM analysis.

Several PdM testing procedures are employed by Jacobs:

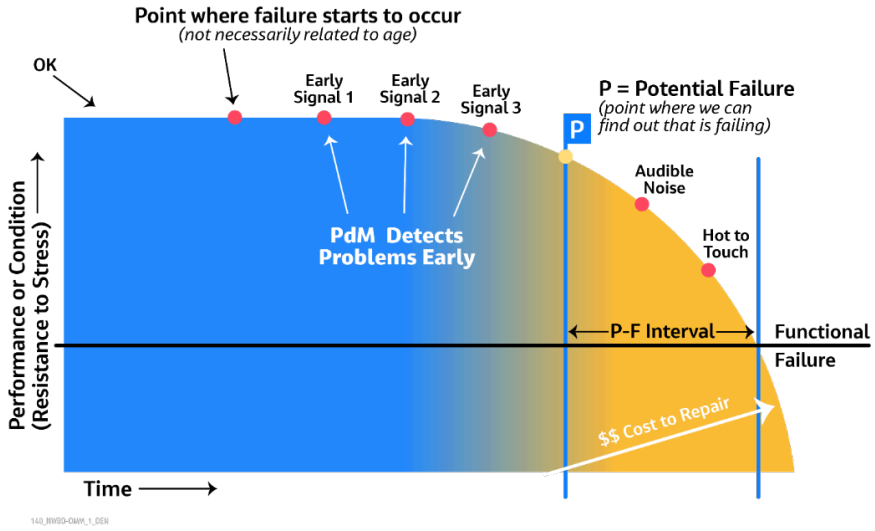
- Major power distribution components and the motor control centers (MCCs): infrared (IR) inspections are a very simple, non-destructive method of identifying anomalies that could lead to potential failures.
- Main pumping equipment: we perform routine vibration analysis and trend the data to provide for early detection of worsening conditions. Vibration analysis is used and trended to provide additional performance information, including optimum bearing life.
- Ultrasonic meters are used for precision bearing lubrication, first to determine the need for lubrication, then to apply the correct amount of lubrication to ensure the bearing is operating at peak efficiency. Ultrasonic testing is also done on all electrical panels and MCC's to determine the presence of loose connections or electrical faults.
- Large electrical motors: vibration testing, oil analysis, and temperature monitoring are components of our PdM program for large motors. All data is trended to provide early detection of potential problems.
- Emergency generators: in addition to our onsite staff maintenance, we use outside contractors who are experts in generator O&M. This PdM program includes many testing procedures, such as oil analysis, vibration monitoring, temperature monitoring, and IR inspections.
- Miscellaneous major equipment: to supplement our onsite PdM program we will use outside contractors with specialized skills to inspect and monitor major equipment condition. This will include HVAC systems, specific large air compressors, cranes, and other unique equipment types.

Inspection Procedures

Equipment and process inspection are the cornerstone of proactive maintenance and operation practices. An experienced operator or mechanic's senses can detect issues with both process and mechanical systems. Jacobs transcends the traditional five senses by augmenting staff experience with several technological methods designed to offer diagnostic precision for faults and defects.

An example of enhanced operator round effectiveness is the use of ultrasonic detection equipment to determine bearing lubrication intervals/repair of costly air leaks and/or an infrared meter for detection of loose electrical connections in a motor control center. Each of these items would generate costly repairs if left to the limitation of the five senses. By the time an operator or mechanic can detect a defect (in the yellow zone shown in Exhibit 2.B.11), significant damage has manifested in the component. Predictive maintenance technologies identify

EXHIBIT 2.B.11. EARLY DETECTION ENSURES REPAIRS ARE MADE AT THE OPTIMUM TIME



defects at the earliest stage and offer a medium for monitoring and trending the defect. The repair can be made at the optimum time for process continuity, safety, and preservation of critical asset components.

Equipment inspections are organized through Maintenance Connection, our computerized maintenance management system (CMMS). Many inspections are determined by manufacturer's recommendations. These include weekly, monthly, quarterly, semi-annual and annual intervals. Jacobs employs progressive maintenance philosophies to determine the best interval for optimum asset life. The administration of dozens of preventive, predictive and corrective work orders across thousands of assets is a daunting task that is met through planning and scheduling, augmented by CMMS and combinatorial optimization.

Jacobs utilizes proprietary PM optimization analysis software designed to eliminate wasteful PM work orders or activities within existing work orders that don't add value to asset preservation. Failure modes and effect analysis (FMEA) provides empirical data points for optimizing PM activities to reduce known failure modes. Maintenance Connection also has programming that optimizes intervals to reduce trips to pump stations, locations and individual assets. The overarching goal is to visit the assets when required yet with the minimum number of visits to a specific location or asset.

Combinatorial optimization is utilized in route optimization strategies. The permit requirements and operations standards outlined in Appendix 3 and Massachusetts regulations dictate specific intervals for maintenance activities. Pump stations will be visited every day. **Our route optimization techniques organize the work in such a manner that the required number of visits for each station is programmed to meet the requirement and reduce the amount of travel and increase efficiency.** It is nearly impossible to manually improve on combinatorial optimization. Jacobs uses these advanced technologies to strategically allocate resource to the greatest benefit of the organization. The result is more time spent on maintenance and reduced waste from duplicative activities.

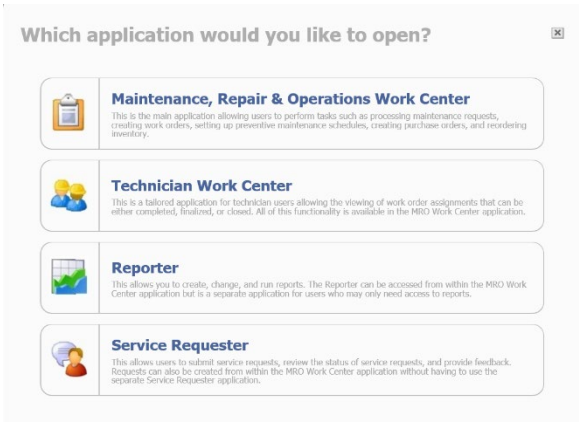
Maintenance Recordkeeping Process

Jacobs uses a computerized maintenance management system (CMMS) at all of our projects to manage assets. Our project standard CMMS is MC, however, we have experience with all leading CMMS products including Lucity. Our CMMS provides asset registry, maintenance scheduling, documentation, tracking, and equipment condition history into a computerized database that enables Jacobs to maximize equipment performance and minimize downtime. Using a centralized CMMS, such as MC, provides several quality tools that, when used effectively, facilitate better decision making, such as determining whether it is more cost effective to replace an older asset based on maintenance costs versus replacement costs.

Jacobs will transfer the available historical maintenance data from the City and input these values into MC. We will work with the existing contractor to extract database files for integration into MC to preserve asset history. Our technical team will enhance this information by conducting a condition assessment on all critical assets in the City's system. A condition assessment will guide initial maintenance efforts and identify any issues that require immediate attention

The work order includes the asset requiring service, the type of work order, e.g., corrective, emergency, preventive, etc., and the resources assigned to the task. Depending on the complexity of the repair, the work order may list several mechanics and a large collection of parts and tools. The planner/scheduler uses the work order system to assemble maintenance staff and the necessary parts for execution of the task. The number of hours spent performing the work, parts, sublets and any other costs are included in the work order. Each work order is finished the day the work is completed. The Maintenance Manager is responsible for validation and closing each work order. Accurate and careful recording of work order activities helps the project to conduct valuable analytical processes such as Failure Modes and Effect Analysis (FMEA). An FMEA helps define defect modes and provides valuable insights into eliminating defects and improving plant reliability.

EXHIBIT 2.B.12. INITIAL SCREEN OF JACOBS CMMS



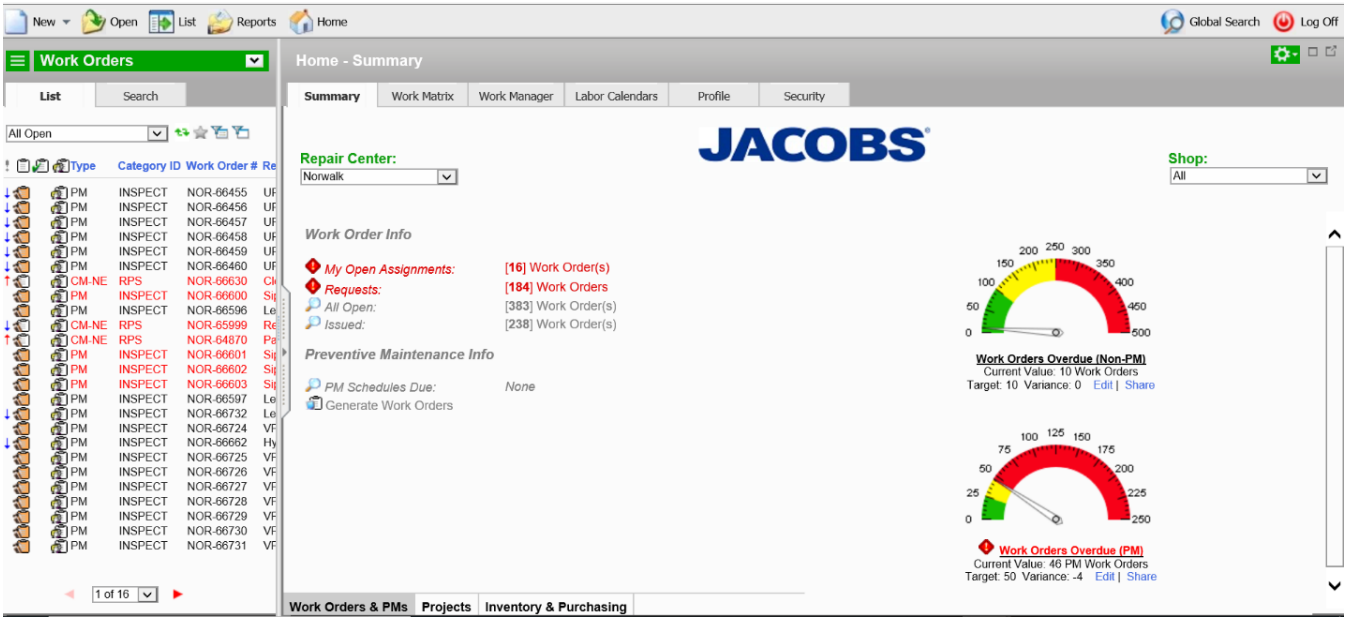
Computerized Maintenance Management System (CMMS)

Jacobs CMMS system offers a complete platform for managing the City's assets. The CMMS is a cloud-based system available on any internet capable Windows based device, including smart phones and tablets. The initial screen (Exhibit 2.B.12) offers the key elements of the platform.

Sample Outputs

The most used choice is the Maintenance, Repair & Operations Work Center, the nerve center of the CMMS. The first screen (Exhibit 2.B.13) gives an overview of maintenance activities with tabs to drill into the details of the program.

EXHIBIT 2.B.13. MAINTENANCE ACTIVITIES OVERVIEW SCREENSHOT FROM JACOBS CMMS



The Asset Registry contains all assets, organized by process. The registry contains all the critical information for each asset, including model number and serial number. Additional tabs are available to show asset history, PM maintenance, meter readings, costs, insurance and customizable fields to meet the requirements of the City's operational interests.

Maintenance activities are recorded on the asset with hours of effort and any additional costs.

Monitoring Measures

Effective monitoring is the collection of actionable data designed to improve the overall reliability and performance of the asset. Predictive maintenance technologies are appropriate for monitoring equipment condition and health. These technologies include vibration analysis, ultrasound analysis, oil analysis, infrared analysis and motor current analysis. Each of these disciplines offers a medium for trending

equipment condition over varying time intervals. As the criticality of the equipment increases, the frequency of monitoring and recording the condition of the asset or components increases. Highly critical equipment may be candidates for continuous monitoring.

Monitoring involves collection of information through one or more of the predictive maintenance technologies, recording the information, evaluating data trends, and taking action based on the incremental degradation of the asset or replaceable components. All assets have a degradation curve. The goal of effective monitoring strategies is to provide corrective maintenance at the point of the degradation curve that produces the greatest value to the organization in reduced costs and downtime.

Jacobs' approach to this important partnership considers total maintenance costs, asset condition, and estimated remaining life when making R&R decisions for facility assets. The benefits of our well-organized and integrated approach—which includes a comprehensive R&R Plan—yields improved performance and reliability, extended equipment service life, reduced maintenance and capital costs, more efficient use of labor, and reduced environmental risk for the City – we are committed to improving the condition of your facilities.

Overall Approach to Performing Repair and Replacement

With the last major upgrade occurring in the early 1990s Jacobs realizes the impact of assets nearing their original design life. **Jacobs' comprehensive Repair and Replacement (R&R) Plan is driven by our industry leading Asset Management Program approach which ensures protection of managed assets, system reliability and proactive repair, renewal, and replacement planning and financial forecasting.** Jacobs' R&R program is a risk-based strategy that examines not only the physical condition of an asset but also the related health and safety impacts, permit and environmental compliance as well as customer confidence and service reliability for the City and your constituents.

R&R Quality Control Process

Jacobs is committed to ensuring that the health of the City' managed assets is consistently maintained throughout the term of this partnership. Through regularly scheduled condition assessment, for all managed assets, R&R planning priorities are reviewed at regular quarterly intervals as well as after any safety, permit or compliance incidences. The review team includes local project staff in collaboration with regional O&M specialists, regional business manager and Jacobs engineering office team members. These important responsibilities are continually reviewed by our business risk assessment team as part of Jacobs' corporate oversight. Jacobs will always provide technically sound, cost effective, sustainable R&R solutions that take into account the mission and goals of the City and maximize return on investment.

Jacobs' Unique Capabilities Assist with Optimal Operations

Jacobs offers a unique set of capabilities in modeling, process design, and operations that gives us a keen understanding of the wastewater treatment plant, in particular the operation of the Primary/Secondary treatment systems, which is critical to ensuring that treatment is stable and at optimal performance to meet the regulatory requirements and to comply with the NPDES permit. A similar approach will be used for biosolids operations and to support the transition of biosolids treatment of from thickened sludge and to dewatered solids.

This collaborative combination of operations, maintenance, and process expertise will focus on optimally controlling the amount of solids within the aeration basins in order to achieve the CBOD and TSS solids reduction while maximizing nitrogen removal within the process units. By using our modeling tools and expertise, Jacobs can optimize the control settings for each of the unit processes to ensure reliable biological treatment, biosolids management, and effluent disinfection. Just as important, these models will manage and track various process parameters such as mixed liquor suspended solids (MLSS), mixed liquor volatile suspended solids (MLVSS) and dissolved oxygen (DO) levels throughout the activated sludge system; solids retention time (SRT), return activated sludge (RAS) rates and waste activated sludge (WAS) rates for maintaining the proper level of MLSS/MLVSS within system so that the secondary effluent CBOD, TSS and nitrogen levels entering the final stage of treatment—the chlorination and de-chlorination processes—meet the NPDES permit and Enhanced Limits requirements.

Routine monitoring and laboratory analysis are key elements for ensuring continuous and reliable treatment performance. Activated sludge systems are proven and reliable treatment processes, but as with any system, if the treatment process gets out of balance a possible plant upset may occur. Thus, the continuous monitoring of process parameters both upstream, midstream and downstream of the treatment processes is very important in providing timely information to operations on the condition and status of the treatment processes.

In addition to the NPDES permit monitoring requirements, frequent monitoring of the primary influent and effluent TSS, sludge pumping rates and sludge blanket levels will be used to ensure that influent solids are being rapidly removed providing high removal rates to minimize solids carry over to the activated sludge system.

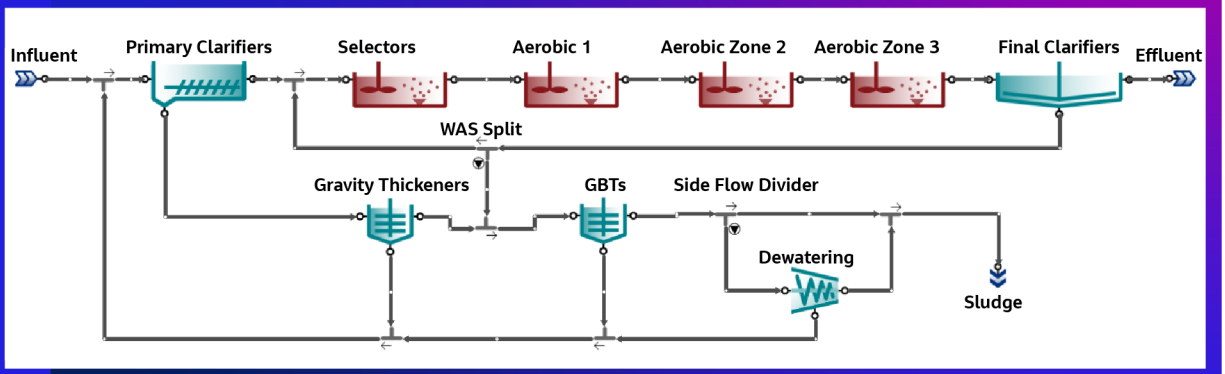
For biological treatment, the operation of the activated sludge system and secondary clarifiers will require monitoring of the influent and effluent quality of these treatment processes to ensure CBOD removal, nitrification/denitrification for nitrogen reduction and additional TSS removal prior to disinfection. For the secondary treatment processes, both hydraulic and solids loading rates will be monitored to avoid overloading. In addition, oxygen levels throughout the secondary treatment processes will be monitored and controlled to ensure that adequate dissolved oxygen is provided to achieve CBOD removal and nitrogen reduction.

Biological process models will be used to evaluate the whole treatment system for optimization opportunities. Jacobs will use our propriety Professional Process Design and Dynamics **(Pro2D)** to create a model of the New Bedford Wastewater Facility. We can simulate influent loadings and process changes to understand the impacts on treatment performance. Overall, Pro2D will be used to enhance the operation of the treatment system as a whole. In addition, our Pro2D model will be utilized for analyzing and optimizing the control setpoints for energy and chemical addition.

In addition, the process model allows operations staff to evaluate potential strategies for process optimization due to changing conditions in the influent flow and/or loads, to maximize chemical additions for odor control both within the collection system and the wastewater treatment plant, and to maximize chemical addition for the chlorination and dichlorination processes to ensure adequate disinfection is achieved prior to dichlorination.

Jacobs Pro2D Provides Proven, Accurate Modeling for Effective Facility Optimization

Pro2D is a whole plant simulator developed by Jacobs that facilitates the evaluation, optimization and design of WWTPs and documents all related process and sizing information. Technical operations specialists, process leads, and conceptual estimators use this tool to model individual unit processes and provide a comprehensive estimate of WWTP processing capacity under different scenarios.



Jacobs' combination of O&M, engineering and construction expertise all under one roof allows our engineering and process control technical experts to partner with our field O&M experts to create a powerful, experienced team with the tools such as Pro2D to tackle any challenge. This proven team approach provides our clients with high confidence that the analysis is complete and correct.

125_NWBD-OMM_PRO2D2TM

Finally, the whole plant design of the process model will allow for evaluation and optimization of the solids residuals treatment system. Whether providing solids treatment for sludge thickening or sludge dewatering, the Pro2D model can support operations in the better management and control of the chemical feed systems in order to ensure a minimum of 86% thickened sludge is achieved.

We discuss how we will establish plan optimization of nitrogen removal in *Section 2.F – Environmental Protection and Mitigation*.

Jacobs' Ability to Conduct Evaluations and Implement Improvements

We also have unique tools that combine sophisticated process modeling, detailed O&M pricing, and 40 years of inhouse operations data from hundreds of wastewater treatment plants to benchmark performance. This is a far more precise and credible set of tools than relying on textbook values alone.

Jacobs uses industry standard process models developed to design and optimize WWTFs. Jacobs' Professional Process Design and Dynamics (Pro2D) is one of the tools that will be used for energy auditing and process optimization.

Based on industry leading models for WWTFs—such as the International Water Association's Activated Sludge Model (ASM) 2D model for activated sludge, Pro2D tracks several wastewater process parameters from raw water influent quality, unit process influent and effluent parameters, and activated sludge conditions using kinetic and stoichiometric information within historical data ranges. Our team will be able to produce a comprehensive mass balance over the entire wastewater treatment plant, including plant recycles, which allows us to predict the impacts of changes made to the plant in terms of both effluent quality and solids handling requirements.

Pro2D offers several benefits, particularly speed and ease of use. When calculating capacities at WWTFs, it allows engineers to complete roughly a week's worth of hand calculations in less than two hours. Using Pro2D, our engineers have developed preliminary process models for the wastewater treatment plant based on the existing operation conditions. The models can be further adjusted to evaluate the biological treatment and unit process options possible to achieve optimum process performance with the goals to reduce energy consumption (which reduces the cost to the City) and general operating costs within the plant's process areas including biosolids treatment and chlorination/de-chlorination. These adjustments will be carried out without compromising current effluent quality and quantity as well as solids production.

Operating Protocols / Unit Process Control Procedures

Our operational strategy will be based on New Bedford's permit requirements, influent characteristics, plant configuration, and existing operations data. Building on this information, we will develop unit process control procedures (UPCPs) for each of the unit processes (I.e., preliminary treatment, primary treatment, secondary treatment, chlorination/de-chlorination, biosolids thickening and biosolids dewatering) to achieve our treatment objects and to meet all regulatory and enhanced treatment requirements. An additional key element to the overall operations of the treatment plant is our Operations Strategy which incorporates all elements of the project from how sewage is managed coming into the treatment plant through the treatment process until final disposal (effluent discharge via the outfall and biosolids disposal by the City).

Process Control Monitoring

Most of what is accomplished in a WWTF is not readily visible. We must understand the status of treatment processes through the collection and analysis of data to optimize treatment. Jacobs understands that the operations team must carefully design a process monitoring plan to "see" the status of each treatment process. Further, the integrity of that data must be protected through each stage of collection, transport, storage, and analysis for resulting data to truly represent the condition of the processes.

Our process monitoring plan will include parameters to be analyzed, sampling frequencies, and locations. We include a location map of all permit and process sampling locations, type, and frequency of the sample. After we assume operations and begin to make process adjustments, firming up a functional operational strategy and establishing a steady state operation will be our primary focus. Subsequently, this plan will be reviewed as process changes dictate to ensure we are collecting the samples needed to fully visualize the status of treatment processes. All operations staff are trained on this plan at least annually or when there are changes and are involved in the review process.

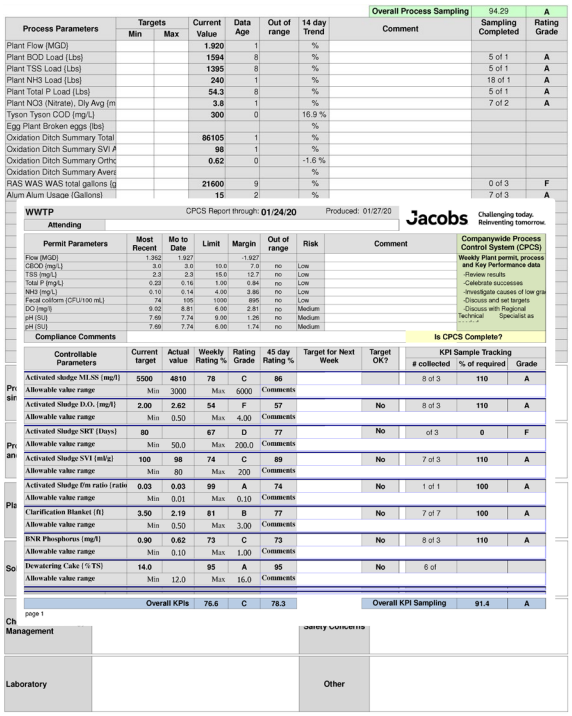
Process Control Tools

Process Control Tools (Exhibit 2.B.14) are the mechanism for applying science to the task of controlling treatment processes. Examples include SRT, food to mass ration (f/m), and other calculations. These tools consist mostly of calculations set up in the operational data management software called Hach WIMS.

Perhaps one of the most important distinctions of Jacobs is the unique ability to design completely new systems that deliver excellence. **Jacobs' Company-wide Process Control System (CPCS), developed with HachWIMS, is one of the newest innovative developments of Jacobs and far exceeds industry standard practices.** We have developed CPCS that makes full use of plant data and modeling in a fully scientific approach to Process Control. The core of the CPCS focuses on control and results. For each step of a treatment process operating parameters, control points and results are determined.

In 2019, Jacobs completed a comprehensive plan to revolutionize the optimization of plants and monitor site specific conditions in a meaningful way. **New Key Performance Indicators (KPIs) were designed to surpass the metrics used in the past.** The KPIs in this new system measure the performance of operators in terms of how well they achieve the targets for each parameter that they can control. The KPIs are set up in a grading system (A-F) that is simple to understand and easily recognizable.

2.B.14. Company-wide Process Control System: A new system of KPIs and Process Control Optimization



Process Parameters	Targets Min	Targets Max	Current Value	Data Age	Out of range	14 day Trend	Comment	Sampling Completed	Rating Grade
							Overall Process Sampling	94.29	A
Plant Flow (MGD)			1.920	1		%			
Plant BOD Load (Lbs)			1594	8		%		5 of 1	A
Plant TSS Load (Lbs)			1395	8		%		5 of 1	A
Plant NH3 Load (Lbs)			240	1		%		18 of 1	A
Plant Total P Load (Lbs)			54.3	8		%		5 of 1	A
Plant NO3 (Nitrate), Dly Avg (m			3.8	1		%		7 of 2	A
Tyson Tyson COD (mg/L)			300	0		16.9 %			
Egg Plant Broken eggs (lbs)						%			
Oxidation Ditch Summary Total			86105	1		%			
Oxidation Ditch Summary SVI A			98	1		%			
Oxidation Ditch Summary Orthc			0.62	0		-1.6 %			
Oxidation Ditch Summary Aver						%			
RAS WAS WAS total gallons (g			21600	9		%		0 of 3	F
Alum Alum Usage (Gallons)			15	2		%		7 of 3	A

WWTP — CPCS Report through: 01/24/20 — Produced: 01/27/20 — Jacobs — Challenging today. Reinventing tomorrow.

Attending

Permit Parameters	Most Recent	Mo to Date	Limit	Margin	Out of range	Risk	Comment
Flow (MGD)	1.362	1.927		-1.927			
CBOD (mg/L)	3.0	3.0	10.0	7.0	no	Low	
TSS (mg/L)	2.3	2.3	15.0	12.7	no	Low	
Total P (mg/L)	0.23	0.16	1.00	0.84	no	Low	
NH3 (mg/L)	0.10	0.14	4.00	3.86	no	Low	
Fecal coliform (CFU/100 mL)	74	105	1000	895	no	Low	
DO (mg/l)	9.02	6.81	6.00	2.81	no	Medium	
pH (SU)	7.69	7.74	9.00	1.26	no	Medium	
pH (SU)	7.69	7.74	6.00	1.74	no	Medium	

Companywide Process Control System (CPCS)
Weekly Plant permit, process and Key Performance data
-Review results
-Celebrate successes
-Investigate causes of low gra
-Discuss and set targets
-Discuss with Regional Technical Specialist as

Compliance Comments — Is CPCS Complete?

Controllable Parameters	Current target	Actual value	Weekly Rating %	Rating Grade	45 day Rating %	Target for Next Week	Target OK?	KPI Sample Tracking # collected	KPI Sample Tracking % of required	KPI Sample Tracking Grade
Activated sludge MLSS (mg/l)	5500	4810	78	C	86			8 of 3	110	A
Allowable value range	Min	3000	Max	6000	Comments					
Activated Sludge D.O. (mg/l)	2.00	2.62	54	F	57		No	8 of 3	110	A
Allowable value range	Min	0.50	Max	4.00	Comments					
Activated Sludge SRT (Days)	80		67	D	77		No	of 3	0	F
Allowable value range	Min	50.0	Max	200.0	Comments					
Activated Sludge SVI (ml/g)	100	98	74	C	89		No	7 of 3	110	A
Allowable value range	Min	80	Max	200	Comments					
Activated Sludge f/m ratio (ratio	0.03	0.03	99	A	74		No	1 of 1	100	A
Allowable value range	Min	0.01	Max	0.10	Comments					
Clarification Blanket (ft)	3.50	2.19	61	B	77		No	7 of 7	100	A
Allowable value range	Min	0.50	Max	3.00	Comments					
BNR Phosphorus (mg/l)	0.90	0.62	73	C	73		No	8 of 3	110	A
Allowable value range	Min	0.10	Max	1.00	Comments					
Dewatering Cake (%TS)	14.0		95	A	95		No	6 of		
Allowable value range	Min	12.0	Max	16.0	Comments					
	Overall KPIs		76.6	C	76.3		Overall KPI Sampling		91.4	A

page 1

Management — Safety Concerns — Laboratory — Other

Our CPCS system begins by using our process modeling (Pro2D) and engineering capabilities to predict the upper and lower bounds of proper operating targets. These are used as the starting point, and over time we add multivariate analysis using site specific data to verify and zero in on targets that guarantee maximum performance of your facility.

In order to assure that operating staff are meeting these targets, reports are sent automatically from CPCS database to a highly experienced process analyst (regional technical specialist), the project manager as well as other area and regional managers to assure that the project process control plan is within the agreed upon parameters to optimize treatment and to meet all regulatory permit and enhanced effluent parameters. The ultimate benefit to this approach is that the proper quality controls are in place to continuously support the operations of the treatment facility. We will establish a system of regular empirical measurement verification so the data that go into these calculations are demonstrated to be meaningful. Examples include draw-down tests, bucket tests, and comparison of redundant flow meter readings.

Plant Data Management

Every plant needs a single place where all plant operational and compliance data are managed. Data from the field and from the lab will be entered into the Hach WIMS database and need not be entered anywhere else. From this single repository of data, a staff can make process calculations, generate regulatory reports, and create graphs and tables that reveal status and trends in the operation. This last function is the equivalent of backing up to the figurative 30,000 feet to see plant from a broader perspective; it is necessary for a responsibly run plant. Data from Hach WIMS can also be input into the Pro2D process model to support process control and optimization decisions for the treatment processes.

With appropriate protection against data corruption, the Hach WIMS will be accessible to all operators and each will be able to create formulas as needed to understand and exert control over their assigned process.

A database must be current to be useful as a window into the status of processes. Jacobs will assign responsibility for data entry so that data is current, usually within 48 hours of its availability.

Energy and Chemical Management and Optimization

Innovative Idea – Blower Modification

Our initial comparison of the observed DO compared to industry standards suggest that the bioreactor system is over-aerated. Reducing the DO would result in energy savings, providing that the single stage blowers can turn-down sufficiently to meet the lower aeration demand. This issue, and **our proposed energy-saving solution, is discussed in further detail in *Section 2.F – Environmental Protection and Mitigation*, under the subsection titled "Establishing Plant Optimization of Nitrogen Removal".**

Liquids and Sludge Hauling Approach

Jacobs will be responsible for solids handling, solids treatment, odor control associated with the biogas from the biosolids treatment facilities and the coordination of solids disposal with the City's contractor Synagro.

Jacobs currently works with Synagro on several of our projects, and we have a great working relationship with them. Some of these projects we have direct contact responsibility with them while on other contracts the Client has this responsibility. In either case, our historical working relationship with Synagro is excellent and we look forward to the opportunity of working with them on this project.

For the treatment of biosolids, we understand that the City may want to thicken biosolids during certain periods and dewater biosolids during other times to minimize disposal costs whenever possible. Either option for biosolids treatment creates no problem for Jacobs: Nearly all our wastewater treatment projects under contract operations involve some aspect of biosolids management and processing of thickened or dewatered sludge. **Our biosolids programs successfully manage the treatment and disposal (and beneficial reuses, when applicable) of over 40,000 dry tons of solids every year.**

Our operations team is highly experienced with biosolids treatment—both in biosolids thickening and sludge dewatering. Jacobs will develop and implement standard operating procedures for the efficient and smooth switchover between biosolids thickening and biosolids dewatering operations to meet the demand requirements of the City. In addition, unit process control procedures and standard operating procedures will be developed by Jacobs for biosolids thickening with the gravity belt thickeners and for biosolids dewatering with the centrifuges.

Jacobs' Extensive Centrifuge Dewatering Experience

Jacobs has garnered proven expertise from its experience on more 200 centrifuge installations, including:

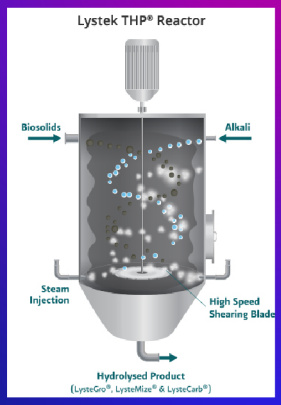
- ✓ *Changi, Singapore: the world's largest with twenty 40-inch diameter Westfalia centrifuge units;*
- ✓ *Green Bay, Wisconsin: the 1st 1,000 gpm and largest Centrisys THK centrifuge unit;*
- ✓ *Columbus Southerly, Ohio: with 5 Andritz D12LL 43-inch diameter machines;*

And numerous startup, commissioning and optimization projects for dewatering centrifuges of all makes, models and sizes. The Jacobs O&M team will be supported by Todd Williams and Dave Oerke, both nationally recognized biosolids dewatering experts.

163_NWBD-OMM_1_DEN

Lystek Thermal Hydrolysis Process (THP)

Lystek THP is a unique, physical-chemical thermal hydrolysis process employing high-speed shearing, alkali and low-pressure steam injection. This system is modular, scalable and cost effective. The technology can process raw or waste activated sludges to produce a multi-purpose, hydrolyzed product with multiple potential benefits for full-cycle resource recovery: 15% TS Class A quality liquid biosolids product that can be subsurface injected.



175_NWBD-OMM_1_DEN

It is anticipated that dewatering operations would only occur for an interim period to address unforeseen circumstances related to liquid disposal options. Biosolids treatment and disposal typically represent some of the largest costs at wastewater treatment facilities and carries a certain risk. Jacobs objective is therefore to provide the City with the flexibility to change the biosolids handling methodology as needed by having established plans in place to make the switch when requested and ensuring that the dewatering equipment is maintained in full operating condition. Further, Jacobs is prepared to offer a range of services to optimize both the existing thickening operation. Jacobs plans to leverage our industry experience in biosolids to optimize the current thickening operations to increase the total solids percent and thus minimize amount of volume required to transport. **Our experience shows that an increase of 0.5% to 1% TS could be achieved—which would translate to a potential cost savings in reduced hauling costs for the City.**

Our fully integrated firm has the capability to evaluate various options when the current Synagro contract expires. A recent example is our work with our client in Michigan, South Huron Valley Utility Authority (SHVUA), to implement an alternative biosolids disposal option that produced a lower life cycle cost for the client.

> *"The transition from our former operator (Suez) to Jacobs has been surprisingly pleasant. Jacobs' staff seem exceedingly knowledgeable in all aspects of wastewater treatment and have done an exceptional job of making our plant look and run better in just a few months."*
>
> —Firooz Fath-Azam, South Huron Valley System Manager, 734-486-2393, Transition Date – January 2019

173_NWBD-OMM_1_DEN

Training

Jacobs' commitment to excellence begins with a commitment to people. Jacobs recognizes that employee training is a critical element to successful O&M and employee satisfaction, and we anticipate over 2,000 hours of O&M training in the first year for the New Bedford staff. Our Employee Training Plan emphasizes a continuous learning environment that encourages and rewards staff for attainment of certifications and credentials that empower them with skills and knowledge to deliver top performance in an ever-evolving environment.

At Jacobs, we train to retain

Retention of newly-learned skills requires applied training materials customized to the participant's work environment, coupled with post-class assignments, all designed to help the participant apply what they have learned at the point of work. As a result, they become more empowered and engaged in their jobs. This focus and attention we give our employees has resulted in Jacobs being named by Fortune Magazine and Business Insider numerous times as one of the

"50 Best Companies to Work for in America."

116_NWBD-OMM_1_DEN

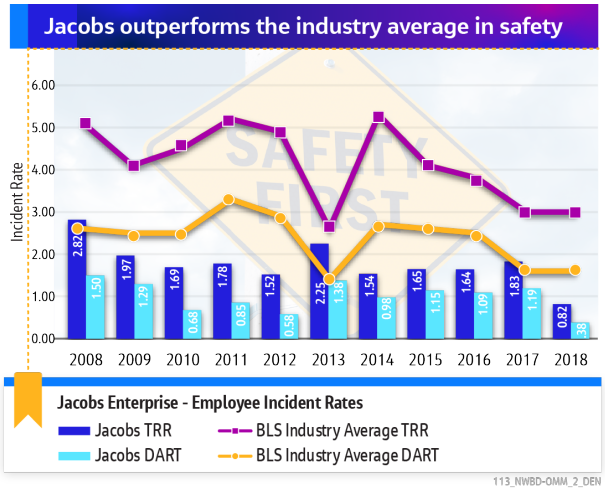
Effective, comprehensive training and certification are some of Jacobs' most important service offerings, directly affecting our people's performance quality, skill mix, morale, and long-term potential and growth. Our focus on employees and their careers has led us to be consistently ranked highly in employee satisfaction by Fortune Magazine and other industry publications. A further discussion of our Training approach is located with our Staffing Plan section.

