Jacobs

August 31, 2020

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Mr. Juan Rivera, P.E
WWRD Design and Construction Section
County of Maui
Department of Environmental Management
2050 Main Street, Suite 2B
Wailuku, Maui, Hawai'i 96793

Project: Central Maui Regional WWRF - FY21 QBS Project CBS-3206

Subject: Response to Request for Information

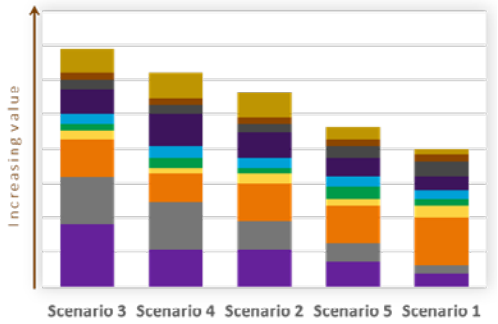
Dear Mr. Rivera,

The County of Maui's (County's) vision for a new greenfield wastewater reclamation facility (WWRF) to serve growing communities in Central Maui demonstrates the County's foresight and commitment to its residents. Successful completion of this project requires a trusted partner for the County to address the challenges associated with planning, design, and construction of the WWRF—while also capitalizing on the unique opportunities a new facility will provide such as energy optimization, automation, and reuse. Jacobs has served as your trusted partner on many significant projects over the past 50 years including the design of the 4 million gallon per day (mgd) greenfield Kihei Sewerage System with capacity to serve the Kihei and Wailea development. We are committed to your success in the planning and implementation of the Central Maui Regional WWRF and provide significant benefits to successfully complete this critical project as detailed below.

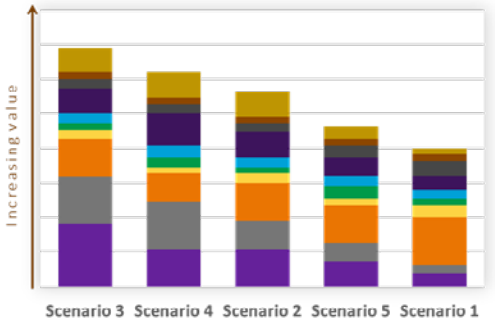
Our proven Lahaina WWRF Stage 1A Improvements Project Team will serve as the foundation for delivering the Central Maui Regional WWRF project, by bringing valuable lessons learned from collaboratively and proactively working with your WWRD staff and operators to address project challenges as they emerge. The core project delivery team for the Lahaina Project will serve similar roles on the Central Maui Regional WWRF project to ensure rapid project start-up, bring their positive working relationships with your staff, and facilitate communication between the County and our Project Team. The Leadership Team of **Tony Ali (Project Manager)**, **Bruce Johnson, Dale Gabel,** and **Bill Leaf (Process Engineering)**, and **Kandi Maestri** and **Carl Koester (Design Management)** understand your needs and preferred approaches, and will provide management and guidance of the entire project team to ensure the project meets your needs and requirements. Our leadership team will be supported by technical experts **Abbey Mayer** and **Nancy Nishikawa**, who have extensive Maui infrastructure development experience and to provide the planning and permitting support needed for the development of a new greenfield facility. **Diane Wakamatsu (Go Maui, Inc.)** will provide guidance on effective public engagement activities to reach and obtain valuable input from County residents.

Our project approach will focus on delivering the Central Maui Regional WWRF project within the allocated budget. We will use our advanced Conceptual and Parametric Engineering System (CPES™) to support critical decisions on the cost of treatment system alternatives and technology options to aid in selection. This parametric design and cost estimating tool that generates quick, accurate, and detailed project-specific designs, equipment and material quantities, and construction and life-cycle costs at the conceptual design stage. This powerful tool will enable the project team to quickly and accurately evaluate potential changes to the project and develop approaches to maintain budget. Additional funding sources, such as technology grants and Water Infrastructure Finance and Innovation Act (WIFIA) loans will be evaluated to augment the County's budget.

Our proven ability to deliver similar projects on schedule will enable the County to meet its commitments to County residents and system users. Delivering the Project on schedule will require the County and key stakeholders to make key decisions in a timely and defensible manner. Using our state-of-the-art Multi-Objective Decision Analysis (MODA) tool will facilitate vetting and decision making. In addition, other schedule enhancements will be evaluated by the Project Team, such as project phasing and alternative delivery methods (such as design-build and design-build-operate).



MODA Step 1: Non-monetary criteria reflect County and Stakeholder values



MODA Step 2: Benefit-cost analysis identifies best balance of monetary and non-monetary considerations

Our project strategy involves a holistic approach in developing the optimal solution that capitalizes on the unique opportunities of a greenfield treatment facility. Based on our extensive experience in operating over 200 treatment facilities around the world, we have found that energy, chemicals, and biosolids handling are all uniquely expensive in Hawaii, which enables energy optimization alternatives to be feasible that might not normally be considered. For example, anaerobic digestion and combined heat and power (CHP) generation would not normally be considered for a plant of this size. However, the high cost of power and biosolids disposal would likely show a net benefit on Maui for these technologies, especially if other solids sources (food waste, Lahaina sludge, grease trap waste) were brought to the site for digestion. Other opportunities include membrane bioreactors (MBR) to produce a consistent high-quality effluent, low maintenance natural treatment systems for nitrogen polishing combined with floating solar cells to provide green energy, and advanced treatment technologies such as membrane aerated biofilm reactors (MABR) for ultra-low energy usage. Our holistic approach will consider aesthetic impacts to neighbors and the availability of on-island equipment and redundancy requirements due to the potential for long delays in replacement parts, as well as the technical skill set of on-island staff.

We will establish a local project office to promote improved and timely personal communication between the County and Jacobs staff and our "best-in-class" experts to resolve issues. The Jacobs Maui Office will be supported by staff in Honolulu and our mainland and international design centers.

Please find enclosed the requested information related to our interest in the CBS-3206 Central Maui Regional WWRF project at Waikapu. We have completed 11 project questionnaires to demonstrate our breadth and depth of experience relevant to the Waikapu WWRF Project. We have also included additional information regarding the types of services, project approach, potential technology, and key personnel that will be valuable to the County for the execution of this project. Please do not hesitate to contact Tony or me if you have any questions or need additional information or clarification.

Sincerely,

Jacobs

Ross A. Kaneko, P.E.
Client Account Manager
808.440.0225
ross.kaneko@jacobs.com

Tony T. Ali, P.E., PMP
Project Manager
808.440.0208
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1 Questionnaires

Questionnaires

The following pages contain a selection of Jacobs' recently completed projects, which highlight our experience with greenfield water reclamation facilities similar to the Central Maui Regional WWRF. This also includes projects that demonstrate our experience with practical, state-of-the-art technology that is valuable to consider for greenfield plants. We have included Table 1-1 below to provide an overview of related services relevant to the Central Maui Regional WWRF project.

Please refer to the completed questionnaires on on the following pages for more information.

TABLE 1-1: RELEVANT PROJECTS

	Lahaina WWRF, HI	Spokane County RWRF, WA	Clovis WRF, CA	Northern Treatment Plant, CO	Agua Nueva WRF, AZ	Changi WRP, Singapore	Honouliuli WWTP, HI	North Las Vegas WRF, NV	Henderson Southwest WRF, NV	Gippsland Water Factory, Australia	Brightwater Treatment Plant, WA
Green Field Site		✓	✓	✓	✓	✓		✓	✓	✓	✓
Planning and Permitting	✓	✓	✓	✓	✓	✓	✓				✓
Community Engagement		✓	✓		✓	✓		✓	✓		✓
Biological Nutrient Removal	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
R-1 Effluent Quality	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
Disposal into Soil Aquifer Treatment Basins					✓						
Around 5 mgd flow, but <10 mgd Advanced Water Facility (ADWF)	✓	✓	✓						✓	✓	
Advanced Controls		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Potable Reuse					✓	✓				✓	
Energy Utilization	✓	✓	✓	✓	✓	✓	✓			✓	✓
Vertical Design (i.e. buildings – admin, dewatering, etc)		✓	✓	✓	✓	✓				✓	✓
Odor Control (low odors)		✓	✓	✓	✓	✓	✓			✓	✓
Design-Build		✓	✓	✓	✓					✓	
Design-Build-Operate		✓	✓		✓						
Solids Reduction		✓	✓	✓		✓	✓				
Membrane Treatment		✓	✓								✓
Green Energy		✓		✓			✓			✓	✓
Green Construction		✓			✓					✓	
Low Community Impact Plant (i.e. buried plant)			✓		✓	✓				✓	✓

Lahaina WWRF Stage 1A Improvements

Lahaina, Maui, Hawaii

PLANT CHARACTERISTICS	Size: 9 mgd Service Area: 11,000 people Process Used: Parallel MLE and 3-Pass Step Feed MLE bioreactor followed by disk filtration. Effluent Quality: R1 reuse quality Effluent Disposal: Reuse water users and injection wells
COMPLETION DATE	Design: 2017 Construction: 2020
DESIGN AND CONSTRUCTION COSTS	Design: $6.3 million Construction: $50 million
PERMITTING	Permitting cost: $50,000 (estimated) Permitting Duration: 6 months (approximately)
DESIGN AND CONSTRUCTION TIME	Design: 9 months Construction: 36 months
DESIGN TEAM	Design Team: Jacobs Design Center professionals including Tony Ali, Kandi Maestri, Bruce Johnson, Bill Leaf, Carl Koester, Jennifer Chang, Lionel Wood, Stephanie McGregor Office Location: Honolulu, Hawaii; Corvallis, Oregon; Denver, Colorado; Boise, Idaho Subconsultants: Cultural Surveys Hawaii (Archeological), Fewell Geotechnical Engineering, RT Tanaka Engineers Inc (Civil Survey) Contractor: Kiewit Infrastructure Group
REFERENCE	Juan Rivera, PE, CE-VI, Supervisor of Design and Construction, Wastewater Reclamation Division Phone: 808.270.7268
OTHER INFORMATION	Please refer to the attached project sheet for additional information.

CONSULTANT: JACOBS

Spokane County Regional Water Reclamation Facility Design-Build-Operate Project

Spokane County, Washington

PLANT CHARACTERISTICS	Size: 8 mgd Service Area: 120,000 people Process Used: Chemically Enhanced Primary Treatment, Membrane Bioreactor, Anaerobic Digestion, Post Aerobic Digestion, Co-Generation Effluent Quality: Achieves lowest phosphorus effluent levels in North America at 50 ppb (to the Spokane River). Ability to meet Class A reclaimed water requirements with total nitrogen (TN) < 10 mg/L Effluent Disposal: Outfall to Spokane River
COMPLETION DATE	Design-Build: 2009 - 2011 Operations & Maintenance (O&M): 2011 - 2031
DESIGN AND CONSTRUCTION COSTS	Design-Build Construction: $132 million Operating: $6 million annually
PERMITTING	Permitting Cost: $250,000 Permitting Duration: 2009 - 2013 (approximately 48 months)
DESIGN AND CONSTRUCTION TIME	Design-Build-Operate Contract Design/Build: 2009 - 2011 (finished 6 months ahead of plan)
DESIGN TEAM	Design Team: Jacobs Design Center professionals including Bruce Johnson, Bill Leaf, Carl Koester, Glen Daigger, Rick Smith, Dennis Nelson, Adam McClymont Office Location: Corvallis, Oregon Subconsultants: N/A Contractor: Jacobs
REFERENCE	Ben Brattebo, Water Reclamation Engineer Phone: 509.477.7521
OTHER INFORMATION	Please refer to the attached project sheet for additional information.

Clovis Water Reuse Facility

Clovis, California

PLANT CHARACTERISTICS	Size: 2.8 mgd (average), 5.6 mgd (peak) Service Area: 100,000 people Process Used: MLE MBR Process with Cannibal Solids Reduction Process, followed by aerobic digestion and dewatering. Effluent Quality: California Title 22 reuse Effluent Disposal: Reuse in the Clovis/Fresno area
COMPLETION DATE	Design-Build: 2006 - 2009 O&M: 2009 - 2018
DESIGN AND CONSTRUCTION COSTS	Design-Build: $37 million contract value
PERMITTING	Permitting Cost: $250,000 (estimated) Permitting Duration: 48 months (approximately)
DESIGN AND CONSTRUCTION TIME	Design-Build-Operate Contract Design-Build: 36 months
DESIGN TEAM	Design Team: Jacobs Design Center professionals Office Location: Denver, Colorado Subconsultants: N/A Contractor: CH2M Hill
REFERENCE	Lisa Koehn, Assistant Public Utilities Director 155 N. Sunnyside Ave, Clovis, CA 93611 Phone: 559.324.2607 Email: lisak@ci.clovis.ca.us
OTHER INFORMATION	Please refer to the attached project sheet for additional information.

Northern Treatment Plant

Brighton, Colorado

PLANT CHARACTERISTICS	Size: 24 mgd (average); 51 mgd (peak) Service Area: 80,000 people (estimated) Process Used: Fine Screens, Primary Clarification, 2-pass step feed 5-stage Bardenpho, tertiary clarification and granular media filtration. Solids includes primary sludge fermentation/thickening, WAS thickening, Anaerobic digestion + Post Aerobic Digestion and dewatering. Effluent Quality: Design for maximum day nitrate of 10 mg/L and effluent total phosphorus of 0.1 mg P/L Effluent Disposal: River Discharge
COMPLETION DATE	Progressive Design-Build: 2011 - 2016
DESIGN AND CONSTRUCTION COSTS	Progressive Design Build: $255 million
PERMITTING	Permitting Cost: $1.2 million (estimated) Permitting Duration: 24 months (estimated)
DESIGN AND CONSTRUCTION TIME	Design-Build-Operate Contract Design: 24 months Construction: 36 months
DESIGN TEAM	Design Team: Jacobs Design Center professionals including Bruce Johnson, Dave Oerke, Steve Patterson, Dale Gabel, Bryan Youker, Scott Champlin Office Location: Denver, Colorado Subconsultants: Brown and Caldwell Contractor: Jacobs
REFERENCE	Available upon request.
OTHER INFORMATION	Please refer to the attached project sheet for additional information.

Agua Nueva Water Reclamation Facility

Pima County, Arizona

PLANT CHARACTERISTICS	Size: 32 mgd (average); 64 mgd (peak) Service Area: 150,000 households Process Used: DAF Primary Clarification, 3-pass Step-Feed, 5-Stage Bardenpho process with simultaneous nitrification and denitrification, followed by disk filtration and chloramination disinfection. Effluent Quality: Total Nitrogen less than 8 mg N/L, Total Phosphorus less than 1 mg P/L and effluent ammonia less than 1.75 mg/L. Non-detect fecal coliforms 4 of 7 samples and THM's less than 80 µg/L. Effluent Disposal: Aquifer storage and Reuse and dry wash discharge.
COMPLETION DATE	Design-Build: 2010 - 2013 O&M: 2013 - 2028 (+5 option)
DESIGN AND CONSTRUCTION COSTS	Design-Build: $162.8M
PERMITTING	Permitting Cost: $800,000 (estimated) Permitting Duration: 36 months (estimated)
DESIGN AND CONSTRUCTION TIME	Design-Build-Operate Contract Design-Build: 2010 - 2013
DESIGN TEAM	Design Team: Jacobs Design Center professionals including Ron Williams, Bruce Johnson, Steve Patterson, Jennifer Phillips, Bill Baxter, Ted Dean, Eugene Baskin, Bryan Youker Office Location: Denver, Colorado; Phoenix, Arizona; Sacramento, California; and Spokane, Washington Subconsultants: N/A Contractor: Jacobs
REFERENCE	Jackson Jenkins, Pima County Director Phone: 520.724.6549

OTHER INFORMATION

- Winner, 2014 AAEES Grand Prize in Design
- Winner, 2014 DBIA Merit Award
- Winner, 2014 Arizona Water Wastewater Treatment Project of the Year
- Winner, 2013 Water & Wastes Digest Top Water and Wastewater Project
- Winner, 2013 Environmental Business Journal Water/Wastewater Project Merit Award

Testimonial:

"Jacobs' performance was excellent on all fronts. Their delivery methodology was founded on a true spirit of partnering, implemented in the earliest project stages and sustained throughout delivery.... We are very pleased with project results – a project delivered $2 million below the final contract value and completed 8 months early."

-Jackson Jenkins, Director, Pima County Regional Wastewater Reclamation Department

Visit:
https://www.jacobs.com/what-we-do/projects/agua-nueva-water-reclamation-facility

Community Impact:

Agua Nueva's footprint is smaller than any facility of its kind—ensuring the least site and environmental impacts at lowest cost to ratepayers. Its landscaping and architecture boast colors and textures that mirror the desert's enduring beauty, serving as a good neighbor to nearby residents and businesses. Promoting local economic progress, Jacobs more than doubled its local small business participation goals, volunteered in the community and hired County operators to operate the new plant, providing new jobs and opportunities in Pima County and Jacobs.

Partnership was an enduring theme throughout the project, since this was the County's first DBO project and we were implementing an unproven technology at full scale. Our formal partnering program unified the team around 14 guiding principles and leveraged the state of the art in collaboration technology—including advanced building information modelling (BIM), 3D visualization, site-wide cameras and video conferencing to engage Pima County in key activities and decisions at all times.

Please refer to the attached project sheet for additional information.

CONSULTANT: JACOBS

Changi Water Reclamation Plant – Phase II Expansion

Singapore

PLANT CHARACTERISTICS	Size: 53 mgd expansion to 210 mgd Service Area: 1.6 million people Process Used: Polymeric and Ceramic MBR. Step feed biological nitrogen removal (BNR) technology, extensive odor control technology using scrubbers, anaerobic digestion using novel cylinder-shaped digesters, and implementation of the world's largest biosolids thermal drying system. Effluent Quality: Meets strict standards for drinking water and the highest grade quality for reclaimed water for wafer fabrication and manufacturing plants. Effluent Disposal: Indirect Potable Reuse and ocean discharge
COMPLETION DATE	Design: 2015 - 2019 Construction: Forthcoming
DESIGN AND CONSTRUCTION COSTS	Design: $40 million (estimated) Construction: $430 million
PERMITTING	Permitting Cost: N/A Permitting Duration: N/A
DESIGN AND CONSTRUCTION TIME	Design-Build-Operate Contract Design: 48 months Construction: TBD months
DESIGN TEAM	Design Team: Jacobs Design Center professionals including Colin Newbery, Tim Constantine, Peter Burrowes, Bharambe Gokul, and Scott Levesque. Office Location: Corvallis, Oregon; Toronto, Canada; Atlanta, Georgia; Brisbane, Australia; Singapore Subconsultants: CPG Consultants Contractor: HSL Constructor Pte Ltd
REFERENCE	Yahya Abd Ghani, Singapore Public Utilities Board Phone: +65.67313368
OTHER INFORMATION	Plant Flythrough: https://www.youtube.com/watch?v=I5a7IHT9Hl8&feature=youtu.be Please refer to the attached project sheet for additional information.

Honouliuli Wastewater Treatment Plant

Ewa Beach, Hawaii

PLANT CHARACTERISTICS	Size: 37 mgd (average), 107 mgd (peak) Service Area: over 300,000 people Process Used: Fine Screens, DAF Primary Clarification, 4-pass Step Feed MLE Activated Sludge System. Residuals system includes THP, anaerobic digestion, dewatering and drying, along with combined heat and power generation. Effluent Quality: 30/30 TSS and BOD Effluent Disposal: Discharge to Water Reuse Treatment Facility and Ocean Outfall
COMPLETION DATE	Design: Ongoing Construction: Ongoing
DESIGN AND CONSTRUCTION COSTS	Design: $40 million (estimate) Construction: $500 million (estimate)
PERMITTING	Permitting Cost: Unknown; Jacobs is a subconsultant; Prime consultant is completing all permitting activities Permitting Duration: 75 months (estimate) for all four phases
DESIGN AND CONSTRUCTION TIME	Design-Bid-Build Contracts for construction. Separate contract for portions of the treatment facility Design: 2016 - 2023 for all four phases Construction: 2018 - 2027 for all four phases
DESIGN TEAM	Design Team: Professionals from multiple Jacobs offices connected through advanced design software systems. Local support for project provided through Honolulu office. Team includes Dale Gabel, Bruce Johnson, Tony Ali, Carl Koester, Tom Jones, Alix Firth, Scott Champlin, and Scott Cowden Office Location: Honolulu, Hawaii; Denver, Colorado; Corvallis, Oregon; Sacramento, California Subconsultants: N/A Contractor: Phase 1A – Parsons RCI, Inc.; Phase 1B – Nan, Inc.; Phase 1C – TBD; Phase 1D – TBD
REFERENCE	Raj Rath, Project Manager Phone: 808.768.8767
OTHER INFORMATION	Treatment system designs are focused on balancing energy demand and energy produced to approach a net energy neutrality. Production of a dried biosolid product could be used on public lands, such as golf courses and parks. Please refer to the attached project sheet for additional information.

North Las Vegas Water Reclamation Facility

Las Vegas, Nevada

PLANT CHARACTERISTICS	Size: 30 mgd, expandable to 50 mgd Service Area: 215,000 people Process Used: Biological phosphorus removal MBR + UV Effluent Quality: Total Maximum Day Loads (TMDL) agreement, phosphorus, ammonia nitrogen and total nitrogen removal limits of <0.15 mg/L, <0.5 mg/L and 10 mg/L are met through enhanced biological phosphorus removal (EBPR) combined with chemical polishing. Biofilter technology uses an impregnated media with natural microbes to absorb odors and biologically break down odors to carbon dioxide and water. Effluent Disposal: Reuse and Outfall to Sloan Channel
COMPLETION DATE	Design-Build: 2008 - 2011
DESIGN AND CONSTRUCTION COSTS	Engineering Cost: $8 million Construction Cost: $258 million
PERMITTING	Permitting Cost: $400,000 (5% of engineering - estimated) Permitting Duration: 24 months (estimated)
DESIGN AND CONSTRUCTION TIME	Design-Build-Operate: 36 months
DESIGN TEAM	Design Team: Jacobs Design Center professionals including Julian Hoyle, George Crawford, and Erdal Zeynep Office Location: Corvallis, Oregon; Las Vegas, Nevada; Toronto, Canada; Santa Monica, California Subconsultants: N/A Contractor: CH2M Hill and New Com Construction (CNLV Constructors II)
REFERENCE	Dave Bereskin, Utilities Director Phone: 702.633.1278
OTHER INFORMATION	Please refer to the attached project sheet for additional information.

CONSULTANT: JACOBS

Henderson Southwest Water Reclamation Facility

Henderson, Nevada

PLANT CHARACTERISTICS	Size: 8 mgd Service Area: 200,000 people Process Used: Sewer Scalping followed by Fine Screening, Step Feed BNR MBR and UV Disinfection with advanced odor control. Solids are sent to another facility for stabilization. Effluent Quality: Title 22 Reuse equivalent, Total phosphorus less than 0.1 mg/L and Total nitrogen less than 10 mg/L Effluent Disposal: Reuse/irrigation
COMPLETION DATE	2012
DESIGN AND CONSTRUCTION COSTS	Design: $7 million (estimated) Construction: $94 million
PERMITTING	Permitting Cost: $500,000 (estimated) Permitting Duration: 48 months (estimated)
DESIGN AND CONSTRUCTION TIME	Design-Build-Operate Contract Design: 2004 - 2008 Construction: 2008 - 2012
DESIGN TEAM	Design Team: Jacobs Design Center professionals including Barb Engleson, Tim Constantine, Julian Hoyle, Geoff Kirsten, Ping Tian, and Scott Cowden Office Location: Corvallis, Oregon; Las Vegas, Nevada Subconsultants: Brahma Group Contractor: Sletten Companies
REFERENCE	Priscilla Howell, Utility Services Director Phone: 702.267.4300

OTHER INFORMATION	The project budget started at $92,900,000 and experienced only a 1.62% increase due to change orders. The very low change order increase places the construction cost at $94,404,892. Berms surrounding the plant are 35 feet tall. The berms help minimize the impact of the SWRF facilities on the neighboring communities. To encourage conservation efforts, the berms are landscaped with xeriscape and native desert species. A neighborhood advisory committee was heavily involved in the design of the site Almost everything is either underground or within an enclosed facility. This is to minimize any odors and noise. The plant also uses biofilters and granular activated carbon canisters to absorb any odors. While the canisters do need to be replaced over time, this technology doesn't require the use of chemicals. Please refer to the attached project sheet for additional information.