Commitment to Health, Safety and Security

Echoing the City's commitment to superior health and safety (H&S), Jacobs continually strives for a strong culture of caring with the goal to consistently deliver an incident and injury free environment for all our people. **We have a long history of keeping our employees safe and consistently outperform the industry average in safety**, as seen in Exhibit 2.B.15.

Jacobs' Culture of Caring, called BeyondZero™, empowers our employees to create and sustain a positive, safe and healthy work environment for themselves and colleagues, and extends to the communities we serve. It also mirrors our respect for the environment with tools and solutions we employ to contribute to sustainable business practices. Our culture and our people go beyond following rules, procedures, and processes. Our goal is beyond driving statistics to zero. We believe our culture will make our people and communities safer and healthier. We look for ways to recognize and mitigate risks, on and off the job, and we have created a culture of caring where genuine concern for each other makes it impossible to tolerate unsafe conditions or behaviors.

EXHIBIT 2.B.15. JACOBS OUTPERFORMS INDUSTRY AVERAGES IN SAFETY YEAR AFTER YEAR



113_NWBD-OMM_2_DEN

Jacobs will submit a Safety and Security Plan within 45 days of the Commencement Date. During our site visits, we observed some distressing safety issues that we would resolve as part of the transition activities in the first months of operations, as demonstrated in Exhibit 2.B.16. In additional to these examples we noted nearly two dozen safety issues that we intend to correct as a part of our O&M Plan implementation.

We will also appoint a Safety Committee that will file a copy of any safety recommendations and accident reports, as outlined in Schedule 2 of the RFP. Jacob's takes a comprehensive view to safety responsibility. Supervisors, team leaders, managers, and staff have a special obligation through their own actions to create a safety culture and climate where those around us share concern for their personal safety as well as the safety of their co-workers. Safety leadership starts at the top of each company and flows down. With the total commitment to safety at the corporate level, this commitment then flows to the Regional Director and Project Manager, then to function leaders such as Operations Manager and the Maintenance Manager, and on to other leaders and all workers. The commitment and culture are to always achieve excellence in all areas of H&S performance. **All Jacobs employees are empowered and required to make H&S and zero injuries a reality at each job task.**

Accident Prevention Plan

In conjunction with the development of the O&M Plan, we will create a site-specific Accident Prevention Plan (APP) to ensure the safety of our employees and to protect the City's equipment and environment. The APP and procedures complement our corporate policies. Our H&S team will evaluate and tailor the APP and procedures to align with best practices, changes in laws and regulations, established Jacobs H&S work procedures, and the City's required components outlined in Schedule 2.7. It will include but not be limited to, operations, maintenance, safety management skills, laboratory, energy management, chemical handling, confined space entry, emergency response, and safety equipment use.

Project Manager Mike Arnold is responsible for the implementation of the safety program and will be closely supported by Regional H&S Manager David Haverly.

Employee training is a critical element of Jacobs' safety program. Prior to starting at a project, the Regional H&S Manager JD Verbrugge will review each task and determines the required training for each employee and enters this information into our training tracking system (HandS). This process will start during the transition period and continue as an ongoing requirement for all employees associated with the City's facilities.

Safety Focus Contributes to Great Performance at the City of Clovis

No cost saving, compliance or optimized process is worth risking the safety of operators or the public. That is why safety is the core of our operations approach. We train our staff to think about safety first and foremost, and we reinforce the importance of safe behavior and protocol in morning meetings, 'tailgate' sessions and formal, classroom learning. At Clovis, our small and tight-knit staff also create an atmosphere of caring. As a result, our staff has not had an OSHA recordable safety incident or injury since we began operating the facility in 2009.

115_NWBD-OMM_1_DEN

BeyondZero℠

BeyondZero® is about keeping our people safe. That means not getting injured, not allowing others to be injured, and not allowing unsafe practices, behaviors, or conditions to exist. It's about creating a culture of caring by actively engaging and involving employees and influencing their beliefs and behaviors.

105_NWBD-OMM_2_DEN

Safety Focus Contributes to Great Performance at the City of Clovis

No cost saving, compliance or optimized process is worth risking the safety of operators or the public. That is why safety is the core of our operations approach. We train our staff to think about safety first and foremost, and we reinforce the importance of safe behavior and protocol in morning meetings, 'tailgate' sessions and formal, classroom learning. At Clovis, our small and tight-knit staff also create an atmosphere of caring. As a result, our staff has not had an OSHA recordable safety incident or injury since we began operating the facility in 2009.

115_NWBD-OMM_1_DEN

EXHIBIT 2.B.16. CURRENT SAFETY DEFICIENCIES AND JACOBS' PROPOSED CORRECTIONS

Current Safety Hazard Deficiencies and Jacobs' Proposed Solutions

Safety Deficiency | *Jacobs Solution*

Fall hazards include the upper level in the Grit Garage, which has openings in the grading and around the window and open wet well pits in the suction style pump stations.

In the E. Rodney French and Cove Rd pump stations, there is no guardrail or sections of the guard have been removed, exposing an employee to a potential fall.

Jacobs will place guard railing or cover over openings with grading/covers to protect employees.

Need for fall protection was found for all locations with exterior wet wells and Can stations when the hatches are being opened, exposing employees to an unprotected edge.

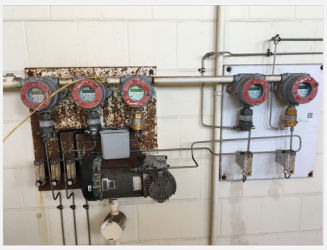
Jacobs would install of safety netting or safety hatch systems to protect workers when opening — providing fall protection during the daily inspections when lids need to be opened only for a visual inspection.

Equipment guarding was missing, exposing employees to rotating parts on numerous pieces of equipment, including pumps and motors at the WWTF; motors and chain driven equipment such as bar screens at the pump stations; and all 8 primary sludge pumps; primary scum pump; odor control pumps; belt press pumps; blended sludge pumps; and all the piston pumps for the thickened primary sludge.

Jacobs will install guarding to prevent accidental contact.

Non-functioning ventilation and gas detectors were observed at several pump stations and locations that had gas monitors installed, leaving workers exposed to potentially hazardous atmospheres by having to enter the space to take air readings, and require inspection and repair.

Jacobs will evaluate needs and replace, repair or install ventilation and gas monitors were needed.



Additional issues were found throughout the facility, including exposed electrical lines and boxes, use of extension cords for permanent wiring, blank Lockout Tags, expired fire extinguishers, improper storage of chemicals, inadequate stair/step protection, inadequate ventilations, trip and slip hazards from hoses/cords and spills, and non-functioning emergency lighting at different locations.

Jacobs will apply our standard safety approaches to correct these deficiencies. Safety is our top priority for our clients and personnel.

Positive Mental Health

Our employees are our most important assets. We believe that each employees' mental health has a direct impact on safety, morale and productivity. Jacobs has implemented a Positive Mental Health program that allows employees to receive support for mental disorders, financial, legal questions, and other well-being issues.

Jacobs initially launched mental health training in November 2016 as part of our global mental health matters' strategy and now has over 1,200 positive mental health champions across the globe. These individuals are trained in how to guide staff who have mental health concerns or crises to the appropriate level of help. The goal of this network of champions is to raise awareness of the risks of mental health and encourage open dialogue about mental illness.

Examples of our culture of caring in practice over the past year also include industry-leading progress in mental health and risk management programs. In April 2018, Jacobs received a Gold Award in the Mind Workplace Wellbeing Index, recognizing our efforts embedding mental health into our policies and practices, demonstrating our long-term commitment to the mental wellness of our employees.

132_NWBD-OMM_2_DEN

Security

Understanding plant security has become an important concern of major cities and utilities around the country and around the world. **Jacobs brings the City unmatched experience in providing physical security for drinking water and wastewater utilities.** Unlike security firms that specialize in a few types of security systems or have limited experience with wastewater utilities, Jacobs' security team brings vulnerability assessment, design and implementation experience, as well as the wastewater system knowledge needed to identify potential weak points.

We will develop a site-specific Security Plan for the City to review that incorporated elements in draft Schedule 2.7 of the RFP as part of our Safety and Security Plan. It is Jacobs policy to provide a secure work environment for our employees and guests and to proactively protect our information and property by requiring compliance with the established industry standards and best security management practices. Our security plan will address crisis management, business continuity, relocation and evacuations, and general security at the project.

Any and all persons entering the facility shall be identified and provide appropriate documentation of authorization to have such access and all gates, access points and doors to the facilities and structures at the Wastewater Facility will be kept locked, as required in Schedule 2.7 in the RFP. In addition to our standard security and asset protection procedures, we will focus on improving physical security for the City's managed assets. Ultimately, we will bring a "Culture of Safety and Security" to this project, as we do at all of our O&M projects.

Cybersecurity

Jacobs is a leader in cybersecurity and has done work for confidential clients and agencies like EPA. Water and wastewater controls systems have become a target for hackers, and cyber-attacks are on the rise across all sectors of the economy. Jacobs is expert at evaluating the Information Technology and Cybersecurity (ITC) needs for our clients, both from an engineering and operational perspective. For example, we have implemented one of the most sophisticated cybersecurity evaluations and real-time threat monitoring systems in the industry at our North Miami Beach WTP, in conjunction with preparations for this year's Super Bowl. We can offer the City cybersecurity options it wishes to include in the tailored Safety and Security Plan we develop with you.

Example Safety and Security Plan

A detailed example of Jacobs Health, Safety and Security Plans including the APP and training activities is provide Section *6.1 – Supplemental Information.* It also includes potential cybersecurity components of for our Safety and Security Plan. Written policies and procedures can be a very effective way to increase the safety and security posture. When all staff members take personal responsibility for the safety and security of the facility and are encouraged to speak up when something is not being done correctly, it empowers staff to take pride in their facility.

Transparency and Open Communication/Reporting to the City

Jacobs overall O&M approach is based on establishing a trusting partnership devoted to delivering safe, compliant, and efficient operations to your wastewater customers. **From Day 1, you can expect a partnership focused on collaboration, communication, transparency, and a commitment to be a good corporate citizen.** Our plan places significant emphasis on providing full access to your data so you can be aware of all aspects of your operations.

> Customer service and client centricity form the hallmark of Jacobs' performance and represent an important reason why clients choose to do business with us. Jacobs' commitment to providing exceptional customer service to our clients extends to the communities we serve and includes a strong emphasis on being a good corporate citizen.

Communication is critical to our mutual success and is reflected in our proposed procedures. We encourage day-to day communication between City and Jacobs staff at all levels, and empower decision making throughout our organization to provide you with immediate attention and response, enabling you to focus on your priorities. We will share our insight, experience, suggestions, and innovative approaches to earn the City's confidence and trust that we are providing the highest level of service at all times. **We will work with the City and provide continual and transparent communications and reporting such that the City is "up to speed" if an issue does arise, so resolutions can be made quickly and without interruption to services.**

Our project communications plan will be updated during negotiations to include the expectations outlined in the Agreement, as well as any other preferences your staff may have. Our Project Manager Mike Arnold and his/her entire team will promote the flow of information and transparency, following our typical communication structure shown in Exhibit 2.B.17. In addition to frequent informal communications daily, our program includes formal weekly, monthly, and quarterly meetings to review plant performance, maintenance activities, and scheduled service to major unit processes.

EXHIBIT 2.B.17. JACOBS' TYPICAL COMMUNICATION STRUCTURE TO FACILITATE TRANSPARENCY AND COLLABORATION

WHEN		WHAT	WHO
Day-to-Day	Meetings & Discussions	» **Open exchange of information to ensure transparency and collaboration**	» City/Jacobs Supervisors and Project Management Teams
Weekly	Weekly Meeting	» Review the previous week events » Discuss future week plans » Document decisions	» Jacobs Project Manager and City Operations Administrator
Monthly	Monthly Reviews	» **Progress update and collaboration** » **Review process performance** » **Review maintenance performance** » **Review CIP and impact to operations**	» City/Jacobs Project Management Teams
Quarterly	Quarterly Business Review	» **Review quarterly progress** » **Discuss future objectives and opportunities for continuous improvement**	» Jacobs Regional Management » City/Jacobs **Project Management Teams**
Annual	Annual Innovation Workshop	» Review prior year's accomplishments while establishing new goals and objectives for the following year to ensure continuous improvement	» Jacobs Executive Team » External Jacobs Utility Experts » City Leadership Team » City/Jacobs **Project Management Teams**

112_NWBD-OMM_2_DEN

Annual Innovation Workshop

As an enhancement to the traditional management approach, we are including an Annual Innovation Workshop aimed at continuous improvement of the partnership. For this important gathering, **we'll bring together our executive sponsor and a team of O&M resources, plus three hand-selected utility experts chosen to reflect then current needs, to review the prior year's accomplishments and establish new goals that address the City's evolving needs and long-term vision.** This

important annual meeting is a way to ensure the program is continuously looking forward to future needs and trends to ensure our operations partnership remains on a path of continuous improvement while avoiding complacency.

Transparent Reporting

Jacobs will provide and maintain well-documented records of operations, maintenance, laboratory, personnel, training, safety, process control, daily inspections, materials, alarms, and any other significant events. All records and reporting will meet MADEP requirements as well as those required by the City. Our goal is to serve as an extension of your staff and bring the best value to your customers. In addition to the compliance and NPDES discharge reporting we discuss in *Section 2.G – Process Monitoring, QA/QC Reporting to City and Regulatory Agencies*, Jacobs will also maintain records and prepare reports to the City and other project stakeholders (as appropriate) that will include:

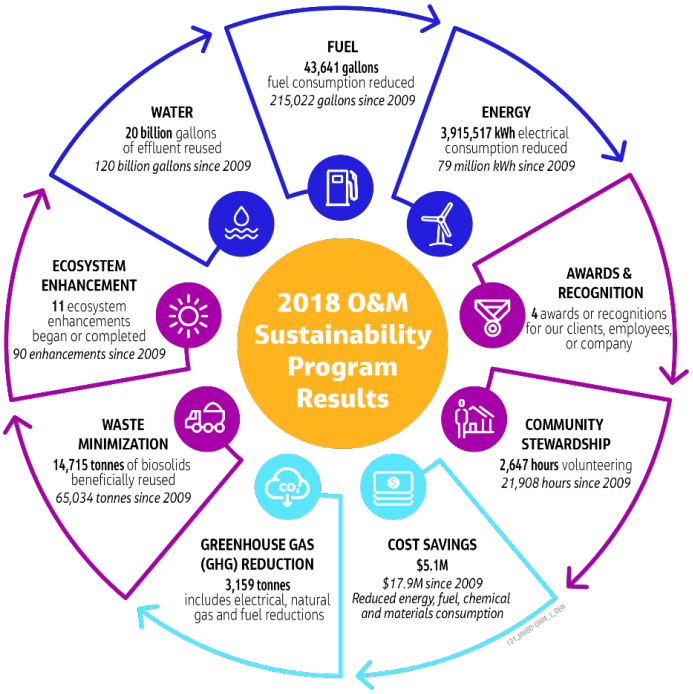
- **Monthly Operations and Maintenance Report** – Jacobs' Project Manager Mike Arnold will be responsible for preparing and delivering to the City a detailed Operations and Maintenance Report. The report will include: O&M activities; process control regulatory activities and issues; laboratory analyses performed, staffing and resources (including any changes in personnel);health and safety(including accidents records); training activities; process control; daily inspections; IPP activities; significant alarms; maintenance plans and activities; permit and compliance results; equipment status; and other relevant information.
- **Annual Report** – Jacobs' O&M team will be responsible for preparing and presenting to the City an Annual Operations Report that would review the past year's activities and planned activities for the upcoming year. This report will be provided to the City within 45 days of the end of the year and would cover: recommended capital repairs and replacements as well as recommended capital improvements; annual flows of wastewater treated; and financial issues, including actual expenditures and any adjustments required in annual payments. In support of this Annual Report, Jacobs will also prepare a listing of Recommendation for Additional Capital Improvements, which would be provided to the City 60 days prior to the end of fiscal year.

Commitment to Community Benefits and Sustainable Operations

Jacobs is aware of the City's signatory to the US Conference of Mayor's greenhouse gas goals for 2028, thereby making sustainable operations and achieving measurable results important to this project. Jacobs shares this commitment to sustainability. We first launched our OM Sustainability Program in 2009 and have produced outstanding results for our O&M clients as shown in Exhibit 2.B.18. Producing real impact, the program drives continuous improvement focused on **reductions and/or savings in chemicals, energy, fuel, water use, waste minimization, or emissions.**

Another key component of our O&M Sustainability Program is to help build and support sustainable communities. As such, we also focus on fostering stewardship activities related to community enhancement projects or environmental benefits such as transitioning to durable goods or local ecosystem restoration.

EXHIBIT 2.B.18. JACOBS' O&M SUSTAINABILITY PROGRAM SUCCESSES



Community Engagement

Jacobs' O&M Team Excited to Continue Our Involvement in New Bedford Community

Jacobs recently helped sponsored the Bike New Bedford Day, put on by the City's Parks, Recreation & Beaches, and Planning departments. Jacobs staff manned an informational both and participated in the event, which highlighted the City's efforts to make New Bedford more bike and pedestrian-friendly. Our O&M team is excited to continue Jacobs' involvement and support of programs and events that benefit the New Bedford community.

123_NWBD-OMM_1_DEN

Jacobs staff are active in all the communities where we operate, and **community involvement in the greater New Bedford area will be a part of our O&M Plan**. We are excited about the vitality of the New Bedford community and have already participated in the recent Bike New Bedford Day event. We look forward to supporting and engaging with the diverse opportunities the New Bedford community presents.

Jacobs' community engagement activities will be tailored to the City's values and interests and could include:

- Educational outreach—particularly with a STEM focus
- Community environmental stewardship such as participating in future outreach involving water/wastewater services
- Support of various organizations such as the Pioneer Valley Riverfront Club events,
- Support for vulnerable communities such as the Meals on Wheels and food pantries
- Partnerships with local organizations to support economic and community development such as the local chamber of commerce.

122_NWBD-OMM_SustainableCommunity

In 2018, Jacobs' O&M staff tallied 2,647 hours of community volunteering among our 263 project sites, and 21,908 hours total since 2009.

Unique Opportunities for STEM Education and Community Benefits

We see a unique opportunity to partner with local colleges such as Bristol Community College and its wastewater treatment plant operators and laboratory technologies program to provide internship opportunities for study areas relevant to the treatment plant's work. We discuss our plans for this paid internship program in *Section 2.C – Staffing Plan*.

Additionally, we regularly reach out to local elementary, middle and high schools to establish relationships and curriculums for the student that teach them about the role of treatment plants and the science behind them. Students then visit and tour the plant to see the science in action. Educating adults and the community at large is another component of our STEM education focus. At community events and local Earth Day events, for example, we can bring our wastewater treatment booth that educates the community on the value of wastewater treatment and how it works. Kids and adults alike love to learn about the "bugs" that make it possible.

Site Tours

Jacobs intends to conduct site tours throughout the year at the WWTF. The purpose of these tours is to increase the public's awareness and understanding of wastewater treatment, and the public's role in pollution prevention. Jacobs plant tours will be tailored to various types of tour participants and in addition will make available educational materials for tour participants to read about the facilities and wastewater transportation, operations and treatment.

Jacobs is committed to making a positive impact in the communities we serve, particularly with STEM education programs. For the past 3 years, Jacobs' O&M team at the Lehigh County Authority project in Pennsylvania have sponsored Hydromania, where more than 1,400 students have learned about water treatment, water supply and public health. Jacobs' Lehigh project leadership used the project's bench-scale filtration system of anthracite and sand to show students how water treatment systems can transform dirty river water into cleaner water.

118_NWBD-OMM_CommunityEngagement_Lehigh

Additional O&M Plan Elements

Additional elements of our O&M Plan are discussed in other sections of our proposal:

- Detailed training approach in *Section 2.C – Staffing Plan and 6.0 Supplemental Information*
- Approach to staffing schedules and shifts in *Section 2.C – Staffing Plan*
- Emergency response in *Section 2.E – Emergency Operations and in 6.0 Supplemental Information*
- Process modeling and optimization of nitrogen removal in *Section 2.F – Environmental Protection and Mitigation*
- Odor and noise management and mitigation in *Section 2.F – Environmental Protection and Mitigation*
- Environmental compliance sampling, reporting, and laboratory management in *Section 2.G – Process Monitoring, QA/QC Reporting to City and Regulatory Agencies* and in *Section 6.E – Supplemental Information*

C. Staffing Plan

Jacobs recognizes the importance of having a fully trained, motivated and certified staff onsite supported by a strong network of offsite expert resources to deliver high quality and reliable services to the City and your customers. Our plan provides the staffing management levels the City desires and efficiently organizes the staff and orchestrates the shift schedules to guarantee superior operations, maintenance, and administrative coverage for the managed assets.

Our team structure, including our team organization chart, and our staff leadership are discussed in *Section 2.A. – Company/Team Information*. Project Manager Michael Arnold, with support from Operations Manager Adam Federau, will lead our Operations team. Maintenance Manager Paul Horigan will manage the inspections and preventative, corrective and predictive maintenance program. Laboratory Manager Liz Tepper will manage laboratory testing services and oversee our compliance sampling plan. She will also have responsibility for managing our proposed internship position focused on laboratory QA/QC program as well process control sampling. These internships are offered to local area students and will serve as a feeder program in the future to fill in vacancies in the organization.

Jacobs' Optimized Staffing Approach

Though our extensive review of the City's current operations, the Jacobs team has identified a number of **efficiencies and optimizations that will allow us to operate the City's facilities at their expected performance standards—or better—but with a more streamlined staffing approach for all three alternatives**. The efficiencies we have identified allow us to provide a lower staffing total for Base Bid/Alternative 1 while adding pump station O&M under Alternatives 2 or 3 with only one additional. Our optimized shift totals shown in Exhibit 2.C.1 provide for 24/7/365 operations coverage and are based on a two-week schedule plan. (The totals do not include our Regional Director/Transition Manager Kevin Dahl. We also intend to offer one internship position throughout the year to supplement our staffing plan, which is also not included in the staffing totals shown.)

The efficiencies, discussed in more detail in other sections of this proposal, are summarized below:

- Adjusted organization of the workforce by **putting more emphases on maintenance** and proposing a more efficient shift schedule for the operators
- Route optimization of the daily pump station monitoring visits and investing in installation two (2) grinders at the Welby and Industrial

EXHIBIT 2.C.1. JACOBS PROPOSED STAFF TOTALS

(Information regarding licenses and grades are in Section 2.A – Company/Team Information.)

Staff Category	Base Bid/ Alternative 1	Base Bid + Alternative 2 or 3
Project Manager	1	1
Admin Assistant	1	1
Laboratory Manager	1	1
Laboratory Technician	1	1
Maintenance Manager	1	1
Maintenance Mechanic	4	4
Pump Station Mechanic	0	1
Asset Manager	1	1
Electrician/I&C	2	2
Utility	2	2
Operations Manager	1	1
Operators	10	10
Labor (Utility)	1	1
Pump Station Operator	0	2
TOTAL	**26**	**29**

Park pump stations to eliminate the need to rake manual bar screens, thereby **reduce labor time required for each pump station visits** (These initiatives will also improve safety.)

- Streamlined fecal coliform and Enterococci analyses by switching from the membrane filtration method to the IDEXX Colilert method, which is approved for use by the US EPA and MADEP, provides more accurate results, and is significantly more user-friendly than the membrane filtration method—**reducing sampling time and affording more time to lab technicians to perform other functions**
- Eliminating a dedicated onsite manager for odor & noise, to be replaced with Jacobs dedicated Subject Matter Experts (SMEs) for odor and noise to **assist the plant staff with critical mitigation measures and O&M issues.** Day-to-day oversight of scrubber performance will remain with the onsite staff and management team.

We recognize that the reduction of staff totals at the Wastewater Facility will require coordination with MassDEP to adjust the NPDES permit, which we are prepared to support.

12-Hour Shifts for Enhanced WWTF Staffing and Operations

In order to enhance efficiency, Jacobs has developed a 12-hour shift schedule. This approach allows for **fewer total full-time employees (FTE) in the project under the Base Bid/but will schedule more of the operators at one time during the shift, thereby increasing the total amount of output from the staff**. We would undertake to negotiate this option with the union.

EXHIBIT 2.C.2. 12-HOUR ROTATING WWTF SCHEDULE OPTION

Shift Staffing	S	M	T	W	Th	F	S	S	M	T	W	Th	F	S	Total hours for 2-Week Pay Period
6AM - 6PM SHIFT															
Operator 1	12	12	12				12	12	12	12					84
Operator 2	12	12	12				12	12	12	12					84
Operator 3	12	12	12				12	12	12	12					84
Operator 4	12	12	12				12	12	12	12					84
Operator 5				12	12	12					12	12	12	12	84
Operator 6				12	12	12					12	12	12	12	84
Operator 7				12	12	12					12	12	12	12	84
Operator 8				12	12	12					12	12	12	12	84
6PM - 6AM SHIFT															
Operator 9	12	12	12				12	12	12	12					84
Operator 10				12	12	12					12	12	12	12	84

Operators would normally be scheduled for rotating 12-hour shifts, 24 hours a day and seven days a week. We would normally schedule four (4) Operators on the day shift—one Lead Operator and three (3) additional Operators. There would be one operator on the overnight shift to provide continuous coverage at the plant. The shift schedule shown in Exhibit 2.C.2. outlines who is scheduled when over a two-week period. An advantage of 12-hour shifts is that each Operator is normally scheduled for seven consecutive days off every month, resulting in a happier, more productive work force with exceptional work/life balance that also has built in overtime.

Optimum staff functionality requires assignment of responsibility to individuals at a level that challenges them, but at which they are also effective. Our approach calls on Operators to specialize in a process, which promotes greater ownership and engagement rather than only to execute routine tasks. Jacobs will divide plant functions into process areas and assign responsibility for each to an Operator, giving them the opportunity and responsibility to specialize in that treatment process. Operators staff will be cross-trained as well to provide flexibility and adequate staffing coverage in the case of vacations or illnesses. Our 12-hour shift schedule further supports adequate staffing levels with three Operators available during the daytime shift when vacations or illnesses occur,

Alternatives 2 and 3: Pump Station Operations

Jacobs understands the City's desire to maintain operational performance while potentially consolidating the WWTF and pump station operations under a single entity responsibility. To that end, our staffing approach to Alternatives 2 and 3 assigns two operators on a 10-hour, seven-day rotating schedule to visit all pump stations in the system. Additionally, we have assigned one full-time mechanic to the pump station alternatives as noted under Maintenance Team below. Jacobs has determined that, through our efficiencies, the staffing levels required for Alternative 2 (with 29 total pump stations) and Alternative 3 (with 12 largest pump station) to be the same, thereby providing greater value to the City should you select Alternative 2. Our proposal is based on Alternative 2.

Maintenance Team

Paul Horrigan, a Certified Maintenance Reliability Technician (CMRT), will lead the maintenance team of nine FTEs under Base Bid/Alternative 1 or a team of 10 FTEs with the addition of Alternative 2 or 3. Maintenance personnel will include individuals with the City's expected skills: (not limited to) electricians, plumbing/pipefitting, welding and instrumentation and controls. As shown in Exhibit 2.C.1., four maintenance mechanics will be assigned primarily to the WWTF, and one additional maintenance mechanic will be assigned primarily to the pump stations under Alternatives 2 and 3. Two utility workers and two electricians/I&C personnel will also assist the maintenance team. The maintenance team will be further supported by an Asset Manager to organize work plans and ensure the right parts are available prior to starting work. The maintenance team will have responsibility for ongoing plant upkeep and painting of the assets, an important component of our asset management approach to prolong the life of the City's aging equipment.

Jacobs employs more CMRT-certified maintenance staff than any other water and wastewater service provider in the U.S.

168_NWBD-OMM_1_DEN

All maintenance personnel will be expected to obtain higher level certifications such as CMRT and CRL. Maintenance staff will perform PM/PdM and CM work as well as perform inspections, cleaning, and painting efforts. Pump stations will be visited daily. Cross-training will occur where appropriate to provide flexibility and ensure adequate coverage during vacations or illness. The Maintenance team will also be supported by the Operations team as needed and especially during wet weather events. Most of the maintenance team will be scheduled Monday through Friday, but on-call staff will be available to address any significant issues promptly.

Offsite, Regional Support Resources

Our Regional Support Resources bring specific expertise the City seeks, such as mechanical and I&C support (Kyle Arnold), millwright (Rich Lang) and electrician (Eric Giles), backed by the considerable additional regional resources to provide a high level of support to the on-site team. These staff and other national SMEs can be tapped on an as-needed basis to ensure consistency in quality and reliability of service. Our regional resources are also available to train or address complex process, maintenance, or system issues on an as-needed basis. In case of the prolonged absence of a staff member, our regional and even national resources can also be tapped to temporarily or permanently staff the position. Please see Section 2.A. – Company/Team Information for more details these Regional Resources.

Developing an Effective Operations Team

Long-term effective and efficient operations will require not only a technically sound operational strategy, but also a staff that understands the principles of treatment and is organized and led in a way that it applies that understanding in changing conditions. In short, a reliable operation and the ability to optimize it, requires a high level of staff functionality. Jacobs is committed to staff development that can elevate New Bedford's facilities to the next level of performance.

Professional Development/Training

Jacobs' project training programs are always tailored to specific project needs. We will complete individual employee training needs assessments, which will guide our training topics and schedule. A custom training curriculum will then be compiled based on everyone's assessed base skills, job descriptions, and training requirements. **The Transition Team will develop a targeted and specific training plan within the 30 days prior to the Commencement Date.** Please see *Section 3.D. – Employee Transition Plan and Compensation Package* for further discussion. In *Section 6.G – Supplemental Information*, we provide Jacobs' typical approach to building highly functional staff at projects we operate.

The Jacobs team is comprised of highly qualified and experienced personnel supported by **a deep pool of local, regional, and national SMEs who will provide proper training to all employees** to help develop skillsets over time. Our ongoing training encompasses ethics, health and safety (H&S), operations/technical and administrative procedures, quality management, certification, and other courses designed to improve skills. We have provided a detailed list of Jacobs' Typical Training Programs in *Section 6.G – Supplemental Information* that we will tailor to match assessed needs at New Bedford. They include elements desired by the City but are not be limited to: modern process control, equipment operation, repair, and maintenance, sampling and analytical procedures, regulatory requirements, supervisory skills, and safety and occupational health procedures. Our training plan will clearly define the **classroom and hands-on training for each associate, with set dates and milestones. Competency grows through a combination of a tailored learning curriculum and on-the-job training with senior technicians.**

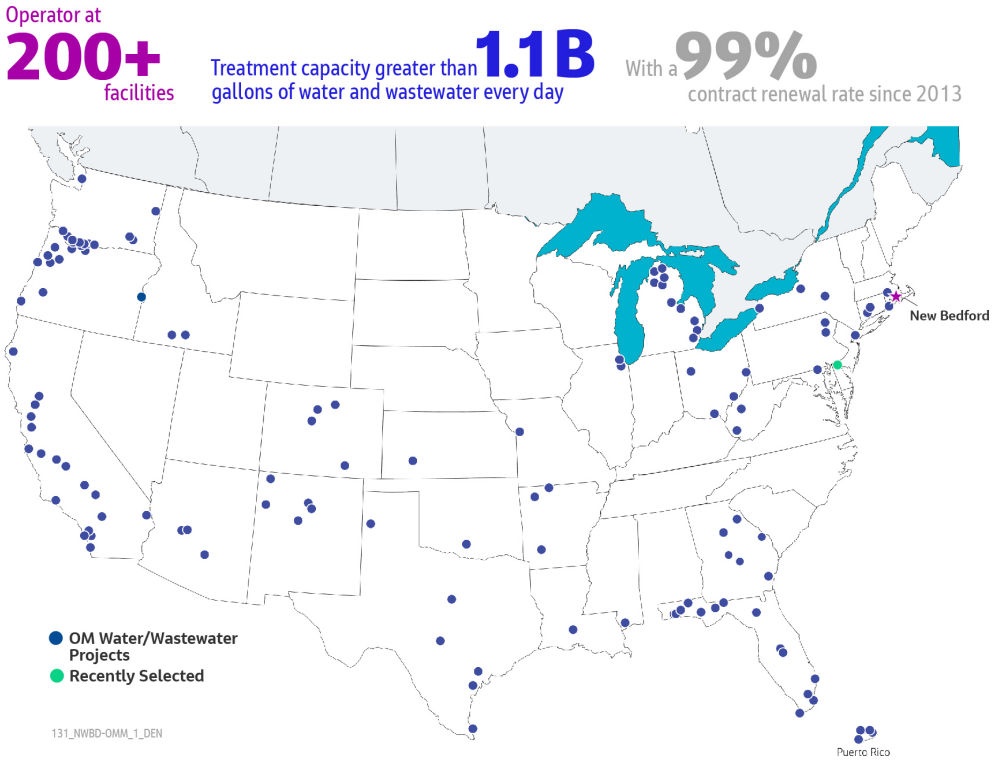
D. Relevant Project Experience

In our seven decades of growth, we have expanded to provide long-term O&M services to 200 clients across the U.S. For each project, we operate as partners with our clients and their staff, providing full contract O&M responsibilities, including regulatory compliance and reporting, operations optimization, facility administration, special maintenance needs, asset management, and equipment maintenance to manufacturer requirements. We are responsible for budget preparation, including capital improvement recommendations, and maintaining consistent cost control measures and sustainable practices. We are proud of our performance and encourage you to contact and visit our clients to learn more about how we work as a valuable extension of their staff and as a contributing member of the community.

The New Bedford facility operations represent an important partnership between the City and your service provider. As a result, it is important that the City selects the most skilled, qualified, and stable organization available. **Jacobs' O&M portfolio includes more than 200 facilities in the U.S.—with more than 50 locations having commenced or renewed services within the last five years.** Some of our newer projects are locations where we have successfully transitioned operations from your current operator, including Woonsocket WWTF in Rhode Island, Vancouver WWTF in Washington, and Gresham WWTF in Oregon, and we have recently been selected as the preferred vendor to negotiate a 20-year contract for Wilmington WWTF in Delaware. We encourage you to contact these clients to learn more about their decision to select Jacobs including our performance.

Our national municipal water and wastewater O&M experience is shown in Exhibit 2.D.1. These projects include a wide range of plant flows, asset management, pump stations, combined heat and power (CHP) operations, biosolids management including anaerobic digestion, liquid and solids sludge production, fluidized bed incinerator operations, industrial pretreatment program (IPP) oversight, sewer conveyance, regional septage facility, combined sewer overflow and cogeneration, process and compliance sampling and analysis, sustainability programs, and more.

EXHIBIT 2.D.1. JACOBS O&M NATIONAL EXPERIENCE



Enclosed in this section are **five exemplary projects that demonstrate our highly advantageous O&M experience on WWTFs**. All five projects are currently active projects. We also provide in our Proposer Qualifications Form in *Section 5 – Proposal Forms* a list of all projects of similar size, complexity and effluent/water quality standards for which we have been involved as the operator.

Waterbury Wastewater Treatment Plant

WATERBURY, CT

CLIENT AND OWNER
City of Waterbury

SIZE
27 MGD with ~310 miles of sanitary sewer and 20 pump stations ranging from .2-13.5 MGD

KEY PROJECT PERSONNEL
Paul Horigan, Liz Tepper, Kevin Dahl

EXPENSES BUDGET	KEY CLIENT CONTACT	KEY PROPOSER CONTACT
O&M: $6M/year CIP: ~$2.5M/year plus $40M for TP upgrade START-UP DATE 11/2018 YEARS OF SERVICE 1 year DURATION OF CONTRACT 10 years	Christian Perez, Assistant Superintendent 21 East Aurora Street Waterbury, CT 06708 203.574.8251 x7657 cperez@waterburyct.org	Kevin Dahl, Regional Manager 210 Municipal Road Waterbury, CT 06708 203.410.4445 Kevin.Dahl@jacobs.com

Applicability and Relevance

- Capital Improvements
- Maintaining Operations during Construction
- Nutrient Removal
- Repair and Replacement Program
- Odor Control Study and upgrade recommendations
- Wet Weather treatment/CMOM compliance
- Asset Management
- Biosolids Management (oversight of subcontractor Synagro)
- Located in Northeast
- Disinfection – Seasonal UV with hypochlorite for wet weather only

Treatment Systems and Processes

Preliminary screening and grit removal followed by primary treatment, secondary aeration and clarifiers, seasonal UV and wet weather Sodium Hypochlorite disinfection. Tertiary filters under construction. 27 MGD design flow, wet weather flows >54 MGD. Chemical addition for TP removal.

Capital Improvements and Retro Fittings

Jacobs provides full contract operations services for a 27 MGD wastewater treatment plant, approximately 310 miles of sanitary sewer and 20 pump stations. The process consists of grit and screening, primary treatment, activated sludge, secondary clarification followed by UV disinfection. Chemical addition is also used to manage low level phosphorous limits. Jacobs is also assisting the City to manage an approximately $25M phosphorous upgrade performed by others which includes tertiary filtration and permanent chemical addition. Current capital improvement projects designed and procured by Jacobs include upgrades to the odor control, maintenance building hatch and associated structures, HVAC improvements, secondary clarification, site security, collection system CMOM and architectural. We are also working with Synagro on biosolids management.