Gippsland Water Factory

Australia

PLANT CHARACTERISTICS	Size: 9.2 mgd MBR, 2.1 mgd RO Service Area: 62,000 people Process Used: Anaerobic Industrial and sludge pre-treatment followed by MBR + RO with cogeneration. Effluent Quality: 3 mg/L Total Nitrogen Effluent Disposal: Industrial Reuse and River Discharge
COMPLETION DATE	Design-Build: 2009 - 2011 O&M: 2011 - 2031
DESIGN AND CONSTRUCTION COSTS	Design-Build: $250M (AUD) construction cost
PERMITTING	Permitting Cost: N/A Permitting Duration: N/A
DESIGN AND CONSTRUCTION TIME	Design-Build-Operate Contract Design-Build: 2006-2010 (48 months)
DESIGN TEAM	Design Team: Jacobs' Design Team professionals including Andrew Hodgkinson, Jim Lozier, and Kim Fries Office Location: Melbourne, Australia; Phoenix, Arizona; Calgary, Canada Subconsultants: N/A Contractor: CH2M Hill
REFERENCE	Peter Skeels, General Manager Operations Phone: +613.5177.4800
OTHER INFORMATION	Refer to https://youtu.be/i6954bbHbkU The Gippsland Water Factory has a Banksia for Water Engineering, an International Water Association award for Water Reuse and an overall Gold Banksia for environmental excellence. Please refer to the attached project sheet for additional information.

Brightwater Treatment Plant

King County, Washington

PLANT CHARACTERISTICS	Size: 51 mgd peak month flow Service Area: Seattle Metropolitan Area Process Used: Facility uses split-flow treatment with chemically enhanced primary clarification process for peak wet weather flow and series primary clarification and membrane bioreactor process for dry weather flow to reduce plant footprint compared to conventional secondary treatment. Includes advanced odor control. Effluent Quality: Class A reclaimed water from MBR and 30/30 BOD/TSS for blended discharge to ocean. Effluent Disposal: Marine outfall to the Puget Sound
COMPLETION DATE	2013
DESIGN AND CONSTRUCTION COSTS	Design: $47M Construction: $488M
PERMITTING	Permitting Cost: $12 million EIS cost Permitting Duration: 48 months (approximately
DESIGN AND CONSTRUCTION TIME	Design-Bid-Build Contract Design-Build: 2002 - 2013
DESIGN TEAM	Design Team: Jacobs Design Team professionals including Pat Burke, Bruce Johnson, Scott Cowden, and Bryan Youker Office Location: Corvallis, Oregon; Seattle, Washington Subconsultants: 16 subconsultants Contractor: Hoffman Construction, Kiewit Construction
REFERENCE	Stan Hummel, Project Representative Phone: 206.263.9457
OTHER INFORMATION	Please refer to the attached project sheet for additional information.

2 Other Information

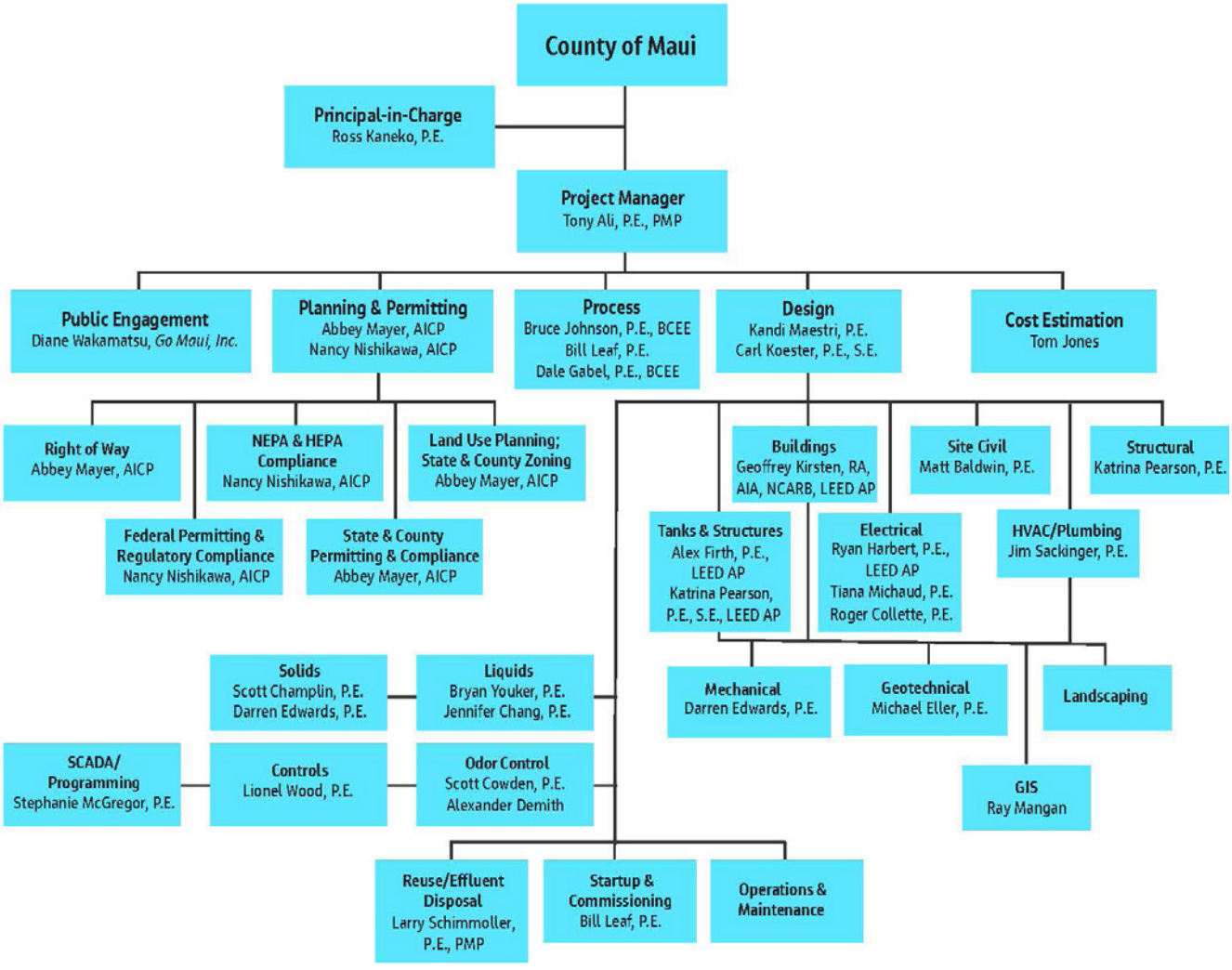
Committed to Maui

Since the late 1970s, Jacobs (formerly CH2M) started collaborating with the County, to complete operations and general civil projects at the Kihei Wastewater Treatment Plant. Most recently, Jacobs partnered with the County to complete the Lahaina WWRF Stage 1A Improvements project to upgrade the existing 9 mgd step-feed aeration facility. This project features a state of the art control system, a truly duplex operating aeration blower system, and dissolved oxygen and ammonia based control approach to reduce energy consumption while meeting stringent R-1 water quality criteria. During the Lahaina WWRF Stage 1A Improvements project, our programmers worked directly with County operations staff to listen and understand their concerns.

Our Proposed Team

Our proposed design team is an expanded version of the team that executed the Lahaina WWRF Stage 1A Improvements project to include seasoned planning and permitting who are locally based in Hawaii.

Tony Ali, our proposed project manager, is dedicated to providing convenient and in-person communication with County staff throughout the duration of this project by working in a project office on Maui. Tony will also supervise subconsultant firms (geotechnical, surveyors, etc.) needed to support this project. **Bruce Johnson, Dale Gabel,** and **Bill Leaf** will continue to serve the County by providing local, national, and global process engineering expertise. Our team has immediate availability to start and is fully committed to the success of the County. Please refer to the organizational chart below for a full overview of our team.



Highlighted below are our key staff proposed for this project.

KEY STAFF NAME/BIOGRAPHY

Leadership

Ross Kaneko, P.E.

Ross will be responsible for overall compliance with the project schedule and the County's objectives.

As a member of Jacobs' Northwest leadership team, Ross has knowledge and access to resources that maximize efficient project delivery. Should unforeseen challenges arise, Ross will quickly mobilize to initiate quick and balanced corrective actions necessary to keep the project on-schedule.

Tony Ali, P.E., PMP

Tony is a proven leader that the County can depend on to get the job done right.

He has led many Jacobs design teams over the years and most recently led the Corvallis-based team for the Lahaina WWRF Stage 1A Improvements project. For this effort, Tony has worked together with County staff to facilitate contracts and amendments, and to ensure proper Jacobs resources are available for design, construction support, startup and training. Tony also has experience serving as the water and wastewater lead for Suncor Energy at Fort Hills greenfield membrane water and greenfield wastewater treatment facilities, and Southern Nevada Water Authority greenfield 400 mgd River Mountains Water Treatment plant (WTP), the largest WTP in the nation at the time. Tony brings experience executing all project stages for federal, municipal and commercial projects, an inclusive leadership style, and is personally committed to the County's success.

Planning & Permitting

Abbey Mayer, AICP

Abbey's expertise in local permits will be valuable for keeping the project on schedule while meeting regulatory requirements.

Abbey is currently Senior Project Manager for Jacobs specializing in climate change, resiliency, environmental, land use, and transportation planning. Abbey previously served as the State of Hawaii, Office of Planning Director and personally represented the State before the State Land Use Commission (LUC) on Special Use Permit applications and petitions for District Boundary Amendment. Abbey has been involved in land use planning, permitting, and compliance—including leading complex National Environmental Policy Act (NEPA) and the State of Hawaii HRS Chapter 343 (HEPA) reviews—for numerous vertical and horizontal infrastructure projects across the State. This includes serving as the Director of Planning, Permitting, and Right of Way for the Honolulu Authority for Rapid Transportation (HART) and the Planning Lead for the National Park Service's rehabilitation and expansion of the Kalaupapa electrical system on Molokai.

Nancy Nishikawa, AICP

Nancy will bring her thorough understanding of community involvement and understanding of regulatory processes at different government levels to effectively meet permit compliance.

Nancy is a planner with more than 30 years of experience. She has successfully completed projects in the environmental, land use, and transportation sectors throughout Hawaii. Over the years, Nancy has specialized in strategizing public involvement to develop appropriate and effective solutions for the community.

John Padre, MBA

John brings his experience planning projects for a diverse group of markets to provide the County with a sustainable planning approach.

John is a planner at Jacobs with more than 20 years of management and technical experience in various markets: rail transit, information technology, real property development, renewable energy, sustainable materials management, asset management, and environmental liabilities. John specializes in program and project management, executive planning and execution, management consulting, and operations management.

Public Outreach

Diane Wakamatsu

Diane's understanding of the Wailuku community and County's values will be valuable for facilitating effective and purposeful communication with the public.

Diane will serve as the bridge between the project team and the community. Born and raised in Wailuku, Diane understands the values of the Wailuku community and has witnessed the growth and development of the Central Maui region over time. Her experience having served the executive and legislative branches of Maui's government will be vital to establishing purposeful communication in alignment with the County's goals.

Design

Kandi Maestri, P.E.

Kandi's experience with various delivery methods and her ability to manage accelerated schedules will help to keep this project organized and on-time.

Kandi brings 20 years of successful design management and quality management on water and wastewater projects. Kandi recently leveraged her skill as design manager and team player to help successfully deliver the Agua Nueva Water reclamation Facility and Wilsonville Wastewater Treatment Plant projects. Kandi's ability to manage fast-paced, accelerated schedules and her collaborative approach to project coordination is essential for effectively managing large, multi-discipline design projects.

Carl Koester, P.E.

Carl will work closely with Jacobs' and County staff to lead timely and effective communication and coordination for this project.

Carl will support Tony and Kandi with project scope, schedule, and budget management. Carl led coordination meetings for the Lahaina Stage 1A Improvements project to ensure project issues were quickly addressed. His leadership helped to complete this project on-schedule for both the design and construction phases. Carl will also help coordinate with County staff to ensure issues and resolutions are clearly communicated.

Process

Bruce Johnson, P.E.

Bruce brings practical, innovative process design expertise to creatively and effectively address the opportunities of a greenfield site.

Bruce is a Technology Fellow and lead process engineer with Jacob's People and Places Solutions group. He has formerly led both the wastewater technology practice and the wastewater simulation groups within Jacobs. He has a broad range of capabilities in industrial and municipal wastewater treatment, both domestically and internationally. Bruce specializes in the design and sizing of biological treatment systems, solid-liquid separation equipment, and waste sludge reduction. He also has extensive experience operating, troubleshooting, and designing water and wastewater treatment plants and equipment, holds 5 patents for technology and processes, and has authored or co-authored more than 26 publications. Most recently, Bruce effectively troubleshooted a plant upset at the Lahaina plant and developed an efficient process design using a stacked channel bio-reactor.

Bill Leaf, P.E.

Bill works closely with operators and contractors to facilitate a smooth startup and commissioning process and provide quality control to meet compliance with effluent regulations.

Bill is a principal technologist and process engineer with more than 25 years of experience. Bill works closely with County operators, contractors and automation control engineers to ensure process parameters are implemented to meet effluent compliance regulations. He was involved with the Lahaina WWRF Stage 1A Improvements project during the startup and commissioning phase, and supported operations during a plant upset. Bill also changed the step feed bioreactor at Lahaina WWRF to operate as extended aeration during seeding and startup, and determined the process to switch the system over to step feed. Bill collaborated with Contractors and County Operators to review equipment operation and perform training during startup.

Dale Gabel, P.E.

Dale brings extensive experience in facilities planning and process engineering for wastewater treatment plants, to help effectively steward County funds by using efficient energy savings approaches.

Dale is Jacobs' Wastewater Practice Lead for the western U.S. He has extensive experience providing the full suite of engineering services for wastewater treatment facilities and a strong background in facilities planning and process engineering for municipal and industrial wastewater treatment plants. He has collaborated extensively with local, state, and federal regulatory agencies and has participated in numerous public meetings to provide technical expertise. Dale is a proven program and project manager for projects ranging from $5,000 to $50M, which includes the evaluation, permitting, design, and construction of private and public facilities. Dale is involved with the planning and design of the Honouliuli expansion for a mandated consent decree.

Environmental Planning, Permitting, & Regulatory Compliance

Regulatory Compliance

Regulatory compliance is an integral aspect of facility planning work, since it carries risk of moderate to severe project schedule delays and can cause projects to be abandoned or entirely re-sited in certain circumstances. For this reason, Jacobs includes planners and environmental scientists on design teams from the earliest stages of a project to weigh in on design choices. This mitigates the risk of schedule and cost overruns by avoiding mandated re-design in response to regulatory pushback.

At Jacobs, we employ in-house planning and regulatory compliance professionals experienced in federal, state, and county laws and rules related to the siting, design, and construction of wastewater treatment facilities. Jacobs works closely with clients to create a complete picture of decision processes and develop a comprehensive description of the proposed project and approvals that could affect the project. The identification of key players and their concerns will be central to this effort. Jacobs will work to understand who is involved in every decision throughout the project's duration to avoid potential project delays. Regulatory processes are often delayed because key personnel or agencies were not identified as participants in the initial planning process. Jacobs has collaborated with **Diane Wakamatsu** of Go Maui, Inc. to identify and conduct outreach to critical participants during public-facing phases of our Maui projects.

NEPA and HEPA

Jacobs is experienced in providing a full range of environmental, engineering, planning, permitting and compliance services for the County of Maui. At Jacobs, a successful project is defined not only by its sound design and engineering, but on thoughtful and skilled planning, permitting, and regulatory compliance. For this reason, we included planning, permitting, and compliance experts on our engineering and design teams (refer to the organizational chart on page 15) at the project's earliest stages.

Our team consists of state, regional, and global subject matter experts (SMEs) who are experienced in completing high-visibility environmental assessments (EAs) and environmental impact statements (EISs) on Maui. Our Honolulu-based personnel are experienced with meeting compliance with both the the National Environmental Protection Act (NEPA) and the Hawaii Environmental Protection Act (HEPA, or Chapter 343, Hawaii Revised Statutes). Together, the Jacobs team provides the range of critical knowledge and experience required to drive this project to success.

Environmental review is intricately connected with various other regulatory requirements, and the proposed Central Maui Regional WWRF's EA/EIS will need to be coordinated with federal, state, and county agencies. Jacobs has successfully delivered EAs and EISs that simultaneously comply with NEPA and HEPA for the County by implementing integrated project planning, coordinating aggressive schedules, and using a proactive approach that identifies and focuses on resolving issues most likely to adversely affect the NEPA, HEPA, and/or permitting processes. Jacobs will serve as a guide for the County to properly meet compliance with regulatory requirements and achieve project success.

Planning & Permitting

A variety of federal, state, and local rules and regulations require the preparation and implementation of plans, as well as supporting document maintenance. Jacobs supports clients in a variety of ways, which may include:

- Conducting due diligence studies associated with biological, archaeological and cultural resources
- Preparing environmental planning documents including EAs and EISs,
- Responding to development needs in sensitive environments that require extensive planning and mitigations, such as Habitat Conservation Plans (HCP) for endangered and protected species, Compensatory Mitigation Plans for loss of wetlands, and Memoranda of Agreement for adverse impacts on significant historic properties
- Preparing permit applications to meet compliance with federal, state, and local regulations
- Providing planning and permitting services for various large-scale infrastructure facilities
- Preparing required supporting documentation, such as recordkeeping, reporting, or training
- Providing tools for managing and visualizing information (i.e. geographic information systems [GIS] and numerical modeling)

Jacobs can also provide specific expertise on all areas required to entitle a new WWRF, including:

- Conducting site investigations
- Right-of-way acquisition assistance
- Preparing applicable design reports
- Preparing topographic surveys

Obtaining and securing applicable permits and clearances may include but are not limited to:

- Coastal Zone Management Act (CZMA) compliance, including Federal Consistency and Special Management Area (SMA) Permits
- Water Quality Certification
- Department of the Army Permits

- National Pollutant Discharge Elimination System (NPDES) Permits
- Endangered Species Act (ESA) compliance
- Section 106 of the National Historic Preservation Act (NHPA) consultations and compliance
- State District Boundary Amendments and/or State Land Use Commission Special Use Permits
- County Zone Change applications and/or Special Permits
- Conducting public meetings as required
- Providing post-design services

Past Performance

Jacobs' recent environmental planning and regulatory compliance experience includes some wastewater treatment facilities:

- EA for the Puu Makaala Natural Area Reserve, Hawaii Island, Hawaii
- Environmental planning services, including NEPA, HEPA, and Section 106 of the NHPA Programmatic Agreement support, for the Honolulu Rail Transit Project (HART), Honolulu, Hawaii
- Ala Wai Watershed Feasibility Study and EIS, Honolulu, Hawaii
- Farrington Highway Improvements Environmental Assessment, Kapolei, Hawaii
- EIS, planning, and regulatory compliance for the Kawailoa Wind Farm Project, Oahu, Hawaii
- Waianae Wastewater Treatment Plant EA, Waianae, Hawaii
- Planning, permitting, regulatory compliance (including EA and permitting for the adjacent force main) for Kamehameha Highway Wastewater Project, Oahu, Hawaii
- Design and federal environmental compliance for Kauai Solid Waste Management and Transfer Station Program, Kauai, Hawaii
- EAs for six exploratory wells for the Honolulu Board of Water Supply: Halawa Nonpotable, Kalihi IV, Punaluu III Addition, Wahiawa II Addition, and Whitmore Exploratory wells, Oahu, Hawaii
- EA for Nuuanu Reservoir System Improvements, Nuuanu, Hawaii

Recent Maui planning, permitting, and regulatory compliance projects include:

- Feasibility study and EA for the Mokuhinia Ecosystem Restoration Project, Lahaina, Hawaii
- Strategic planning and environmental permitting for Hawaiian Electric and Maui Electric Co.'s "Big Wind" Project, Oahu and Maui, Hawaii
- Strategic planning and permitting services for Maui Electric Co.
- Central Maui Landfill Engineering Services
- Central Maui Landfill Groundwater Monitoring Services

Climate Change, Sustainability, and Resiliency Planning

Over the past 25 years, there has been an increasing recognition to consider the longer-term implications of management actions with respect to climate change, sustainability, and resiliency—especially in relation to traditional infrastructure design and engineering—to avoid committing future generations to unsustainable practices. Finding solutions to these challenges requires the development of strategic plans that cover long time periods and large spatial scales, and involve multiple stakeholders.

Jacobs brings this expertise to the County as a global industry leader in climate change, sustainability, and resilience planning. This effort will include access to world-class expertise during design reviews for the Central Maui Regional WWRF and incorporation of measures aligned with to help achieve State and County sustainability goals. We will also evaluate siting plans, flood risk assessments, green infrastructure and renewable energy options, and effluent handling and reuse options. Cost-benefit analyses and risk assessments will help guide decision-making for potential sustainability and resilience design features.

Environmental Planning and Regulatory Compliance during the COVID-19 Pandemic

Today, we are faced with unexpected circumstances and significant new uncertainties that may include:

- Emergency operations and teleworking
- Slower economic activity and business functions
- Pressure from customers and funders to be more sensitive to costs and affordability
- Need to optimize and fund capital projects amid changing priorities
- Staffing challenges, including staff illnesses and making short- and long-term personnel decisions
- Reduced customer demand for discrete services forced shutdowns of offices and facilities
- New operational efficiency, performance, and service delivery imperatives
- Supply chain disruptions

Fortunately, proven approaches and tools can help to minimize the new risks and uncertainties that have surfaced during this pandemic.

The Jacobs Honolulu team has adapted project procedures to make sure design, engineering, planning, permitting, and regulatory compliance services remain on-time and on-budget during the pandemic. Supported by Jacobs' Strategic Consulting division, we offer the County project- and program-level services to successfully adapt to the "new normal." We will draw upon best practices to ensure that program and project goals can be met, while maintaining the highest practicable safety levels.

Lahaina WWRF Stage 1A Improvements

County of Maui, Lahaina, Hawaii

Client Reference

Eric Nakagawa, 808.270.7422

Performance Highlights

- Design plans, specifications, and cost estimate for new secondary treatment facilities for operational reliability
- Modifications to existing secondary treatment facilities

Fee: $3M (design fee)

Areas this Project Addresses

- Secondary treatment with biological nutrient removal
- Modifications to existing tankage
- Sludge handling improvements

Scope

The County of Maui owns and operates the Lahaina WWRF This Facility serves the population of West Maui from Puamana to Kapalua and it is currently rated at 9.0 million gallons per day (mgd) average daily flow and consists of preliminary, secondary, tertiary treatment, UV disinfection, and solids processing facilities. Maintaining 9.0 mgd reliability has become an issue since the original portion of the plant, built in the 1970's, has become obsolete and can no longer be used as backup for the current operating portion of the plant, built in the 1980's and 1990's.

Based on recommendations from the Lahaina WWRF Process Study Update, Steady State Process Modeling and Alternatives Evaluation (Process Study Update) (Jacobs, November 2015), the Lahaina WWRF will be restoring reliable secondary treatment capacity of the WWRF to 9.0 mgd ADF, also known as the "Stage 1A Upgrade." The secondary treatment facilities were configured and sized to meet treatment criteria using Jacobs wastewater treatment simulation model, Pro-2D2™.

The design concept for the new bioreactor is based on a three-pass configuration, where any one pass can be taken out of service for maintenance. Preliminary treatment effluent (PTE) can be introduced into either or both of the first two passes, also known as step feed. Return activated sludge (RAS) is introduced at the first pass. Within the first two passes is an anoxic zone (no air diffusers; nitrate introduced via mixed liquor return from the end of the pass; mixers required to keep sludge in suspension) and aerobic zones (with fine-bubble diffusers, no mixing required). In the final pass the first zone is a swing zone (diffusers and mixers provided) followed by aerobic zones. Aerobic zones in the final pass may be operated under low (not zero) dissolved oxygen (DO) conditions, which may require mixers due to the reduced air flow.

Provided the design for a new Secondary Clarifier 6—a 75-foot diameter clarifier with 20-foot side water depth. The secondary clarifier mechanism is a spiral type to match the existing clarifiers. Chlorine solution prevents algae growth on the weirs/launders similar to the existing clarifiers instead of using launder covers. A RAS pump station integral with the exterior wall of the new clarifier houses submersible pumps in a wet well to serve the new clarifier.

The Process Study Update also recommended related improvements such as a new preliminary treatment effluent (PTE) flow splitter box, a new blower and electrical building, and modifications to the existing FAB, CAB, secondary clarifiers, and RAS/WAS pump station. Jacobs prepared plans and specifications for new plant improvements and provided engineering support to the County of Maui during construction. Jacobs staff also worked with the Contractor to perform the operational control system and troubleshoot construction issues, such as challenges with aeration blower duplex operation. Construction commenced in March 2017 and will be completed in September 2020.

Spokane County Regional Water Reclamation Facility Design-Build-Operate (DBO) Project

Spokane County Division of Utilities,Washington

Client Reference

Ben Brattebo, Water Reclamation Engineer, 509.477.7521

Key Project Elements

- Innovative, state-of-the-art membrane bioreactor (MBR) and nutrient removal achieve lowest phosphorus effluent levels in North America at 50 ppb to meet Class A reclaimed water requirements
- Operations and maintenance responsibility for 20 years with unattended operations capability
- First full-scale post aerobic digester in North America for nitrogen load and volatile suspended solids reductions
- Excellent safety performance, with over 583,000 hours performed while recording a Total Recordable Rate of 183 and Days Away Restricted Time of 000 points, both well below the industry average

To meet future population growth, eliminate septic tank service, and reduce phosphorous discharge to the Spokane River, the Spokane County Board of Commissioners awarded

Innovative facility design protects Spokane River while allowing population growth

Jacobs a $132 million DBO contract for a new greenfield 8 mgd (30 ML/d) water reclamation facility that was delivered early and under budget.