Odor Control Facilities

There are chemical wet scrubbers (4 total) on the headworks building, solids handling and 2 on the incineration building.

Computer Systems and Automated Systems

WWTF and pump stations are on separate SCADA systems. The WWTF is monitoring and limited control. The pump station SCADA is monitor only.

5-Year Compliance History

Jacobs is in full compliance with NPDES limits and contract requirements since 2018, with the exceptions of the following dates: Nickel average and daily max in November and December, 2018, and January, February, April, May, June, September, October, November, 2019; Flow on January 31,2019; Ammonia, May August and September 2019 and E. coli on July 31 and August 31, 2019.

Wastewater Treatment Plants O&M Services

HOBOKEN AND WEST NEW YORK, NJ

CLIENT AND OWNER
North Hudson Sewerage Authority (NHSA)

SIZE
20.8 MGD & 10 MGD with 106 miles of combined sewer and 9 pump stations and 2 wet weather pump stations ranging from 4.3-50 MGD

KEY PROJECT PERSONNEL
Mike Arnold, Paul Horigan, Mike Wilson, Jeff Heroux, Kevin Dahl

EXPENSES BUDGET
O&M: $9.8M
CIP: $5M/year

START-UP DATE
04/1989

YEARS OF SERVICE
31 years

DURATION OF CONTRACT
18 years (2012 renewal)

KEY CLIENT CONTACT
Fredric J. Pocci, Authority Engineer
1600 Adams Street
Hoboken, NJ 07030
201.963.6043
FPocci@nhudsonsa.com

KEY PROPOSER CONTACT
Kevin Dahl, Regional Manager
210 Municipal Road
Waterbury, CT 06708
203.410.4445
Kevin.Dahl@jacobs.com

Applicability and Relevance

- Capital Improvements
- Maintaining Operations during Construction
- Major Electrical System Upgrades
- Repair and Replacement Program
- Wet Weather Treatment/CSO's/CMOM
- Asset Management
- Biosolids Management
- Located in Northeast
- Disinfection – UV; also uses supplemental peracetic acid as needed

Treatment Systems and Processes

NHSA (The Authority) owns and operates two WWTFs (Adams Street and River Road), 106 miles of combined sewer (including interceptors, siphons and force mains), 9 wastewater pump stations, 2 wet weather pump stations (H1 and H5), 17 CSO Regulators, 10 CSO Outfalls, and 11 Solids/Floatables Screening Facilities.

The Adams Street WWTF serves the municipalities of Hoboken, Weehawken and Union City with a service area of 2.6 square miles. It is permitted by New Jersey Department of Environmental Protection (NJDEP) to discharge 20.8 MGD. It has a dry weather design flow of 24 MGD and a wet weather capacity of 40 MGD. The Adams Street WWTF treats wastewater to secondary treatment standards through several unit processes including grit/screenings removal, primary clarification, deep bed trickling filters, dissolved air floatation/secondary filtration, effluent UV disinfection, and solids handling. The solids handling system utilizes belt thickening and is then transferred to Passaic Valley Sewerage Commission for disposal.

The River Road WWTF serves the municipalities of Weehawken, Union City, and West New York with a service area of 1.4 square miles. It is permitted by NJDEP to discharge 10 MGD and has a wet weather capacity of 20 MGD. The River Road WWTF service area treats wastewater to secondary treatment standards through several unit processes including grit/screenings removal, microstrainers, deep bed trickling filters, secondary clarification, effluent chemical disinfection and solids handling. The solids handling process utilizes belt thickening and is then transferred to the Passaic Valley Sewerage Commission for disposal.

Capital Improvements and Retro Fittings

Jacobs provides capital upgrades when requested by The Authority. For example; following Hurricane Sandy we installed new electrical feeders and electrical manholes within the plant site that were damaged by salt water intrusion. Other capital projects we have completed include pumping equipment damaged by flooding due to Sandy.

Odor Control Facilities

NHSA uses carbon adsorption for odor control at the Hoboken facility and uses a wet scrubber at the West New York facility. Hoboken has three carbon tanks, and one carbon drum used for sludge truck loading ventilation. West New York has 4 carbon tanks, and one carbon drum also used for sludge truck loading ventilation. There is also a total of four carbon odor control tanks in the collection system: one per each of the following locations - 5th Street Pump Station, 11th Street Pump Station, 18th Street Pump Station, and the WNY-1 Solids and Floatables Screening Facility.

Computer Systems and Automated Systems

NHSA has 2 fully integrated SCADA systems for each WWTF and associated collection system in addition to real time monitoring of the CSO locations that are on the NHSA website for public use. Most of the SCADA systems are used for monitoring and alarms. There are processes in the plant that are fully automated, such as the PURAC building that uses dissolved air floatation along with a sand filter to treat secondary effluent. The system is fully automated, including backwashing each of the 10 filter cells.

5-Year Compliance History

Jacobs has been in full compliance with NPDES limits and contract requirements, with the following exceptions:(22) Coliform between November 30, 2017 and July 31, 2019; BOD % Removal on March 31 and April 30, 2018; TSS % Removal and Wekly Ave on April 30, 2018. On December 20, 2018, the NJDEP issued an Administrative Consent Order to The Authority, at The Authority's request, to allow for completion of a major upgrade to the secondary treatment sand filter process at the Adams Street Wastewater Treatment Plant to bring the facility into compliance with the fecal coliform limits of the NJPDES permit. The NJDEP issued a Notice of Violation dated May 25, 2016 to The Authority for an April 7, 2016 dry weather overflow to the Hudson River and a July 2015 fecal coliform bacteria permit limit exceedance.

Fayetteville Water Resource Recovery Facilities

FAYETTEVILLE, AR

CLIENT AND OWNER
City of Fayetteville

SIZE
12.6 MGD & 10 MGD with 17 and 21 pump stations (respectively) ranging from 6-36 MGD

KEY PROJECT PERSONNEL
Jeff Heroux, Steve Meininger

EXPENSES BUDGET	KEY CLIENT CONTACT	KEY PROPOSER CONTACT
O&M: $7.2M CIP: $2.5M (2019, funded by City)	Don Marr, Chief of Staff 113 W. Mountain Street Fayetteville, AR 72701 479.443.3292 dmarr@fayetteville-ar.gov	Greg Weeks, Project Manager 1400 North Fox Hunter Road Fayetteville, AR 72701 479.443.3292 Greg.Weeks@jacobs.com
START-UP DATE 08/1986		
YEARS OF SERVICE 34 years		
DURATION OF CONTRACT 5 years (last renewal 01/2020)		

Applicability and Relevance

- Capital Improvements
- Maintaining Operations during Construction
- Major Electrical System Upgrades
- Repair and Replacement Program
- Asset Management
- Biosolids Management
- Disinfection – UV and Ozone
- Wetlands Mitigation Management

Treatment Systems and Processes

The Noland WRRF is a 12.6 MGD advanced WRRF, with influent fine screens, grit removal, Anaerobic/Anoxic/Oxic plug flow biological nutrient removal secondary treatment, secondary clarification, single-media sand filtration, and ozone disinfection. Odors from the Noland WRRF are captured and treated by two multi-stage chemical scrubbers.

The West Side WRRF is a 10 MGD advanced WRRF with influent fine screens, grit removal, Anaerobic/Anoxic/Carrousel BNR secondary treatment, secondary clarification, deep-bed sand filtration, UV disinfection, and post aeration. Odors from the West Side WRRF are captured and treated by biofilters and carbon absorbers. Jacobs also manages a 43.65-acre constructed wetland mitigation site.

Biosolids Management Site (BMS)

The BMS employs six solar houses and a thermal drying operation, which process belt filter-pressed biosolids from the WRRFs to Class A biosolids fertilizer for bulk sale. The site is permitted for land application of water treatment residuals and treated wastewater effluent. Nutrient uptake from the old land application site is achieved through hay harvesting, marketing, appropriate supplemental nutrient application, and irrigation with treated plant effluent.

Capital Improvements and Retro Fittings

We proposed, prioritized, and delivered $1.6M in CIP projects in 2019.

Odor Control Facilities

Chemical odor scrubbers

Computer Systems and Automated Systems

Maintenance Connection (CMMS), currently under contract with the City for a new SCADA system (VT SCADA). The West Side plant is operated one shift M-F and off shift is controlled and monitored via SCADA by the Noland plant operator.

5-Year Compliance History

Jacobs has been in full compliance with NPDES limits and contract requirements with the following exceptions: BOD-5 MO and 7-DAY AVG on October 31, 2015, BOD-5 on November 31, 2019.

Gresham Wastewater Treatment Plant

GRESHAM, OR

CLIENT AND OWNER
City of Gresham

SIZE
20 MGD with 8 pump stations with max capacity of 11.9 MGD

KEY PROJECT PERSONNEL
Liz Tepper, Steve Meininger

EXPENSES BUDGET	KEY CLIENT CONTACT	KEY PROPOSER CONTACT
O&M Fee: $2.9M annually CIP: $350K annually	Alan Johnston, Sr. Wastewater Engineer 20015 NE Sandy Blvd, Portland, OR 97230 503-803-0470 alan.johnston@gresham.gov	Efrain Rodriguez, Manager of Projects 2323 W Mill Plain Blvd. Vancouver, WA 98660 360.695.0092 Efrain.Rodriguez@jacobs.com
START-UP DATE 07/2018		
YEARS OF SERVICE 1.5 years		
DURATION OF CONTRACT 10 years		

Applicability and Relevance

- Repair and Replacement Program
- Odor Control
- Wet Weather Treatment
- Asset Management
- Biosolids Management
- Laboratory and IPP Support
- Disinfection – Seasonal UV with hypochlorite for wet weather only

Treatment Systems and Processes

Wastewater enters the treatment plant, flows through a screen, which removes large objects that could damage equipment. The remaining solids are minute particles that fall to the bottom of a sedimentation tank. The particles form a mass of solids called primary sludge. This sludge is removed and converted to biogas to help create energy to power the treatment plant.

An activated sludge process based on pumping air into a tank which promotes microbial growth in wastewater. The oxygen helps the bacteria break down organic matter and remove contaminants.

The wastewater from the aeration basin is slowed down and any remaining sludge is separated and removed from the wastewater.

The wastewater is then disinfected with sodium hypochlorite to remove any disease-causing organisms and ensure that water leaving the plant meets the water quality standards set by the Oregon Department of Environmental Quality.

Following the treatment, the water is discharged to the Columbia River.

Capital Improvements and Retro Fittings

Jacobs provides full contract operations services for a 20-mgd WWTF pump stations, laboratory and biosolids handling while also achieving net zero energy through proactive management of the cogeneration and fats, oils and grease (FOG) facilities.

Odor Control Facilities

There is one bark media odor control bed and a passive odor control system for the lower plant solids processing building.

Computer Systems and Automated Systems

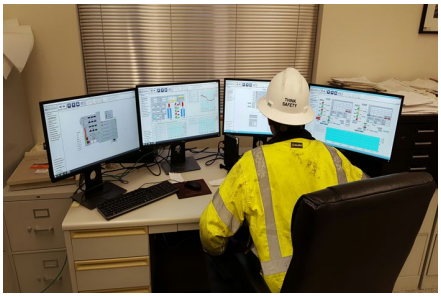
WWTF and pump stations are on separate SCADA systems. The WWTF is monitoring and limited control. The pump station SCADA is monitor only.

5-Year Compliance History

Jacobs is in full compliance with NPDES limits and contract requirements since July 1, 2018 when the contract started.

City of Vancouver O&M Services

VANCOUVER, WA



CLIENT AND OWNER
City of Vancouver

SIZE
16.1 MGD & 28.26 MGD with 7 and 2 pump stations (respectively): larger ones range from 2.96-12.82 MGD, smaller ones 10-30 kgal/day

KEY PROJECT PERSONNEL
Steve Meininger

EXPENSES BUDGET
O&M: $5.7M
CIP: $1.2M/year

START-UP DATE
01/2016

YEARS OF SERVICE
4 years

DURATION OF CONTRACT
10 years

KEY CLIENT CONTACT
Dan Swensen, Position Engineering and Construction Services Manager
4500 SE Columbia Way
Vancouver, WA 98661
360.487.7550
Dan.Swensen@cityofvancouver.us

KEY PROPOSER CONTACT
John Loucks-Powell, Project Manager
2323 West Mill Plain Boulevard
Vancouver, WA 98660
360.608.6468
John.LucksPowell@jacobs.com

Applicability and Relevance

- Capital Improvements
- Nutrient Removal
- R&R Program
- CSOs/CMOM
- Asset Management
- Biosolids Management
- Disinfection – UV and Hypochlorite

Treatment Systems and Processes

The Westside Wastewater Treatment Facility (WSWRF) provides treatment for municipal wastewater from the southern and western sections of Vancouver and has on-site sludge incineration capabilities. The facility has an average maximum monthly design capacity of 28.26 MGD, with a maximum daily flow of 41.1 MGD. The facility performs primary treatment in primary clarifiers, secondary treatment by activated sludge and secondary clarifiers, and disinfection by ultraviolet radiation. Residual primary solids are degritted, thickened and stored. Waste activated sludge is normally wasted to the tank or to the gravity belt thickeners, with the option of conditioning in an aeration basin. The two solid trains are mixed and thickened with gravity belt thickeners and dewatered with a centrifuge. The facility operates a sewage sludge incinerator as its primary means of solids disposal. Foul odors from various plant processes are collected and treated in a packed tower scrubber for hydrogen sulfide gas removal.

The Marine Park Wastewater Treatment Facility (MPWTF) provides treatment for municipal wastewater from the northern and eastern sections of Vancouver. The facility has an average maximum monthly design capacity of 16.10 MGD, with a peak maximum hourly flow of 41.8 MGD. The facility performs primary treatment in primary clarifiers, secondary treatment by activated sludge and secondary clarifiers, and disinfection by ultraviolet radiation. Residual primary solids are degritted, thickened then pumped also with the waste activated sludge, via a pipeline to the WSWTF where solids are mixed, dewatered and incinerated.

The lagoon system is designed specifically to treat industrial waste that is generated from three food manufacturers in Vancouver. Effluent from the lagoon is discharged to the headworks of the WSWTF to be further treated by the activated sludge system prior to discharge to the Columbia River. The lagoon has an average maximum monthly design capacity of 3.2 MGD. The system is an aerated and facultative 3 cell process to remove high strength BOD and soluble BOD.

Jacobs also operates and maintains the 8 major lift stations within the collections system that are integral to ensuring wastewater is conveyed to the appropriate treatment facility headworks for processing. Lift stations vary in design from submersible pumps to dry well applications with odor and corrosion control processes.

Capital Improvements and Retro Fittings

Services provided by Jacobs include the operation, maintenance and management of the two wastewater treatment plants, lift stations, sludge incinerator and industrial pretreatment lagoon operations. Maintenance activities include preventive, corrective and predictive procedures performed on all treatment plant, lagoon and lift station equipment, so it can be maintained in accordance with manufacture recommendations and industry standards. Jacobs also provides capital improvement recommendations and are undertaken by Jacobs as directed by the City, including engineering support, regulatory compliance support and major SCADA upgrades.

Odor Control Facilities

ATS Chemical Treatment- Scrubber towers with loose media, sodium hypochlorite addition for oxidation, sodium hydroxide addition for PH control.

Computer Systems and Automated Systems

Jacobs Business Network SCADA System – controls influent rates and levels, RAS/WAS rates, monitors most facets of treatment system, historian collects data for analysis of process control.

5-Year Compliance History

Jacobs is in full compliance with NPDES limits and contract requirements since 2016, with the following exceptions: BOD, TSS and coliform July 2016, TSS December 2016. The City received a notice of violation dated January 9, 2019 from the Washington Department of Ecology for a wastewater influent bypass that occurred in September 2017 due to a power disruption at an electrical substation that caused a loss of power to the Westside Wastewater Treatment Plant and a wastewater influent bypass that occurred in October 2017 due to calibration of level sensors that control pumping from the influent wet well. The City received a notice of violation dated April 5, 2018 from the Southwest Clean Air Agency for failure to calibrate the thermocouples on the fluidized bed incinerator during calendar year 2017.

E. Emergency Operations

Sometimes the unexpected occurs and Jacobs stands ready to respond with the superior services that are the cornerstone our O&M project delivery. This can include being a part of our client's emergency response team when emergencies (natural or human-made) threaten safety, property, or compliant operations. Jacobs operates or supports 20+ municipal and industrial wastewater facilities in the Northeast, whose personnel could respond to any emergency in support of our onsite team or the City within hours. **With 13 supporting offices and more than more than 5,000 associates in the Northeast, our team is equipped and committed to providing immediate, rapid, efficient, and effective assistance to the City—whether for hurricanes, flooding, wildfires, nuclear, hazardous wastes, or equipment failure.** Our experts understand the level of resources essential in your time of need and will adapt to provide you with the most technically effective and feasible solutions, while delivering work products expeditiously and within budget.

"When super storm Sandy hit the New York harbor and the magnitude of the disaster became apparent, you were the first person that I reached out to for help. Fortunately, for the North Hudson Sewerage Authority, Jacobs, our partner of 22 years at the time, came to our assistance and in 24 hours provided an expert team to address the damage caused by the disastrous storm surge. Our main Sewage Treatment Plant in Hoboken was pumped out, some 24 pumps were removed, rebuilt and replaced and temporary electrical control systems constructed to enable primary treatment 48 hours later with full secondary treatment restored within 5 days of the system failure. It was teamwork at its best.

As an expression of gratitude, the Authority Board dedicated a plaque to acknowledge the efforts of the NHSA/Jacobs team that made it all possible. We will always be grateful for those efforts and also be comfortable knowing that our team can overcome all obstacles."

—Fredric J. Pocci, P.E. Authority Engineer

111_NWBD-OMM_SANDYPLAQUE_QUOTE

Should events require it, our project team will be supported by hundreds of Federal Emergency Management Agency (FEMA) specialists and emergency response experienced professionals. This broader pool of resources is crucial because events that require emergency response often affect nearby communities, rendering their resources unavailable as they respond to their own local emergencies. Regional Director Kevin Dahl and Project Manager Michael Arnold are empowered to access and provide the necessary resources to New Bedford. To meet the objective for high-level responsiveness and ease of access to our temporary personnel and equipment resources in time of need, we have organized our team structure and approach to provide:

- Continuity of operations planning
- Pre-disaster plans and protocols
- Contingency and emergency response plans
- Before-event planning (for storms or emergencies with a known lead time) and after-event planning
- Documenting our disaster response to increase maximum benefit of federal funding
- Local and regional resources for emergency response
- Access to our FEMA certified respondents
- Access to our integrated suite of applications to support implementation of the National Incident Management System (NIMS).

Emergency Operations Plan

For the City of New Bedford, our plan will include preparing for and responding to a broad range of situations, including all elements required under draft Schedule 2 of the RFP with the City. Our Emergency Response Plans (ERPs) typically including training personnel in procedures and appropriate use of emergency equipment. They also include critical coordination with the local community and other agencies and will integrate the similar plans we developed previous for the REBF operations.

Jacobs Emergency Reporting Hotline

Jacobs maintains a 24/7 emergency reporting hotline, giving the City, staff and residents immediate access to resources trained to respond quickly and effectively to emergencies and significant customer services issues.

169_NWBD-OMM_1_DEN

Our comprehensive ERP will incorporate reliability and communication features to minimize the occurrence of emergencies where possible and to enhance safety, response, and communications when emergencies occur. **Because it is impossible to predict the exact nature of every possible emergency, our program provides a comprehensive communication, training, and resource-based plan that manages the broadest range of possible emergencies.** A summary of emergency response measures for possible events is provided in Exhibit 2.E.1. We have provided a detailed discussion of our Emergency Response Plan elements in *Section 6.F – Supplemental Information*.

EXHIBIT 2.E.1. SUMMARY OF TYPICAL EMERGENCY RESPONSE PLAN MEASURES

Event	Approach
Chemical spill	Individual safety data sheets (SDS) will be used to determine proper cleanup and control measures. In the event of a large chemical spill, notify local Fire Department and the City.
Pipe, valve, pump, and other equipment failure	Jacobs will perform an initial and periodic condition assessment of these assets. Critical equipment spares could be placed in inventory so emergency replacements can be made.
Process failure	Increase treatment plant solids retention time (SRT) and adjust aeration basis dissolved oxygen to hold inventory under aeration and minimize wasting.
Power failure	In the event of a partial or complete power failure, procedures are followed to minimize equipment downtime. The City will be immediately contacted when a power failure occurs. To determine the location of the outage, a complete list of all meter numbers for lift stations and other unit processes will be located at the operator desks and in the back of the onsite ERP.
Emergency telephone numbers	An emergency contact list with site numbers will be posted at each worksite and include: project contacts, including project manager, safety director, the Public Safety Department, police, fire, and ambulance for surrounding communities—emergency (911) and non-emergency numbers, area hospitals, and serious incident reporting and crisis management.
Emergency equipment inventory	In the event that emergency equipment is a rental item or provided as a specialty service by a vendor, agreements for 24/7 service will be put in place in advance so there will be no interruption in service.

Customer Service Response to Odor and Noise Complaints

The Jacobs team will make odor and noise complaints a priority as they have the potential to noticeably impact New Bedford citizens. Jacobs approaches these complaints as a priority maintenance condition because odors emanating from facilities could indicate an illicit discharge or hazardous substance introduced into the system. Similarly, noise complaints can reflect less than optimal maintenance conditions.

Our intention to respond to non-emergency and odor and noise complaints will be on a 24/7 basis with on-call staff. As requested in Schedule 2 of the draft service agreement, Jacobs will provide a 24-hour toll-free phone line and answering service that will inform operators immediately of an odor or noise complaint or emergency and document the call and time. We recognize the City's "zero tolerance" approach to odor and noise issues and will work with the City to craft a tailored response approach that meets the City's desired goal. Details on our approach to odor and noise issues are presented in *Section 2.F. – Environmental and Mitigation* in our discussion, "Performing a Zero Tolerance Odor and Noise Program."

F. Environmental Protection and Mitigation

Jacobs is fully committed to delivering on the City of New Bedford's objective of operating in full compliance with all applicable regulations, statutes, and permits.

Jacobs' Environmental Compliance Program is an organized, systematic approach to maintain compliance with environmental, legal, and business requirements. Jacobs has extensive expertise in all pertinent areas of environmental regulations including the Clean Water Act, the Clean Air Act, EPCRA, RCRA, Biosolids management, Industrial Pretreatment, Laboratory management and Stormwater regulations. Jacobs actively develops strong working relationships with regulators at the Federal, State and local levels. We believe in complete transparency in our reporting to the regulators and to the communities that we serve.

Our Environmental Compliance Program is designed to generate consistent and predictable compliance with all applicable laws, regulations, and standards. Our goal is "Perfect Compliance and Perfect Reporting". The information developed from our program will:

- **Alert New Bedford staff to situations that require special attention and possibly require calling on assistance from regional, corporate, or other specialists to support onsite staff.**
- **Generate legally defensible data and records.**

Jacobs will implement a suite of Project Compliance Tools for the City of New Bedford to assure long-term compliance with environmental regulations, permit conditions and the Division of Marine Fisheries MOU including:

- A comprehensive training program including project start-up, Jacobs-developed video modules and on-going training provided via web-based delivery mechanisms along with onsite training.
- An NPDES permit Sample Tracking Tool with multiple layers of oversight to ensure that sampling is performed as required.
- In-depth NPDES and air permit evaluation tools to ensure that all permit requirements are identified and fully understood.
- Biosolids and IPP tracking and assessment tools.
- Utilization of a SharePoint site, entitled Project Compliance Tools, which is available to all associates. The tools described above, as well as other tools and compliance-related information, can be found on the SharePoint site.

Because a great deal of the information necessary for permit compliance begins in the laboratory, Jacobs has developed a suite of tools including a QA/QC manual, the QC-Stats software program and participation in third-party Proficiency Testing programs to ensure the performance of the laboratory to yield data of unquestionable integrity.

Jacobs has a comprehensive Internal Auditing program to verify the adherence of our projects to the permit and other regulatory requirements.

Our approach to Mitigation

As a facility operator, there may be situations where violations occur due to circumstances beyond operational control or in rare instances, due to operator error. Jacobs has an excellent reputation among regulatory agencies, and we are committed to full disclosure and remedying situations that may arise even when an excursion occurs due to physical plant limitations, storm events, illegal or unanticipated discharges into the collection system, or other activities outside of our operational control. Jacobs has developed a comprehensive program for mitigating adverse environmental impacts in emergency and accidental spill situations. Our response to any incident of non-compliance, including effluent quality outside of permit limits, unintentional spills or bypasses, or process upsets, is to:

- Immediately assess the situation
- Apply the resources necessary to return to compliance
- Determine any additional precautions to be put in place to prevent repeat or future occurrences
- Mitigate the impact through immediate cleanup and restoration
- Report accurately and promptly to the City of New Bedford and to the Massachusetts Department of Environmental Protection, US Environmental Protection Agency and other regulatory agencies and stakeholders as required.

As necessary, we will draw upon Jacobs' regional and corporate technical resources to assist our onsite team in resolving process challenges or assist in determining appropriate mitigation steps. We maintain critical equipment lists, vendors, contact information, and response agreements so we may access any additional outside resources deemed beneficial to the specific situation.

Jacobs will be responsible for regulatory fines or penalties assessed for non-compliance resulting from the negligent action of Jacobs during the contract term.

Jacobs has developed a tool known as the "Preliminary Excursion Guide". This mandatory tool is utilized for internal reporting of any instance or suspected incidence of regulatory noncompliance at our O&M projects. All noncompliant events are investigated, and a detailed root cause analysis is performed. A conference call discussing the event with compliance and technical experts, as well as upper management, is required for these events. The goal of the call is to fully understand the cause of the event and bring the necessary resources to bear to prevent recurrence of this incident.

Changes in Regulatory Requirements

Jacobs devotes considerable effort and resources to identifying potential changes to regulations that could have an impact on the communities that we serve. Once a regulation is proposed, it is thoroughly reviewed, and a determination of its impact is developed, both in terms of requirements for capital investment as well as operational changes that may be required to comply with the terms of the proposed regulation. Jacobs will provide assistance to the City of New Bedford for the purpose of negotiating the impacts of proposed changes ensuring there is sound reasoning and cause for the changes. We then provide guidance to our clients, well in advance of the regulation going final, on the requirements of the regulation and its potential impact on the facilities and operations.

Integrated City Capital Improvements into Long-term Operations

Jacobs will work closely with the City to integrate our solutions and innovations with the City's capital improvement program and in cooperation with the City's engineering consultant.

Establishing Plant Optimization of Nitrogen Removals

Our technical approach is founded on leading edge operations and maintenance strategies supported by dedicated experts, and it continually evolves as new technologies emerge. In the following section we discuss our technical approach in detail for several our solutions and investments. We will continuously share our insight, experience, suggestions, and innovative approaches to earn the City's confidence and trust that we are always providing the highest level of service.

Understanding of Nitrogen Issues

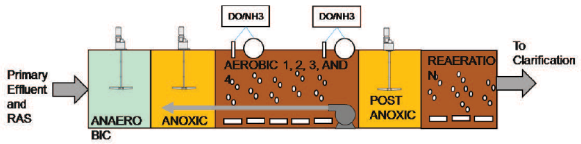
Jacobs recognizes that the City of New Bedford will likely see the establishment of effluent nitrogen limits in the near future. While there is uncertainty in what the limits will be, Jacobs offers both tremendous experience operating facilities with some of the strictest nutrient limits and a world-class engineering practice with experience designing and optimizing nutrient removal facilities. We stand ready to assist the City and your consultant's in permit negotiations, treatment studies, and plant optimization.

The most recent NPDES permit, issued in September 2008, requires that the City of New Bedford identify and quantify major sources of nitrogen in the influent and develop an approach to optimize plant operation to reduce nitrogen discharges in the plant effluent. The City has begun to monitor and report influent total kjeldahl nitrogen (TKN) and effluent ammonia on a regular basis. The average influent TKN has been approximately 38 mg/L and effluent ammonia has been approximately 13 mg/L over the years 2016–2019.

Jacobs' Expertise in Nutrient Removal Strategies

Jacobs regularly develops strategies to improve or address changes in nutrient removal at the wastewater facilities we operate. And as the No. 1 ranked Environmental Design Firm by ENR for over a decade, we have successfully developed, designed, and delivered new and upgraded nutrient removal strategies at many dozens of projects over our 80 years in business.

As an integrated O&M, engineering, and construction firm, Jacobs uses our advanced modeling tools such as Pro2D to identify, model, and design strategies. We then test them with our Replica whole-plant simulation tool, which creates a digital twin of your facility. This approach brings together proven expertise in engineering and a deep understanding of your plant from our operations teams to find the best solutions for nutrient removal for clients like New Bedford.



In Waterbury, CT, we have been leveraging our expertise with wastewater process modeling and operations to maximize the performance of the existing activated sludge process for nutrient removal (N and P), with significant cost savings.

174_NWBD-OMM_1_DEN

The Jacobs Team visited the City's facilities on December 11 and 12, 2019. Overall, our team devoted hundreds of hours to a detailed review of the WWTF to understand the limitations of the current plant configuration and to identify opportunities to enhance the facilities operation to meet future nutrient discharge limits, including total nitrogen.

Achieving Nitrogen Removal

Our technical approach applies a collaborative combination of operations, maintenance, and process expertise critical to ensuring that treatment is stable and optimal. This includes using a whole plant process model developed to optimize and potentially upgrade the treatment process. The process model is a wastewater plant simulation program that calculates the mass balance for over 70 different wastewater components and performance of the various treatment flow streams, based on plant influent flows and loads, treatment plant processes and configuration, operational criteria, and chemical dosages. Jacobs' wastewater process simulation team has expertise in numerous process simulator platforms including BiowinTM, SumoTM, and Jacobs' internally developed Pro2D.

Historical data (2018 - 2019) provided by the City allowed Jacobs to construct a calibrated whole plant process model to evaluate opportunities to achieve nitrogen removal at the facility.

Model results show that with some moderate modifications the activated sludge system **can achieve biological nitrogen removal during spring and summer months**. At design conditions (30 mgd), this configuration will reduce effluent TN to less than 10mg/L. At current conditions, this configuration would result in effluent TN less than 8 mg/L. **A more substantial upgrade may be necessary to ensure consistent results at colder water temperatures. Upgrade to existing basins would provide year-round stability and the needed biological inventory to achieve greater levels of nitrogen removal.** Because of the limited available space at the facility, an attached growth retrofit of the existing basins would provide a path to meeting more stringent effluent TN limits. Attached growth processes utilize biomass that grows on inert surfaces rather than suspended in liquid as found in conventional activated sludge processes. Jacobs has created a Pro2D model to determine the feasibility of this type of retrofit, and the result show that effluent TN of less than 8 mg/L at all temperatures. At warmer temperatures, an effluent TN < 5 mg/L is possible.

The required modifications are summarized in Exhibit 2.F.1 and illustrated in Exhibit 2.F.2

EXHIBIT 2.F.1. SUMMARY OF PROPOSED ACTIVATED SLUDGE SYSTEM MODIFICATIONS TO ACHIEVE BIOLOGICAL NUTRIENT REMOVAL

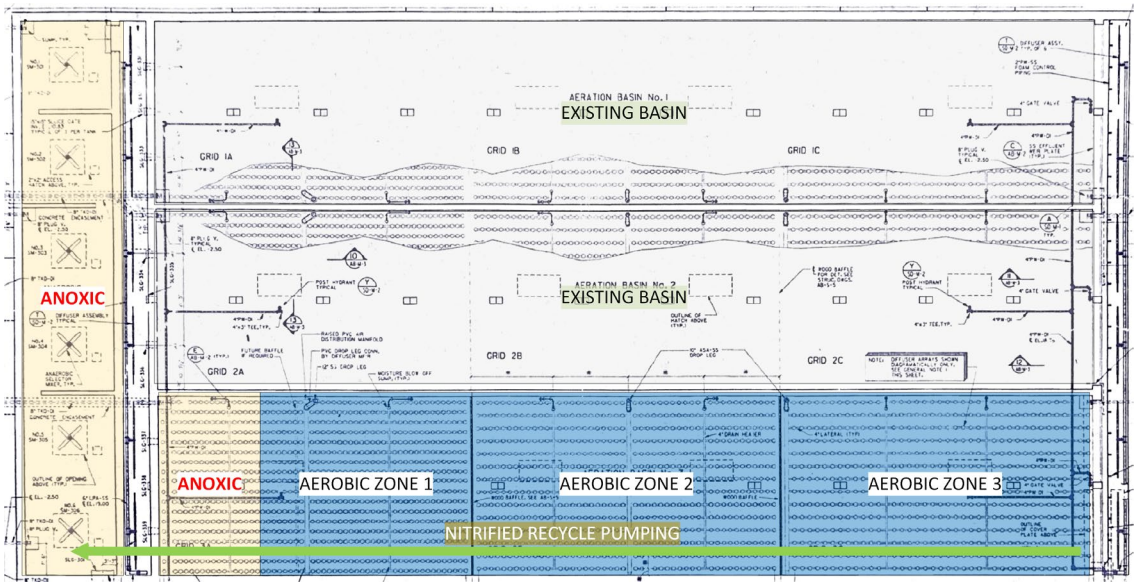
Approach	Rationale/Benefit
Verify influent wastewater characterization	Biological nutrient removal requires specific constituent in influent the influent, specifically soluble COD, and sufficient alkalinity for nitrification. Verification is required to determine ultimate nutrient removal ability.
Convert existing selector basins to anoxic basins and add nitrified recycle pumps	By using the selector basins as anoxic zones, soluble carbon in the primary effluent can be used as the carbon source for denitrification. The nitrified recycle pumps will return the nitrate formed by nitrification (ammonia removal) to the anoxic zones for denitrification.
Convert portion of Aerobic Zone 1 to anoxic zone	In order to maximize the extent of denitrification in the available basin volume, a portion of the aerated basins would be converted to un-aerated/anoxic.
Increase activated sludge solids retention time (SRT)	Plant design criteria and operational data indicate a relatively short SRT (consistent with a BOD removal facility). To achieve full nitrification, the SRT needs to be increased to 6-10 days.

As shown in Exhibit 2.F.2, the anoxic zones are created out of the current selector zones. We would then make the first existing zone partially anoxic. The remainder of that first zone is aerobic.

Potential Mitigation Innovation: Implementing an Ammonia Based Aeration Control to Reduce Power Consumption

With any plant modification for nitrogen removal comes an increase in the amount of air required for treatment. Aeration for the Bioreactors consists of blowers and fine bubble diffusers to provide the necessary oxygen for the biological treatment system to degrade organic carbon and nitrify ammonia. The aeration system is controlled based on dissolved oxygen (DO) readings within the bioreactors. The DO is measured using a probe located within the aerobic zone of each aeration basin. This measurement is used within the control system to adjust the control valves to each bioreactor changing the amount of air delivered. As the valves adjust, the pressure in the main air header changes proportionally. The single stage aeration blowers theoretically will adjust their variable vanes to maintain the header pressure within a selected range, or ultimately turn blowers on/off. During the site visit, at the short snapshot of time when the SCADA system was reviewed, the DO was observed to be between 7 and 10 mg/L.

EXHIBIT 2.F.2. POTENTIAL MODIFICATIONS TO THE ACTIVATED SLUDGE SYSTEM TO IMPROVE NITROGEN REMOVAL



Based upon our results from modeling the New Bedford facility in our proprietary PRO2D model, Jacobs proposes modifications in shown 2.F.2 to include anoxic zones created out of the current selector zones. We would also make the first existing zone partially anoxic with the remainder of that first zone aerobic.

An initial comparison of the observed DO compared to industry standards suggest that the facility is over-aerated. Reducing the DO would result in energy savings, providing that the single stage blowers can turn-down sufficiently to meet the lower aeration demand. In the future when nitrogen limits have been implemented, additional energy savings can also be realized by upgrading the aeration control system to

utilize ammonia-nitrogen as the control variable. Ammonia-based aeration control (ABAC) has grown in popularity recently due to allowing utilities to fine tune their biological treatment system to only nitrify as much as the discharge permit requires.