Use Of MBR And Nutrient Removal To Achieve Stringent Nutrient Limits

The state-of-the-art MBR and nutrient removal systems achieve some of the lowest phosphorus effluent levels in North America, at 50 ppb and 0.25 mg/L ammonia. The other notable aspect of the facility is the use of post-aerobic digestion (aerobic digestion after anaerobic) to greatly reduce nitrogen loads on the facility and improve volatile suspended solids (VSS) destruction in the biosolids train.

Beginning in January 2009, Jacobs' scope of work for the Spokane County Regional Water Reclamation Facility (SCRWRF) encompassed the design, permitting, construction, commissioning, and long-term operations of the new treatment facility. Facilities constructed on the 20 acre (8 hectare) site include:

- Headworks facility to screen influent, remove grit, and receive septage deliveries
- Primary clarifiers featuring a chemically-enhanced treatment process with step-feed membrane bioreactor technology to produce Class A effluent within the specified phosphorus limits
- Anaerobic/aerobic digestion and dewatering facilities to produce Class B biosolids for beneficial land application reuse
- Digester gas cogeneration facilities to generate power and recover heat for use in treatment processes
- LEED™ Silver-certified Water Resource Center, Treatment Operations Facility and Maintenance Buildings

Construction was completed in November 2011, 7 months ahead of schedule and nearly $1 million under budget, at which point Jacobs began a 20-year facility operation and maintenance period that includes administration of the County's Industrial Pretreatment Program.

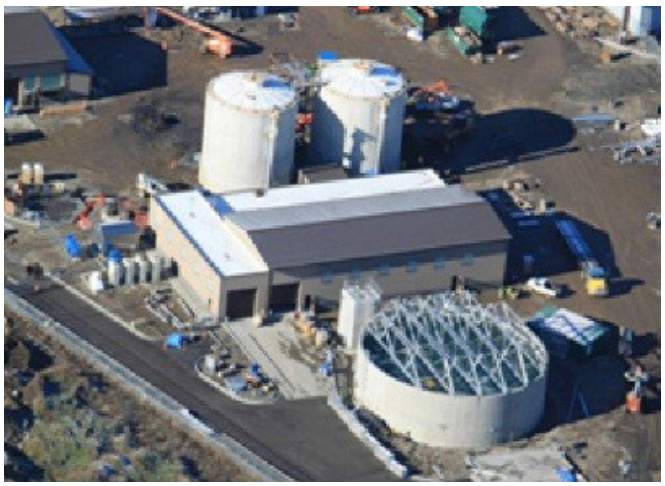
Sustainable Design Recovers Energy

The plant's sustainable design allows energy recovered through digester gas production, process heating, and cogeneration systems to produce electricity to help run the facility. Using this renewable energy will help the environment and reduce electrical costs for the County, and were designed to meet LEED™ Silver criteria. Jacobs self-performed all design disciplines including mechanical, electrical, structural, civil, instrumentation and controls (I&C), HVAC, architectural, geotechnical, and process. We also led permitting, construction management, yard piping, equipment installation, process mechanical, concrete/ civil work, SCADA and I&C installation, and long term O&M operations and planning. Sustainable elements included:

- Irrigation systems use only recycled wastewater
- Potable water use has been reduced by 45 percent with dual-flush water closet, low-flow urinals and ultra-low flow lavatories
- HVAC system selection has minimized/eliminated emissions that contribute to ozone depletion or global warming
- 9838 percent of onsite generated construction waste has been diverted from a landfill
- 2328 percent of all building materials were manufactured with recycled materials

The plant serves as a catalyst to revitalize the area and be a good neighbor to existing developments. An advanced SCADA system that can allow unattended operations was implemented and integrated with maintenance management and operations optimization programs to minimize operation and maintenance costs.

Jacobs' staff used a proactive and aggressive permitting approach, and received permits ahead of schedule. This was achieved due to our long history of collaboration with regulatory agencies, including the Department of Ecology, EPA, Spokane Regional Clean Air Agency, City of Spokane, and the Washington Department of Transportation.



PAD provides additional solids reduction

Clovis Sewage Treatment Water Reclamation Facility with Membrane Bioreactors

City of Clovis, California

Client Reference

Steve White, City Engineer, 559.324.2355

Key Project Elements

- 28 mgd (106 ML/d), expandable to 8 mgd (30 ML/d)
- Reclaimed water for landscape and agricultural irrigation
- 3-D design and a compact footprint
- Covered facility with odor control

The Clovis Sewage Treatment Water Reclamation Facility involved design, construction, and 10 years of operation and maintenance of a new facility capable of 2.8 mgd (10.6 ML/d) average daily flow (expandable to 8.4 mgd [30 ML/d]). Plant features include a headworks, a bioreactor basin, a membrane equipment building, an administration building, a 3 MG (11 ML) storage tank, street utilities in an existing major traffic artery, and a new city street. Sewage is pumped to the plant from the Fresno/Clovis Regional Trunk Line, allowing the plant to operate at near capacity at all times. Water from the process is used for residential and commercial irrigation.

The integrated DBO delivery contract provides seamless delivery, resulting in an integrated mindset and single point of contact and responsibility. Through this delivery method, Jacobs provided facilities planning, engineering, design, construction, obtaining governmental approvals, permitting acceptance testing, startup, O&M, and warranty for this project. Jacobs is providing operation and maintenance services for the facility, chemicals, capital maintenance repair and replacement, membrane maintenance and replacement, residual solids disposal, and guaranteed maximum energy usage.

Innovations Minimize Footprint And Maximize Sustainability

Jacobs used state-of-the-art treatment technologies with the goal of a sustainable design while minimizing the facilities environmental footprint. The selected treatment includes membrane bioreactors (MBRs), low-energy UV technology for minimal power consumption, and Siemen's Cannibal process. The MBR system delivers the highest quality water and provide exceptional effluent quality; create the least environmental impact by use of a small footprint; significantly reduce costs; offer simplified expansion for future needs; and present improved aesthetics. In addition to MBR, Siemen's Cannibal solids reduction process was incorporated into the new ST/WRF. The Cannibal process greatly reduces solids production with consequent capital and operating cost savings. It significantly reduces biosolids production, which eliminate the need for expensive dewatering and digestion equipment and associated costs. Additionally, these technologies make the facility highly automated requiring fewer staff to operate than conventional treatment facilities.


"You won't smell it, you won't hear it, you won't see it"

That's what Steve White, City Engineer for the city of Clovis, California, recently said about CH2M HILL's DBO delivery and current operations of the new 2.8-mgd City of Clovis Sewage Treatment/Water Reclamation Facility. The Clovis facility is required to meet an odor threshold of 10 D/T, the same standard required by the Pima County WRF.

When plans for the DBO project were originally announced, residents in the surrounding neighborhood initially opposed the new facility. The City conducted a series of public meetings to inform adjacent property owners of the architectural treatments and odor control measures built into the design of the facility.

By designing process treatment buildings with prairie-style architecture that compliments the surrounding community, we created positive visual impacts while delivering tightly enclosed odor-producing facilities that use organic wood mulch media biofilters to treat odorous air. The result is a virtually odor-free facility that serves as a good neighbor now and for years to come. The full article describing CH2M HILL's delivery of the Clovis ST/WRF is available at http://www.fresnobee.com/local/story/1303689.html.

Dirty job starts with clean slate in Clovis

(photo above) Jason Rysavy, an engineer for CH2M HILL, tests the ultraviolet light transmittance of treated water recently at Clovis' new sewage treatment plant.

The facility was designed to blend in with the local residential and business community. Architectural features include prairie-style architecture, water features, and extensive landscaping and screening to minimize visual impact. The facility also includes extensive odor control, including reuse of odorous air within the treatment process and biofilters.

The project has been honored with numerous industry awards, including:

- 2008 Environmental Business Journal Wastewater Project Merit Award
- 2009 American Academy of Environmental Engineers Design Honor Award for Excellence
- Finalist, Global Water Intelligence's 2009 Water Reuse Project of the Year
- 2009 Award of Merit from the WateReuse Association
- 2009 Design-Build Institute of America Excellence Award for Projects over $15 Million

Compact design features allow room for future growth

Design-Build Construction of The Northern Treatment Plant

Metro Wastewater Reclamation District, Denver, Colorado

Key Project Elements

- Sludge fermentation for low-cost supplemental carbon supply
- Step-feed 5-stage Bardenpho biological process, coupled with chemical addition for nutrient removal
- Post-aerobic digestion for additional nitrogen removal and solids destruction
- Lamella plate settler and granular media filtration

In July 2011, the Metro Wastewater Reclamation District (District) contracted with Jacobs to serve as the design-builder for the design, construction, and startup of the Northern Treatment Plant (NTP), a new regional wastewater treatment facility to serve the northern Denver metropolitan area. The District selected design-build (DB) delivery to shorten the project schedule, streamline risk allocation, and establish project costs early to ensure cost certainty.

Jacobs holds 100 percent responsibility for delivery of the NTP project with support from a construction subcontractor and several engineering subconsultants, each of whom is located within 60 minutes of the project site so that all project decisions are made locally in the District's best interests.

A key component in the District's selection of DB delivery was the anticipated changes to the Colorado Department of Public Health and Environment statewide nutrient criteria for total inorganic nitrogen (TIN) and total phosphorus (TP). The NTP's selected delivery method and treatment process allows flexibility for the NTP to meet these requirements.

In 2016, the NTP facility was one of the most advanced treatment facilities in the Western U.S. and met very stringent effluent limits established to protect the water quality of the South Platte River. The $255 million facility uses biological nutrient removal and tertiary treatment, including granular media filtration to meet effluent limits of 10 mg/L for total nitrogen, and 0.1 mg/L for total phosphorus.

Jacobs' scope of work was completed in two phases:

Phase 1

- Engineering and design development for liquids and solids treatment processes, site and support facilities, and related infrastructure
- Permitting support including coordination of applicable regulatory permitting activities with the District, documentation, and meeting attendance
- Cost model development for a Guaranteed Maximum Price contract

The Northern Treatment Plant is one of the most advanced wastewater treatment facilities in the western United States.

- $255 million progressive, DB delivery of 24 mgd (91 ML/d) advanced wastewater treatment facility expandable to buildout capacity of 60 mgd (227 ML/d)
- Treatment process addressed anticipated increases to Colorado's nitrogen and phosphorus effluent discharge standard
- Facility operational by 2016 with discharge to the South Platte River
- Scope of work included engineering, permitting, cost model development, construction, startup and commissioning
- Jacobs collaborated with the District to create a customized secondary treatment process
- The plant includes one of the first post-aerobic digesters in North America

Phase 2

- Final design, construction, and construction-related activities for the NTP Facilities, including self-performance and management of subcontractors
- Secure all necessary and applicable construction-related permits
- Startup and commissioning of NTP facilities

Safety performance was excellent, with over 226,000 hours worked without a single injury.

Agua Nueva Water Reclamation Facility

Pima County Regional Wastewater Reclamation District, Tucson, Arizona

Key Project Elements

- Innovative treatment process using dissolved air flotation clarification replacing primary clarifiers and separate grit chamber
- 5-stage Bardenpho, enhanced with step-feed and dissolved oxygen control capabilities, followed by deep tank secondary clarification
- Disinfection includes preformed chlroamination to reduce trihalomethane formation
- Contract includes Jacobs operations for 20 (15+5) years

The Lower Santa Cruz River creates Pima County, Arizona's principal wetland habitat, supporting important bird and wildlife species and providing numerous community benefits, ranging from recreation to the recharge of local groundwater aquifers. Concerned that effluent discharged into the river could affect local groundwater supplies, in 2006 state regulators ruled that Pima County meet stringent nutrient discharge requirements by January 1, 2015. To realize the most sustainable, community-focused solutions, the Pima County Regional Wastewater Reclamation Department (RWRD) embarked on the largest capital program in its history—the $720 million Regional Optimization Plan (ROMP). In December 2010, Jacobs was selected to design, build, and operate (DBO) ROMP's crown jewel: the $172 million Agua Nueva Water Reclamation Facility (WRF).

The new 32 mgd (121 ML/d) Agua Nueva WRF produces quality effluent, replacing the old Roger Road Wastewater Treatment Plant with one of the world's most advanced WRFs. Its treatment process includes new headworks, influent pumping, and a combined flocculation/grit removal system, followed by dissolved air flotation (DAF) clarification for primary treatment and sludge thickening; 5-Stage Bardenpho activated sludge secondary treatment with step-feed aeration; tertiary filtration; and chloramine-based disinfection. Solids are transferred to RWRD's Tres Rios WRF for treatment, dewatering, and disposal. The plant is designed for expansion to an ultimate capacity of 48 mgd (182 ML/d).

Other ROMP projects include a new central laboratory complex; biosolids and biogas program; decommissioning

Aerial view of Agua Nueva Water Reclamation Facility

of the Roger Road Wastewater Treatment Plant; SCADA upgrades; a 72 inch (183 centimeter) influent pipeline; and related capital improvements.

Technical Innovation, Exceptional Performance, And Low Lifecycle Cost

Jacobs' single-entity DBO approach delivered innovation at every turn, completing the project 8 months early, 1 year ahead of the compliance schedule, $77 million below the design-build budget, and $2 million below the final contract value. Using a complete lifecycle approach delivered process control and efficiency strategies that managed costs, mitigated energy and resource use, and extended the useful life of key assets—significantly reducing the carbon footprint and saving $2 million in annual operating costs. The team also provided record safety performance: the 150+ workforce delivered over 930,000 hours with no lost time injuries and a 1.09 Total Recordable Incidence Rate. Key project innovations include:

- Unlike other DAF wastewater systems, Agua Nueva uses DAF for primary clarification at the beginning of the liquids train – world's first such large-scale application significantly reduced costs
- For nutrient removal, Pima County required that Agua Nueva use a 5-stage Bardenpho process Jacobs enhanced this process with step feed and simultaneous nitrification and denitrification
- Agua Nueva's first-of-its-kind advanced dynamic model combined control system, aeration system, hydraulic profile, and wastewater process models into a single simulation, which was used to check field installations, control system performance during startup and operation
- The biological technology odor control solution requires no chemicals and little-to-no operational attention

"....[Jacobs'] performance was excellent on all fronts, from their integrated delivery approach, technical quality, and innovation, to their safety performance and efficiency during construction and startup.... The project has gone exceptionally well from the client perspective and has been an enjoyable experience for all involved. We are more than satisfied customers."

Kenny Shelor, Pima County's Agua Nueva Project Manager

- To enhance site aesthetics, the LEED Silver-certified administration and maintenance building was coupled with building forms, roofing materials, and color/texture palettes that mirror the enduring beauty of the Sonoran Desert
- The advanced SCADA system integrates all treatment components into an efficient, easy-to-operate facility, enhancing the complex systems resulting in reliable and consistent performance

Unique, Single Entity DBO Integrates All Project Facets

Enhanced secondary treatment

Jacobs' overriding objective was to bring RWRD an optimized lifecycle solution that balanced the responsibilities of each project function—design, construction, and operations—at best value to ratepayers. To achieve this, we created a single-entity DBO team dedicated to technical innovation across each major discipline. This provided a design process built around input from construction and operations experts to address constructability and operability at all times. It also engaged engineers and designers during construction and startup to avoid process interruptions and provide a smooth transition to long-term O&M.

As the single-entity designer, builder, and operator, Jacobs led the project's design and construction activities in close partnership with RWRD staff. The firm will operate the plant for 20 (15+5) years, with RWRD operators filling all available operations roles.

Project controls, advanced BIM and visualization models, and effective communication facilitated collaboration and timely issue resolution during start-up. Our scope management, trend system, and risk management ensured risks were successfully tracked and mitigated, delivering a benchmark facility with the highest levels of quality and safety.

Social, Economic, And Sustainable Development

Agua Nueva's highly compact treatment process produces Class A+ reclaimed water quality with the highest degree of integration, efficiency, flexibility, and reliability, while dramatically reducing energy consumption, chemical usage, and capital and O&M lifecycle costs.

The advanced odor control system resolves nuisance odors that plagued area residents for decades, and creative architecture and low-thirst landscaping create an attractive aesthetic that saves energy and water, reduces waste, and increases the use of recovered materials. Agua Nueva dramatically improves the county's reclaimed water quality for recharge and reuse—ensuring the region has enough water to satisfy service demands to the year 2030, decreasing water diversions from sensitive habitats, and providing wetlands benefits. It's also critical to restoring the Santa Cruz River, with once-destroyed flora and fauna already returning to the river.

The substantial cost savings avoided rate shock, and Jacobs hired RWRD operators to fill all available operator positions, with guaranteed equal or better salary and benefits. We also more than doubled local small business participation goals, volunteered in the community, and have sponsored many learning opportunities at the new WRF.

As a result of these, the project has received five industry awards accounting for its innovation and exceptional delivery:

- Winner, 2014 AAEES Grand Prize in Design
- Winner, 2014 DBIA Merit Award
- Winner, 2014 Arizona Water Wastewater Treatment Project of the Year
- Winner, 2013 Water & Wastes Digest Top Water and Wastewater Project
- Winner, 2013 Environmental Business Journal Water/Wastewater Project Merit Award

Disk tertiary filtration system

The project was lauded in Engineering News-Record's feature story: "Nitrogen Diet, Arizona's Pima County uses innovative technologies and delivery methods to remove nitrogen from its wastewater" (July 30, 2012)

Changi Water Reclamation Plant – Phase II

Singapore PUB, Singapore

Key Project Elements

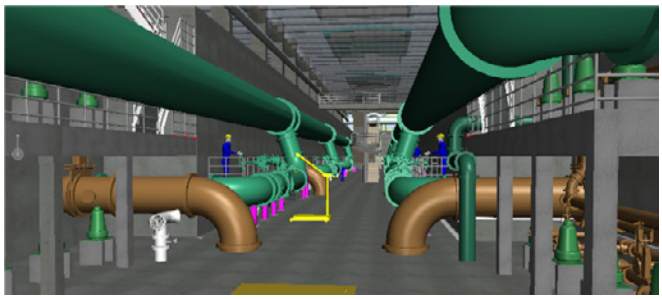
- New headworks facility with robust screenings, grit and grease removal, and flexibility to upgrade to A-stage primary treatment
- New liquids module treatment including membrane bioreactor
- Design incorporates of ceramic and polymeric membranes
- Future flexibility to implement mainstream anammox granule capture and retentio
- New wet weather facility using ballasted settlement

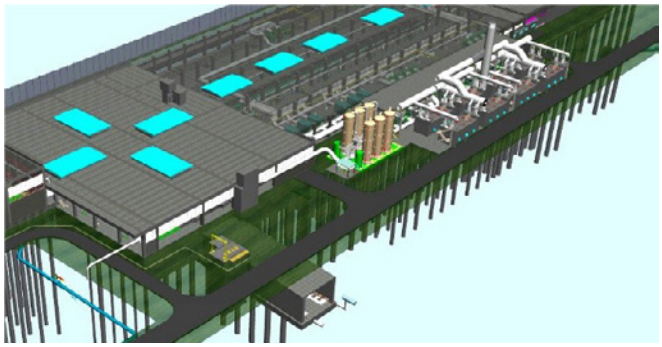
Jacobs is providing professional engineering services to Singapore's Public Utilities Board (PUB) and responsible for the study, design and tender, contract administration and supervision of construction and commissioning of the facilities. Upon completion of Phase II Expansion work, the water reclamation facilities will be able to accommodate projected used water flows and loads up to year 2030.

The Changi Water Reclamation Plant (CWRP) – Phase II Expansion will increase the treatment capacity by 53 mgd (200 ML/d) through the addition of Train 5. Peak flows will be treated in a separate wet weather facility (WWF).

At CWRP, used water is currently treated in two liquids modules. The liquid treatment uses a biological treatment process to treat incoming used water for use as NEWater feedstock. There are four treatment trains, each with an average capacity of 52,830,000 gallons per day (200,000 m3/d). Sludge is sent to the solids facility for further treatment prior to disposal.

The Phase II expansion will add Train 5 to the liquids treatment facilities. A key advancement will be the use of a membrane bioreactor (MBR) system providing a higher quality NEWater feedstock, eliminating the need for the initial microfiltration stage, which has been necessary in all the NEWater plants built to date.





Computer generated images of plant layout and interior

The MBR system comprises 11 membrane trains. Polymeric and ceramic membrane trains will be installed to give flexibility and valuable operating experience. All associated civil works, mechanical, electrical, instrumentation, controls and automation systems are included within Jacobs' scope.

Sludge generated will be treated by the existing solids processing facility. The scope of Phase II expansion also includes modification works to the existing solids facility, enhancing the reliability of the existing system in treating the increased sludge production associated with the increase in flow. The architectural scheme uses open structures makes use of natural ventilation and lighting, resulting in a safer and more pleasant operator environment.

Honouliuli WWTP Secondary Upgrades

City and County of Honolulu, Hawaii

Project Background

Jacobs is teamed with a local engineering firm to provide planning, design and construction support for the $450 million upgrade to the Honouliuli WWTP to meet the requirements of a USEPA-mandated consent decree and increase the plant capacity to 40 mgd. In addition, the City and County of Honolulu (CCH) is converting the

treatment plant into a regional biosolids processing and drying facility to support six additional treatment facilities and produce a Class A biosolid product for use as a fertilizer on golf courses, public parks, and agriculture.

Th e design of treatment systems are focused on balancing energy demand and energy produced to approach a net energy neutrality. Key design considerations for the liquid treatment processes are:

- Conversion of the existing trickling filter/solids contact biological treatment process to an activated sludge system that can be converted to a biological nutrient removal (BNR) system in the future when nutrient removal requirements are implemented
- A-stage treatment to divert carbon from the liquid to solids streams
- Step-feed to manage wet weather fl ows
- Ammonia based aeration control (ABAC) to reduce aeration requirements
- Advanced energy-saving aeration systems

The solids treatment systems are critical in approaching energy neutrality with the goal to both minimize biosolids production and maximum biogas production. Key design elements include:

- Incorporating the thermal hydrolysis process (THP) prior to digestion to increase volatile solids destruction, increase digester gas production, and increase dewatered solids concentrations
- Enhancing the existing anaerobic digestion process
- A cake receiving and storage facility for trucked-in dewatered cake from other treatment plants
- New dewatering and pre-THP dewatering facilities
- Low-temperature belt dryer facility to produce exceptional Class A biosolids product
- FOG waste receiving and management facility
- Digester gas treatment and storage facility
- Combined heat and power (CHP) facility

Extensive process modeling demonstrated that the THP provides additional digestion and biogas that can be used for CHP energy recovery. Also, the THP produces biosolids with a significantly higher solids content in the dewatered cake fed to the dryers, thus enabling the dryers to be downsized and require less energy. Waste heat from the CHP system will be the primary heat source for the low-temperature belt dryer with natural gas as a backup. Excess biogas or natural gas will be used to supply the steam generation needs of the THP process. Energy mass balance calculations confirmed that the planned treatment systems will significantly reduce energy demands approaching net energy neutrality.

A key design consideration was the production of a dried biosolid product that could be used on public lands, such as golf courses and parks. The full spectrum of biosolids dryers were evaluated including rotary drum, paddle, disc, fluidized bed and belt dryers. A survey of golf course managers on the island determined that pellets produced by drum and some belt dryers with screens, crushers and back-mixing were the most desirable. Low-temperature belt dryers with back-mixing were selected for implementation.

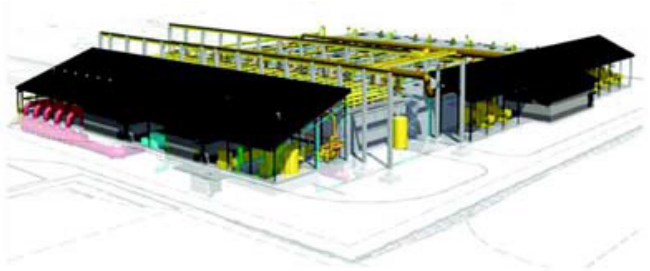
North Las Vegas Water Reclamation Facility

City of North Las Vegas Utilities Department, Nevada

Key Project Elements

- 30 mgd (114 ML/d) membrane bioreactor expandable to 50 mgd (190 ML/d)
- Design of MBR facility, pre-construction and construction services
- Provided a plant flow recycle line for startup and plant upsets, and producing reuse water for golf course irrigation
- 3D design including small piping and electrical features
- Jacobs' identified 15 to 20 percent in capital cost savings

Jacobs designed treatment processes for a new 30 mgd Water Reclamation Facility (WRF) using membrane bioreactor (MBR) technology for the City of North Las Vegas Utilities Department. The system provides high level of nutrient removal for dual purpose effluent



Integrated MBR facility design saves site space, and provides high level of process automation

reclamation. Under a broad Total Maximum Day Loads (TMDL) agreement, phosphorus, ammonia nitrogen and total nitrogen removal limits of <0.15 mg/L, <0.5 mg/L and 10 mg/L are met through enhanced biological phosphorus removal (EBPR) combined with chemical polishing.