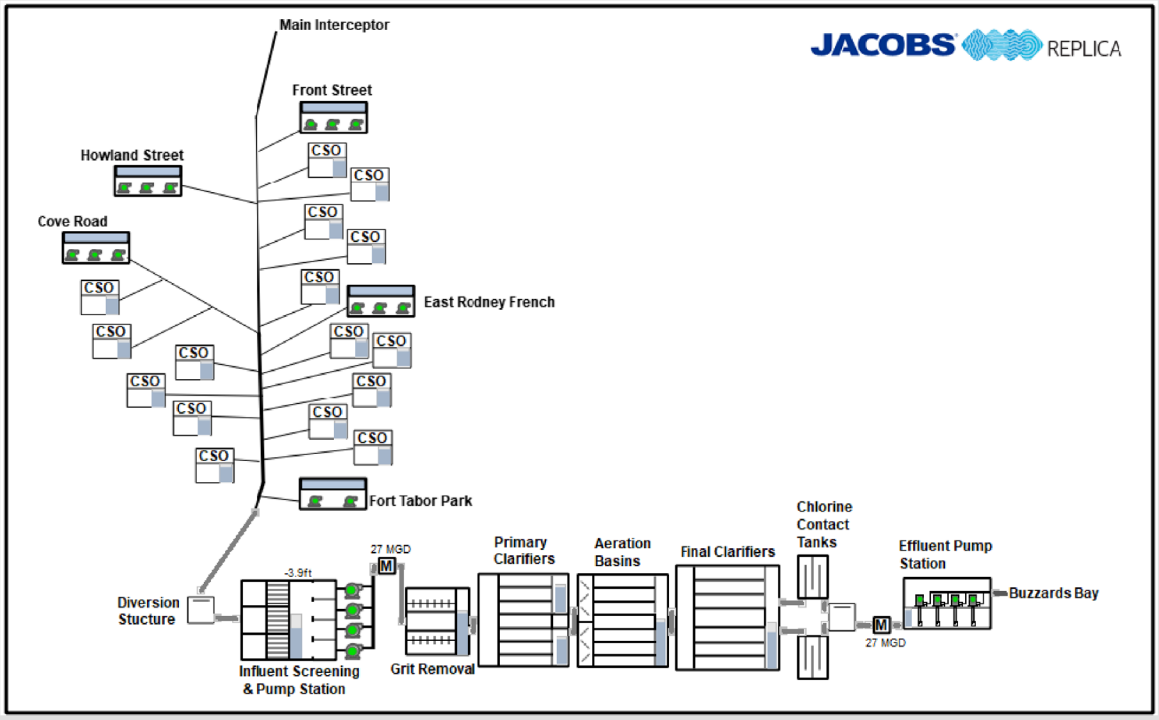
ABAC is an extension of a traditional DO control system by using a measured ammonia concentration in the bioreactors to adjust the DO setpoint to control to an ammonia setpoint; therefore, while the traditional DO control system may fully nitrify influent ammonia to <0.2 mg/L, the ABAC will only nitrify to the Operators setpoint. Stoichiometrically, nitrification requires approximately 4.6 grams of oxygen to oxidize a gram of ammonia. This presents an opportunity to reduce the overall aeration demand and reduce energy consumption. ABACs has been shown to reduce aeration demands by 10 to 20% as compared to a traditional DO control system. Installation of the ABAC system is summarized in Exhibit 2.F.3

EXHIBIT 2.F.3. SUMMARY OF STEPS FOR INSTALLATION OF THE ABAC SYSTEM TO IMPROVE BIOLOGICAL NUTRIENT REMOVAL

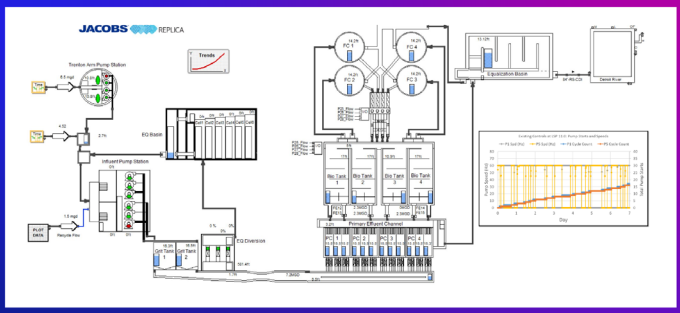
Approach	Rationale/Benefit
Evaluate aeration system	Evaluate the existing aeration to verify equipment condition and turn-down capability to develop alternatives to maximize potential savings.
Rehabilitate aeration system	Replace air mass flow meters and flow control valves for the diffuser grid drop legs (as identified in evaluation).
Rehabilitation DO measurement system	Replace DO probes and controllers (as identified in evaluation).
Install ammonia measurement system	Install new ammonia probes in the bioreactors and effluent ammonia analyzer in the secondary effluent.
Provide additional control logic for ABAC	The existing DO control system will require additional control logic for the ammonia-based control. Ammonia measurements and control setpoints will be provided in the SCADA system.

Jacobs can use its Digital Twin of New Bedford's CSOs and Wastewater Facility to develop an operational strategy for reducing CSO overflow and optimizing nitrogen removal

New Bedford's collection system includes sixty-five regulators that drain to twenty-seven Combined Sewage Overflows. These CSOs impact the water quality of the receiving stream. The amount of overflow from a CSO is a function of the characteristics of the area draining to the regulator and the rainfall received in this area. The operation of the system also can contribute to or reduce the amount of overflow.



We propose to develop a Digital Twin of the Collection System – including the regulators and CSOs and the WWTP, shown in the figure above. This Digital Twin will allow our team to develop an operational strategy with New Bedford that will be used to determine the existing operational strategy as an integrated system. Once this Existing Condition Digital Twin has been developed, our team can use this to develop an optimized operational strategy that will minimize the volume of annual overflow from the CSOS. The Jacobs team can review any existing monitoring in the system to determine if it can be used for operational purposes. Additional flow or level monitoring have not been costed in this proposal.



Jacobs developed a Replica model of the South Huron Valley Authority's collection system pump station and 24 MGD Waste Water Treatment Plant to develop various control and operations strategies that can not only reduce required operational staff during non-wet weather events, but also reduced energy consumed at their influent pump station. The model was used to demonstrate to operators that the automated control logic will work prior to implementation.

166_NWBD-OMM_MgmtPhilosophy

Performing a "Zero Tolerance" Odor and Noise Control Program

Through your "Zero Tolerance" program, the City has gone to great lengths to successfully abate and manage noise and odor complaints that stem from the plant. In order to maintain the City's high expectations in this endeavor, Jacobs will routinely monitor the plant for odors and noises including the presence of Hydrogen Sulfide (H2S) using a portable H2S meter and a hand-held sound level meter. Operators will make routine patrols of the plant and the boundary using both the portable meters as well as their own senses to determine if noise, H2S or other odor conditions are detectable. Once per shift, Jacobs will make an off-site patrol to specified potential odor source locations in neighboring vicinities during the known high odor season using a portable H2S meter. Any detection of abnormal noise, odor or H2S will be cause for Jacobs to implement a corrective action plan. Written guidelines will be prepared for operators to follow if any of these three elements are detected. Jacobs will record each plant patrol finding, including any measured readings of noise, H2S or detection of odor on an Odor and Noise Inspection Log. Jacobs will sign the log for each patrol indicating time of patrol, weather conditions, wind speed and direction.

There may be times when due to a combination of unfavorable meteorological conditions, equipment failures, or tank cleaning operations, odors or noise may travel past the fence line and may be detected by local residents. When this occurs, Jacobs will be immediately dispatched to the complaint location to interview the complainant and, if the odor and/or noise is still present, to record the intensity and character of the odor/noise, wind speed and direction, and other relevant information. Information requested from the complainant will include the following:

- Frequency of odor/noise detection
- Time of day when detected
- Weather conditions when detected
- Intensity of the odor/noise
- Duration of odor/noise events

This information will be kept in a permanent record per the plant's air quality permit stipulations. Concurrently with the dispatching of an operator to the location of the odor and/or noise complaint, an immediate review of plant operations will commence. This review will consist of the analysis of the following elements:

- Air handling building chemical scrubbers serving the influent pumping station, headworks, aerated grit tanks and primary settling tanks
  - Chemical scrubber serving the aeration basins
  - Chemical scrubber serving the sludge processing building
- Sludge removal
- Open hatches and doors
- Septage deliveries
- Duration of odor/noise events
- Chemical feed system (ferrous chloride and potassium permanganate)
  - Noise levels emanating from all chemical scrubber discharge stacks
- Low dissolved oxygen

Operation staff will routinely check the blended sludge in the sludge building to ensure that sufficient potassium permanganate or other approved chemical is being added to the sludge to prevent the escape of H2S or other odors. Operators will check aeration tanks and secondary clarifiers for odor free conditions. They will also check the return sludge for the presence of any septic odors. The detection of any odors in secondary system will prompt operational changes such as increasing the air supply or the rate of return sludge.

Routine housekeeping is an important yet simple way to ensure that odors do not escape from various locations on site. Operators will check the sludge processing building, the aeration basin facility and the headworks to ensure that doors are kept closed, exhaust systems are operating properly and that no abnormal amounts of dust or abnormal odors are present. They will check thickening and dewatering areas within buildings to ensure that H2S levels do not exceed safe levels for operational personnel. Safe levels within buildings for personnel should be low enough to preclude generation of objectionable odors that could extend beyond the facility fence line into the community.

Odor Control Standards

Jacobs will perform odor and dispersion modeling tests for the purpose of establishing the odor control baseline during the first contract year. Approximately every five years thereafter we will conduct sampling for and analyze the odor conditions at the plant in order to ensure that odor control is being optimally performed. The baseline odor tests will be performed only during periods when the treatment facility is being operated in compliance with the performance guarantees and there are no odor complaints that have not been resolved. This will ensure that baseline odor control standards are reflective of routine operating conditions. In addition, Jacobs will perform a wider, more comprehensive odor study that will include a wellness check on the existing chemical scrubbers and analyses of both odors released from the wastewater treatment plant itself as well as the conditions in the collection system lift stations lead to odorous compounds being brought to the plant through plant influent. Details on this wider approach are presented in the "Wellness Check and Baseline Odor Condition Establishment" section on the following page.

In order to establish the baseline for odor control standards, the numerical H2S measurement and the dilution-to-threshold ratio will be reported for each wastewater treatment process. These values will then be used to determine a reasonable odor test-based numerical value to characterize the odors present at the listed locations during periods of normal, non-odor event causing operations and, as such, will become the numerical odor control standard.

These results will then be input into our AEROMOD gaussian dispersion air model. **The purpose of the use of this model will be to determine the extent beyond the plant fence line that foul air concentrations reach potential receptors at levels that are above the human detection limit and how many hours per year those concentrations would be expected at those locations.** An example of graphical output from this model showing odor concentrations at various distances from a WWTF in California from one of our recent projects is presented in Exhibit 2.F.4.

EXHIBIT 2.F.4. TYPICAL AEROMOD GRAPHICAL ODOR CONCENTRATION OUTPUT

Such information will give the City a full understanding of the day-to-day impact, if any, that odors emanating from the plant are having on the surrounding neighbors. The beneficial impacts of any recommended odor control solutions will also be modeled using AEROMOD, thus giving the City further confidence that these solutions will have the desired effect of continuing to minimize odor impacts in the surrounding community. Jacobs will perform base line sampling and dispersion modeling every 5 years/

Understanding of Odor Complaints and Odor Control Systems

Ferrous chloride is added to plant influent in order to precipitate existing dissolved sulfides from solution that are generated in the collection system and carried into the plant. The iron feed is employed during warm weather months when influent liquid phase dissolved sulfide and plant odors are expected to be higher than normal. Potassium permanganate is added occasionally to the blended sludge line in the sludge building to provide odor reduction in sludge processing. Vapor phase odor control is successfully performed by four (4) chemical scrubbers that range in airflow capacity from 24,500 to 50,250 cfm. Elements of the system in the air handling building that control odors in the headworks are shown in Exhibit 2.F.5. The scrubbers utilize a combination of sodium hydroxide for pH control and sodium hypochlorite for oxidation of the vapor phase odorous compounds that are passed through the scrubber vessels.

EXHIBIT 2.F.5. ODOR CONTROL FANS IN AIR HANDLING BUILDING

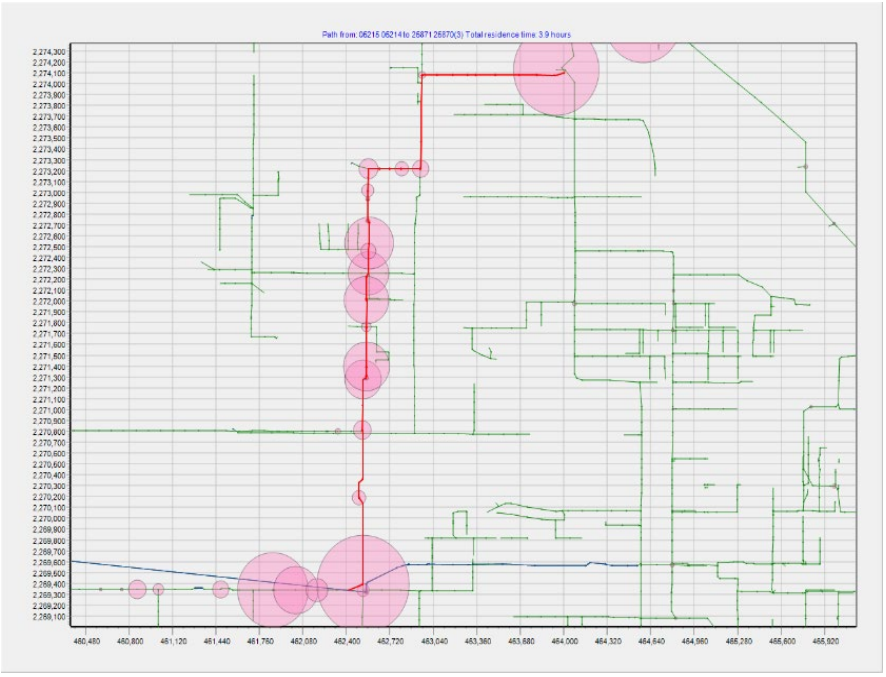
Wellness Check and Baseline Odor Conditions Establishment

VALUE-ADDED

Given that the City In order to achieve this, during the first year of the O&M period **Jacobs will perform an optimization-focused wellness check on the odor control protocols and facilities both at the water pollution control facility and at the 29 lift stations that directly contribute flows to the plant.** At a minimum, odor sampling will also be conducted in the plant at the influent pumping station, headworks, aerated grit tanks and primary settling tanks. We will utilize the AEROMOD air dispersion model to determine the extent to which natural air dispersion of the treated air discharge from each of the four chemical scrubbers contributes to overall odor control beyond the fence line of the water pollution control facility. Such analysis will contribute to the optimized usage of chemicals in the four odor control scrubbers. For example, if analysis reveals that natural air dispersion contributes to a significant amount of odor reduction from these four treated air discharge points, it could mean that continued successful odor control could be achieved with less chemical usage in the scrubbers.

In addition to investigating the current physical and performance conditions of the chemical scrubbers, through a series of gas phase and liquid phase sampling and analysis procedures **we will study the relationship between odorous liquid phase sulfide production in the collection system lift stations and subsequent chemical demand in the plant odor control chemical scrubbers with the goal of identifying opportunities to optimize potential combined odor control practices at the treatment facility and at the lift stations**. For example, it could be that the most optimized odor control approach might include some combination of operation of the plant chemical scrubbers with less sodium hypochlorite and sodium hydroxide in conjunction with strategic liquid phase chemical feed at one or more of the collection system pump stations. This "ounce of prevention equals a pound of cure" approach in the collection system, combined with our AEROMOD-driven analysis of dispersion of air discharges from the four plant chemical scrubbers could save the City up to hundreds of thousands of dollars in chemical costs per year if found to be feasible by our planned analytical approach. This optimization analysis will be greatly aided by our **WATS collection** system odor control dynamic computer model. An example of typical dissolved oxygen graphical output from the WATS model is presented in Exhibit 2.F.6.

EXHIBIT 2.F.6. TYPICAL GRAPHICAL OUTPUT FROM WATS MODEL



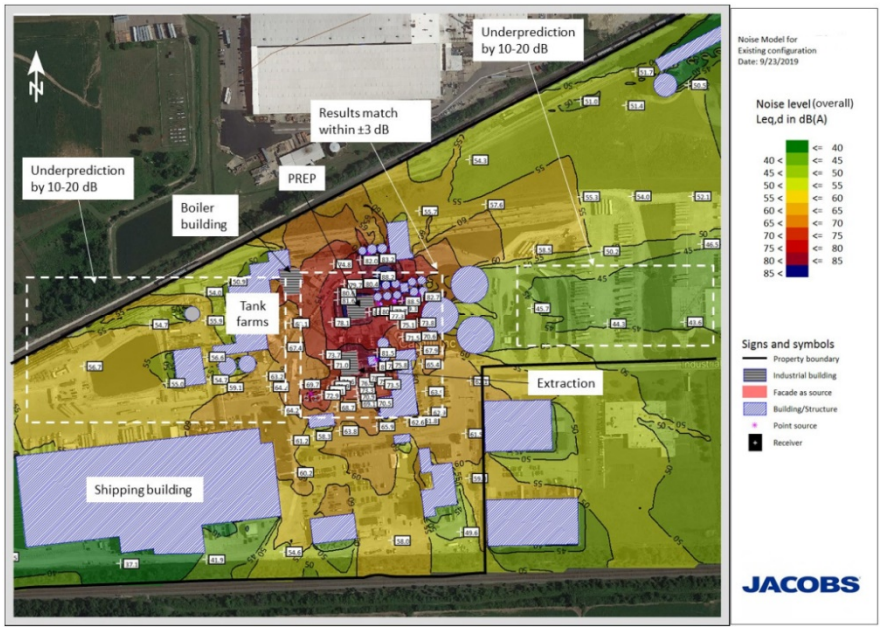
The WATS model utilizes GIS-based collection system physical information combined with flow data and grab sampling information to accurately predict, amongst many other odor-causing parameters, concentrations of liquid-phase dissolved sulfides in the collection system. As previously mentioned, the point of employing the WATS model for this application will be to expand upon our planned plant analysis to determine whether chemical feed might be more economically employed at one or more of the twenty-nine pump stations in the New Bedford wastewater collection system that currently contribute flows to it. The benefit of performing such an analysis would be to either confirm that current plant odor control practices are fully optimized or, if they are not, to identify additional methods by which such optimization could be achieved.

Noise Control

Jacobs' capability includes acoustic prediction for new sites or for modifications to existing sites. Acoustic predictions are made using both in-house design tools, and the commercial software package SoundPLAN.

When analyzing existing facilities, an important toolset is our ability to take onsite measurements of sound levels. This can include both indoor and exterior measurements of a building or facility. For industrial acoustics, Jacobs uses microphones to survey these facilities to find primary noise sources and their propagation around a facility. For example, a recent project utilized this capability to measure the sound levels of an operational agricultural processing plant and find the primary noise sources. These noise sources were going to be moved to a new building on

EXHIBIT 2.F.7. ACOUSTIC MODEL FOR A RECENT INDUSTRIAL PROJECT



another part of the property which was closer to the property boundary. Taking onsite measurements of the existing components allowed for more accurate modeling in the sound propagation analysis. The results of this analysis can be seen in Exhibit 2.F.7.

Finally, as part of a typical acoustic analysis, noise mitigation techniques are provided to reduce or eliminate the potential of noise complaints or ordinance violations. It is sometimes necessary to isolate equipment in silencer housings or use barrier walls. Another useful method of noise mitigation is landscaping which can be useful along property lines or around parks to further reduce noise propagation. **This combination of acoustic expertise at Jacobs allows us to provide valuable input in every phase of a facility's life cycle, from design to operational maintenance or refurbishment.**

Our response to odor and noise complaints is discussed at that end of *Section 2.E – Emergency Operations*.

G. Process Monitoring, QA/QC Reporting to City and Regulatory Agencies

Jacobs is fully committed to delivering on the City's objective of operating in full compliance with all applicable regulations, statutes, and permits.

Jacobs will be responsible for regulatory fines or penalties assessed for noncompliance resulting from the negligent action of Jacobs during the contract term. Jacobs' Environmental Compliance Program is an organized, systematic approach to maintain compliance with environmental, legal, and business requirements.

Through nearly 1,000 project years (number of projects multiplied by average contract length served) Jacobs has achieved a 99.98-percent compliance record with all regulatory requirements and permit parameters. This figure is quite impressive considering the number and complexity of facilities that we manage. Utilizing a series of quality assurance/quality control procedures, we guarantee the integrity and accuracy of the compliance and facility-performance data that we gather and report to regulators. As a result, we have formed positive and beneficial working relationships with the agencies to which we report on behalf of our customers.

Through nearly 1,000 project years (number of projects multiplied by average contract length served), we have achieved a 99.98-percent compliance record with all regulatory requirements and permit parameters. This figure is quite impressive considering the number and complexity of facilities that we manage.

Compliance Reporting Plan

Jacobs will be responsible to perform all sampling, analysis and reporting as necessary for compliance with all current state and federal regulations and any permitting or other regulatory requirements. Jacobs will implement a comprehensive laboratory program at the New Bedford facility that is compliant with current and anticipated regulations, including 40 CFR Part 136, the EPA Method Update Rule (MUR), Standard Methods Online Version, Guidelines Establishing Test Procedures for the Analysis of Pollutants, and other industry-accepted standards.

Jacobs will provide the City with a Quality Assurance Plan (QAP) detailing procedures for providing the City with timely regulatory and operational data. The QAP will also provide protocols for coordinating sampling activities with the City's testing program and communicating regulatory issues with the City and regulatory agencies.

A laboratory start-up will be performed that includes onsite training, installation of laboratory programs and policies, a review of regulatory requirements, and a follow-up laboratory review within 6 to 12 months. All resources will be utilized to make the laboratory compliant, efficient, and successful. Our main objective is to operate a fully-functional wastewater process control laboratory that will conduct all required sampling and analysis of samples in compliance with state and federal requirements. Compliant laboratory practices will be implemented and maintained along with an approved laboratory safety program.

Routine analyses and procedures for NPDES reporting of field parameters such as pH and total residual chlorine are performed by the laboratory staff at the treatment facility. Additional permit-required analyses will be performed using a combination of both the in-house laboratory and commercial laboratories. Samples will be transported to the contract laboratories via courier service to ensure all samples meet hold time requirements.

Permit Compliance Sampling Plan

All samples will be collected, preserved, analyzed, and the results will be reported to meet all EPA and MA DEP regulatory requirements as specified in NPDES permit number MA0100781.

Process Control Sampling and Testing

In addition to permit-required compliance sampling, Jacobs will implement a Process Control Sampling Plan in order to monitor the condition and performance of individual unit processes within the New Bedford WWTF.

Quality Assurance (QA) Protocols

A Laboratory QA Program will be implemented to verify the reliability of the data produced in the New Bedford laboratory. This will safeguard against errors in data production by implementing testing protocols according to industry approved methods. The main objectives of Jacobs' QA program are to produce reliable and defensible data, with documentation that fully complies with Massachusetts and Federal regulations. Jacobs' QA program will utilize a suite of tools to ensure all required samples are collected and properly analyzed, data is traceable and verified, and that performance-bias is tested with blind proficiency evaluation studies.

Quality Control (QC) Protocols

QC requires technicians to essentially demonstrate that each day's analysis was successful. All essential QC elements are incorporated with each method analyses, including, but not limited to: Method Blanks, Laboratory Control Samples, (LCS), Duplicates, Matrix Spike, and Matrix Spike Duplicate. Each essential QC element must meet the minimum EPA-established acceptable criteria for each analysis performed.

Jacobs' Example Compliance, Monitoring, and Laboratory Management Plans

Jacobs has developed rigorous compliance, sampling/monitoring, and laboratory programs we tailor and apply to all of our projects. The following example Jacobs plans and programs can be found in Section 6 – Supplemental Information:

- ✓ *Detailed example matrices of our Permit Compliance Sampling Plan showing permit parameters and analysis approach*
- ✓ *Example list of Jacobs' Process Control Sampling and Testing Parameters*
- ✓ *Additional details of our Quality Assurance and Quality Control Protocols*
- ✓ *Additional details about Jacobs' Laboratory Best Practices*

170_NWBD-OMM_1_DEN

Each Jacobs laboratory has required control limits for precision and accuracy that bracket the variation inherent in the test at that lab on our particular sample matrices. By using precision and accuracy control charts, Jacobs analysts can track trends and identify the emergence of systemic error. The graphs and charts necessary for these activities at the project site are prepared using our spreadsheet tool called "QC Stats."

Reporting Mechanisms

Jacobs will maintain records and prepare reports to regulators and other project stakeholders (as appropriate), The type and frequency of reports that Jacobs will generate for the City will include **Monthly Discharge Monitoring Reports.** The NPDES Discharge Monitoring Report will be submitted on time as required each month. Per protocols agreed upon by the City, we will ensure that timely notification of permit violations and operational situations are made as appropriate. These types of notifications would cover laboratory results that indicate a permit violation, spills, and other situations that normally require notification of regulatory agencies.

Laboratory Information Management System

The City's laboratory data software programs that will be utilized by Jacobs are the HACH WIMS database and Microsoft Excel and Access. HACH WIMS is the primary database used for compiling permit and process laboratory data. The information is tracked, compared to historical averages and targets, and sent to our process supervisors to make any necessary changes at the facility. Our laboratories use a Document Control System to retain all original observations, calculations and derived data, and calibration records.

Laboratory Operations Best Practices

Jacobs is committed to managing the laboratory based on rigorous standards to ensure safety and equipment longevity. Our approach to laboratory safety involves implementing a site-specific laboratory safety plan, including a laboratory chemical hygiene plan (LCHP), chemical and safety training, and a focus on laboratory safety equipment. Jacobs' works diligently to prolong equipment life and ensure proper operability by implementing a CMMS-based preventive maintenance plan for all critical laboratory equipment can be found in *Section 6.E – Supplemental Information.*

H. Licenses, Permits, and Approvals

Obtaining Licenses

Our commitment to excellence begins with our commitment to staff. We encourage and support our employees in pursuit of all applicable licenses—*it's part of our employee incentives program*—and they appreciate our willingness to invest in their careers. Jacobs understands the importance of licensure is to the City of New Bedford and the State of Massachusetts, which is why our staffing plan ensures that properly licensed and certified personnel are on-site to perform the required services at your facility.

As indicated in Section 2-A, our leadership team possesses four Massachusetts wastewater operations certifications. One manager has applied for reciprocity and fully expects to have it well before the start of this partnership. For a complete list of the wastewater operator licenses held by our leadership team, please refer to the Proposer Qualifications Form in *Section 5 – Proposal Forms*.

Jacobs Sets Expectations for Advancement and Team Collaboration

Within two years of employment, all plant and collection system operators at New Jersey's North Hudson Sewerage Authority are required to obtain their S-1 or C-1 licenses. Further licensing is also rewarded with promotions, salary increases, and a bonus. Currently, 24 out of the 33 operators and managers on staff are now licensed, and those that are not are either taking classes or studying for exams. Our training program also helps build collaboration between the associates as they discuss the classes during their breaks, and even form study groups. Our managers are all encouraged to help the staff with their studies, and a "wastewater problem of the week" is always on the white board in the Ops Room. Since 2017, eight employees obtained new license levels at the project.

157_NWBD-OMM_1_DEN

Obtaining Permits

The single most important permit for this facility is the NPDES permit and its impacts on nitrogen, plant operations and any required upgrades to reduce nitrogen discharges. This permit will likely require additional reductions in the total nitrogen discharge within the next permitting cycle. We work proactively to make sure the appropriate agencies have everything they need when they need it. For the New Bedford permit, Permitting Lead Mike Wilson will meet early with regulators to start the submittal of applications in support of the regulatory approval and permitting process.

Our philosophy for approvals centers on close coordination with regulatory agencies and timely permit negotiations and application submissions. When new permits are required, we build in the necessary review periods into the schedule. We facilitate completeness meetings to ensure application submittal packages contain all required material and are organized to the preferences of each agency. We conduct a full walk through of the package and identify any additional material needed. This proactive approach mitigates the agency's need to request additional submittals during its scheduled review period and eliminates schedule delays.

We also employ a proactive communications strategy from application preparation through final approval to keep the process moving. We will maintain a proactive communications approach after permit application submittal to effectively monitor the permit review and address questions and concerns. Jacobs' permitting professionals will provide routine follow-up with each agency to maintain schedule requirements.

Our success working with agencies on nutrient and other permitting limits has formed the basis of our permitting approach.

Our local permitting team has negotiated and secured over $600M worth of capital improvement projects throughout New England, including Massachusetts, in the last 15 years. Led by Permitting Lead Mike Wilson, this team has worked closely on permit negotiations and nutrient limits with regulators in communities like Lynn, Massachusetts, GE Lynn, and Woonsocket and Westerly (WWTPs), Rhode Island.

For example, with the Lynn Water and Sewer Commission, we obtained approval to repurpose a wastewater outfall into a combined wastewater and stormwater outfall into the Inner Harbor, saving the Commission over $10M in new construction.

For other communities, we developed process modeling and negotiated with regulators on industrial pretreatment strategies to reduce effluent nitrogen to a 3 mg/l TN seasonal discharge and keep existing industrial businesses and jobs in the community.

Lastly, Jacobs serves as the remediation contractor for the USACOE for the New Bedford Harbor Cleanup. We work closely with the MassDEP and EPA on meeting all environmental compliance requirements for the sediment removal and remediation.

159_NWBD-OMM_1_DEN

Section 5

Proposal Forms

Section 5 – Proposal Forms

A. Proposer Qualification Form (Evidence of Minimum Qualifications)

B. Proposal Form 1 - Non-Collusion Affidavit and Pricing Commitment

C. Non-Collusion State Tax

D. Proposal Form 2 - Guarantee

E. Proposal Form 5 - Key Project Staff

PROPOSER QUALIFICATIONS

PROPOSER NAME: **Operations Management International Inc. (OMI)**

Per section 6.3.2 of the RFP, enclosed we provide two certifications demonstrating authorization of the two signatories, Steve Meininger and Elliott Wheeler, for OMI.

1) United States Wastewater Plant Experience

Utility Location	Design Capacity / Treatment Process	# and Size of Pump Stations	Contract O&M Program Dates	Current Client Contact (Name, Phone, Fax)
Pima County Agua Nueva Reclamation Facility Tuscon, AZ	**32 MGD** • Preliminary Treatment – Grit/ Screenings Removal • Secondary Treatment – Activated Sludge • Secondary Treatment – Activated Sludge Five Stage Bardenpho • Secondary Treatment – Bardenpho Process • Sludge-handling – DAF Solids Removal • Sludge-handling – Sludge Holding Tanks • Tertiary Treatment – Filtration • Tertiary Treatment – Tertiary Treatment	0	Oct-2010 to Present	Jeff Prevatt, Deputy Director of Wastewater (p) 520.256.5685 No fax available
City of Fayetteville Paul R. Noland WWTP Fayetteville, AR	**12.6 MGD** • Aerobic Digestion – Aerated Sludge • Aerobic Digestion – Aerobic Digestion • Disinfection – Chlorination/ Dechlorination • Disinfection – Ultraviolet (UV) Disinfection • Odor Control – Odor Scrubbers • Other – Irrigation • Other – Post Aeration • Preliminary Treatment – Preliminary Treatment, degritting and screening • Primary Treatment – Primary Clarifiers • Secondary Treatment - A20 Process	17 ranging from 6-36 MGD	Jan-1983 to Present	Don Marr, Chief of Staff (p) 479.575.8330 (f) 479.575.8257

	• Secondary Treatment – Biological Nutrient Removal (BNR) • Secondary Treatment – Secondary Treatment • Sludge-handling – Belt Filter Press • Sludge-handling – BFP Dewatering • Sludge-handling – Dewatering • Sludge-handling – Sludge Hauling • Tertiary Treatment – Effluent Filtration			
City of Fayetteville West Side Treatment Plant Fayetteville, AR	**10 MGD** • Disinfection – Ultraviolet (UV) Disinfection • Odor Control – Odor Scrubbers • Preliminary Treatment – Grit/ Screenings Removal • Secondary Treatment - A2C Process • Secondary Treatment – Aeration • Secondary Treatment – Biological Nutrient Removal (BNR) • Secondary Treatment – Secondary Clarifiers • Sludge-handling – BFP Dewatering • Sludge-handling – Sludge Hauling • Tertiary Treatment – Filtration	21 ranging from 6-36 MGD	Jan-1983 to Present	Don Marr, Chief of Staff (p) 479.575.8330 (f) 479.575.8257
City of Norwalk Norwalk WWTP East Norwalk, CT	**18 MGD** • Disinfection – Chlorination/ Dechlorination • Disinfection – Disinfection • Disinfection – Disinfection Using Sodium Hypochlorite • Odor Control – Odor Control • Odor Control – Odor Scrubbers • Other – Activated Carbon Other – Equipment Maintenance • Other – Pump Station-Sewage • Other – Sanitary Sewage Collection and Pumping • Other – Sanitary Water and Sewage Sampling and Analysis • Other – SCADA	24 ranging from .144-10.5 MGD	Jun-2000 to Jun-2020	Ralph Kolb, Supervisory Environmental Engineer (p) 203.854.7791 (f) 203.854.3224

	• Other – Sewage and Drainage Pumping • Other – Sewer Collection Other - Storage Tanks (Non-Potable) • Other – Valve Maintenance • Other – Wastewater Sampling and Analysis • Other – Water Treatment and Distribution System O&M • Preliminary Treatment – Aerated Grit Chambers • Preliminary Treatment – Bar Screen • Preliminary Treatment – Comminution and Screening • Preliminary Treatment – Grit/ Screenings Removal • Preliminary Treatment – Preliminary Treatment • Preliminary Treatment – Preliminary Treatment, Chlorination with Sodium Hypochlorite • Primary Treatment – Primary Clarifiers • Secondary Treatment – Activated Sludge • Secondary Treatment – Aeration Basins • Secondary Treatment – Biological Nutrient Removal (BNR) • Secondary Treatment – Clarifiers • Secondary Treatment – Secondary Treatment • Sludge-handling – Belt Filter Press • Sludge-handling – BFP Thickening • Sludge-handling – Sludge Disposal • Sludge-handling – Sludge Handling • Sludge-handling – Thickening-Gravity Belt			
City of Waterbury Waterbury WWTP	**27 MGD** • Disinfection – Ultraviolet (UV) • Disinfection	20 ranging from .2-13.5 MGD	Sep-2018 to Present	Christian Perez, Assistant Superintendent (p) 203.574.8251

Waterbury, CT	• Other – Chemical Phosphorus Removal • Other – Physical/Chemical settling • Preliminary Treatment – Aerated Grit Chambers • Preliminary Treatment – Fine Screens • Secondary Treatment – Bardenpho Process • Sludge-handling – Dewatering • Sludge-handling – Incineration			(f) 203.574.8269
City of Key West Richard A. Heyman Environmental Pollution Control Facility Key West, FL	**10 MGD** • Disinfection – Ultraviolet (UV) • Disinfection • Effluent Disposal – Deep Well Injection • Other – Chemical Phosphorus Removal • Other – Pump Assisted Stormwater Injection Wells • Secondary Treatment – Activated Sludge • Secondary Treatment – Biological Nutrient Removal (BNR) • Secondary Treatment – Extended Aeration • Secondary Treatment – Nitrification • Secondary Treatment – Secondary Treatment • Sludge-handling – Alternate Solids Stabilization • Sludge-handling – BFP Dewatering • Tertiary Treatment – Effluent Filtration	25	Dec-1988 to Present	John Paul Castro, Utilities Director (p) 305.809.3902 (f) 305.292.5130
Village of Carol Stream Water Reclamation Center Carol Stream, IL	**12 MGD** • Aerobic Digestion – Aerobic • Digestion • Anaerobic Digestion – Anaerobic Digestion • Disinfection – Chlorine Disinfection • Disinfection – Dechlorination • Landfill Management Other – Industrial Treatment Facility	1 14 MGD	Sep-1997 to Present	Phil Modaff, Director of Public Works (p) 630.871.6260 (f) 630.462.3650

	• Preliminary Treatment – Aerated Grit Chambers • Preliminary Treatment – Grit/ Screenings Removal • Secondary Treatment – Activated Sludge • Secondary Treatment – Nitrification • Secondary Treatment – Secondary Clarifiers • Secondary Treatment – Secondary Treatment • Sludge-handling – Belt Filter Press • Sludge-handling – Dewatering • Sludge-handling – Single Sludge • Sludge-handling – Sludge Disposal • Sludge-handling – Sludge Stabilization • Tertiary Treatment – Filtration			
South Huron Valley Utility Authority Wastewater Treatment Facility Rockwood, MI	**24 MGD** • Disinfection – Dechlorination • Flow Equalization – Flow Equalization and Storage • Odor Control – Odor Scrubbers • Odor Control – Preliminary Treatment, odor control • Other – Chemical Phosphorus Removal • Other – Physical/Chemical settling • Preliminary Treatment – Bar Screen • Primary Treatment – Primary Clarifiers • Secondary Treatment – Activated Sludge • Secondary Treatment – Biological Nutrient Removal (BNR) • Sludge-handling – Gravity Thickener • Sludge-handling – Lime Stabilization • Sludge-handling – Sludge Holding Tanks • Sludge-handling – Thickening-Holding tank decanting	2 1.3 MGD and 39 MGD	Jan-2019 to Present	Firooz Fath-Azam, SHVUA System Manager (p) 734.486.2393 (f) 734.379.4465

North Hudson Sewerage Authority Adams Street WWTP Hoboken, NJ	**20.8 MGD** • Disinfection – Ultraviolet (UV) Disinfection • Odor Control – Odor Control • Other – Pumping Stations Preliminary Treatment – Bar Screen • Preliminary Treatment – Vortex Grit • Primary Treatment – Primary Clarifiers • Secondary Treatment – Trickling Filter • Sludge-handling – Sludge Holding Tanks • Sludge-handling – Thickening-Gravity Belt • Tertiary Treatment – Sand Filtration	8 ranging from 4.3-50 MGD	Feb-1998 to Present	Fredric J. Pocci, P.E., Authority Engineer (p) 201.963.6043 (f) 201.963.3782
North Hudson Sewerage Authority River Road WWTP West New York, NJ	**10 MGD** • Disinfection - Chlorination/ Dechlorination • Disinfection – Chlorine Contact Disinfection – Sodium Hypochlorite • Odor Control – Odor Control • Other – Pumping Stations Preliminary Treatment – Bar Screen • Preliminary Treatment – Screening-Rotary drum screen • Preliminary Treatment - Vortex Grit • Secondary Treatment – Secondary Clarifiers • Secondary Treatment – Trickling Filter • Sludge-handling – Sludge Holding Tanks • Sludge-handling – Thickening-Gravity Belt	3 ranging from 4.3-50 MGD	Feb-2013 to Present	Fredric J. Pocci, P.E., Authority Engineer (p) 201.963.6043 (f) 201.963.3782
City of Brookings Brookings WWTP Brookings, OR	**14 MGD** • Odor Control – Odor Control • Preliminary Treatment – Bar Screen • Sludge-handling – Residuals Management	13 Ranging from 0.2-6 MGD	Mar-2018 to Present	Jake Pieper, Mayor (p) 541.469.1104 (f) 541.469.3650

City of Gresham Gresham WWTP Gresham, OR	**20 MGD** • Preliminary Treatment – Grit/ Screenings Removal • Secondary Treatment – Clarifiers	8 max capacity of 11.9 MGD	7/1/2018	Alan Johnston, City Engineer (p) 503.618.3454
City of Woonsocket Woonsocket Regional Wastewater Commission Woonsocket, RI	**16 MGD** • Disinfection – Dechlorination • Disinfection – Disinfection Using Sodium Hypochlorite • Effluent Disposal – Reuse • Odor Control – Odor Control • Other – SCADA • Primary Treatment – Primary Treatment • Secondary Treatment – Activated Sludge • Tertiary Treatment – Sand Filtration • Tertiary Treatment – Tertiary Filters	6 ranging from 0.05-0.7 MGD	Oct-2012 to Present	Jon Pratt, City Engineer (p) 401.767.9209 (f) 401.769.8712
City of Vancouver Marine Park WWTP Vancouver, WA	**16.1 MGD** • Disinfection – Ultraviolet (UV) • Disinfection • Preliminary Treatment – Grit/ Screenings Removal • Primary Treatment – Primary Clarifiers • Secondary Treatment – Activated Sludge • Secondary Treatment – Aeration Basins • Secondary Treatment – Clarifiers	7 larger ranging from 2.96-12.82 MGD, smaller from 10-30 kgal/day	Oct-2015 to Present	Dan Swensen, Engineering & Construction Services Manager (p) 360.487.7750 (f) 360.487.8625
City of Vancouver West Side Facility Vancouver, WA	**28.26 MGD** • Disinfection – Ultraviolet (UV) Disinfection • Other – Wastewater Laboratory Analysis • Other – Wastewater Sampling and Analysis • Preliminary Treatment – Bar Screen • Preliminary Treatment – Grit/ Screenings Removal • Primary Treatment – Primary Clarifiers • Secondary Treatment – Aeration Basins • Secondary Treatment – Clarification	2 larger ranging from 2.96-12.82 MGD, smaller from 10-30 kgal/day	Jan-2016 to Present	Dan Swensen, Engineering & Construction Services Manager (p) 360.487.7750 (f) 360.487.8625

	• Sludge-handling – Biosolids Disposal • Sludge-handling – Centrifuge Dewatering • Sludge-handling – Fluidized Bed Sludge Incinerator • Sludge-handling – Gravity Thickener • Sludge-handling – Thickening-Gravity Belt			

2) Financial Statements (Indicate if Proposer or Project Guarantor attached most recent three years of audited financials to proposal).