CNLV Constructors II, a joint venture between Jacobs and New-Com Construction, was selected in 2008 to provide construction manager at-risk services for a new 25 mgd (95 ML/d), $257-million MBR water reclamation facility to produce high quality effluent water. The biofilter technology uses an impregnated media with natural microbes to absorb

odors and biologically break down odors to carbon dioxide and water.

The treatment facility features screening and grit removal followed by the MBR treatment process with chorine disinfection and solids processing for disposal to landfill. Constructed facilities included an influent pump station, grit and screening facility, bioreactor and membrane equipment gallery, UV disinfection building, biosolids handling center, and administration and maintenance buildings.

Value Engineering And Contructibility Reviews Save Capital Costs

Jacobs' preconstruction services included value engineering and constructibility reviews of the facility design documents. We identified numerous opportunities to save capital costs, including relocating the project site, rearranging facility layouts, optimizing treatment processes for long-term operations, and realigning access roads to provide simplified entry and exit for deliveries and maintenance vehicles.

In addition to providing the value engineering and constructibility services as part of preconstruction, Jacobs' construction personnel worked with the City and their design team to identify and prepare applications for all necessary regulatory approvals and government permits needed to commence construction.

Construction began in November 2008, with substantial completion of the $257 million plant in May 2011, reaching the following milestones:

- Over 575,000 hours without a lost time incident, with more than 1,100 safety orientations performed The project finished with a 110 Total Recordable Rate 80 percent below industry average
- Over 800 people were put to work providing materials and equipment for this landmark project—the project provided the local economy a boost by creating more than 500 jobs in Las Vegas alone
- Facilities included an influent pump station, grit and screening facility, MBR equipment gallery, ultraviolet disinfection building, biosolids handling center, administration and maintenance buildings
- The initial phase of the project provided 25 mgd of capacity to meet discharge and reuse standards, with future expansion capacity up to 50 mgd
- First major wastewater project performed under new State of Nevada legislation authorizing alternative project delivery for public sector projects
- Completed on schedule and under budget by $8 million

As a direct result of Jacobs' value engineering and constructibility reviews, project costs were reduced by up to 10 percent from original project estimates. The project was delivered under a guaranteed maximum price contract which contained provisions for shared savings to be split equally between CNLV and the City.

MBR Reduces Environmental Footprint

The treatment plant design concept focused on reducing the environmental footprint by using MBR technology and compact solids processing facilities, and using biological instead of chemical processes for nitrogen and phosphorous removal. The integrated design combined 3-D design with an equipment and instrumentation database, allowing for continuous engagement of client staff to review design work products and remain engaged throughout the design.

Jacobs also identified numerous opportunities to save between 15 and 20 percent in capital costs. The project site was relocated, facility layouts were rearranged, and treatment processes were optimized for long-term operations saving the client costs in the long term. Jacobs also realigned access roads to provide simplified entry and exit for deliveries and maintenance vehicles.

"Construction of the facility provided some stability in our struggling economy," said North Las Vegas Mayor Shari Buck. "It created 500 jobs locally and generated business that reverberated across the country by the type of supplies and technology it took to build this a state-of-the-art facility."

Southwest Water Reclamation Facility

City of Henderson, Nevada

Key Project Elements

- Completed the facility planning, pre- design, and final design for an 8-mgd ADF with potential expansion to 16-mgd ADF reuse facility, using MBR technology
- Performed business case evaluation
- Designed for small footprint
- Provided operational flexibility
- Oversaw the constrained sequence of work during the SCADA Master Plan implementation, which is extensive because all the sites are active facilities that must remain operational during the cutover phases

Project Description

The Southwest Water Reclamation Facility (WRF) is a facility designed to remove wastewater from the collection system and supply water into the reclaimed water distribution system. This facility relieves several shortcomings within

the existing infrastructure serving the western portion of the city and provides a supply for the added reclaimed demands as the West Henderson area becomes developed. By constructing this satellite reclaimed water treatment facility, the City reduced loading on the collection system and provided a facility to satisfy reclaimed water demand.

Jacobs led the planning and design process, which included evaluating wastewater flow contribution estimates, treatment system alternatives, and projected reclaimed water demand. The process evaluation covered options for Southwest WRF connections to the existing and proposed reclaimed distribution systems, options for treated effluent disposal, and the impact on the Southwest WRF's contributed sewage solids on the existing sewer interceptors and WRF.

A decision support process was used to determine the preferred treatment alternative for the Southwest WRF. The treatment alternative that was selected for the Southwest MBR.

Jacobs also provided program management, design and development of bid documents, application software development, procurement management, and construction management services to implement the City's SCADA System Master Plan. The 6-year program includes radio design for 45 facilities, including potable water and reuse water pumping stations, sewer lift stations, the water treatment plant, and two water reclamation facilities.

Results/Successes

The WRF incorporates an MBR treatment process, which has resulted in several benefits to the City:

- Cost efficiencies achieved with few unit processes required (no secondary clarifiers or tertiary filters)
- Abandonment or conversion of tankage in Phase 2 not required
- The MBR system is well-suited for automation and remote superintendence; automation allows for unattended operations at night

Gippsland Water Factory

Gippsland Water, Victoria, Australia

Key Project Elements

- Two greenfield MBR facilities (domestic and industrial) with reverse osmosis for water reuse from domestic system, and anaerobic pretreatment for industrial waste and sludge
- Final effluent to meet Total Nitrogen limit of 3 mg/L
- Anaerobic pretreatment for industrial wastewater component
- Victoria State Government Health Approval for indirect potable reuse
- Facilities operated by Jacobs' Operations Management Services for the first 2 years (2010-2012)

As part of an alliance, Jacobs was awarded a contract to design, build, commission, and operate (for an initial 2 year period), a wastewater treatment and recycling facility for Gippsland Water in Victoria's Central Gippsland region. The project treats industrial and municipal effluent disposal in the Latrobe Valley region and includes:

- A new 92 mgd (35 ML/d) membrane bioreactor (MBR) wastewater treatment plant to treat effluent from Australian Paper and other industries, as well as municipal effluent from Traralgon, Churchill and Rosedale
- A 21 mgd (8 ML/d) reverse osmosis (RO) system to provide high quality reclaimed water for use within Australian Paper's Maryvale plant
- 56 miles (90 kilometers) of transfer pipelines and associated pumping stations

Aerial view of Gippsland Water Factory

- An upgrade of the Dutson Downs wastewater treatment facility to permit reuse of effluent from Sale and Fulham
- An interpretive centre to educate the community on water cycle management issues
- Co-generation and hydro power facilities to reduce the greenhouse gas impact of treatment energy consumption

The new treatment facility ensures that remaining unsold wastewater is of high quality and odor free, eliminating existing previous odor issues.

The facility won three 2011 Banksia Environmental Awards, including the prestigious overall Origin Gold Banksia Award. The Gippsland Water Factory also won in the Water category, and its Vortex Centre and associated 'Water Wonders' education program won in the Education category. The facility also won the IWA 2012 International Reuse Project of the Year.

Brightwater Treatment Facility

King County, Washington

Key Project Elements

- 36 mgd (136 ML/d) membrane bioreactor advanced wastewater treatment and reclamation facility Facility uses split-flow treatment with chemically enhanced primary clarification process for peak wet weather flow and membrane bioreactor process for dry weather flow to reduce plant footprint compared to conventional secondary treatment
- Effluent reuse (Class A reclaimed water) source generated at the facility
- 3D modeling software used during design to provide detailed, graphical images of process facilities
- Community-friendly, totally-enclosed process facilities were implemented with multiple-stage odor control systems
- Innovative energy-saving modifications reduced lifecycle costs
- LEED Platinum center designed and accredited

Four Phase Process Delivered Using Design-Build Approach

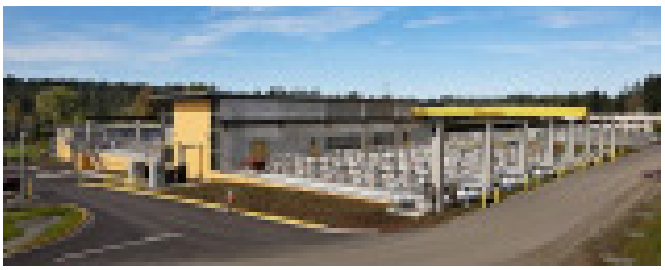
Brightwater is the hub of a new a $1.85 billion regional wastewater system that includes an offsite influent pump station, 12 miles (19.3 kilometers) of large diameter tunnels and conveyance pipelines, a marine outfall into Puget Sound, and a reclaimed water distribution network. The 120 acre (48.6 hectare) Brightwater Treatment Plant site, reclaimed from automobile wrecking yards and other uses, has been transformed into a park-like setting, with streams, wetlands, trails, overlook structures, and an environmental education/ community facility (the Brightwater Center).

The four-phase Brightwater project included performing studies and public outreach assistance for siting the new plant; selecting the plant site and preparing an Environmental Impact Statement; designing the treatment plant; and providing comprehensive engineering services during construction and commissioning.

Jacobs, in partnership with subconsultant Brown and Caldwell, led a team of over 20 firms to deliver planning, design, and services during construction. Predesign tasks included screening and selecting technologies for liquids, solids, and odor control; conducting pilot studies; authoring a facilities plan for the Brightwater system; developing treatment plant layouts; and preparing schematic design drawings of the new facility.

Project Innovations

Three-Dimensional (3D) Modeling Used to Optimize Facility Layouts The Jacobs team developed construction documents consisting of over 5,000 drawings and supporting specifications, organized into two contract packages. The



Brightwater MBR

flow process wherein 98 percent of the annual flow is routed through the MBR for advanced treatment, while infrequent peak wet weather flows receive chemically enhanced primary clarification (CEPT) was used. The membrane bioreactor (MBR) and CEPT effluents are blended prior to discharge and meet the NPDES permit requirements. The split flow MBR offers improved effluent quality and reduced footprint at equal or less cost than competing processes. Since commencing discharge in October 2012, effluent quality has been excellent, with biochemical oxygen demand and total suspended solids values typically below permit reporting limits.

Solids Handling: Designed for Future Flexibility Solids handling facilities include gravity belt thickening, mesophilic anaerobic digestion, and centrifuge dewatering. The digesters are constructed with post-tensioned walls to minimize construction costs and configured to facilitate future conversion to a thermophilic process. All solids processing facilities, including the biosolids truck loading bay, are fully enclosed, with foul air conveyed to the odor control facilities.

Odor Control: Key to Public Support King County assured the surrounding community that Brightwater would have no odors—ever. To meet this challenge, process facilities are totally enclosed and ventilated to multiple-stage odor control systems. The odor control approach was instrumental to plant siting. Its successful operation—producing no detectable odors at the property line—has been critical to achieving community acceptance.

Resource Recovery/Reuse Class A reclaimed water is produced at Brightwater for reuse. Initially, 7 mgd (26 ML/d) of reuse capacity is provided. Space is reserved onsite for facilities that will increase reclaimed water production to 21 mgd (80 ML/d). Reclaimed water is used off-site for golf course irrigation and on site for irrigation, toilet and urinal flushing, and other activities that do not require potable water.

Construction Services

Jacobs provided engineering services during construction including submittal reviews and responses to requests for information; onsite staffing; plant control system implementation; change order assistance; and startup planning and operational assistance. Construction was completed early in 2012.

Tools for Collaboration: *Effective Alternatives Evaluation and Selection*

Our team will assist County of Maui staff in effectively evaluating a large number of potential alternatives under several capacity and effluent limit scenarios.

Our collaboration and communication approach is based upon a suite of process models and costing models which enable accurate sizing and costing of each alternative, including 3D visualizations of the proposed layouts. These tools, in combination with our existing understanding of your requirements and our lessons learned from similar installations, will assist County staff in evaluating each alternative in a timely and consistent manner throughout the project.

The Jacobs team will incorporate tools for the completion of similar large-scale WWTP projects. This tool suite is comprised of Pro2D, CPES, Preview, and Replica. Our team's integrated wastewater treatment analytical tools provide rapid and accurate assessment of alternatives to develop the optimal solution for the Central Maui Regional WWRF Project.