Jacobs is excited about the opportunity to serve as the City of Bedford's O&M partner. Consistent client satisfaction has fueled our growth over the last 72 years and provided us the strength to meet financial requirements of the largest and most complex programs in the world. With $12.7 billion in fiscal 2019 revenue and a talent force of more than 50,000, Jacobs provides a full spectrum of services for business, industrial, commercial, government, and infrastructure sectors. Our first quarter fiscal year results show double digit revenue and operating profit growth and Jacobs is on track to exceed its 3-year financial commitments made in 2016. With our financial strength—measured by a stable revenue and backlog, strong retained earnings, and effective risk management—Jacobs is committed to providing all financial guarantees to protect the public's interests and deliver exceptional value to the City and its customers.

The Proposer, Operations Management International, Inc., is a subsidiary of Jacobs and does not have audited financial statements. Unaudited financial information for the Proposer is summarized in Exhibit 1. Exhibit 2 summarizes this information for Jacobs. Audited financial statements for Jacobs Engineering can be found by clicking the link below.

http://invest.jacobs.com/investors/Jacobs-Filings/default.aspx

Exhibit 1. Summary of OMI's Financial Information

Year	2016	2017	2018
Net Worth	$18,571,000	$25,207,000	$38,250,000
Revenues	$211,159,000	$176,765,000	$132,483,000
Profit After Tax	$2,134,000	$7,872,000	$5,620,000

Exhibit 2. Summary of Jacob's Financial Information

Year	2016	2017	2018
Net Worth	$4,265,276,000	$4,428,352,000	$5,854,345,000
Revenues	$10,964,157,000	$10,022,788,000	$14,984,646,000
Profit After Tax	$214,515,000	$287,375,000	$173,142,000

3) Letter of Credit / Performance Bond

Attach to the Form a written demonstration of the ability to obtain the required letter of credit or performance bond. Written confirmation should be on the letterhead of the financial institution which will provide the letter of credit or performance bond consistent with M.G.L., Chapter 30B. **Do not specify the actual dollar amount of the commitment since price information can only be specified in the Price Proposal.**

A copy of the performance bond is provided in *Section 3 – Business Arrangement / Proposer Financials.*

4) Certifications and Licenses

Position	Individual Named	State	Wastewater (Grade)
Project Manager	Mike Arnold	MA IO NEWPCA	7C 4 4
Operations Manager	Adam Federau	IL ABC MA	1 3 Pending
Maintenance Manager	Paul Horigan	MA	5C
Regulatory Compliance Lead	Jeff Heroux	MA	7C
Regional Operations Manager	Kevin Dahl	MA RI CT	6C 4 4

5) Anti-Fraud Demonstration (to be signed by company officer submitting Proposal)

"No officer of the Proposer company or affiliate of the company nor the Project Guarantor, if any, or any affiliate of the Project Guarantor has been convicted of fraud by the Federal government of the United States or by any governmental entity in Massachusetts, or by any other state in the United States."

Name: Steve Meininger

Signature: _____

Title: President and Delegated Signer

Date: 1/23/2020

6) Bankruptcy (to be signed by company officer submitting Proposal)

"Neither the Proposer Company or any affiliate of the Proposer company nor the Project Guarantor, if any, or any affiliate of the Project Guarantor has ever filed for bankruptcy."

Name: Steve Meininger

Signature: _____

Title: President and Delegated Signer

Date: 1/23/2020

Or:

Bankruptcy was claimed under the following circumstances:

Jacobs

SECRETARY CERTIFICATE

I, Robert Albery, Secretary of OPERATIONS MANAGEMENT INTERNATIONAL, INC., hereby certify that Steve Meininger is President of OPERATIONS MANAGEMENT INTERNATIONAL, INC., and has been granted authority in accordance with our Signature Authority Policy to execute documents on behalf of the company.

Dated this the 23RD day of January 2020.

Robert Albery, Secretary

State of Colorado)
) ss:
County of Douglas)

Subscribed and sworn to before me by Julie T. Arnold on this the 23rd day of January 2020.

Notary Public

JULIE T ARNOLD
Notary Public – State of Colorado
Notary ID 19984008241
My Commission Expires Mar 23, 2022

JACOBS

SECRETARY CERTIFICATE

I, Robert S. Albery, Secretary of Operations Management International, Inc. (the "Company"), hereby certify that:

Elliott Wheeler is Vice President of the Company and has been granted authority to sign documents on behalf of the Company.

I hereby further certify that Secretary Certificate remains in full force and effect at the date of this Certification.

Dated this 21st day of January 2020.

Robert S. Albery, Secretary

PROPOSAL FORM 1

NON-COLLUSION AFFIDAVIT
AND PRICING COMMITMENT

STATE OF Colorado)

)SS.

COUNTY OF Douglas)

I, Steve Meininger of the City of Clarksville, in the County of Howard and State of Maryland, of full age, being duly sworn on oath depose and say that:

I am President of the firm of Operations Management International Inc., the Proposer making the Proposal of Operation, Maintenance, and Management Services ("Services"), and that I executed the said Proposal with full authority to so do; that said Proposer has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free, competitive bidding in connection with the Services; that all statements contained in said Proposal and in this affidavit are true and correct, and made with full knowledge that the City of New Bedford ("City") relies upon the truth of the statements contained in said Proposal and in the statements contained in this affidavit in awarding Agreement for the said Services.

The Proposer understands the RFP and Agreement Term Sheet and Agreement and has based the Proposal on the risk allocation contained in the RFP and Agreement Term Sheet and Agreement. The Proposer accepts all the terms and conditions contained in the Agreement and will sign the Agreement upon selection by the City.

I have submitted all Proposal Forms which are incorporated into this Proposal by this reference.

I further certify:

A. that neither the Proposer nor any member of the Proposer's team is currently suspended or debarred from doing business with any government entity;

B. that the Proposer has reviewed all of its engagements and pending engagements and that, in making this Proposal, no potential for conflict of interest or unfair advantage exists;

C. that the information supplied by the Proposer in this Proposal is current, truthful and complete;

Having carefully examined the project documents comprising the RFP and all other documents bound therewith, together with all Addenda thereto, all information made available at the City, and being familiar with the work and the various conditions affecting the work, the undersigned hereby offers to furnish all plant, labor, materials, supplies, equipment and other facilities and things necessary or proper or incidental to the contract operations as required by and in strict accordance with the applicable provisions of this RFP and of all Addenda issued by the City and mailed to the undersigned prior to the date for operating proposals, whether received by the undersigned or not, for the Service Fee stated in the Proposal as elected to be implemented by the City and at the City's sole discretion.

I acknowledge receipt of addenda:

NO.	Date
1	December 20, 2019
2	January 2, 2020
3	January 7, 2020
4	January 14, 2020

I further warrant that no person or selling agency has been employed or retained to solicit or secure such Agreement upon an agreement or understanding for a commission, percentage, brokerage or contingent fee, except bona fide employees or bona fide established commercial or selling agencies maintained by Operations Management International Inc.

(Signature of Proposer)

Note: If this Proposal is being submitted by a corporation, the Proposal shall be executed in the corporate name by the president or other corporate officer, and the corporate seal shall be affixed and attested to by the clerk. A certificate of the clerk of the corporation evidencing the officer's authority to execute the Proposal shall be attached.

If this Proposal is being submitted by a joint venture, it shall be executed by all joint venture Partners, and any partner that is a corporation shall follow the requirements for execution by a corporation as set forth above.

NANCY A WARDELL
(Notary Public)

State of COLORADO County of DOUGLAS

On this 23 day of JANUARY, 2020 before me appeared STEPHEN MEINGER personally known to me to be the person described in and who executed this AFFIDAVIT and acknowledged that (she/he) signed the same freely and voluntarily for the uses and purposes therein described.

In witness thereof, I have hereunto set my hand and affixed my official seal the day and year last written above.

Notary Public in and for the state of CO

(seal)

NANCY ANN WARDELL
NOTARY PUBLIC - STATE OF COLORADO
NOTARY ID 19914005252
MY COMMISSION EXPIRES DEC 17, 2023

NANCY A WARDELL
(Name printed)

Residing at 345 PANORAMA DR ELIZ CO 80107

My appointment expires 12/17/2023

CITY OF NEW BEDFORD
MASSACHUSETTS

NON-COLLUSION AND TAX COMPLIANCE FORM

CERTIFICATE OF NON-COLLUSION

The undersigned certified under penalties of perjury that this bid has been made and submitted in good faith and without collusion or fraud with any other person. As used in this certification, the word "person" shall mean any natural person, business, partnership, corporation, union, committee, club or other organization, entity or group of individuals.

Signature of individual submitting bid

Operations Management International Inc.
Name of business/organization

TAX COMPLIANCE CERTIFICATION

Pursuant to M.G.L. c. 62C, §49A, I certify under the penalties of perjury that, to the best of my knowledge and belief, I am in compliance with all laws of the Commonwealth relating to taxes reporting of employees and contractor, and withholding and remitting child support.

Signature of individual submitting bid

Operations Management International Inc.
Name of business

PROPOSAL FORM 2

GUARANTEE

Chief Procurement Officer
City of New Bedford
City Hall
133 William Street
New Bedford, MA 02740

Re: City of New Bedford
Procurement for the Operation, Maintenance and Management of the Wastewater Treatment Facility

Dear Chief Procurement Officer:

The undersigned hereby represents to the City of New Bedford ("City") that if Operations Management International Inc. (the "Proposer") is awarded the Service Agreement for the Operation, Maintenance and Management services ("Services") described in this RFP and outlined in the Service Agreement, the undersigned agrees to fully and unconditionally guarantee all obligations of whatever kind or nature of the Proposer to the City. Those matters which the undersigned will guarantee shall include, but shall not be limited to the following:

- All financial, payment, and performance obligations of the Proposer under the Service Agreement to be executed by the selected Contract Operator and the City.
- All obligations of the Proposer to perform the Services.
- All indemnification obligations of the Proposer to the City for any claims, losses, damages or liabilities arising out of any acts or omissions of the Proposer' its agents, contractors, subcontractors, and employees, in performing the Services in accordance with the Service Agreement.

Notwithstanding anything to the contrary in this Letter of Intent and in the draft Service Agreement, the Guarantor expressly reserves the right to effectuate its obligations under such Letter of Intent and Service Agreement through a properly licensed and registered corporate affiliate, as such licensure and registrations are required by applicable law.

Sincerely yours,

_____

Sr. Vice President and Delegated Signer

Jacobs Engineering Group Inc.
Name of Firm

PROPOSAL FORM 5

KEY PROJECT STAFF

(Copy and complete this form for key project staff members as defined in Section 7.0. Attach additional pages if necessary.)

GENERAL INFORMATION

Name:	Mike Arnold
Firm:	Jacobs
Title:	Project Manager
Years employed by firm:	19 years
Wastewater professional experience:	35 years
Professional registration and Licenses (type/state/year):	Grade 7C Wastewater Operator / MA / 1992 New England Water Pollution Control Association Grade 4 Collection Systems Operator / 1990 Grade IV Wastewater Operator / IO / 1997

CITY OF NEW BEDFORD PROJECT-SPECIFIC INFORMATION

Title / Assignment: Project Manager

Description of Role/Responsibilities:

Provide strategic leadership and overall operations management by creating a caring and supportive culture based on respect and mutually beneficial relationships. Responsible for the quality performance of the operations team, management of assets, and adherence to service contract requirements, including budget and schedule.

REFERENCE PROJECT EXPERIENCE (Please repeat this for the requested number of projects)

Project #1:	North Hudson Sewerage Authority (NHSA) Adams Street (Hoboken) WWTP (20.8 MGD) and River Road (West New York) WWTP (10 MGD)	
Location:	Hoboken and West New York, NJ	
Current Status:	Inactive	
Dates of Involvement:	From 2005	Through 2011
Contact Person:	Fredric J. Pocci	
Title:	Authority Engineer	
Address:	1600 Adams Street, 2nd Floor Hoboken, NJ 07030	

Phone:	201.963.6043
Fax:	201.963.3782
E-mail:	FPocci@nhudsonsa.com

Project #2:	City of Norwalk WWTP (18 MGD)	
Location:	Norwalk, CT	
Current Status:	Inactive	
Dates of Involvement:	From 2001	Through 2005
Contact Person:	Ralph Kolb	
Title:	Supervisory Environmental Engineer	
Address:	15 South Smith Street Norwalk, CT 06855	
Phone:	203.854.7791	
Fax:	203.854.3224	
E-mail:	rkolb@norwalkct.org	

Project #3:	City of New Haven Water Pollution Control Authority's East Shore Water Pollution Abatement Plant (40 MGD)	
Location:	New Haven, CT	
Current Status:	Inactive	
Dates of Involvement:	From 2001	Through 2005
Contact Person:	Gary Zrelak	
Title:	Director of Operations	
Address:	260 East St New Haven CT 06511	
Phone:	203.260.5280	
Fax:	203.772.1586	
E-mail:	gzrelak@gnhwpca.com	

PROPOSAL FORM 5

KEY PROJECT STAFF

(Copy and complete this form for key project staff members as defined in Section 7.0. Attach additional pages if necessary.)

GENERAL INFORMATION

Name:	Adam Federau
Firm:	Jacobs
Title:	Assistant Project Manager
Years employed by firm:	5 years
Wastewater professional experience:	7 years
Professional registration and Licenses (type/state/year):	Class 1 Wastewater / IL / 2017 ABC Class III Wastewater 2019 Class 6C Wastewater / MA / Pending

CITY OF NEW BEDFORD PROJECT-SPECIFIC INFORMATION

Title / Assignment: Operations Manager

Description of Role/Responsibilities:

Manage the daily operations of the facility with primary focus on ensuring the various wastewater treatment processes are performing as designed for permit compliance. Direct daily involvement with laboratory staff and reviewing analytical sample results. Supervise the operations team, scheduling work and shifts, training, coaching, and communicating with shift staff to satisfy the program schedule.

REFERENCE PROJECT EXPERIENCE (Please repeat this for the requested number of projects)

Project #1:	South Huron Valley Utility Authority (SHVUA) Wastewater Treatment Facility (24 MGD)	
Location:	Rockwood, MI	
Current Status:	Active	
Dates of Involvement:	From 01/2019	Through Present
Contact Person:	Firooz Fath-Azam	
Title:	SHVUA System Manager	
Address:	17800 Fox Glen Drive	

	Riverview, MI 48193
Phone:	734.486.2393
Fax:	734.379.4465
E-mail:	firoozfath@yahoo.com

Project #2:	West Chicago / Winfield Regional Wastewater Treatment Facility (7.64 MGD)	
Location:	West Chicago, IL	
Current Status:	Active	
Dates of Involvement:	From 03/2012	Through Present
Contact Person:	Brent Lautenbach	
Title:	Project Manager	
Address:	725 Dayton Avenue	
	West Chicago, IL 60185	
Phone:	630.293.2260	
Fax:	630.293.3028	
E-mail:	Brent.Lautenbach@Jacobs.com	

Project #3:	Village of Carol Stream, Wastewater Treatment Facility (6.5 MGD)	
Location:	Carol Stream, IL	
Current Status:	Active	
Dates of Involvement:	From 09/2014	Through Present
Contact Person:	Nick Lenzi	
Title:	Project Manager	
Address:	245 Kuhn Road	
	Carol Stream, IL 60188	
Phone:	630.653.5663	
Fax:	630.462.3650	
E-mail:	Nicholas.lenzi@Jacobs.com	

PROPOSAL FORM 5

KEY PROJECT STAFF

(Copy and complete this form for key project staff members as defined in Section 7.0. Attach additional pages if necessary.)

GENERAL INFORMATION

Name:	Paul Horigan
Firm:	Jacobs
Title:	Asset Management / Maintenance Expert
Years employed by firm:	17 years
Wastewater professional experience:	17 years
Professional registration and Licenses (type/state/year):	5C Municipal & Industrial Wastewater Operator / MA / 2006 Level I Thermography / US / 2011 Vibration Analysis Category II / US / 2008 ARC FLACH 70e Qualified Person / state / YYYY CRL-Certified Reliability Leader / US / 2016 CMRT-Certified Maintenance Reliability Technician / US / 2016 MLT1-Machine Lubrication Technician / US / 2017

CITY OF NEW BEDFORD PROJECT-SPECIFIC INFORMATION

Title / Assignment: Maintenance Manager

Description of Role/Responsibilities:

Assist in the development of the O&M Plan and manage the team responsible for inspections and preventative, corrective, and predictive maintenance programs. Document and communicate any deficiencies observed, including measures taken to correct such deficiencies. Provide expert consulting services, focusing on computerized maintenance management systems (CMMS), workflows, best practices, planning/scheduling, and performance metrics. He will provide training support for trades related to water and wastewater plant maintenance.

REFERENCE PROJECT EXPERIENCE (Please repeat this for the requested number of projects)

Project #1:	North Hudson Sewerage Authority (NHSA) Adams Street (Hoboken) WWTP (20.8 MGD) and River Road (West New York) WWTP (10 MGD)
Location:	Hoboken and West New York, NJ
Current Status:	Active

Dates of Involvement:	From 02/1998	Through Present
Contact Person:	Fredric J. Pocci, PE	
Title:	Authority Engineer	
Address:	1600 Adams Street, 2nd Floor	
	Hoboken, NJ 07030	
Phone:	201.963.6043	
Fax:	201.963.3782	
E-mail:	FPocci@nhudsonsa.com	

Project #2:	City of Waterbury WWTP (27 MGD)	
Location:	Waterbury, CT	
Current Status:	Active	
Dates of Involvement:	From 09/2018	Through Present
Contact Person:	Christian Perez	
Title:	Assistant Superintendent	
Address:	21 East Aurora St.	
	Waterbury, CT 06708	
Phone:	203.574.8251 x7657	
Fax:	203.574.6849	
E-mail:	cperez@waterburyct.org	

Project #3:	South Huron Valley Utility Authority (SHVUA) Wastewater Treatment Facility (24 MGD)	
Location:	Rockwood, MI	
Current Status:	Active	
Dates of Involvement:	From 01/2019	Through Present
Contact Person:	Firooz Fath-Azam	
Title:	SHVUA System Manager	
Address:	17800 Fox Glen Drive	
	Riverview, MI 48193	
Phone:	734.486.2393	
Fax:	734.379.4465	
E-mail:	firoozfath@yahoo.com	

PROPOSAL FORM 5

KEY PROJECT STAFF

(Copy and complete this form for key project staff members as defined in Section 7.0. Attach additional pages if necessary.)

GENERAL INFORMATION

Name:	Elizabeth Tepper
Firm:	Jacobs
Title:	Senior Operations Specialist–Environmental Chemistry, Geologist
Years employed by firm:	20 years
Wastewater professional experience:	9 years
Professional registration and Licenses (type/state/year):	N/A

CITY OF NEW BEDFORD PROJECT-SPECIFIC INFORMATION

Title / Assignment: Laboratory Manager

Description of Role/Responsibilities:

Manage all necessary analyses, including testing (effluent testing, effluent metals analysis, sludge analysis, process control, etc.), sampling and any other analytical procedures to demonstrate compliance with the agreement, applicable regulatory requirements, and permit provisions.

REFERENCE PROJECT EXPERIENCE (Please repeat this for the requested number of projects)

Project #1:	City of Waterbury WWTP (27 MGD)	
Location:	Waterbury, CT	
Current Status:	Active	
Dates of Involvement:	From 01/2019	Through Present
Contact Person:	Christian Perez	
Title:	Assistant Superintendent	
Address:	21 East Aurora St.	
	Waterbury, CT 06708	
Phone:	203.574.8251 x7657	

Fax:	203.574.6849	
E-mail:	cperez@waterburyct.org	

Project #2:	City of Woonsocket Regional WWTP (16 MGD)	
Location:	Woonsocket, RI	
Current Status:	Active	
Dates of Involvement:	From 10/2012	Through Present
Contact Person:	Jon Pratt	
Title:	City Engineer	
Address:	169 Main Street	
	Woonsocket, RI	
Phone:	401.767.9209	
Fax:	401.769.8712	
E-mail:	Jpratt@woonsocketri.org	

Project #3:	City of Gresham WWTP (20 MGD)	
Location:	Gresham, OR	
Current Status:	Active	
Dates of Involvement:	From 07/2018	Through Present
Contact Person:	Alan Johnston	
Title:	City Engineer	
Address:	1333 NW Eastman Parkway	
	Gresham, OR 97030	
Phone:	503.618.3454	
Fax:	N/A	
E-mail:	Alan.Johnston@GreshamOregon.gov	

Project #4:	City of Brookings WWTP (14 MGD)	
Location:	Brookings, OR	
Current Status:	Active	
Dates of Involvement:	From 07/2019	Through Present

Contact Person:	Anthony Baron
Title:	Public Works Director
Address:	898 Elk Drive
	Brookings, OR 97415
Phone:	541.469.1159
Fax:	541.469.3650
E-mail:	abaron@brookings.or.us

PROPOSAL FORM 5

KEY PROJECT STAFF

(Copy and complete this form for key project staff members as defined in Section 7.0. Attach additional pages if necessary.)

GENERAL INFORMATION

Name:	Michael Wilson
Firm:	Jacobs
Title:	Design Manager
Years employed by firm:	31 years
Wastewater professional experience:	35 years
Professional registration and Licenses (type/state/year):	Professional Engineer / MA / 2007 Professional Engineer / RI / 2012 Professional Engineer / CT / 2009 Professional Engineer / WI / 1989

CITY OF NEW BEDFORD PROJECT-SPECIFIC INFORMATION

Title / Assignment: Permitting Lead

Description of Role/Responsibilities:

Provide direction and guidance on negotiating and obtaining permits or permit renewals and support for wastewater treatment process and plant optimization.

REFERENCE PROJECT EXPERIENCE (Please repeat this for the requested number of projects)

Project #1:	North Hudson Sewerage Authority (NHSA) Adams Street (Hoboken) WWTP (20.8 MGD) and River Road (West New York) WWTP (10 MGD)	
Location:	Hoboken and West New York, NJ	
Current Status:	Active	
Dates of Involvement:	From 02/1998	Through Present
Contact Person:	Fredric J. Pocci, PE	
Title:	Authority Engineer	
Address:	1600 Adams Street, 2nd Floor Hoboken, NJ 07030	

Phone:	201.963.6043
Fax:	201.963.3782
E-mail:	FPocci@nhudsonsa.com

Project #2:	City of Woonsocket Regional WWTP (16 MGD)	
Location:	Woonsocket, RI	
Current Status:	Active	
Dates of Involvement:	From 10/2012	Through Present
Contact Person:	Jon Pratt	
Title:	City Engineer	
Address:	169 Main Street	
	Woonsocket, RI	
Phone:	401.767.9209	
Fax:	401.769.8712	
E-mail:	Jpratt@woonsocketri.org	

Project #3:	City of Westerly WWTP (3.3 MGD)	
Location:	Waterbury, CT	
Current Status:	Active	
Dates of Involvement:	From 07/2017	Through Present
Contact Person:	Bill Beauregard	
Title:	Assistant Director of Public Works - Utilities	
Address:	68 White Rock Road	
	Westerly, RI 02891	
Phone:	401.741.7589	
Fax:	N/A	
E-mail:	abeauregard@westerlyri.gov	

PROPOSAL FORM 5

KEY PROJECT STAFF

(Copy and complete this form for key project staff members as defined in Section 7.0. Attach additional pages if necessary.)

GENERAL INFORMATION

Name:	Jeff Heroux
Firm:	Jacobs
Title:	Compliance Manager
Years employed by firm:	27 years
Wastewater professional experience:	31 years
Professional registration and Licenses (type/state/year):	Grade 7C Full Wastewater Operator / MA / 2021

CITY OF NEW BEDFORD PROJECT-SPECIFIC INFORMATION

Title / Assignment: Regulatory Compliance Lead

Description of Role/Responsibilities:

Provide direct support for NPDES permitting and reporting issues. Perform comprehensive onsite compliance audits and develop and conduct regulatory training programs for treatment facility managers and staff. Provide expertise in municipal industrial pretreatment programs (IPPs).

REFERENCE PROJECT EXPERIENCE (Please repeat this for the requested number of projects)

Project #1:	City of Fayetteville, Paul R. Noland WWTP (11.2 MGD) and West Side Treatment Plant (10 MGD)	
Location:	Fayetteville, AR	
Current Status:	Active	
Dates of Involvement:	From 03/2008	Through Present
Contact Person:	Don Marr	
Title:	Chief of Staff	
Address:	113 W. Mountain Street	
	Fayetteville, AR 72701	

Phone:	479.575.8330
Fax:	479.575.8257
E-mail:	dmarr@fayetteville-ar.gov

Project #2:	City of Waterbury WWTP (27 MGD)	
Location:	Waterbury, CT	
Current Status:	Active	
Dates of Involvement:	From 09/2018	Through Present
Contact Person:	Christian Perez	
Title:	Assistant Superintendent	
Address:	21 East Aurora St.	
	Waterbury, CT 06708	
Phone:	203.574.8251 x7657	
Fax:	203.574.6849	
E-mail:	cperez@waterburyct.org	

Project #3:	South Huron Valley Utility Authority (SHVUA) Wastewater Treatment Facility (24 MGD)	
Location:	Rockwood, MI	
Current Status:	Active	
Dates of Involvement:	From 01/2019	Through Present
Contact Person:	Firooz Fath-Azam	
Title:	SHVUA System Manager	
Address:	17800 Fox Glen Drive	
	Riverview, MI 48193	
Phone:	734.486.2393	
Fax:	734.379.4465	
E-mail:	firoozfath@yahoo.com	

Project #4:	North Hudson Sewerage Authority (NHSA) Adams Street (Hoboken) WWTP (20.8 MGD) and River Road (West New York) WWTP (10 MGD)
Location:	Hoboken and West New York, NJ

Current Status:	Active	
Dates of Involvement:	From 02/1998	Through Present
Contact Person:	Fredric J. Pocci, PE	
Title:	Authority Engineer	
Address:	1600 Adams Street, 2nd Floor	
	Hoboken, NJ 07030	
Phone:	201.963.6043	
Fax:	201.963.3782	
E-mail:	FPocci@nhudsonsa.com	

Project #5:	City of Vancouver, Marine Park WWTP (16.1 MGD) and West Side Facility (28.26 MGD)	
Location:	Vancouver, WA	
Current Status:	Active	
Dates of Involvement:	From 08/2015	Through Present
Contact Person:	Dan Swensen	
Title:	Engineering & Construction Services Manager	
Address:	415 W. 6th St	
	Vancouver, WA 98660	
Phone:	360.487.7750	
Fax:	360.487.8625	
E-mail:	Dan.Swensen@cityofvancouver.us	

PROPOSAL FORM 5

KEY PROJECT STAFF

(Copy and complete this form for key project staff members as defined in Section 7.0. Attach additional pages if necessary.)

GENERAL INFORMATION

Name:	Mark Smith
Firm:	Jacobs
Title:	Managing Engineer
Years employed by firm:	2 years
Wastewater professional experience:	27 years
Professional registration and Licenses (type/state/year):	Professional Engineer (Env) / OR / 2005

CITY OF NEW BEDFORD PROJECT-SPECIFIC INFORMATION

Title / Assignment: Odor Control Lead

Description of Role/Responsibilities:

Responsible for leading both day-to-day and long-term studying and planning efforts for our proposed odor control strategy, both at the water pollution control facility and in the 29 pump stations in the wastewater collection system.

REFERENCE PROJECT EXPERIENCE (Please repeat this for the requested number of projects)

Project #1	Clackamas County Water Environment Services, Collection System Odor Control Study (23 pump stations)	
Location:	Clackamas County, Oregon	
Current Status:	Completed	
Dates of Involvement:	From 03/2013	Through 09/2013
Contact Person:	Dan Laffitte	
Title:	Project Manager	
Address:	Carollo Engineers	
	707 SW Washington St. #500	
	Portland, OR 97205	
Phone:	503.290.2817	

Fax:	N/A
E-mail:	DLaffitte@carollo.com

Project #2:	Clackamas County Water Environment Services (WES), Kellogg Water Resource Recovery Facility (25 MGD)	
Location:	Milwaukie, OR	
Current Status:	Completed	
Dates of Involvement:	From 10/2011	Through 12/2014
Contact Person:	Dan Laffitte	
Title:	Project Manager	
Address:	Carollo Engineers	
	707 SW Washington St. #500	
	Portland, OR 97205	
Phone:	503.290.2817	
Fax:	N/A	
E-mail:	DLaffitte@carollo.com	

Project #3:	Owner's Rep, City of Wilsonville, Oregon WWTP DBO (4 MGD)	
Location:	Wilsonville, Oregon	
Current Status:	Completed	
Dates of Involvement:	From 10/01/2009	Through 04/30/2014
Contact Person:	Art Molseed, PE	
Title:	Director of Project Management	
Address:	Brown and Caldwell	
	6500 Macadam Blvd., Suite 200	
	Portland, OR 97239	
Phone:	503.244.7005	
Fax:	503.244.9095	
E-mail:	Amolseed@brwncald.com	

Section 6

Supplemental Information

6.A

Key Project Staff Resumes

A. Key Project Staff Resumes

MICHAEL ARNOLD | PROJECT MANAGER

Education | Qualifications	Intermediate Wastewater Operations, Massachusetts Department of Environmental Protection Microbiology for Process Control and Intermediate Wastewater Operations, Massachusetts Department of Environmental Quality Engineering Collection System Operations, Massachusetts Department of Environmental Protection and New England Water Pollution Control Association Industrial Pretreatment Pollution Prevention, New England Interstate Environmental Training Center Enforcement Response Plan Workshop, USEPA
Registrations | Certifications	Grade 7C Wastewater Operator, MA, 1992 New England Water Pollution Control Association Grade 4 Collection Systems Operator, 1990 Grade IV Wastewater Operator, IO, 1997 Authorized OSHA General Industry Trainer/Instructor

Profile

With 35 years of plant operations experience, Michael is a leader in managing, training and motivating an O&M team. His experience includes treatment plant operation, management, laboratory management, industrial pretreatment monitoring, and program planning for WWTPs ranging in size from 1.37 MGD to 40 MGD and involving optimized nitrogen removals. He has managed the operations of three 20+ MGD WWTPs with five or more pumping stations within a single system. For the New Bedford facility, Michael will provide strategic leadership and overall operations management by creating a caring and supportive culture based on respect and mutually beneficial relationships. He will be responsible for the quality performance of the operations team, management of assets, and adherence to service contract requirements, including budget and schedule.

Relevant Project Experience

Adams Street 20.8 MGD and River Road 10 MGD Wastewater Treatment Plants O&M, Hoboken and West New York, NJ

Client: North Hudson Sewerage Authority (NHSA) | Title: **Project Manager**

Michael provided oversight of operations and maintenance at the Adams Street and River Road facilities, 105 miles of collection system and six pump stations. This involved working with the operations manager and lead operators in developing and monitoring all operating strategies, process control, and analysis of daily operating results. Michael was also responsible for development and implementation of operator training, SOPs and UPCP, management of the laboratory operations including all reporting of internal and external operating data, maintaining approved laboratory standards and methods, QA/QC program, and laboratory certification. He served as liaison for NHSA on NJDEP certification, compliance and inspection issues. Michael also prepared all written monthly reports and presentations for NHSA. Additional duties included development of written operations and facility safety plans, safety training quality training and development, interviewing new hires, and community outreach and education.

One of the biggest efforts Michael led was developing a comprehensive odor control program. Both facilities are built in the middle of thickly populated cities with houses and apartment complexes overlooking the treatment plants. After a facility wide sampling program, pilot testing as well as modifications to process and practices, prioritized projects were planned and scheduled in order to put funding where the greatest level of odor removal could be accomplished. These changes along with continued operator training resulted in odor complaints being reduced and within months being eliminated.

East Shore 40 MGD Water Pollution Abatement Plant O&M, New Haven, CT

Client: City of New Haven Water Pollution Control Authority | Title: **Project Manager**

Michael was responsible for all management, operations, collection system, laboratory, and maintenance activities associated with the facility as well as administering and providing required training for the site safety program. He was also responsible for administering the contracts for New Haven, three satellite projects and the collective bargaining agreement with the union that represents 27 of the employees. Michael, along with the Regional Lab Director, had overall responsibility for the regional laboratory in Connecticut that conducts all NPDES required analysis for the New Haven, West Haven and Norwalk treatment facilities. This included final review of all QA/QC reporting.

The East Shore facility, which includes an interceptor sewer collection system, represents the largest coastal plant in Connecticut to be modified for nitrogen removal under the Interim Nitrogen Reduction Program initiated by the Connecticut Department of Environmental Protection. The Nitrogen removal improvements worked far beyond expectation and achieved limits after phase II were not expected until after phase III. This resulted in substantial savings to the sewage authority as well as allowing them to sell nitrogen credits to other communities thus creating additional revenue. The scope of work included full-service system O&M (treatment plant, pumping stations, collection lines, and laterals/interceptors including industrial pretreatment program implementation). Two of the pump stations were former 30 MGD primary treatment facilities with onsite bar screens and grit removal systems that were converted to pump directly to the New Haven Regional Facility.

Fall River's Wastewater Facilities O&M, Fall River, MA

Client: Fall River Sewer Commission | Title: **Project Manager, Industrial Pretreatment/Laboratory Specialist**

Michael was responsible for oversight of the contract operations of the City's 40 MGD wastewater facility with more than five pumping stations during his tenure with the Commission. After an employment move to OMI, Michael served as the industrial pretreatment/laboratory specialist where he was responsible for administering the pretreatment and laboratory functions of the City's 30.9 MGD pure oxygen activated sludge wastewater treatment plant and 11 pump stations. His duties included directing and performing sampling and analytical tests; developing and implementing a safety program; monitoring plant performance; and researching plant trends. In addition, Michael observed the biological process and related laboratory work, such as nutrient analysis, filament staining, and process bench testing using a laboratory respirometer.

Dartmouth 4.2 MGD Water Pollution Control Facility O&M, Dartmouth, MA

Client: Town of Dartmouth | Title: **Assistant Plant Manager**

Michael oversees the daily operations of the town's 4.2 MGD water pollution control facility, 22 pump stations and compost facilities while working with the existing manager during a major upgrade of odor control at the treatment facility, influent pumps and controls, main pumps and controls, as well as emergency generators at the four largest pump stations. His duties include monitoring of plant processes, developing and implementing operational control strategies, directing the activities of 12 employees, overseeing laboratory operations, performing laboratory analysis, conducting facility inspections and monitor efficiency, management of all data collection and entry into the management databases. Additional responsibilities include monitoring of SCADA, preparing monthly reports for DMR and MOR submission, and programming for standard operating procedures, process control plan, quality assurance, facility safety, and employee training. Michael also manages the maintenance management program including preventive and corrective work order scheduling and coordinates this work with the chief operations and maintenance operators. He coordinates with all outside engineering groups on upgrades and capital improvements.

ADAM FEDERAU | OPERATIONS MANAGER

Education | Qualifications	B.A., Chemistry
Registrations | Certifications	Illinois Class 1 Certified Wastewater Operator - 2017 ABC Class III Wastewater Treatment Operator – 2019 Eligible for reciprocity in the State of Massachusetts per 257 CMR 2.00

Profile

Adam Federau is an Illinois Class 1 and ABC Class 3 certified wastewater operator with experience at WWTPs ranging in size from 3.3 MGD to 24 MGD. He is strongly knowledgeable of 40 CFR regulations with regards to wastewater and industrial pretreatment. His project experience involves the operation, repair, and maintenance for one WWTP 20+ MGD and several less than 10 MGD WWTP having as many as 9 pumping stations in a single system. Adam understands state and federal pretreatment regulations, has led multiple industrial pretreatment and FOG programs, and spearheaded multiple NPDES permit renewal and revisions processes.

Relevant Project Experience

SHVUA 24 MGD Wastewater Treatment Facility O&M, Rockwood, MI

Client: South Huron Valley Utility Authority (SHVUA) | Title: **Regional Compliance Coordinator**

Adam assists the project team with operations and compliance. Since startup, he has been heavily involved in the implementation of laboratory practices such as laboratory setup, systems implementation, and staff training. Additionally, he assists with reporting and data qualification requirements; developing and implementing the Industrial Pretreatment Program; and managing facility inspections, sampling

protocols/procedures, permitting, surveying, etc. This included the development of a Fats, Oils, and Grease program. Adam also assists with operational strategies, particularly focusing on solids management and secondary treatment processes.

West Chicago/Winfield 7.64 MGD Regional Wastewater Treatment Facility O&M, West Chicago, IL

Client: City of West Chicago | Title: **Operations Manager/Laboratory Manager/Industrial Pretreatment Coordinator**

The facility is a 7.64 MGD design average flow facility with a design maximum flow of 20.3 MGD. It has employed both gaseous chlorine and hypochlorite disinfection as well as tertiary filtration, aerobic and anaerobic digestion, and solids processing. Leading an operations team of five, Adam was responsible for managing the daily operations of the wastewater treatment facility including: process optimization strategies, utilizing data analytics to evaluate process control adjustments, facility maintenance and repairs, scheduling small and large-scale facility projects, developing short and long-term operational strategies and capital improvement plans, and maintaining compliance with the facility's NPDES permit. In his time at the facility, Adam had developed an expertise in conventional activated sludge wastewater treatment plant operations, worked through multiple NPDES permit renewal and revisions processes, and maintained extensive experience in the drafting and development of industrial user control permits.

Carol Stream 6.5 MGD Wastewater Treatment Facility O&M, Carol Stream, IL

Client: Village of Carol Stream | Title: **Regional Compliance Coordinator**

Adam is involved in the management and implementation of the industrial pretreatment and laboratory programs. Carol Stream is an activated sludge facility with aerobic digestion, operated by Jacobs more than 23 years. Adam provides regional support for Carol Stream's laboratory and Industrial Pretreatment Programs. Additionally, Adam performed routine and non-routine operational tasks including, but not limited to, sludge de-watering, screening operations, clarification operations, aerated treatment operations with high efficiency turbine blowers, Hycor Screening operations, and chlorination and de-chlorination operations.

Traverse City 8.5 MGD Regional Wastewater Treatment Plant DBO, Traverse City, MI

Client: City of Traverse City | Title: **Regional Laboratory and Compliance Coach**

The plant performs a high level of treatment that protects the community and its natural resources to a degree few other municipal plants achieve. It can handle peak flows of 17 MGD, making it capable of processing the largest instantaneous flow with MBR technology in the world. The operations team has minimized energy use in plant operations, while helping to protect the environment and saving ratepayer dollars. Adam assists with the laboratory and industrial pretreatment programs. By conducting routine laboratory reviews, he ensures that Traverse City is conducting laboratory activities in accordance with their discharge permit and all state and federal requirements. Additionally, Adam ensures that contract laboratories utilized by Traverse City are compliant all standards and regulations. He has also assisted in training Traverse City's most recent industrial pretreatment coordinator to ensure compliance with permit and contractual requirements.

Westerly 3.3 MGD Wastewater Treatment Plant O&M, Westerly, RI

Client: Town of Westerly | Title: **Regional Laboratory and Compliance Coach**

Jacobs operates the wastewater treatment facility, including six pump stations and associated utility equipment. Unit processes include biological nutrient removal, primary and secondary clarification and chlorine disinfection. The plant accepts hauled commercial and domestic septage, and Jacobs manages an industrial pretreatment program. Adam assisted in the startup procedures at the Westerly Wastewater Treatment Facility. Adam spent two weeks on-site establishing laboratory and industrial pretreatment systems. He continued to provide on-site and remote support in the development and management of the Industrial Pretreatment Program.

Norwalk 18 MGD Wastewater Treatment Plant O&M, Norwalk, CT

Client: City of Norwalk | Title: **Laboratory Compliance**

Jacobs operates the wastewater-utility systems including the 18 MGD wastewater treatment plant, a 180-mile collection system, 22 sewage pump stations, and two stormwater pump stations. Adam provided support to the Norwalk Client in developing their Fats, Oil and Grease (FOG) Program. Adam provided on-site training for the City's FOG staff. Additionally, he provided training on permitting/approving of business permits with regards to FOG and provided training on industry inspections.

The Dalles 4.15 MGD Wastewater Treatment Plant O&M, Dalles, OR

Client: City of Dalles | Title: **Laboratory Compliance**

The plant, originally built in 1954 and upgraded and expanded in 1978, is a secondary treatment facility using activated sludge processes with anaerobic digestion for sludge treatment. Jacobs performs O&M services and manages the land application of biosolids and industrial pretreatment programs. A staff of six serve the City's population of 13,000. Staff also operates two satellite projects, Mosier and Biggs

Junction. Adam conducts routine laboratory reviews and support to ensure that the laboratory is operated in compliance with the plant's discharge permit, contract, state and federal regulations, and Jacobs' standards.

Water and Wastewater O&M Services, Rio Rancho, NM

Client: City of Rio Ranch | Title: **Regional Compliance**

Jacobs manages the operations and maintenance of 22 deep wells with a peak water supply of 23,250 GPM, 18 water reservoirs with a total storage capacity of 41 million gallons, 10 water-pumping stations, approximately 350 miles of transmission and distribution lines, 26 lift stations, 10 miles of force mains, and more than 7,038 manholes. The wastewater system consists of six treatment facilities: a 6 MGD nitrate removal plant, two 1.2 MGD activated sludge plants, and two 0.5 MGD membrane bioreactor facilities (with a build-out capacity of 10 MGD). Adam assisted in the developing and their Fats, Oil and Grease program as well as providing training to the projects dedicated FOG staff. This training included regulatory training, on-site facility inspection training and sampling training.

PAUL HORIGAN | MAINTENANCE MANAGER

Education | Qualifications	1000-hour Electronic Technician Training Program, Middlesex Community College Technical Training Courses, Massasoit Community College and Quincy Jr. College
Registrations | Certifications	Massachusetts 5C Municipal and Industrial Wastewater Operator OSHA 40-hour Level I Thermography Vibration Analysis Category II ARC FLACH 70e Qualified Person CRL-Certified Reliability Leader CMRT-Certified Maintenance Reliability Technician MLT1-Machine Lubrication Technician

Profile

With a 35-year background in electronic and mechanical technology, Paul provides scheduling and maintenance on all mechanical, electrical and instrumentation/controls for WWTPs ranging in size from 10 MGD to 57 MGD with multiple pumping stations within a single system. His background includes staff selection and training and client interface. For New Bedford, Paul will assist in the development of the O&M Plan and manage the team responsible for inspections and preventative, corrective, and predictive maintenance programs. Document and communicate any deficiencies observed, including measures taken to correct such deficiencies. Provide expert consulting services, focusing on computerized maintenance management systems (CMMS), workflows, best practices, planning/ scheduling, and performance metrics. He will provide training support for trades related to water and wastewater plant maintenance.

Relevant Project Experience

Adams Street 20.8 MGD and River Road 10 MGD Wastewater Treatment Plants O&M, Hoboken and West New York, NJ

Client: North Hudson Sewerage Authority (NHSA) | Title: **Maintenance Manager**

Jacobs operates two WWTPs and their associated collection systems in four Hudson County, New Jersey communities: Hoboken, West New York, Weehawken and Union City. The two WWTPs are the 20.8 MGD Adams Street WWTP in Hoboken and the 10MGD River Road WWTP in West New York. The collection systems in these communities are combined sewer systems. Paul provides expertise in mechanical, electrical, instrumentation/ control. He implemented CMMS system (MC), developed KPIs, and created procedures for PM and PdM tasks. Paul also develops and presents training to project staff in a variety of disciplines.

Waterbury 27 MGD Wastewater System O&M, Waterbury, CT

Client: City of Waterbury Wastewater Utilities | Title: **Maintenance Manager**

Jacobs provides full contract operations services for a 27 MGD wastewater treatment plant, approximately 310 miles of sanitary sewer and 20 pump stations. The process consists of grit and screening, primary treatment, activated sludge, secondary clarification followed by UV disinfection. Chemical addition is also used to manage low level phosphorous limits. Paul provides expertise in mechanical, electrical, instrumentation/ control. He implemented CMMS system (MC), developed KPIs, and created procedures for PM and PdM tasks. Paul also develops and presents training to project staff in a variety of disciplines.

South Huron 24 MGD Wastewater Treatment Plant O&M, Rockwood (Detroit), MI

Client: South Huron Valley Utility Authority | Title: **Maintenance Manager**

The South Huron treatment plant, built in 1986, treats 24 MGD of wastewater and 40,000 PPD of BOD from the communities of Brownstown Township, Huron Township, Van Buren Township, Flat Rock, Gibraltar, South Rockwood, and Woodhaven. Jacobs performs comprehensive operations, maintenance and management of the plant and associated utilities including some pump stations and interceptors. Our team manages treatment process, maintenance, biosolids, and industrial pretreatment. Paul provides expertise in mechanical, electrical, instrumentation/ control. He implemented CMMS system (MC), developed KPIs, and created procedures for PM and PdM tasks. Paul also develops and presents training to project staff in a variety of disciplines.

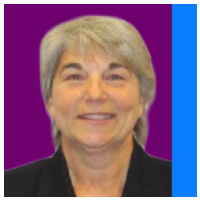
Otis Air National Guard Base Groundwater Treatment Plants, Cape Cod, MA

Client: Otis Air National Guard Base | Title: **Maintenance Supervisor**

Paul scheduled and performed maintenance for all electrical and mechanical aspects of the groundwater treatment plants. He used the computerized maintenance management system and practical, hands-on troubleshooting techniques. He also wrote and implemented the site-specific lock out-tag out program and other health and safety onsite programs. Paul's responsibilities included working with radio frequency, fiber optic communication networks, and the SCADA system.

ELIZABETH TEPPER | LABORATORY MANAGER

Education | Qualifications	B.S., Geology
Registrations | Certifications	OSHA 40-hour HAZWOPER



Profile

In her 17 years with the firm, Liz has managed our General Chemistry Lab and sections of the Research Soil Lab, Semi Volatile Extraction Lab, Air Lab and several pilot studies and industrial startups. She has experience with both analytical and process chemical optimization for treatment plants, including more than 15 plants processing up to 30 MGD of industrial water. Since 2007, Liz was extensively involved with proprietary onsite water treatment projects, whereby she assisted in the startup and commissioning of treatment facilities and laboratories. More recently, she has been providing support to wastewater treatment facilities from coast to coast that process between 2 MGD to 25 MGD. For New Bedford, Liz will manage all necessary analyses, including testing (effluent testing, effluent metals analysis, sludge analysis, process control, etc.), sampling and any other analytical procedures to demonstrate compliance with the agreement, applicable regulatory requirements, and permit provisions.

Relevant Project Experience

Waterbury 27 MGD Wastewater System O&M, Waterbury, CT

Client: City of Waterbury Wastewater Utilities | Title: **Lead investigator**

Jacobs provides full contract operations services for a 27 MGD wastewater treatment plant, approximately 310 miles of sanitary sewer and 20 pump stations. The process consists of grit and screening, primary treatment, activated sludge, secondary clarification followed by UV disinfection. Chemical addition is also used to manage low level phosphorous limits. Liz is responsible for identifying risks and deficiencies in the daily plant operation process and implementing the corrective action plan in a timely fashion. In this role, she has developed and revised Standard Operating Procedures, Quality Assurance Manuals and Unit Process Control Plans. She has also trained operators and laboratory technicians.

Woonsocket 16 MGD Regional Wastewater Treatment Plant DBO

Client: City of Woonsocket | Title: **Project Startup, Transition Facilitator, Trainer**

Jacobs manages the operations and maintenance of the existing 16 MGD regional WWTP, pump stations and siphons, and perform the capital upgrades to the facility. We were responsible for an approximately $40M upgrade to treat for low level nutrients, which included a new electrical backbone, HVAC, SCADA, tankage and equipment. The O&M team is responsible for compliance with the RIPDES permit and all associated reporting. The upgraded facility significantly improved the City's wastewater treatment capabilities, while improving water quality and the environment by reducing the nutrients (phosphorus and nitrogen) discharged to the Blackstone River. Liz is responsible for identifying risks and deficiencies in the daily plant operation process and implementing the corrective action plan in a timely fashion. In this role, she has

developed and revised Standard Operating Procedures, Quality Assurance Manuals and Unit Process Control Plans. She has also trained operators and laboratory technicians.

Gresham 20 MGD Wastewater Treatment Plant O&M, Gresham, OR

Client: City of Gresham | Title: **Project Startup, Transition Facilitator, Trainer**

Jacobs provides full contract operations services for a wastewater treatment plant, pump stations, laboratory, and biosolids handling while also achieving net zero energy through proactive management of the cogeneration and fats, oils and grease (FOG) facilities. Liz is responsible for identifying risks and deficiencies in the daily plant operation process and implementing the corrective action plan in a timely fashion. In this role, she has developed and revised Standard Operating Procedures, Quality Assurance Manuals and Unit Process Control Plans. She has also trained operators and laboratory technicians.

Brookings Wastewater Treatment Plant, Brookings, OR

Client: City of Brookings | Title: **Laboratory Manager, Lead Chemistry Specialist**

The Brookings Wastewater Treatment Plant is designed for an average dry weather flow of 1.7 MGD, and a maximum wet weather flow of 4.9 MGD. The peak wet weather flow is 10.9 MGD, while the instantaneous peak wet weather flow is 15.5 MGD. Liz is responsible for identifying risks and deficiencies in the daily plant operation process and implementing the corrective action plan in a timely fashion. In this role, she has developed and revised Standard Operating Procedures, Quality Assurance Manuals and Unit Process Control Plans. She has also trained operators and laboratory technicians.

Traverse City 8.5 MGD Regional Wastewater Treatment Plant DBO, Traverse City, MI

Client: City of Traverse City | Title: **Senior Project Closeout Manager, Transition Facilitator**

The plant performs a high level of treatment that protects the community and its natural resources to a degree few other municipal plants achieve. It can handle peak flows of 17 MGD, making it capable of processing the largest instantaneous flow with MBR technology in the world. Thirteen employees operate and manage the wastewater facility along with some of the City's pump stations, serving a population of 50,000. The operations team has minimized energy use in plant operations, while helping to protect the environment and saving ratepayer dollars. Liz is responsible for identifying risks and deficiencies in the daily plant operation process and implementing the corrective action plan in a timely fashion. In this role, she has developed and revised Standard Operating Procedures, Quality Assurance Manuals and Unit Process Control Plans. She has also trained operators and laboratory technicians.

Wilsonville 4 MGD Wastewater Treatment Plant DBO, Wilsonville, OR

Client: City of Wilsonville | Title: **Lead Investigator, Trainer**

Jacobs is the City's DBO partner for the $36M upgrade and expansion project. The project expanded the WWTP's capacity from 2.5 to 4 MGD, with future expansion capabilities to 7 MGD and produces Class A biosolids for land application. The project also replaced and upgraded most remaining portions of the original WWTP, which was first constructed in the early 1970s. Odor control was a key project driver, as the facility was previously faced with odor control issues that impacted the surrounding community. Jacobs' design directs foul air from the fully enclosed headworks, bioreactor, and dewatering and drying building to a new engineered media biofilter. The revitalized facility produces a higher quality effluent and eliminated several odor generating processes. Liz is responsible for identifying risks and deficiencies in the daily plant operation process and implementing the corrective action plan in a timely fashion. In this role, she has developed and revised Standard Operating Procedures, Quality Assurance Manuals and Unit Process Control Plans. She has also trained operators and laboratory technicians.

MICHAEL WILSON, PE | PERMITTING LEAD

Education | Qualifications	B.S., Civil Engineering
Registrations | Certifications	Professional Engineer, MA, 2007 Professional Engineer, RI, 2012 Professional Engineer, CT, 2009 Professional Engineer, WI, 1989

Profile

Michael has 30 years of experience in planning, designing, and pre- and post-construction services for WWTPs ranging in size from 3.3 MGD to 27 MGD, including four plants in New England, affording him a strong understanding of wastewater processes, technology and innovation. He is well-versed in permitting for upgrades and modifications to existing facilities. He also leads plant studies and technical reports. For New Bedford, Mike will provide direction and guidance on negotiating and obtaining permits or permit renewals and support for wastewater treatment process and plant optimization.

Relevant Project Experience

Adams Street 20.8 MGD and River Road 10 MGD Wastewater Treatment Plants O&M, Hoboken and West New York, NJ

Client: North Hudson Sewerage Authority (NHSA) | Title: **Program Manager**

Jacobs operates two WWTPs and their associated collection systems in four Hudson County, New Jersey communities: Hoboken, West New York, Weehawken and Union City. The two WWTPs are the 20.8 MGD Adams Street WWTP in Hoboken and the 10MGD River Road WWTP in West New York. The collection systems in these communities are combined sewer systems. Michael directed the design staff and services during construction staff during the project construction phase for the $17M project including two wet weather pump station projects. He led the design and permitting for the $9M H5 Wet Weather Pump Station which is the second of the wet weather pump stations in Hoboken to help protect the City from street flooding.

Woonsocket 16 MGD Regional Wastewater Treatment Plant DBO

Client: City of Woonsocket | Title: **Engineering Manager**

Jacobs manages the operations and maintenance of the existing 16 MGD regional WWTP, pump stations and siphons, and perform the capital upgrades to the facility. We were responsible for an approximately $40M upgrade to treat for low level nutrients, which included a new electrical backbone, HVAC, SCADA, tankage and equipment. The O&M team is responsible for compliance with the RIPDES permit and all associated reporting. The upgraded facility significantly improved the City's wastewater treatment capabilities, while improving water quality and the environment by reducing the nutrients (phosphorus and nitrogen) discharged to the Blackstone River. Michael managed the upgrades including facilities planning, permitting, design coordination, and client communications.

Westerly 3.3 MGD Wastewater Treatment Plant O&M, Westerly, RI

Client: Town of Westerly | Title: **Engineering Manager**

Jacobs operates the wastewater treatment facility, including six pump stations and associated utility equipment. Unit processes include biological nutrient removal, primary and secondary clarification and chlorine disinfection. The plant accepts hauled commercial and domestic septage, and Jacobs manages an industrial pretreatment program. Michael is responsible for management, engineering design and permitting for all capital upgrades. He's also involved with the BNR alternatives study.

Morristown Wastewater Treatment Plant Expansion, Morristown, NJ

Client: Town of Morristown **| Title:** Staff Engineer

The Morristown WWTP is a 3.3 MGD treatment plant in Morristown, N.J. The plant includes screening, grit removal, primary treatment, BNR secondary treatment, filtration, and effluent disinfection. The plant discharges to the Whippany River which is a small effluent dominated stream. The discharge includes a permit limit for very low ammonia, total nitrogen and chlorine residual. The plant upgrades were completed in 1992 and the project cost was approximately $22 million. Mike was responsible for the submittal coordination, estimating costs, preparing change orders, coordinating resident observation, and coordinating regulatory permitting with the Town and County.

Braintree Power Plant Upgrades, Braintree, MA

Client: Braintree Electric Light Department | Title: **Project Manager**

The NPDES permitting for the new power plant included thermal modeling of a new and modified discharge into the Harbor. Michael was responsible for the characterization, sampling, flow and thermal modeling; meeting with the MA DEP and EPA; and the preparing the study and NPDES permit negotiations with the EPA on the cooling water discharge. The project included a new outfall pipe and headwall and a new mixing box for the combined flow to the Harbor. Mike was also involved in the coordination with the Massachusetts Bureau of Water Resources for the permitting revisions for the plant site.

JEFF HEROUX | REGULATORY COMPLIANCE LEAD

Education | Qualifications	Biology and Chemistry, University of Massachusetts Pretreatment Facility Inspection Course, California State University Supervisory Management in Wastewater field course, University of Michigan LEAD Institute Leadership Course, Denver, CO
Registrations | Certifications	Grade 7C Full Wastewater Operator, MA, 2021 (exp.)

Profile

Jeff has more than 30 years of regulatory oversite experience with wastewater regulatory compliance and industrial pretreatment programs, including considerable laboratory, operations, management, and supervision. As a manager in Jacobs' Compliance & Reporting group, Jeff assists plant operations teams with compliance with federal and state environmental regulations, regulatory risk assessments, NPDES regulatory assistance and training, and permit renewals. He created and manages the companywide Project Compliance Tools SharePoint site to provide all O&M personnel easy access to pertinent regulatory guidance and tools. For New Bedford, Jeff will provide direct support for NPDES permitting and reporting issues, perform comprehensive onsite compliance audits and develop and conduct regulatory training programs for treatment facility managers and staff, and provide expertise in municipal industrial pretreatment programs.

Relevant Project Experience

Paul R. Noland (12.6 MGD) and West Side (10 MGD) Water Resource Recovery Facilities, Fayetteville, AR

Client: City of Fayetteville | Title: **Environmental Compliance Manager**

The Noland WRRF is an advanced facility with influent fine screens, grit removal, A2/O® plug flow biological nutrient removal secondary treatment, secondary clarification, single-media sand filtration, and HyDoz disinfection. Odors from the Noland facility are captured and treated by two multi-stage chemical scrubbers. The West Side advanced facility has influent fine screens, grit removal, A2C™ BNR secondary treatment, secondary clarification, deep-bed sand filtration, UV disinfection, and post aeration. Odors from this facility are captured and treated by biofilters and carbon absorbers. Jeff has overall responsibility for supporting and oversight of the project's compliance with environmental regulations and provides direct support with NPDES permitting and reporting issues. He performs comprehensive onsite compliance audits and develops and conducts regulatory training programs for treatment facility managers and staff. Jeff also provides project support with expertise in municipal industrial pretreatment programs (IPPs) and oversees all IPPs the company administers.

Waterbury 27 MGD Wastewater System O&M, Waterbury, CT

Client: City of Waterbury Wastewater Utilities | Title: **Environmental Compliance Manager**

Jacobs provides full contract operations services for a 27 MGD wastewater treatment plant, approximately 310 miles of sanitary sewer and 20 pump stations. The process consists of grit and screening, primary treatment, activated sludge, secondary clarification followed by UV disinfection. Chemical addition is also used to manage low level phosphorous limits. Jeff has overall responsibility for supporting and oversight of the project's compliance with environmental regulations and provides direct support with NPDES permitting and reporting issues. He performs comprehensive onsite compliance audits and develops and conducts regulatory training programs for treatment facility managers and staff. Jeff also provides project support with expertise in municipal industrial pretreatment programs (IPPs) and oversees all IPPs the company administers.

South Huron 24 MGD Wastewater Treatment Plant O&M, Rockwood (Detroit), MI

Client: South Huron Valley Utility Authority | Title: **Environmental Compliance Manager**

The South Huron treatment plant, built in 1986, treats 24 MGD of wastewater and 40,000 PPD of BOD from the communities of Brownstown Township, Huron Township, Van Buren Township, Flat Rock, Gibraltar, South Rockwood, and Woodhaven. Jacobs performs comprehensive operations, maintenance and management of the plant and associated utilities including some pump stations and interceptors. Our team manages treatment process, maintenance, biosolids, and industrial pretreatment. Jeff has overall responsibility for supporting and oversight of the project's compliance with environmental regulations and provides direct support with NPDES permitting and reporting issues. He performs comprehensive onsite compliance audits and develops and conducts regulatory training programs for treatment facility managers and staff. Jeff also provides project support with expertise in municipal industrial pretreatment programs (IPPs) and oversees all IPPs the company administers.

Adams Street 20.8 MGD and River Road 10 MGD Wastewater Treatment Plants O&M, Hoboken and West New York, NJ

Client: North Hudson Sewerage Authority (NHSA) | Title: **Environmental Compliance Manager**

Jacobs operates two WWTPs and their associated collection systems in four Hudson County, New Jersey communities: Hoboken, West New York, Weehawken and Union City. The two WWTPs are the 20.8 MGD Adams Street WWTP in Hoboken and the 10MGD River Road WWTP in West New York. The collection systems in these communities are combined sewer systems. Jeff has overall responsibility for supporting and oversight of the project's compliance with environmental regulations and provides direct support with NPDES permitting and reporting issues. He performs comprehensive onsite compliance audits and develops and conducts regulatory training programs for treatment facility managers and staff. Jeff also provides project support with expertise in municipal industrial pretreatment programs (IPPs) and oversees all IPPs the company administers.

Westside Wastewater Treatment Facility and Marine Park Wastewater Treatment Facility O&M, Vancouver, WA

Client: City of Vancouver | Title: **Environmental Compliance Manager**

The Westside Wastewater Treatment Facility provides treatment for municipal wastewater from the southern and western sections of Vancouver and has on-site sludge incineration capabilities. The facility has an average maximum monthly design capacity of 28.26 MGD, with a maximum daily flow of 41.1 MGD. The Marine Park Wastewater Treatment Facility provides treatment for municipal wastewater from the northern and eastern sections of Vancouver. The facility has an average maximum monthly design capacity of 16.10 MGD, with a peak maximum hourly flow of 41.8 MGD. Jeff has overall responsibility for supporting and oversight of the project's compliance with environmental regulations and provides direct support with NPDES permitting and reporting issues. He performs comprehensive onsite compliance audits and develops and conducts regulatory training programs for treatment facility managers and staff. Jeff also provides project support with expertise in municipal industrial pretreatment programs (IPPs) and oversees all IPPs the company administers.

MARK SMITH, PE | ODOR CONTROL LEAD

Education | Qualifications	B.S., Civil Engineering B.A., Economics
Registrations | Certifications	Professional Engineer (Env), OR, 2005

Profile

Mark has significant experience with wastewater odor remediation, including directing numerous wastewater related odor analyses and solution implementation for zero tolerance odor control programs. This includes field monitoring for sewer ventilation and odor release conditions, comprising literally hundreds of miles of collection system piping and scores of WWTPs. He recently led a combined study of an applicably-sized collection system coupled with a study and design of corresponding odor control facilities at the treatment plant that treats flows from the collection system. For New Bedford, Mark will be responsible for leading both day-to-day and long-term studying and planning efforts for our proposed odor control strategy, both at the water pollution control facility and in the 29 pump stations in the wastewater collection system.

Relevant Project Experience

Kellogg 25 MGD Water Resource Recovery Facility, Milwaukie, OR

Client: Clackamas County Water Environment Services (WES) | Title: **Senior Project Engineer for Odor Control**

Mark conceived and carried out odor sampling efforts at the plant during two successive summers at the 25 MGD water pollution control plant. Plant processes were identified and prioritized for numerous cost-effective odor control upgrades. In addition, several meetings were held with the local public advisory group and with representatives from the City of Milwaukie to extend the District's good neighbor policies with these groups. As part of this effort, Mark set the design criteria for the planned replacement of odor control media in an 8,000 cfm in-ground biological odor control facility. This effort was combined with a 6 month-long odor control study that Mark performed in the WES collection system that feeds the Kellogg treatment facility. The goal was to identify areas for optimization of odor control efforts in the collection system and at the plant. Such a study was made necessary due to the presence of 25 sanitary sewer lift stations throughout the collection system. The results of the study showed that WES was conducting odor control operations in the collection system in an optimized manner and that no further liquid phase odor control treatment was necessary upstream of the 25 MGD Kellogg plant.

Wilsonville 4 MGD Wastewater Treatment Plant DBO, Wilsonville, OR

Client: City of Wilsonville | Title: **Senior Project Engineer for Odor Control**

Jacobs is the City's DBO partner for the $36M upgrade and expansion project. The project expanded the WWTP's capacity from 2.5 to 4 MGD, with future expansion capabilities to 7 MGD and produces Class A biosolids for land application. The project also replaced and upgraded most remaining portions of the original WWTP, which was first constructed in the early 1970s. Odor control was a key project driver, as the facility was previously faced with odor control issues that impacted the surrounding community. Jacobs' design directs foul air from the fully enclosed headworks, bioreactor, and dewatering and drying building to a new engineered media biofilter. The revitalized facility produces a higher quality effluent and eliminated several odor generating processes. Mark reviewed odor control related reports and submittals during the upgrade of the WWTP that included a facility plan update, risk management evaluation, surveying and condition assessments, and also set the stage for subsequent conceptual design and establishment of performance criteria.

Interceptor ATF Study, City of Los Angeles, California

Client: City of Los Angeles | Title: **Project Manager**

Phase I: The owner had been plagued by odor problems emanating from large diameter interceptors in Central Los Angeles since the 1920s, which had gone unsolved. Mark led a team of engineers who studied the problem in detail via a comprehensive continuous differential air pressure sampling effort. The recommendations from this study included setting the design criteria for three10,000 cfm odor control systems that were subsequently designed, built and are currently successfully reducing odorous emissions from the Central Los Angeles wastewater interceptor system.

Phase II: The City of Los Angeles was under order to solve odor control problems in its large diameter wastewater outfall system. As technical lead on a subsequent study, Mark conceived, directed and carried out several baseline air pressure and forced ventilation air pressure monitoring tests on many large diameter outfall sewers throughout Greater Los Angeles. Two years' worth of intensive field sampling and subsequent data analysis resulted in recommendations that saved the city millions of dollars in capital and O&M money by identifying flow diversion schemes and drop structure retrofits that significantly reduced the number of odor complaints.

Kailua Regional 28 MGD WWTP TIPS and Headworks, Honolulu, HI

Client: City and County of Honolulu | Title: **Senior Project Engineer for Odor Control**

Mark performed pre-design and design services for two separate odor control facilities as part of this combined plant decommissioning and plant upgrade project. Biological odor control systems were designed both for a CSO storage tunnel at the decommissioned plant as well as for the Tunnel Influent Pump Station and headworks at the Kailua RWWTP.

Budd Inlet 22 MGD WWTP Improvements, Olympia, WA

Client: LOTT Clean Water Alliance | Title: **Senior Project Engineer for Odor Control**

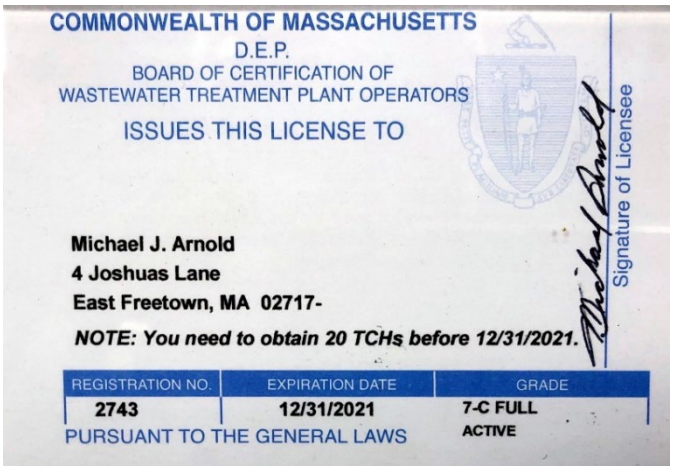
Mark performed pre-design services for scrubber system on plant upgrades and performed QC on subsequent design. The project consists of major upgrades to the biological nitrogen removal process, centrate treatment facilities, chemical feed facilities, odor control, energy conservation improvements, and rehabilitation of primary sedimentation facilities.

6.B

Project Staff Licenses

B. Project Staff Licenses

Mike Arnold, Project Manager



COMMONWEALTH OF MASSACHUSETTS
D.E.P.
BOARD OF CERTIFICATION OF
WASTEWATER TREATMENT PLANT OPERATORS
ISSUES THIS LICENSE TO

Michael J. Arnold
4 Joshuas Lane
East Freetown, MA 02717-

NOTE: You need to obtain 20 TCHs before 12/31/2021.

Signature of Licensee

REGISTRATION NO.	EXPIRATION DATE	GRADE
2743	12/31/2021	7-C FULL ACTIVE

PURSUANT TO THE GENERAL LAWS

Adam Federau, Operations Manager

Association of Boards of Certification
An International Organization of Environmental Control Certifying Authorities

This Certificate of Competency verifies that

Adam Federau

has fulfilled ABC's standards for education, experience and examination for a

CLASS III WASTEWATER TREATMENT OPERATOR

Signed and Sealed

Paul D. Bishop, CAE
ABC Chief Executive Officer

Certificate Number: 53190211

This certificate expires on 9/18/2021

Advancing Water Quality and Integrity for more than 40 Years

ABC

Environmental Protection Agency
State of Illinois
Adam T. Federau

having fulfilled the requirements therefore, is hereby awarded this Certificate of Competency

As a

Class 1
Wastewater Treatment Works Operator
qualified to operate Group 1,2,3&4 Wastewater Treatment Works

Issued July 11, 2017

Director

Massachusetts 6C pending reciprocity; correspondence on following page.

From: Murphy, John J (DEP) <john.j.murphy@state.ma.us>
Sent: Friday, January 24, 2020 1:26:13 PM
To: Federau, Adam/WCH <Adam.Federau@jacobs.com>
Subject: [EXTERNAL] RE: Application for Reciprocity

Looks good. I don't see any issues. I will get this added to the next Board Meeting for approval on February 12.

Best,
John

John J. Murphy
Wastewater Operator Certification and Training
1 Winter St., 5th Floor
Boston, MA
617-292-5867 (office)
617-352-3375 (cell)

From: Federau, Adam/WCH [mailto:Adam.Federau@jacobs.com]
Sent: Thursday, January 23, 2020 12:42 PM
To: Murphy, John J. (DEP)
Subject: Application for Reciprocity

John,

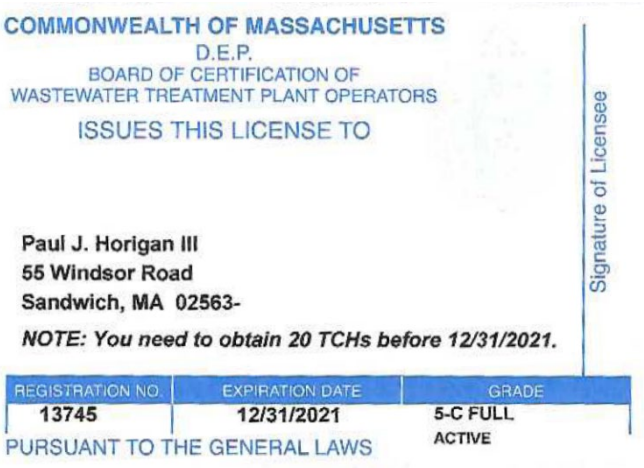
As we discussed earlier on the phone, attached is my application for reciprocity. I may have gone a little overboard on attachments, but I wanted to make sure you had all the pertinent and useful documentation available when reviewing my application. Included is a certification of work experiences, copies of all certifications currently held, copy of pertinent completed wastewater/management courses, and High School and College transcripts. If there is anything else that may be need please let me know. I will place the original copy in the mail this week.

Thanks,

Adam Federau
Operations and Compliance Supervisor
D 1 630 293 2260
M 1 708 548 0659

JACOBS
725 Dayton Avenue
West Chicago, IL, 60185
United States
www.Jacobs.com | LinkedIn | Twitter | Facebook

Paul Horigan, Maintenance Manager



COMMONWEALTH OF MASSACHUSETTS
D.E.P.
BOARD OF CERTIFICATION OF
WASTEWATER TREATMENT PLANT OPERATORS
ISSUES THIS LICENSE TO

Paul J. Horigan III
55 Windsor Road
Sandwich, MA 02563-

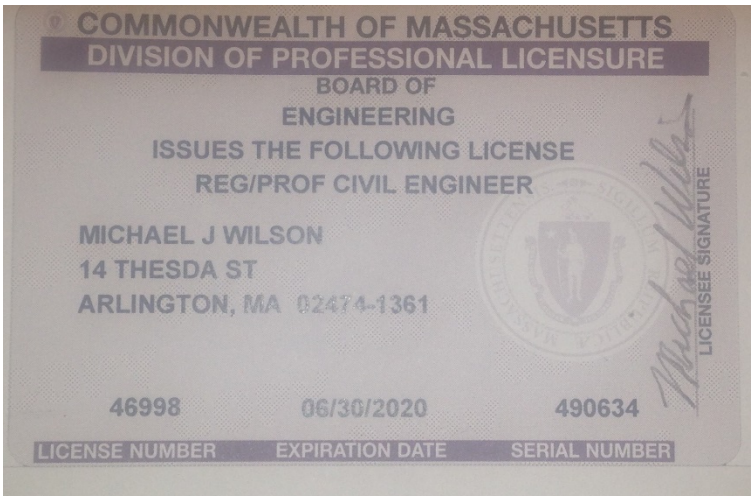
NOTE: You need to obtain 20 TCHs before 12/31/2021.

Signature of Licensee

REGISTRATION NO.	EXPIRATION DATE	GRADE
13745	12/31/2021	5-C FULL ACTIVE

PURSUANT TO THE GENERAL LAWS

Mike Wilson, PE, Permitting Lead



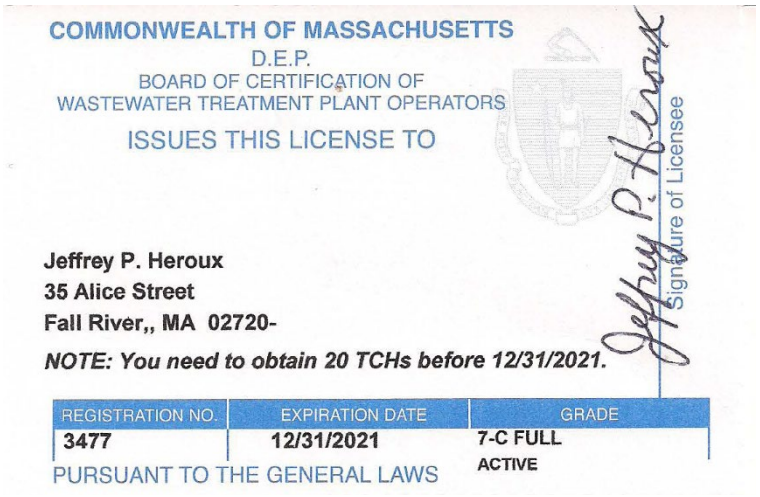
COMMONWEALTH OF MASSACHUSETTS
DIVISION OF PROFESSIONAL LICENSURE
BOARD OF
ENGINEERING
ISSUES THE FOLLOWING LICENSE
REG/PROF CIVIL ENGINEER

MICHAEL J WILSON
14 THESDA ST
ARLINGTON, MA 02474-1361

LICENSEE SIGNATURE

LICENSE NUMBER	EXPIRATION DATE	SERIAL NUMBER
46998	06/30/2020	490634

Jeff Heroux, Regulatory Compliance Lead



COMMONWEALTH OF MASSACHUSETTS
D.E.P.
BOARD OF CERTIFICATION OF
WASTEWATER TREATMENT PLANT OPERATORS
ISSUES THIS LICENSE TO

Jeffrey P. Heroux
35 Alice Street
Fall River,, MA 02720-

NOTE: You need to obtain 20 TCHs before 12/31/2021.

Signature of Licensee

REGISTRATION NO.	EXPIRATION DATE	GRADE
3477	12/31/2021	7-C FULL ACTIVE

PURSUANT TO THE GENERAL LAWS

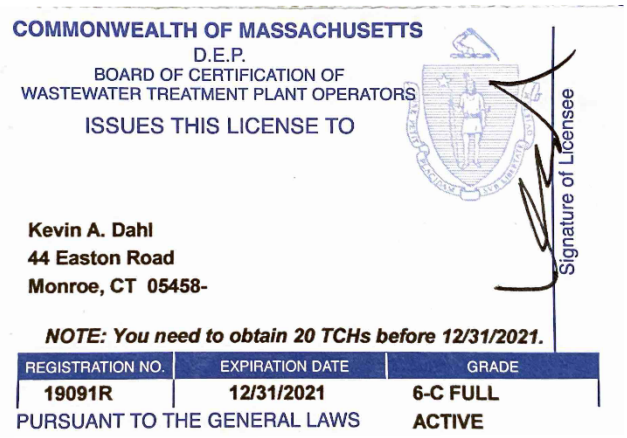
Mark Smith, PE, Odor Control Lead

STATE OF OREGON
BOARD OF EXAMINERS
FOR
ENGINEERING AND LAND SURVEYING

TO ALL TO WHOM THESE PRESENTS SHALL COME:
This is to Certify, that
MARK MC KINNEY SMITH
has been licensed as a PROFESSIONAL ENGINEER, and is
authorized to practice in the State of Oregon, in accordance with the Laws thereof,
having especially qualified in ENVIRONMENTAL ENGINEERING
In Testimony Whereof, this Certificate No. [redacted]
has been issued, and the Seal of the Board affixed hereto on
MAY 10, 2005 at Salem, Oregon.

ROBERT V. NEATHAMER P.L.S., PRESIDENT
MARI LOPEZ, EXECUTIVE SECRETARY

Kevin Dahl, Regional Director of Operations



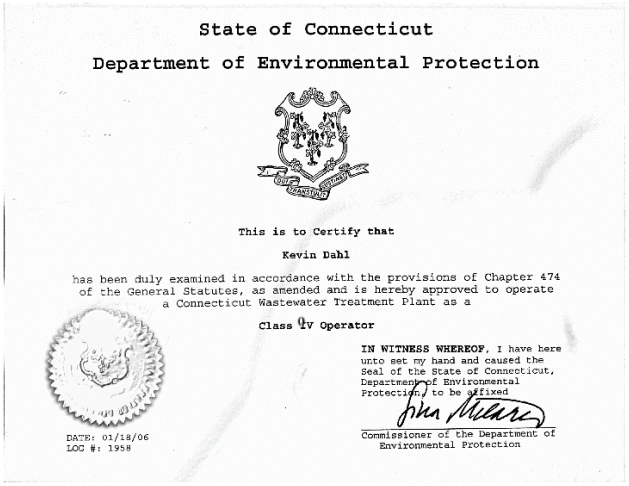
COMMONWEALTH OF MASSACHUSETTS
D.E.P.
BOARD OF CERTIFICATION OF
WASTEWATER TREATMENT PLANT OPERATORS
ISSUES THIS LICENSE TO

Kevin A. Dahl
44 Easton Road
Monroe, CT 05458-

Signature of Licensee

NOTE: You need to obtain 20 TCHs before 12/31/2021.

REGISTRATION NO.	EXPIRATION DATE	GRADE
19091R	12/31/2021	6-C FULL
PURSUANT TO THE GENERAL LAWS		ACTIVE



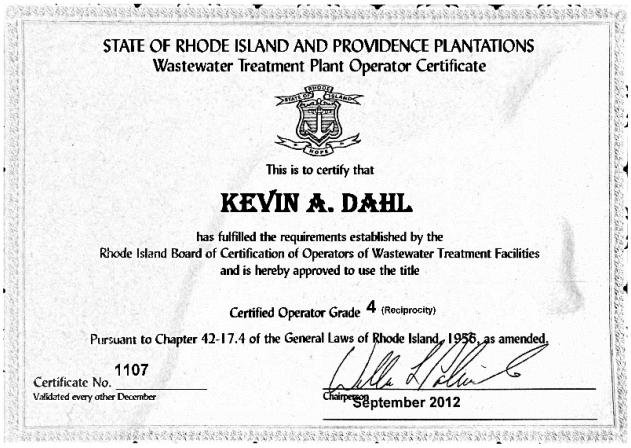
State of Connecticut
Department of Environmental Protection

This is to Certify that
Kevin Dahl
has been duly examined in accordance with the provisions of Chapter 474 of the General Statutes, as amended and is hereby approved to operate a Connecticut Wastewater Treatment Plant as a
Class IV Operator

IN WITNESS WHEREOF, I have here unto set my hand and caused the Seal of the State of Connecticut, Department of Environmental Protection, to be affixed

DATE: 01/18/06
LOC #: 1958

Commissioner of the Department of Environmental Protection



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
Wastewater Treatment Plant Operator Certificate

This is to certify that
KEVIN A. DAHL
has fulfilled the requirements established by the
Rhode Island Board of Certification of Operators of Wastewater Treatment Facilities
and is hereby approved to use the title

Certified Operator Grade 4 (Reciprocity)
Pursuant to Chapter 42-17.4 of the General Laws of Rhode Island, 1956, as amended.

Certificate No. 1107
Validated every other December

Chairperson
September 2012

State of Connecticut
Department of Consumer Protection

Board of Examiners for Professional Engineers and Land Surveyors
BE IT KNOWN THAT
Kevin A Dahl
has satisfied the qualifications required by law and is hereby designated as a licensed
Professional Engineer
In the State of Connecticut
in witness whereof, the Board has issued this certificate
under the seal of the board this
30th of August 2005
No. 24578

Commissioner
Chairperson

Jacobs

6.C

Qualifications for Team Resources

C. Qualifications for Team Resources

Regional Resource Team = RR Transition Team = TT

Name, Role	Qualifications
Kevin Dahl, PE, CMRT, CRL **Regional Director of Operations, Transition Manager | RR TT**	Kevin brings 20 years of experience managing projects and is currently responsible for overseeing Jacobs' O&M portfolio in the Northeast. He has a PE license and a Connecticut and Rhode Island Grade IV Wastewater Treatment Plant Operator license, in addition to his NEWEA Grade 4 Collections Operator license. He is both a Certified Maintenance Reliability Technician (CMRT) and a Certified Reliability Leader (CRL). As Transition Manager, Kevin brings a long track record of leading smooth transitions, including Wilmington REBF in 2016 and Woonsocket (Rhode Island) WWTP in October 2012, both transitioned from Veolia. His other recent Transition Manager roles included at Waterbury (Connecticut) WWTP in November 2018; South Huron Valley Utility Authority (SHVUA) WWTP in January 2019; and Westerly (Rhode Island) WWTP in July 2017.
John Rickermann, PE, CMRT **Regional Resources Lead | RR**	John has over 27 years of experience and leads a group of technical experts that support full contract O&M and consulting clients with process and energy optimization, process control, maintenance management, instrumentation and control (I&C) services, staff augmentation, training, and asset management. Professional Engineer: VA; ABC Class I Wastewater Operator; Certified Maintenance Reliability Technician
Kyle Arnold **Maintenance Support | RR** **Maintenance Specialist | TT**	Kyle has 14 years of maintenance experience with 10 in the wastewater industry. He is a self-motivated professional with supervisory and maintenance experience who prides himself on being able to meet aggressive deadlines and develop solutions for issues in all areas of maintenance while maintaining compliance, contractual obligations and promoting a safety conscience work environment. He troubleshoots and oversees repairs of mechanical systems, pumps systems, HVAC systems, electrical systems, hydraulic systems, chemical dosing systems and SCADA / automation systems. Qualified NFPA 70E Trainer; Certified Maintenance Reliability Technician; Certified Reliability Leader; CAT 1 Vibration
Tyler Brooker, PhD **Noise Control | RR**	Tyler brings over five years of experience in academic research, experimental design, and measurement techniques. His experience also includes design and commissioning of environmental, aerodynamic, and acoustic test facilities.
Shelly Campbell **Finance | TT**	Shelly has been a Regional Business Manager (RBA) with Jacobs for the past y years. In this role, Shelly works closely with Regional Director Kevin Dahl, project managers, and admins across the Northeast and Midwest project sites to create, maintain, and monitor financial budget and proactively mitigates financial risk. Shelly also provides tools and training to the projects to assist them in understanding how their project is operating financially at any given point during the year against their specific goals and margins. Prior to taking on the RBA role, Shelly worked as the Business Administrator (2 years) at a large Jacob's project in CT. This experience allows Shelly to bring a unique perspective to her current role as she understands the day-to-day workings of a project, which allows her to connect better with her project manager and admin contacts.
Matt Crowley, CRL **Asset Management | RR**	Matt has 17 years of experience in the maintenance of water and wastewater utilities. Matt brings field experience and proven asset management principles to the on-site team. As a former Maintenance Manager and a champion for maintenance excellence, Matt will support the team in developing and maintaining the CMMS system, WO flows, and world class reliability centered maintenance which focuses on planned preventative and predictive maintenance maximizing life cycle costs and equipment uptime.
Erik Giles **Electrical/Maintenance Support | RR**	Erik has 23 years of experience in the O&M and construction industry with responsibilities range from completing Preventative Maintenance to doing various electrical projects, saving the clients the expense of using an outside contractor. Licensed in Massachusetts; OSHA 30 safety training
David Haverly **HSSE | RR TT**	David has over 16 years of experience in the environmental consulting industry, with approximately 9 years of Health and Safety experience. He currently oversees the health and safety at eight facilities in the Northeast and Mid-Atlantic. In this role he provides both H&S reviews of the project site and staff trainings in the full range of H&S topics. Dave will be onsite during the Transition to ensure that the operations team is thoroughly grounded and trained in Jacobs' safety practices, policies, and culture. Dave is based in Hartford, CT, and will provide a continued local support long after the Transition Period. He will be responsible for coordinating hazmat and safety training with the chlorine vendor for the proper unloading, handling, and connection of one-ton cylinders.

Name, Role	Qualifications
Rich Lang **Maintenance Support | RR**	Rich has 23 years of experience in the maintenance and construction industry, with 21 of leadership experience including leading jobs and communicating with project engineers and customers to make certain that jobs are on schedule and completed to specification. His experience ranges from the installation, relocation, repair, reworking, and maintenance of machinery. He performed preventive maintenance (PM) and emergency service calls for a variety of clients. He is also experienced in the layout and fabrication of structural steel, including welding and plasma cutting, and is a certified fork lift operator.
Mike Mitchell **Maintenance Specialist | TT**	Mike is a proven manager with 17 years of wastewater and water treatment industry experience. He offers solid administration, communication, and supervisory skills along with significant maintenance management, project safety and project management experience. ME Grade III Wastewater Operator, NEWEA Class IV Wastewater Collection Systems Operator
Dave Parry, PhD, PE **Biosolids | RR**	Dr. Parry has built a national and international reputation for providing proven innovative solutions in wastewater, biosolids, and energy. He has 35 years of experience in wastewater treatment, solids processing, and energy projects. He has been principal investigator for research on effluent heat recovery, anaerobic digestion, co-digestion, pyrolysis, gasification, and combustion. He recently served as the principal investigator for the Water Environment Research Foundation's co-digestion project and the Environmental Security Technology Certification Program demonstrating the conversion of food waste to fuel at the U.S. Air Force. Dr. Parry served as the Chair of the Bioenergy Technology Subcommittee of the Water Environment Federation Residuals and Biosolids Committee. He was the lead author of the chapter on anaerobic digestion in the recently published WEF/EPA/WERF Solids Process Design and Management Manual. He has authored more than 40 technical papers, given numerous presentations, and has conducted workshops on wastewater collection and treatment, solids processing and anaerobic digestion, and energy management. Professional Engineer: OR, CA, WA
Amy Reid **Human Resources | RR TT**	Amy is a trusted HR business partner able to work within and across client sectors to consult, influence, and drive desired organizational behaviors and objectives. She brings experience in workforce planning, recruiting, coaching/counseling, employee relations, leadership development, and analytics. Role: During the Transition, Amy will focus on onboarding of staff, including interviews, offer letters, electronic timesheet system training, orientation, payroll set-up, and enrollment in benefits and workers compensation.
Joyce Smith-Corrente **Administrative Support | TT**	Joyce brings extensive experience in Jacobs' O&M services organization providing administrative support for the O&M project at Woonsocket, RI, and for the Northeast regional resources. Her experience includes administrative staff training, application and coordination of Jacobs' business processes and internal reporting at client projects as well as supplier and vendor coordinator and interaction. Joyce will bring the administrative staff up to speed in using Jacobs' business processes and internal reporting practices. Her contribution will continue in a Regional Support role well beyond the Commencement Date. She will also coordinate with Jacob's Procurement staff to orient New Bedford's administrative staff to suppliers and vendors with which Jacobs has existing national agreements. She will lead this important process to help the New Bedford project benefit from pricing efficiencies through agreements that leverage the buying power of our nationwide water and wastewater projects portfolio.
Lee Tharps, PE **Process/Modeling Engineer | RR Operations Support Specialist | TT**	Lee has 13 years of experience in planning, design, analysis and startups of complex wastewater systems. Lee is part of the regional support team and recently has worked with other members of the Regional Resources Team. Lee has performed preliminary analysis of the New Bedford facility and will add depth to our knowledge of the operation and performance of your facility. Professional Engineer: PA
Duyen Tran **Sustainability | RR**	Duyen has over 28 years of experience in wastewater operations management, including Regional Business Manager for the Central US region, and Project Manager for the City of Fayetteville Water Resource Recovery Facilities. She has proven success in leading changes and empowering broad-based actions on sustainability across three business sectors and 22 regionals within Jacob O&M Service Organization.

Name, Role	Qualifications
Ryan Vedrode **Laboratory | TT**	Ryan provides laboratory support and training to ensure compliance at his water and wastewater treatment plant projects. He provides remote support for laboratory technical issues, performs laboratory startups at new Jacobs projects, prepares budgets for laboratory operation expenses for new and prospective projects and reviews NPDES permits, monitoring plans, and other permits to ensure full compliance. He regularly support Transition teams with Laboratory startup. Michigan Class A DEQ Certified Municipal Wastewater Treatment Operator; First Aid and CPR, OSHA 30 Hour General Industry Training, MI DEQ Industrial Stormwater
Jeff Williams **Labor Relations | RR TT**	Todd has a 36-year career in environmental engineering with experience and specific emphasis in the biosolids and residuals management field. He is a recognized biosolids management planning expert having supported dozens of biosolids and residuals management master plans in his career. Senior Professional in Human Resources, HR Certification Institute; Certified Labor Relations Leader, Michigan State University
Maribeth Wintercorn **Operations Support Specialist | TT**	Maribeth has 27 years of experience in laboratory, water, and wastewater operations. Her expertise includes project management, municipal, and industrial wastewater treatment system operation, and water treatment system operation. Maribeth is skilled in process control, performance optimization, laboratory management, regulatory monitoring and reporting, and project administration. WI Class IV Wastewater Operator; WI Class I Water Operator; TX Class B Wastewater Operator; TX Class C Surface Water Operator; TX Class C Groundwater Operator; MI Class D Water Operator

6.D Example of Jacobs' Operations and Maintenance Plan

D. Example of Jacobs' Operations and Maintenance Plan

Below is a detailed sample Table of Contents (TOC) for the O&M Plan we will provide, pending further input by the City. You will find elements of the various plans and programs found in our O&M Plan within this section in the same order as the TOC below.

6.E

Example Elements of Jacobs' Laboratory Management Program

E. Example Elements of Jacobs' Compliance and Laboratory Program

Permit Compliance Sampling Matrices

NPDES Parameter	Frequency	Sample Type	Sample Location	Units	Analysis Performed By:
Flow	Continuous	Report	Effluent	MGD	recorded in-house
Total Residual Chlorine	Daily	Grab	Effluent	ug/L	Analyzed in-house
pH	Continuous Monitor	On-line Meter	Effluent, Influent	s.u.	Analyzed in-house
Carbonaceous Biochemical Oxygen Demand (CBOD)	Daily	24-Hour Composite	Effluent, Influent	mg/L	Analyzed in-house
Total Suspended Solids	Daily	24-Hour Composite	Effluent, Influent	mg/L	Analyzed in-house
Fecal Coliform	Daily	Grab	Effluent	cfu/100 mL	Analyzed in-house
Enterococci	Weekly	Grab	Effluent	cfu/100 mL	Analyzed in-house
Copper, Total	Monthly	24-Hour Composite	Effluent, Influent	ug/L	Analyzed by Contract Laboratory
Nickel, Total	Monthly	24-Hour Composite	Effluent, Influent	ug/L	Analyzed by Contract Laboratory
Biomonitoring (LC_{50}, Chronic NOEC, including metals)	4x / Year (March, June, September, and December)	24-Hour Composite	Effluent	ug/L	Analyzed by Contract Laboratory
PCBs	Semi-annually (April and September)	24-Hour Composite	Effluent, Influent	ug/L	Analyzed by Contract Laboratory
CBOD5 Minimum % Removal	Monthly	Calculation	Calculation	%	Calculation

Biosolids Monitoring Parameter	Frequency	Sample Type	Sample Location	Units	Analysis Performed By:
Metals, Total	Monthly	Grab	Biosolids	ug/Kg	Analyzed by Contract Laboratory
Nitrogen, Total	Monthly	Grab	Biosolids	mg/Kg	Analyzed by Contract Laboratory
Phosphorus, Total	Monthly	Grab	Biosolids	mg/Kg	Analyzed by Contract Laboratory
TCLP	Monthly	Grab	Biosolids	ug/Kg	Analyzed by Contract Laboratory
Fecal Coliform Bacteria	Monthly	Grab	Biosolids	cfu/100 mL	Analyzed by Contract Laboratory

Process Control Sampling and Testing

In addition to Permit-required compliance sampling, Jacobs will implement a Process Control Sampling Plan in order to monitor the condition and performance of individual unit processes within the New Bedford WWTF. Elements will include:

- Effluent: Temperature, Total Phosphorus, NH3
- Influent: VSS, BOD, pH, Temperature, Alkalinity, COD, Total Phosphorus, Total Nitrogen
- Primary Effluent: TSS, VSS, CBOD, Alkalinity, COD, TKN, NH3
- Secondary Effluent: NH3
- Recycle Flow: TSS, pH, Temperature, H2S, COD
- GBT Filtrate: TSS
- RAS (1-6): TSS, VSS
- Mixed Liquor (1-6): TSS, VSS
- Trucks: TS, VS
- Thickener Effluent (1-4): TSS
- Primary Sludge (1-6): TSS

Jacobs Laboratory Management Program

Methodology – The in-house process laboratory will follow the most current USEPA and Standard Methods of chemical analyses. Jacobs' Compliance & Reporting (C&R) Team establishes site-specific laboratory procedures and SOPs and will train staff on pertinent topics including quality control, safety, sampling protocols, correct analytical methods and the most up-to-date approved test method to meet permit requirements. We will routinely analyze quality control samples using Method Blanks, Reference Standards, Duplicate Samples, Spiked Samples, and Split Sampling where applicable.

Chain of Custody – Required for all outside and in-house process laboratory analyses, the chain of custody records the sample preservation and handling procedures for detailed tracking of samples. We will utilize an in-plant laboratory and operations logbook to further track the sequence from sample collection through final analyses for all process samples. We will comply with all chain of custody, preservation and transport requirements as defined by the City for all permit required analyses.

Instrumentation – Laboratory equipment and plant meters, including in-line equipment, are calibrated to ensure accurate and precise analysis results. Calibration results are recorded in logbooks to meet regulatory requirements. When calibration results prove to be outside of operating specifications, our staff will perform necessary preventive and corrective maintenance. Annual third-party calibration procedures will be conducted to ensure compliance with industry standards for instrumentation.

Our proven approach will be documented in Jacobs' Quality Assurance Manual which will be customized for New Bedford. Our C&R Team performs regular internal audits of the laboratory and reporting procedures and will require analysis of blind audit samples at least twice a year.

Elements of the LIMS System:

- Identity of personnel involved in sampling, sample receipt, preparation, or testing
- Information related to equipment, test methods, sample receipt, sample preparation, and data verification
- Record-keeping system that facilitates retrieval of information for verification or inspection
- Sample preservation, including appropriateness of sample container and compliance with holding time requirement
- Sample identification, receipt, acceptance or rejection, and log-in
- Sample storage and tracking including shipping receipts, sample transmittal forms, (chain of custody form)
- Documented procedures for the receipt and retention of samples, including all provisions necessary to protect the integrity of samples
- All original raw data, whether hard copy or electronic, for calibrations, samples and quality control measures, including analysts' worksheets and data output records

- Copies of final reports
- Archived SOPs
- All corrective action reports, audits and audit responses
- Blind sample proficiency test results and raw data
- Results of data review, verification, and cross-checking procedures
- Analytical records, (such as strip charts, tabular printouts, computer data files, analytical notebooks, and run logs), including data and statistical calculations, review, confirmation, interpretation, assessment and reporting conventions
- Quality control protocols and assessment
- Electronic data security, software documentation and verification, software and hardware audits, backups, and records of any changes to automated data entries
- Method performance criteria, including expected quality control requirements
- Personnel qualifications, experience, and training records
- Records of demonstration of capability for each analyst
- A log of names, initials, and signatures for all individuals who are responsible for signing or initialing any laboratory record
- Internal audit reports
- Management reviews
- Corrective and preventive actions
- Laboratory Chemical Hygiene and Safety
- Our approach to managing laboratory chemical hygiene and safety includes:
- Developing a site-specific Laboratory and Chemical Hygiene Plan (LCHP), to include a consistent procedure for daily, weekly, and monthly hygiene requirements for the laboratory
- Maintaining an inventory of the laboratory chemicals; label, store, or dispose of according to the LCHP
- Installing all safety equipment as required by regulation
- Installing and/or updating required signage for all laboratory entrances
- Installing a fire blanket, smoke detector, broken glass disposal box, and other required safety equipment
- Setting up safety preventive maintenance for all laboratory equipment
- Performing OSHA-required fume hood ventilation calibration, if applicable
- Installing GFCI receptacles in laboratory, if and where necessary
- Providing laboratory safety training
- Review, train, and document Safety Data Sheets and laboratory chemical hazards with staff
- Jacobs' approach to maintaining the laboratory, equipment, and ancillary equipment will include:
- Developing Preventive Maintenance, (PM), procedures for laboratory equipment according to manufacturer's recommendations, and input practices into the Maintenance Computer Tracking system
- Developing PM and inspection frequencies for Laboratory Safety Equipment as required by the Code of Federal Regulations, Standard Methods Online Version, MUR, and manufacturer's recommendations
- Implementing Laboratory Maintenance Log for Probes and Laboratory Equipment

Laboratory Resources

Resources available to all personnel include:

- Regional Laboratory Coordinator for guidance
- Compliance Laboratory Director for guidance
- Corporate Compliance (C&R) Team for guidance

- Initial laboratory startup/training and follow-up training
- Blind Study/DMR QA assistance for testing and reporting
- Ongoing updates of methods and regulation revisions and adaptations
- Continuing laboratory training on site and via Webinar
- Regular laboratory reviews as required by State and Federal regulations

Source Materials

Materials that will be provided by Jacobs include:

- QC Stats Program
- Laboratory Quality Control Manual
- Bound Bench book templates for lab parameters, maintenance, and calibration
- Laboratory Review Checklist
- Contract Laboratory Review Checklist
- Laboratory Chemical Hygiene Plan
- Laboratory Training Modules
- Standard Operating Procedure, (SOP), Library
- Standard Methods, Online Version
- Access to Laboratory Quality and Safety Programs and templates
- Laboratory SharePoint Site Access, (houses laboratory tools and resources)
- Sample Tracking Tool, (STT)
- Laboratory Techniques Videos
- Laboratory Video Shorts
- Preliminary Excursion Guide, (PEG)

6.F

Example of Typical Jacobs' Emergency Response Plan

F. Example of Typical Jacobs' Emergency Response Plan

The purpose of an Emergency Preparedness and Response Plan (ERP) is to prevent emergencies where possible, to prepare for emergencies that may occur and to provide clear, concise procedures following an emergency to resume normal operations as soon as possible. As an industry leader in emergency response and preparedness, Jacobs has access to nationally recognized experts who are skilled at helping local government officials and the public understand the risks posed by natural hazards, evaluating whether the level of risk is acceptable, and prioritizing mitigation actions. Our experts author technical guidance, emergency plans, training, and user manuals that emphasize quantitative hazard-level determinations, vulnerability and risk, and cost-effective mitigation strategies and action items.

We will develop a customized ERP that incorporates our experience developing and implementing similar plans for facilities throughout the region, integrating design and operational considerations specific to the City's facilities. The program team's most important tasks during emergencies are to protect the safety of personnel and the public, reduce capital losses, and protect environmental quality surrounding the scene. Our plan includes preparing for and responding to a broad range of situations, as well as training personnel in procedures and appropriate use of emergency equipment.

Plans also include critical coordination with the City and other agencies.

Chemical Spills—Onsite and from Offsite Transportation

All chemical spills are treated as an emergency situation requiring extreme caution and organized action. Individual material safety data sheets (MSDS) are used to determine proper cleanup and control measures. Records are retained with the following:

- Type of chemical
- Location of spill
- Estimated volume of spill
- Method of cleanup
- Personnel involved
- Supervisor's signature

In the event of a large chemical spill, the local Fire Department and the Public Safety Department will be notified even if the situation appears to be under control to determine if assistance is needed. Spills of certain materials or specific volumes must be reported to MADEP and to the National Chemical Response Center. This information is included in all MSDS kept in the plant laboratory.

Pipe, Valve, Pump, Equipment, and Process Failures

To address piping, valve, pump, equipment, and process integrity risk, we will perform an assessment of these assets initially and then on an ongoing basis to minimize failures. Avoiding these risks has many benefits to employees, managers, operations staff, shareholders, and society as a whole, such as:

- Increased safety
- Reduced environmental risk
- Increased uptime for operations
- Reduced unplanned downtime and failures
- More accurate data for the Integrity Management System
- Overall reduced operating risk

Failure Mode and Effect Analysis

Failure Mode and Effect Analysis (FMEA) is a methodical study of component failures. This review starts with a diagram of the operation and includes all components that could fail and conceivably affect the safety of the operation. Typical examples are instrument transmitters, controllers, valves, pumps, piping, rotometers, etc. These components are analyzed for the following:

- Potential mode of failure (i.e., open, closed, on, off, leaks)

- Consequence of the failure; effect on other components and effects on whole system
- Hazard class (i.e., high, moderate, low)
- Probability of failure
- Detection methods
- Remarks/compensating provisions

Once the assessment is completed, critical equipment spares, such as pumps, valves, controllers and piping, will be placed in inventory so emergency replacements can be made expediently. Should the failure be process related (e.g., an upset at the treatment plant that is hydraulic or organic related), we will follow the steps outlined in the ERP to address the situation.

Extended Downtime

If the facility is impacted for an extended time, we will use practical approaches to determine the best course of action. First, we will notify the City promptly to discuss what the issue is and provide an estimate of how long the facility may be out of service.

For situations that are only a few days up to a maximum of a week, our approach will be as follows:

- Increase treatment plant solids retention time (SRT) and adjust aeration basis dissolved oxygen to hold inventory under aeration and minimize wasting.
- Employ the use of chemicals to assist in improving solids captures in the primary clarifiers (chemically enhanced primary treatment [CEPT] system) to reduce the load on the aeration basin during this time and maximize the amount of storage and detention in the gravity thickeners.

Situations 1 week or longer are considered extended periods, and our approach will be as follows:

- Use CEPT as appropriate.
- Where possible, coordinate with our local solids hauling vendors to dispose of the solids in a manner for beneficial reuse (i.e., land application, composting, or alternate daily cover for landfills).
- Should the beneficial reuse option not be available, explore the most efficient option to dispose of solids at a landfill.
- Review all options thoroughly and discus with the City prior to a decision being made.

Power Failure

In the event of a partial or complete power failure certain procedures are followed to minimize equipment downtime. The local power company will be immediately contacted when a power failure occurs. To determine the location of the outage, a complete list of all meter numbers for lift stations and other unit processes will be located at the operator desks and in the back of the onsite ERP.

When power is interrupted for more than 15 seconds, the existing emergency generator will startup automatically. To ensure that the emergency generator operates properly, the generator is exercised weekly under the maintenance management program, and any required corrective maintenance identified is scheduled immediately. For the SCADA network and computers, an independent uninterruptible power supply (UPS) will be installed in all locations to ensure that the network is never without power.

Fire

In the event of a fire, we will take the following steps:

- All personnel will promptly report the occurrence of any fire, no matter how small, to their immediate supervisor, Emergency Response Lead and the Safety Lead.
- Notifications for fires will always include the following:
  - The City
  - Local Emergency Management and Emergency Coordination Center or other designated agency (911, contacts medical, fire, police responders as needed)
  - MADEP

  - Local electrical and natural gas providers (if a gas fire)
  - Other agencies as required
- In the event of a minor fire, respond by extinguishing the fire with available fire extinguisher and/or water lines, assuming this can be done without risk of personal injury.
- Should a major fire occur, promptly call 911 and immediately evacuate all personnel in the area in an orderly fashion.
- Personnel are to report to muster areas.
- All power and natural gas lines to area of fire are immediately turned off.
- Supervisors conduct head counts at muster areas and ensure that all staff are present. They will notify the Safety Lead and Emergency Response Lead of the counts.

Earthquakes and Floods

The Safety Supervisor will monitor emergency broadcasts and communicate to the Project Manager, Superintendent of Facility Operations, and others to ensure proper preparation for such events. In the event of an earthquake or flood, the highest priority is public and employee safety during and after the event. Posted instructions for these events will include the following:

- Take cover to protect yourself from injury by getting to a safe area. Safe areas include doorways, under doorsills, or beside heavy upright beams. If those areas are not available or accessible, get under the nearest heavy table, desk, bench, or machine.
- If there is overhead glass in the area, keep a jacket nearby to cover yourself from falling debris.
- Look around for equipment that may fall or tip over in the area and stay clear.
- Do not run from buildings during an earthquake. Most injuries occur outside from flying debris, falling objects, or from downed high-voltage wires.
- Avoid elevators and extinguish open flames. If you are at a location that has an elevator, do not use it during an emergency.
- Do not smoke or light a match/lighter, as there may be ruptured gas lines.
- Once the initial shock is over, calmly walk out of the building to the site Evacuation Area. Do not reenter the building until the structural damage has been assessed.

Flooding can occur as a result of either long-term, sustained precipitation; short-term, intense weather events; or a rupture in pipes. Procedures specific for flood events include the following:

- Install stop logs
- Secure work area and turn off equipment and machines, if feasible.
- Evacuate the site if conditions permit.
- If unable to evacuate, move personnel to higher grounds.
- Ensure the safety of personnel.

Freezing Weather

Occasionally weather conditions will be so severe that freezing may cause equipment failure or create unsafe conditions for plant personnel. Preventive measures are taken to keep equipment online and flows unrestricted through the plant. When low temperatures cause icing, associates will do the following:

- Shut off spray equipment to reduce surface icing.
- Keep all clarifier drive mechanisms online as long as possible; when ice loads become heavy and torque overloads are activated, do no reset.

Before freezing temperatures arrive, crack open hose bibs and hydrants and cover exposed piping. If hydrants or hose bib pipes break causing minor flooding, shut down water to that area when possible. If it is not possible, clearly mark hazard and inform the supervisor.

Lightning

The most serious lightning damage would be from a direct strike on the telemetry system, emergency generator, plant equipment, or lift station. A direct strike would impair the level of treatment or possibly contaminate the environment. Remedial action would depend on which components were shut down, and would primarily involve immediate repairs of all electrical damage so that normal operations could resume as quickly as possible. In the event bad lightning or severe weather is approaching, safety precautions include the following:

- Shut down and unplug plant computers.
- Secure doors and loose equipment.
- Seek shelter away from windows, doors, and metal objects that may act as a ground.
- Avoid standing in water.

If plant is struck by lightning, associates will immediately contact their Supervisor. Field personnel will take shelter in a vehicle or building until the threat of lightning has passed.

Influent Wastewater Quality and/or Quantity Outside Specifications

Should influent wastewater quality or quantity be outside of specifications, and regardless of whether it is categorized as an upset or not, we will evaluate the particular situation and make the appropriate process control adjustments to maximize plant performance and minimize the risk for any effluent water quality issues. Once adequate information is generated, a description of the incident and its cause will be communicated and include:

- The period in which influent was outside of specifications, including exact dates and times.
- The estimated time the out of specification situation is expected to continue if it has not been corrected.
- Discussion with the City on steps taken or planned to reduce, eliminate, and prevent recurrence of the out of specification situation.

In either upset situation or not upset situation, we will communicate promptly with the City to discuss the occurrence even if all information isn't known at the time to capture all data known and identify what needs to be examined. We will provide periodic updates as appropriate to ensure the City is well informed.

In the event that influent water quality or quantity is outside of specification and warrants notification to MADEP, we will inform the City prior to making any notification.

Proposer-Operated Pump Station Failures and Overflow

Responsibility for operating and maintaining the City's designated pump stations is critical to the success of this partnership. Taking a proactive approach is the most important factor when it comes to preventing pump station failures and overflows. We will use our MMS to ensure that stations are checked and maintained to a high-quality standard for preventative and predictive maintenance procedures. Each station will be loaded into MMS where station checks and maintenance will be documented and tracked. As previously noted, pump station equipment that is deemed critical will have spares in inventory so situations involving equipment failure can be responded to and mitigated quickly. Our proactive Maintenance Management and Asset Management Program will also minimize likelihood of failure.

In the unlikely event that a pump station failure should occur and an overflow condition exist, the City will be contacted first as soon as conditions permit. Under these circumstances:

- Immediate emergency response actions are required at the sewer interceptor pump stations and assistance as-needed.
- Immediate emergency response actions are required at the sewer collection system.
- Immediate emergency that may impact City-operated utilities (collection and pumping of wastewater). operations or threatens human health or safety of City Utilities Operations staff.
- During normal working hours, City Wastewater Utilities will be contacted at the Wastewater Department; after hours, City dispatch will contact the appropriate City staff as listed in draft ERP.

We will follow the prescribed emergency response procedures for spills and clean up to ensure that any overflow is contained as much as possible and to minimize any threat to the public or environment. Jacobs and the City must also provide MADEP with a written submission within 24 hours of an overflow condition occurrence. The written submission must contain the following:

- Description of the noncompliance and its cause
- Period of noncompliance, including exact dates and times
- Estimated time noncompliance is expected to continue if it has not been corrected
- Steps taken or planned to reduce, eliminate and prevent recurrence of the noncompliance

Emergency Telephone Numbers

A comprehensive and up-to-date emergency contact list provides information needed for all workers to address emergency and emergent situations quickly. An emergency contact list with site numbers will be posted at each worksite and include the following:

- Project contacts, including Project Manager, Safety Director, and Site Supervisor
- City of New Bedford Public Safety Department
- Police, Fire, and Ambulance for surrounding communities— emergency (911) and non-emergency numbers
- Area hospitals
- MADEP
- Serious Incident Reporting and Crisis Management

Emergency Equipment Inventory

As mentioned in the sections for Pipe, Valve, Pump, Equipment, and Process Failures, Jacobs will use an analysis approach of all equipment up to and including spare parts inventories and develop a detailed and comprehensive list for critical equipment and spares and will be analyzed for the following:

- Potential mode of failure (i.e., open, closed, on, off, leaks)
- Consequence of the failure; effect on other components and effects on whole system
- Hazard class (i.e., high, moderate, low)
- Probability of failure
- Detection methods
- Remarks/compensating provisions

In the event that emergency equipment is a rental item or provided as a specialty service by a vendor, those agreements for 24/7 service will be developed and put in place in advance so there will be no interruption in service.

Coordinating with Public Safety Agencies

Jacobs works closely in partnership with agencies that place a priority on public safety and our approach is to meet with such agencies frequently to familiarize ourselves with their procedures, as well as educate them on the treatment facilities. Notification requirements, depending on the situation, shall include City Utilities, County Office of Emergency Services, State Office of Emergency Services, Public Health, Sheriff, and Fire and Police Departments. As described in the ERP, other local, state, and federal agencies will be notified of any activity, problem, or circumstance that threatens the safety, health, or welfare of the facility staff or City residents.

Evacuation Drills

We will conduct at least one evacuation drill per year. The drill will cover all site locations, buildings and shifts. The local Fire Department will be invited to participate to become familiar with the site and be more prepared in the event of an actual emergency.

Conducting an evacuation drill involves the following:

- Plan the drill and enter the event
- Conduct or simulate the drill
- Verify the appropriate evacuation takes place
- Time the evacuation

- Check the site for people who did not leave, areas where the alarm can't be heard, or other potential problems
- Give employees the OK to come back inside
- Critique the drill
- Document the critique, communicate results with employees, and discuss any improvements to address

Emergency Preparation and Prevention

Most emergency situations occur suddenly and without warning. The best way to minimize the impact of any emergency on employees, equipment and the environment is to plan ahead and train all associates on how to respond in case of an emergency situation. For situations where advanced warning is possible (i.e., floods, freezing) planning must include actions to be taken immediately before these events are expected to occur. Our planning approach includes:

- Pre-disaster planning workshops
- Documentation of requirements and procedures
- Identify resources available to the Jacobs emergency response team
- Prioritization of critical governmental operations
- Development of scalable, before-, during- and after-event response implementation procedures

Proven Rapid Response Capability & Resource Depth

We recognize your service provider must be able to respond quickly and efficiently to emergencies. With a staff of more than 2,300 in the Northeast and Mid-Atlantic, Jacobs' trained personnel can respond quickly to any emergency, supporting our onsite team or the City within a matter of hours.

To achieve the highest level of responsiveness and ease of access to our temporary personnel and equipment resources in time of need, we have organized our multifaceted team and approach to provide Gresham the following customized plans and resources:

- Contingency and emergency response plans
- Identification of local and regional emergency response resources
- Continuity of operations planning
- Access to FEMA certified respondents
- Access to NIMS implementation support applications
- FEMA public-assistance coordination
- Disaster recovery & restoration

Jacobs' proven FEMA-endorsed approach addresses all aspects of disaster preparedness, disaster restoration, FEMA public-assistance coordination, and disaster recovery.

6.G

Example of Typical Jacobs' Staffing Plan Elements

G. Example of Typical Jacobs' Staffing Plan Elements

Developing a High-functioning Team

Long-term effective and efficient operations will require not only a technically sound operational strategy, but also a staff that understands the principles of treatment and is organized and led in a way that it applies that understanding in changing conditions. In short, a reliable operation and the ability to optimize it, require a high level of staff development.

Culture

"Culture" is not a mysterious or a fad-driven feature of a workplace. Every workplace has one; it is a matter of whether it is a healthy one. The philosophy of a Jacobs operation is this: it must "work in 360 degrees." This means:

- We produce clean effluent that protects the environment.
- We provide value to the City—in efficient operations, protection of your assets, and by providing sound science-based information for your use in decision making.
- We create a workplace where staff can apply and grow their abilities.

Team Meetings

Regular operations meetings or full staff meetings provide opportunity for leadership to convey themes to staff and to disseminate information. It is a time to conduct staff-wide training, coordinate work (such as between maintenance and operations), raise issues, and celebrate accomplishments. And, these meetings also establish a sense among staff of being a member of a group with a purpose.

In a functional staff, meetings are not rote. Any staff member may be responsible for preparing content since all are assigned responsibility for parts of the plant operation and depend on others for its implementation. Operators evaluate process status against targets and determine appropriate adjustments. A typical operations meeting will include projection of graphs representing process performance data. For example, energy and chemical consumption is among the data reviewed together. Operators can see changes in energy use each week and correlate it with recent operational decisions.

Professional Development

A functional staff is made up of people who are actively improving themselves. Employees and supervisors think about and discuss directions of development that work both for the individual and the organization. Mechanisms for encouraging and guiding development will be part of work lives. These include regular employee/ supervisor communication and formal goal setting. Employees are encouraged and supported in pursuit of licensure.

Training

This topic is introduced in the Professional Development/Training section of *Section 2.C – Staffing Plan*.

Ongoing Targeted Training and Knowledge Retention

Jacobs will provide focused training, based on employee assessments and identified needs, throughout the life of the project. Typical training topics are show in Exhibit 6.G.1.

We have deployed various training systems at more than 200 O&M sites, providing more than 50,000 hours of training to staff across North America. We will leverage this extensive training experience when developing a staff development program for the City of New Bedford.

EXHIBIT 6.G.1. EXAMPLES OF JACOBS' TYPICAL STAFF TRAINING PROGRAMS AT O&M SITES SIMILAR TO NEW BEDFORD'S WWTF

Operations Staff		
▪ Plant Specific Process Control Testing and Monitoring ▪ Conducting Weekly Process Control Meetings and Submitting Reports to the RTS ▪ Operations Strategy (and how to periodically update this document) ▪ Standard Operating Procedures (SOP) Development	▪ Solids Handling Operations and Optimization ▪ Monitor Process KPIs by Observing Data Trends ▪ Plant Check Sheets and Operator Duties ▪ Optimization Plan (to include process, chemical usage, electrical, and sludge handling) ▪ Unit Process Control Procedures (UPCP) Development Lockout/Tagout	▪ Site Specific Odor Control System Operations and Monitoring ▪ NPDES Permit ▪ Data Management ▪ Confined Space Entry ▪ Fall Protection ▪ Forklift
Maintenance Staff		
▪ CMMS and Completing Work Orders ▪ Equipment Calibration ▪ Training Provided to Achieve Certification as a Wastewater Plant Maintenance Technologist	▪ Inventory Control ▪ Infrared Thermography for Electrical Staff ▪ Arc Flash (NFPA 70E) ▪ Confined Space Entry	▪ Vibration Analysis ▪ Pump Repairs and PM Tasks ▪ Motor Current Analysis—Predictive Maintenance ▪ Reliability Assessment
All Staff		
▪ Smith Safe Driving ▪ Fire Extinguisher ▪ First Aid/CPR/AED ▪ Bloodborne Pathogens ▪ Personal Protective Equipment (PPE)	▪ Beyond Zero ▪ Annual SPDES Permit Training* ▪ Spill Response ▪ Globally Harmonized System (GHS) ▪ Team Work and Supervisor Training	▪ Contract Synopsis (KPI) ▪ Workplace Violence ▪ Sexual Harassment ▪ Cultural Sensitivity ▪ Ethics

Structured Training Approaches

Our structured training approaches, summarized in Exhibit 6.G.2 are focused on helping employees and the project accomplish their specific skill enhancement goals. Retention of newly learned skills requires applied training materials customized to the participant's work environment and coupled with post-class assignments—all designed to help the participant apply what they have learned at the point of work. To encourage success, coaches are assigned to make sure the participants understand and can successfully apply what they have learned, enabling them to work safely and effectively. We will provide the City with an annual training report each January, documenting the past year's training results and a schedule for the upcoming training year.

EXHIBIT 6.G.2. TARGETED TRAINING APPROACH

Targeted Training Type	Description
Transition and New Employees	Initial training and development encompass health and safety (H&S), operations/technical and administrative procedures, quality management, certification, and other courses designed to improve skills.
Ongoing Training	Required for all projects, ongoing training ensures that staff members understand the processes in place to ensure compliance. Each associate receives training on NPDES permits, the sampling plan, the O&M Plan, emergency response plans, and others. Annual training is provided on project standard operating procedures (SOPs), unit process control plans (UPCPs) and maintenance procedures. Training on contract compliance will include key project indicators (KPIs), deliverables, CMMS audits and other contract requirements.
Quality Coaching	An element of Jacobs' quality management program. Trained quality coaches deliver focused training on a variety of topics, including statistical process control, communications, leadership, time management, and other topics. Mental Health training has been incorporated and each project now has a mental health champion.
Certified Maintenance and Reliability Technician Program	These certifications reinforce the philosophy of reliability-centered maintenance, which is the gold standard for overall plant performance. A progressive knowledge base ensures that our staff are performing in accordance with best practices and maximizing the life of the New Bedford WWTP assets.
Jacobs University	Jacobs uses its own best practice instructional design and on-line courses to provide training to the work teams in a series of areas relevant to the project. Management staff will receive management and administrative training via a 40-hour leadership training program and annual ethics training. We will work with City to develop a framework for how the Jacobs University approach could be applied to the City's training program and assist with implementation. Subjects can range from job-related skills and operator training to management skills such as efficient team management, creative solution development, and performance management.

Improved Certification of All Staff Assigned to the Project

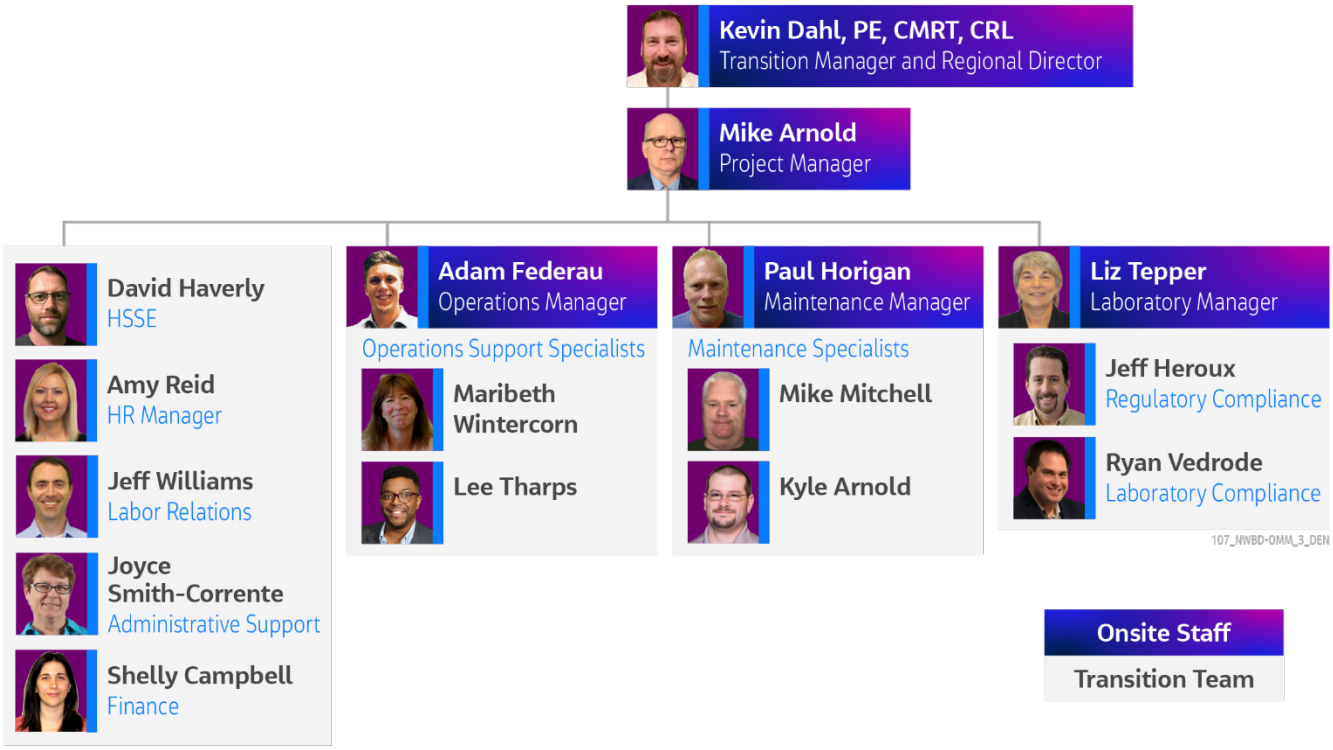
Jacobs encourages advancement in certification by awarding staff with a cash bonus for each increase in certification. Jacobs is also taking our maintenance staff to the next level by driving certifications around the Certified Maintenance Reliability Technician (CMRT) provided by the Society of Maintenance and Reliability Professionals (SMRP) and Certified Reliability Leader (CRL) provided by the Association of Asset Management Professionals (AMP).

6.H

Example of Jacobs' Transition Plan

H. Example of Jacobs' Typical Transition Plan

Jacobs' Transition Team Organization for New Bedford



Please see the Transition Team qualifications, included in section ***6.C Qualifications for Team Resources***.

Sample Schedule of Transition Activities

Jacobs will modify the draft transition schedule (Exhibit 6.H.1) based on the City's guidance related to early planning activities and to meet your exact needs based on the actual contract award and execution dates. Furthermore, as with any other plan discussed in this proposal, we fully anticipate seeking the City's feedback on our approach following selection to ensure your input is incorporated in the final plan.

Exhibit 6.H.1. Jacobs' Draft Transition Schedule

Timeline	Activity
Upon Contract Award	▪ Formalize startup and transition plan ▪ Organize integrated support staff with the Commission as a key partner ▪ Begin preparing required O&M process systems ▪ Develop functional startup and transition contingency plans and mitigation measures with the Commission ▪ Begin developing technology, instrumentation and data management systems ▪ Submit Project Manager and key team member contact information to the Commission ▪ Establish communication and reporting protocols

Timeline	Activity
Post-Contract Execution Date	▪ Initiate recruiting process ▪ Interview existing plant employees in a phased and coordinated manner, ensuring seamless transition and startup at commencement while maintaining uninterrupted operations ▪ Interview, orient, train, and communicate with new employees to facilitate training and transition ▪ Mobilize operations, maintenance, and engineering specialists for staff training and startup assistance ▪ Host introduction workshops ▪ Assess and develop training plans for new employees ▪ Initiate project document control systems and tools to facilitate communications and track progress during transition ▪ Make employment offers to new prospective (transitioning) employees
NLT 10 Days After Contract Date	▪ Deliver final Transition Plan to the Commission for approval ▪ Submit certificates of insurance ▪ Provide audited financial statements
Transition Start	▪ Implement functional startup and transition contingency plans and mitigation measures in cooperation with the Commission ▪ Initiate project training programs for safety and compliance ▪ Commence asset inventory followed by condition assessment of the assets
30 Days Post Transition Start	▪ Implement required O&M process systems ▪ Implement laboratory practices and process control testing programs ▪ Update emergency response plan notification list ▪ Submit an inventory of the parts, supplies and tools and vehicles which were present at the facilities on the Commencement Date, including the cost-substantiated aggregate value of initial inventory (the method of such valuation to be mutually agreed upon ▪ Incorporate technology, instrumentation, and data management systems ▪ Submit a final safety and security program

Action Plan for Organized and Timely Transition of Business Functions

Specific action plans are used to clearly delineate and track transition responsibilities across the business functions. The action plans summarized below are based on best practices and lessons learned, developed over decades of project transition experience and are designed to make certain that the appropriate functions are transferred to Jacobs in a timely manner with no interruptions in business processes. Prior to implementation, the transition team leadership will collaborate with the City to develop customized action plans to ensure alignment with the existing project organization, and to ensure that all requirements are met and mutually-agreed- upon success factors are achieved.

Administration
Tasks and action plans include:

- Provide managers copies of the company phone directory
- Provide a list of corporate support personnel
- Provide all relevant headed paper, business forms, and request forms in electronic format
- Arrange for signage changes as appropriate on vehicles and facilities
- Notify appropriate regulatory agencies of management changes
- Review the permits and certification required to meet relevant regulations and ensure they are in place and current
- Rectify any deficiencies
- Obtain originals of existing vendor and service contracts
- Obtain original signed copy of all contracts

Purchasing

Purchasing tasks and action plans include:

- Determine the purchasing contact person and provide him/her with contact information
- Obtain a listing of current vendors and compare to Jacobs' vendors; determine if Jacobs has any national agreements that provide favorable pricing
- Provide purchasing contact with national agreement information/preferred vendor listing
- Provide purchase contact with purchasing procedures including requisition process, P-card information, and credit application process
- Provide purchase contact with approval authority guidelines
- Perform periodic price comparisons

Health and Safety

Health and safety tasks and action plans include:

- Evaluate the status of current workers' compensation claims (before startup whenever possible) and verify that the current employer and insurance carrier will be responsible for open claims
- Identify those employees who are off work on disability and/or workers compensation and determine how they will be transitioned
- Perform an audit of all facilities
- Review task schedule for project. If not available or complete, produce a comprehensive task schedule
- Perform a risk assessment of all the tasks and then rank according to the significance of risk
- Perform an Activity Hazard Analysis (AHA) of all tasks, starting with those having the most significant risks
- Review all H&S procedures with reference to the AHAs and identify procedures that need to be revised
- Identify training needs
- Produce and implement an action plan that addresses the deficiencies

Human Resources and Payroll

The following human resources and payroll activities should be completed:

- Prepare new hire packets before enrollment meetings
- Obtain approval for first payroll, start of benefits, and 401K start date
- Ensure that medical benefit coverage is continuous, and any new plan is in place from day one of the project
- Schedule and hold employee and spouse meetings to begin the benefit registration process and provide new employees with information pertaining to topics that include:
  - Pay cycle, reporting, and calculation work rule changes, if any
  - Company employee policies and procedures
  - New-hire packet completion
  - Employee addition to payroll and benefits plans
  - Pre-employment screening locations and timing of any associated tests
  - Current employee interviews (coordinate with new project manager)
  - Employees' training needs assessment (in consultation with the transition manager and project manager) and initiate training programs
  - Identification and training of HR contact at the new location and provision of HR contact information
  - Follow-up meetings held to further explain benefits and discuss transition issues

Asset Management

Asset management tasks and action plans include:

- Review the asset inventory of all fixed plant equipment and buildings.
- Determine the steps to be implemented for the project.
- Take digital photographs of all buildings, operating areas, storage areas, lab, maintenance areas, and landscaping. Secondly, take individual photographs of all operating plant and other facilities (both interior and exterior), equipment, fixtures, machinery, vehicles, tools, lab equipment, and any other significant items with a written description. An initial condition report with photographs should be prepared for each major project that documents the initial conditions and the inventory of equipment with photographs and a detailed report. All photos must be dated.

- Update the inventory of all fixed plant, equipment, and buildings used operationally and included in the scope of the contract.
- Review and update the inventory of all mobile plant, equipment, and vehicles.
- Provide the fixed and mobile plant inventories for insurance purposes.
- Perform a review of all assets, determine their condition and performance, and rate accordingly.
- Take necessary corrective action to address any immediate safety or maintenance problems that pose a risk to employees or operations.
- Produce an asset management report including asset photos, condition and performance rating, and criticality.
- Establish an asset management plan for all fixed assets.
- Determine the replacement cost of the assets and include in the asset management plan the investment required to maintain the performance of all facilities to ensure compliance with regulations and Commission's expectations.
- Determine the predictive maintenance requirements of the project and produce a plan.
- Review the existing planned maintenance plan. A computerized maintenance management system (CMMS) will be used to generate preventive maintenance work orders and track reactive maintenance tasks.
- Print out a list of the equipment and conduct an audit to verify that all equipment is in the program and that the original manufacturers' preventive maintenance recommendations are being followed.
- Determine which predictive maintenance tools can be used to enhance the maintenance program.
- Review the list of equipment and determine which equipment is critical to facility operations.
- Identify which predictive maintenance tools should be used to monitor the condition of the critical equipment.
- Put together a list of the critical equipment and the recommended predictive maintenance tools for each piece of equipment. Some of the predictive maintenance tools that should be considered are:
  - Detailed inspections
  - Vibration monitoring
  - Infrared thermography
  - Oil and fluid analysis
  - Ultrasonic inspection
  - Motor circuit and motor performance analysis

Activities related to employee skills and training are a vital part of asset management and include:

- Interviewing all maintenance personnel to determine whether they are adequately trained, determining whether they have any concerns about the condition of the facilities, and obtaining details of historical maintenance gaps. All maintenance employees should have enough training on the CMMS to be able to review equipment history data and preventive maintenance tasks. At a minimum, the plant should have a procedure in place that would allow the maintenance personnel to get this information from another employee or manager.
- Ensuring that all maintenance personnel have knowledge of predictive maintenance tools.
- Ensuring that employees who perform mechanical repairs are properly trained.
- Ensuring that relevant employees have the necessary training to properly align motors.
- Ensuring that employees whose jobs require them to work on electrical circuits have adequate electrical training and are properly licensed or certified.

The closing asset management tasks and action plans include:

- Submitting a report to the regional manager and project manager that summarizes the effectiveness of the current maintenance program and provides recommendations for improvements.
- Producing an action plan for completing and implementing the asset management tasks.

Performance of Processes

Performance of processes tasks and action plans include:

- Review all wastewater processes and their performance in terms of water quality, sludge classification, odors, and public nuisance. The quantities of sludge held on site at the time of contract start should be determined and recorded. Photographic evidence should be used to supplement data wherever possible.
- Determine action required to meet regulatory standards and contractual obligations.
- Review adequacy of standard operating procedures; produce the necessary standard operating procedures and amend those requiring improvement.

- Prepare the O&M manuals; review manufacturer's manual and installation reports.
- Obtain approvals for proposed process changes, as required by regulatory agencies.
- Review adequacy of process control mechanisms in place; upgrade process control system as necessary.
- Review adequacy of process data management system.
- Identify and record any opportunities to enhance cost effectiveness of operating the processes.
- Produce an action plan for completing and implementing the above tasks.

Process Control Laboratory

Laboratories tasks and action plans include:

- Review all laboratory procedures—from sampling through to analysis—and all relevant documentation
- If not already in place, implement a QA/QC program
- If not already in place, implement the standard lab procedures manual
- Identify any deficiencies in terms of standard operating procedures and compliance with regulatory reporting training
- Produce and implement an action plan that addresses the deficiencies

Information Technology (IT)

Information technology tasks and action plans include:

- Identify the client's IT contact person
- Obtain an inventory of hardware and software
- Review all computer systems
- In consultation with the transition team, determine system, software, and hardware needs
- Review all software licenses to determine suitability for Jacobs usage and verify that all Jacobs machines are properly licensed
- Add employees (per the project manager) to the e-mail system
- Review systems troubleshooting procedures
- Produce an action plan to meet our contractual obligations and enhance efficiency

Business Management System (BMS)

Business Management System tasks and action plans include:

- Implement the BMS
- Produce the aspect matrix and determine significant aspects
- Note any action plans initiated to address transition issues in the BMS process and number the action plans accordingly
- Include additional BMS action plans from subsequent phases

6.1

Example of Jacobs' Safety and Security Plans

I. Example of Jacobs' Health, Safety and Security Plans

Health and Safety (H&S) Plan

Employees taking ownership of the H&S program is critical in achieving zero accidents. Jacobs, Regional Director Kevin Dahl and Project Manager Mike Arnold are accountable for protecting the environment, safety and health of every worker and the public by identifying, analyzing and mitigating hazards and implementing effective work practices. Employees have the right and responsibility to report unsafe acts, conditions, areas of concern and to interrupt or stop work without fear of reprisal. No employee will be asked to complete a task that the employee feels is unsafe or may endanger the environment. We will not compromise safety for the sake of any other objective.

Jacobs has the following responsibilities to its employees. First, the responsibility to involve all employees in the task or job, including the planning, identification of the hazards, pre-job hazard briefings, and all aspects of the task or job performance. Management is held accountable to ensure that all employees are involved in each aspect of the job or task athand.

Management shall ensure that all work is performed within the controls that have been identified and to continually review the job for any new hazards. Management will also ensure that only qualified and appropriately trained personnel are allowed to perform any job or task. The responsibilities of the H&S staff are to review implementation of the safety program, provide guidance on the selection and use of safe work practices, and to help identify, analyze, and mitigate hazards.

H&S Training

Immediately upon joining Jacobs, employees participate in an orientation to our safety program, during which they learn about the policies and procedures outlined in our Accident Prevention Plan (APP). We have over 100 online safety courses that allows our employees to continue required training without disrupting operations. We also maintain a library of classroom and practical based safety training programs, some of which are designed to meet specific OSHA regulations. Examples of courses include: hazard communication, hazardous waste operations, confined space entry, bloodborne pathogens, lead, benzene, lockout/tagout, working from heights, personal protective equipment, and electrical safety. Prior to performing high-risk tasks, our safety team conducts classroom/practical training (NFPA 70E, CSE, Fall Protection, etc.).

We also provide OSHA 30-Hour Construction and General Industry and construction and industrial safety awareness training that exceed the regulatory requirements. Jacobs has a number of medical surveillance programs that meet OSHA requirements as well, including hazardous waste operations, benzene, lead, and respiratory protection. We maintain a database that tracks employees who have received medical monitoring and who require additional examinations.

Jacobs' H&S program incorporates several different plans, all of which will be developed and implemented at the City's facilities.

- **Safety Management Standards/Standards of Practice (SMSs/SOPs) –** We maintain over 85 SMSs/SOPs that outline our comprehensive H&S requirements, including procedures for hazardous waste operations, written hazard communication program, etc.
- **Office Safety Programs –** We have established office safety programs to prompt H&S in the office environment and to address employees' safety concerns for all business operations. Central to the office safety programs are the office safety committees that are responsible for developing and implementing emergency planning and response procedures, identifying office safety hazards, and increasing safety awareness
- **Accident Prevention Plan –** We require written site-specific APP's for all field projects.
- **Competent Persons –** We have a program for providing competent persons, either through their own or subcontractor personnel, as required by OSHA.
- **Inspections –** We provide job site inspections consisting of both self-assessments and third-party audits.
- **Personal Protective Equipment (PPE) –** We provide employees with PPEs as required by the activities they are conducting.
- **Subcontractor Management –** We developed the following systematic method for managing risks associated with subcontractors' H&S:
  - Contract language that assigns the responsibility for safety to the appropriate party and outlines expectations associated with safety.
  - Prequalification of subcontractors based on their safety performance. The criteria used include EMR, OSHA statistics (i.e., incident rate, lost workday case rate),training, and written safety program.

- Based on our relationship, subcontractors may be required to submit safety documents to demonstrate they are in compliance with appropriate regulations and are capable of managing their safety risks.

Accident Prevention Plan (APP)

The APP is the guiding document for each project and includes OSHA and client required site-specific written programs such as site emergency plans, confined space entry programs, hot work programs, etc. In addition, the written programs address site- specific OSHA and client training requirements such as hazard communication and fall protection. Incorporated areas include:

- H&S Policy
- Responsibilities and Lines of Authority
- Management of Contractors and Suppliers
- Training Requirements
- H&S Inspections
- H&S Expectations and Compliance
- Incident Reporting
- Plans, Programs, and Procedures
- Forms and Permits

Behavior Based Safety

We will implement a Behavior Based Safety (BBS) approach that is designed to supplement the implementation of the APP for the project. The H&S Manager orchestrates the elements of the BBS that are applied to the project. These elements are determined based on client requirements, risk and project culture. We will verify compliance with the H&S program through routine self-assessments by the site H&S staff and project leaders. We also utilize scheduled corporate H&S audits by the Regional H&S Manager. Results of self-assessments and audits are provided to Project Manager Mike Arnold, who will take immediate action to correct deficiencies. Dennis is also responsible for tracking all audit findings to completion and documenting that the corrective actions are completed. Results of corporate audits are forwarded to Regional and Project Management, as well as the Corporate Director of H&S. These worksite analysis actions apply to office and field situations.

In addition to auditing and the Safety Scorecard mentioned previously, we use the following lagging metrics to measure the effectiveness of our health and safety program:

- OSHA Citations
- OSHA Monetary Penalties
- Lost Workday Case Rate
- Lost Workday Rate
- Average Lost Workdays Per Case
- Restricted Workday Case Rate
- Fatalities
- Workers Compensation Experience Modification Rating
- Workers Compensation Claims
- Workers Compensation Paid

BBS utilizes the principle of Plan, Do, Check, Act and this concept is documented and implemented through the Work Control Plan. The Work Control Plan is a part of the overall APP for the project. The concept includes properly planning each task, doing the work in a compliant manner with the plan, evaluating the task after completion to see if improvements are possible and acting on feedback from the check process.

Annual Audits

The City's facilities will be audited at least annually by the Regional H&S Manager. The audit assesses the following major components:

- Management Engagement
- Planning of work

- Recordkeeping and maintenance of written programs and plans
  - Accident Prevention Plans
  - Work Control Plans
  - Activity Hazard Analyses
  - Hazard Communication Program
  - Confined Space Entry Program
  - Lockout/Tagout Program
  - Personal Protective Equipment (PPE) Hazard Assessments
- Training assessments
- Site physical conditions such as electrical safety, machine guarding, life safety, and housekeeping
- Site work practices such as confined space entry, fall protection, NFPA 70E compliance and work practices, equipment operation, chemical handling, and PPE usage

Weekly Inspections

We will conduct weekly job site safety inspections. These are a management responsibility. Each department is required to inspect work areas and identify unsafe conditions or regulatory non-compliance.

Equipment Inspections (Maintenance Connection and Other Tools)

We will generate Work Orders for the inspection of H&S equipment such as eye wash stations, fire extinguishers, confined space monitoring meters, emergency lighting and exit signs. These items are incorporated into Maintenance Connection and other preventative maintenance software to ensure that the inspections are scheduled and completed in a timely manner.

Activity Hazard Analysis

Jacobs takes as many precautions as necessary to keep our employees safe. In addition to preparing SOPs for operating system equipment, the project team is required to perform an Activity HazardAnalysis (AHA) for all high hazard tasks.

The AHA carefully studies and records each step of a job that employees perform, identifying existing or potential equipment, environment, or action-generated hazards. A complete and thorough AHA entails four essential steps:

1) Analyzing, assessing, and evaluating a job.
2) Breaking the job down into discrete steps.
3) Identifying hazards, unsafe conditions, and unsafe work practices associated with the job.
4) Identifying the correct way to perform the job.

Creating AHAs will not eliminate risk completely but will confirm that tasks performed are less likely to result in injury or illness.

Pre-Task Plans

Prior to performing work, a Pre-Task Plan is completed and signed by each employee. This ensures that they have reviewed the AHA or Hazard Analysis and have all the PPE, tools and equipment required to perform the task safely.

Health and Safety Training Database

Jacobs developed a Health and Safety Training database (HandS) that is used to assess the training needs for each worker. The HandS system provides real-time data used to track and ensure that each employee has received the required training. Employees and supervisors receive notices in advance of training expiration dates. In addition to tracking training requirements, HandS is also used to track medical surveillance where required, audiometric testing, and respirator fit testing.

Safety Scorecard

Jacobs believes that we can only improve on what is measured. Therefore, we have created a Safety Scorecard that holds all levels of management accountable for the project safety.

Since its inception, we have experienced lower incident rates and higher morale. The Scorecard is comprised of 2 lagging indicators and 8 leading indicators (listed below). We believe that if the project focusses on each of the leading indicators it will ultimately reduce our recordables and motor vehicle accidents. The following summarizes the Scorecard leading indicators that are used for assessment:

- Required training completion performance
- Completion of Safe Observation Reports
- Performance on scored HSE audits
- Weekly Health and Safety Inspections of the site
- Timely completion of Corrective Actions identified in HSE
- Audits and Weekly Inspections
- Health and Safety Prequalification of subcontractors
- Timely submittal of incident investigation documentation
- Timely reporting of injury incidents to the Occupational Health Case Management nurse

Safe Observation Reports

Jacobs utilizes a Safe Observation Report (SOR) system that requires managers and supervisors to regularly observe work as it is being conducted at the City's facilities. This provides the opportunity for positive reinforcement of good work practices as well as coaching opportunities where improvements may be made. The observation also requires an evaluation of the pre-task plan/hazard analysis to determine whether it was adequate and is being implemented. Besides addressing behavior, SORs provide an opportunity to identify and correct site physical and health hazards. The results are tracked in a computer-based system, which generates trending reports. The trending reports allow the team to identify areas for focused improvement.

Rewards and Recognition

Another tool that Jacobs utilizes to support exceptional health and safety performance is the Rewards and Recognition system. This system is used to recognize any team member for exceptional H&S performance in terms of leading indicators, safety suggestions and improvements, and contribution.

Nominations can be made by any employee and the recognition may range from Certificates of Recognition/Achievement, plaques, and monetary rewards.

Security Plan

The major components of Jacobs' Security Program typically include the following components:

Security Awareness and Training	Security awareness training. Periodic refresher sessions will be required throughout the duration of the project.
Security Incident Reporting	All security and asset protection violations or concerns are reported immediately to the project manager. Security incidents such as theft, property damage, vandalism, and losses are recorded and investigations assigned.
Security Surveillance	Determine the appropriate physical security measures to mitigate any identified risk/threat or vulnerability at the New Bedford WWTP. During normal hours, the project offices will be secured.
Information Protection	Implement policies consistent with SCADA/IT standards provided by the City. Implement policies consistent with Jacobs SCADA/IT standards.
General Security	Zero tolerance policy for work place violence. Each employee has an obligation to report any observance or threat of violence in the workplace to safeguard an employee's, property, and reputation. Maintain a drug- and alcohol-free workplace.
Security Assessments	Project manager will conduct an annual physical security/asset protection assessment.

Cybersecurity

Having a comprehensive ICS program is mandatory for today's critical infrastructure operations. There is substantial pressure and momentum to force cybersecurity regulation in the water sector. Jacobs is leading the industry with expertise and evaluations that follow industry best practice NIST SP-800 standards and include:

- Developing comprehensive SCADA Standards to include HMI, PAC, Network and Control Panel standards.
- Conducting system wide ICS network architecture design, including detailed design with equipment specification for each facility or facility type.
- Conducting RAMCAP J100 All Hazards assessment.
- Developing ICS specific cybersecurity policies and procedures. These constitute approximately 80% of cybersecurity.
- Developing Backup/Disaster Recovery and Response Plan along with Business (Ops) Continuity Plan.
- Performing physical network design, including physical connectivity (fiber and copper) and physical location of equipment as well as physical security of equipment.
- Performing logical network design that utilizes NIST recommendations for redundancy and industry best practice for network topology.
- Performing WAN communications review to evaluate WAN system components, architecture and configurations of radio equipment, with a focus on identifying single points of failure, developing options for SCADA isolation, and performing penetration testing of WAN network.

In addition to providing expert consulting, we also manage IT systems for sites where we are the contract operator, so we can offer suggestions regarding integration of CMMS, GIS, customer billing, financial data, and other software tools for an efficient operation, with a particular focus on needs from the various IT tools and systems.

Jacobs