The graphic on the following page illustrates how these tools can be used throughout all project phases, and the process our team will follow to collaboratively share ideas with your staff, including Pro2D process modeling to derive process sizing according to treatment requirements, CPES facility modeling to derive predesign life cycle costs and facility sizing, and Preview to permit 3D visualization.

Our Team's Tools and Processes will be Applied Throughout all Project Phases to Enhance Efficiency, Cost-Optimization, and Collaboration.

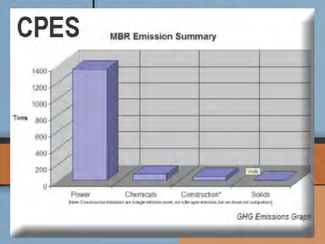
Below, we summarize the value-added benefits of selected tools.

PLANNING | **DESIGN** | **CONSTRUCTION/COMMISSIONING**

ACCURATE COST ESTIMATING

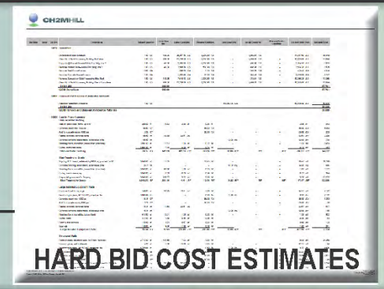
CPES

CPES will be used through the planning phase to establish base level capital estimates, O&M costs, and even GHG emissions if desired. CPES is particularly useful for comparative estimates between various options, and will enable the CCH to quickly select optimized alternatives.



HARD BID COST ESTIMATES

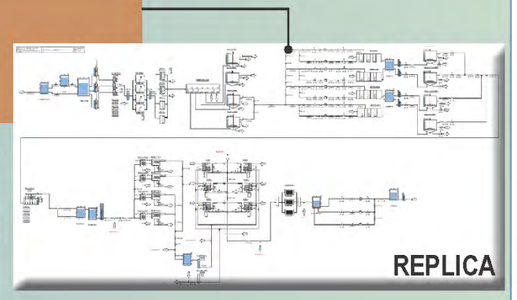
Our construction cost estimators routinely generate estimates with very low contingencies, based on actual material, labor, and equipment costs. We can do similarly for the HWWTP Project—resulting in a more accurate, realistic cost estimate reflective of the current market conditions.



EFFECTIVE TECHNICAL EVALUATION

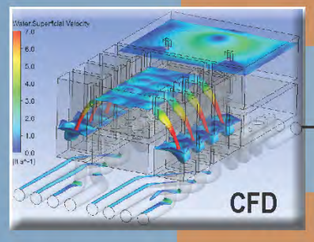
REPLICA

Replica offers CCH value from planning through commissioning. Its dynamic simulation capabilities can be used to design process control of the aeration basins and blowers. During commissioning, it offers operators a valuable tool to fine tune and test control system software before site installation.



CFD

Computational Fluid Dynamics will be used from planning through design to ensure appropriate hydraulics, flow split and distribution of design elements.



PRO2D

In addition to BIOWIN, CH2M HILL's proprietary tool PRO2D can be used to simulate the biological characteristics of the HWWTP Project, especially options for future regulatory compliance and nutrient recovery.

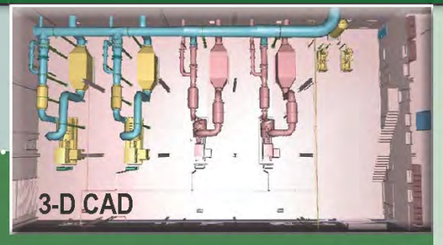
COLLABORATION & VISUALIZATION

PREVIEW

Preview is used to communicate schematic designs and enable the operations staff to verify the initial layouts. Preview is linked to Pro2D and CPES, and is used throughout the planning phase.

3-D CAD

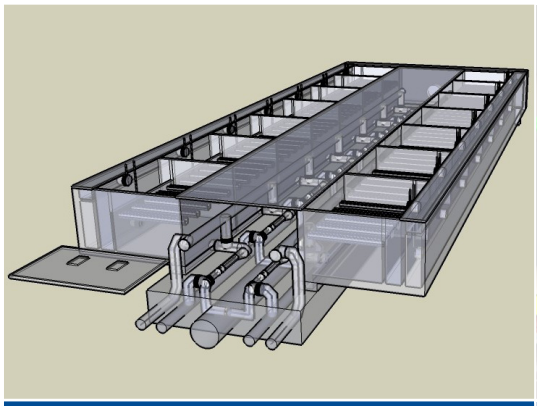
3-D Design offers substantial benefit throughout the project lifecycle, from planning through O&M. 3D CAD not only provides a tool for collaboration and visualization during design, but if desired equipment and maintenance data are embedded in the database it can be adopted for subsequent use during operation.



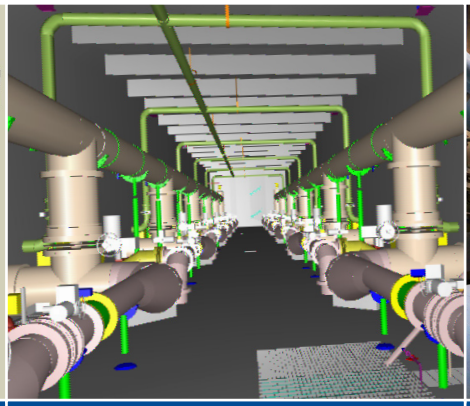
401_HWWTP

CPES™

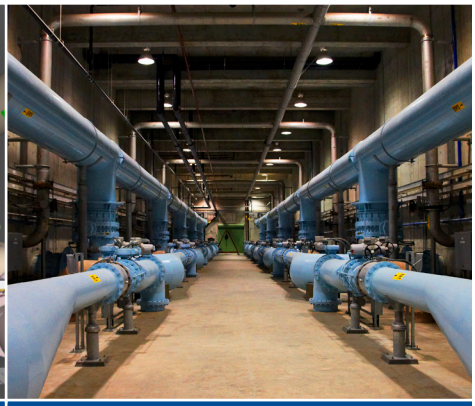
Conceptual and Parametric Engineering System



1) CPES Output Allows Early Facility Preview



2) Preview Translates to CAD Design



3) CAD Design Translates to Construction

Around the world, communities are working to sustainably manage water resources for a variety of needs. With population growth, aging infrastructure, and climate risk, the management of water resources is becoming more complex. These complexities present challenges for municipalities and industries to manage water in a sustainable and economical way. To address these challenges, Jacobs has developed a unique software, CPES™. This software generates conceptual-level designs and cost estimates for municipal and industrial water and wastewater projects that facilitate sustainable and economical decision-making early in the project. CPES™ integrates the three main conceptual components of early project planning (facility design criteria and footprints, construction cost estimates, and life cycle cost estimates) to provide a clearer picture of project scope and cost than traditional conceptual estimating techniques. From proposals to preliminary design, CPES™ streamlines the design development of concepts and facilitates making informed, defensible decisions that enable project advancement.

With over 120 process models, CPES™ can be used on nearly all water and wastewater projects worldwide for conceptual design, cost estimating, and technology comparison. CPES™ utilizes parametric engineering algorithms based on the successful implementation of previous projects to provide detailed and accurate scope, cost estimates, and 3D visualizations for projects early in their lifespans. Compared with traditional conceptual estimating techniques, CPES™ yields a much clearer picture of the project's unique scope and provides a Class 4 cost estimate to inform technical decision-making before investing in further detailed design. For each model, CPES™ outputs a 3D visualization of the facility layout based on general arrangement drawings derived from previous projects. This supports early stakeholder understanding and civil site layout.

Typical applications for CPES™:

- Drinking water treatment plants
- Wastewater treatment plants
- Industrial water treatment plants
- Water and wastewater conveyance
- Greenfield and upgrades/ expansion projects

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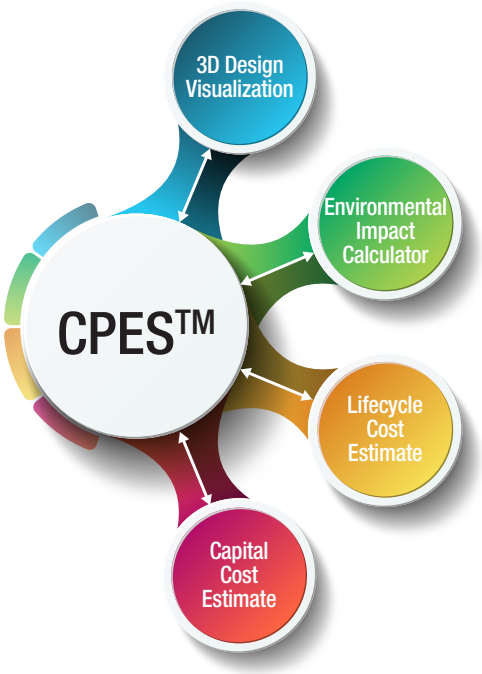
Value of using CPES™

- Accurate and detailed cost estimates early in the project lifespan
- Eliminates reliance on scaling cost based on similar projects, rules of thumb, cost curves, or manual quantity take-off cost estimating techniques
- Substantially reduces time required to develop estimates
- Increases cost estimate accuracy through the use of quantity take-offs and a material unit cost approach
- Quickly provides capital and lifecycle cost, footprint, energy use, and environmental impact information for alternatives in multi-attribute decision models
- Enables 3D visualization of facilities early in the project
- Supports improved water management decision-making

CPES™ also produces lifecycle costs, energy usage, and an environmental impact summary, which includes greenhouse gas emissions, for each project. The environmental impact summary is based on key construction quantities (e.g. concrete, steel, earthwork, etc.) as well as facility power, chemical, and residuals consumption and/or generation. Early estimates of environmental impacts help to inform more sustainable water management decision-making.



Examples of CPES™ projects

Project	Client	CPES Conceptual (10%) Design Estimate (USD)	Actual Construction Bid Award (USD)	CPES % Difference
92 mgd (348 MLD) San Juan-Chama Treatment Facility	ABCWUA, Albuquerque, NM	$144.3M	$159.5M	-10.5
100 mgd (379 MLD) Twin Oaks Valley Treatment Plant	San Diego County Water Authority	$150.8M	$157M	-4.1
30 mgd (114 MLD) Upper Valley WTP	El Paso Water Utility, TX	$28.7M	$27.4M	+4.5
15 mgd (57 MLD) Buckman Direct Diversion Project	City and County of Santa Fe, NM	$192M	$186M	+3.2
50 mgd (189 MLD) Peter Binney WPF	City of Aurora, CO	$211M	$190M	+10.0
30 mgd (114 MLD) Phase I WTP Expansion	City of Loveland, CO	$7.6M	$6.5M	+14.5
38 mgd (144 MLD) Phase II WTP Expansion	City of Loveland, CO	$20M	$23.5M	-17.0
8 mgd (30 MLD) Long Pond WTP	Falmouth, MA	$39.2M	$41.2M	-5.1
19.3 mgd (73 MLD) Poughkeepsie WTP Ozone and Centrifuge Upgrade	Poughkeepsie, NY	$16.7M	$17.1M	-2.4

HRSD Aquifer Replenishment System Project (Hampton Roads, Virginia)

- Advanced treatment of wastewater effluent for injection into drinking water aquifer
- CPES™ models developed for multiple 20 MGD (76 MLD) advanced water treatment alternatives
- Treatment design included membrane filtration (MF), reverse osmosis (RO), and ultraviolet advanced oxidation process (UVAOP)

SABESP Parque Novo Mundo Direct Potable Reuse Project (São Paulo, Brazil)

- Upgraded existing treatment plant for direct potable reuse to supplement potable water supplies
- Designed to respond to periods of drought in Brazil
- Treatment approach included coarse and fine screens, bioreactor, membrane bioreactor (MBR), RO, UV disinfection, UVAOP, storage, and finished water pumping

"We have never seen such innovation, detailed planning, and information developed in such a short time scale by any consultant."

— Paulo Nobre, *SABESP Wastewater Technology Manager*

"[Jacobs'] CPES™ platform allowed us to quickly and efficiently evaluate many identified facility alternatives. This enabled our team to more effectively discuss the options, evaluate alternatives, and make informed decisions. The ability to quickly move from a concept, with construction and life-cycle cost estimates, to a scaled 3D model that could be dropped onto our site layout, was invaluable. The application of the CPES™ toolset moved our project forward rapidly, providing defensible estimates and the ability to effectively evaluate project and environmental impacts. This information provided the groundwork for subsequent phases and allowed us to move forward with confidence in designing our preferred solution."

— Roger McClain, *Park City Municipal Corporation Public Utilities Engineering Manager*

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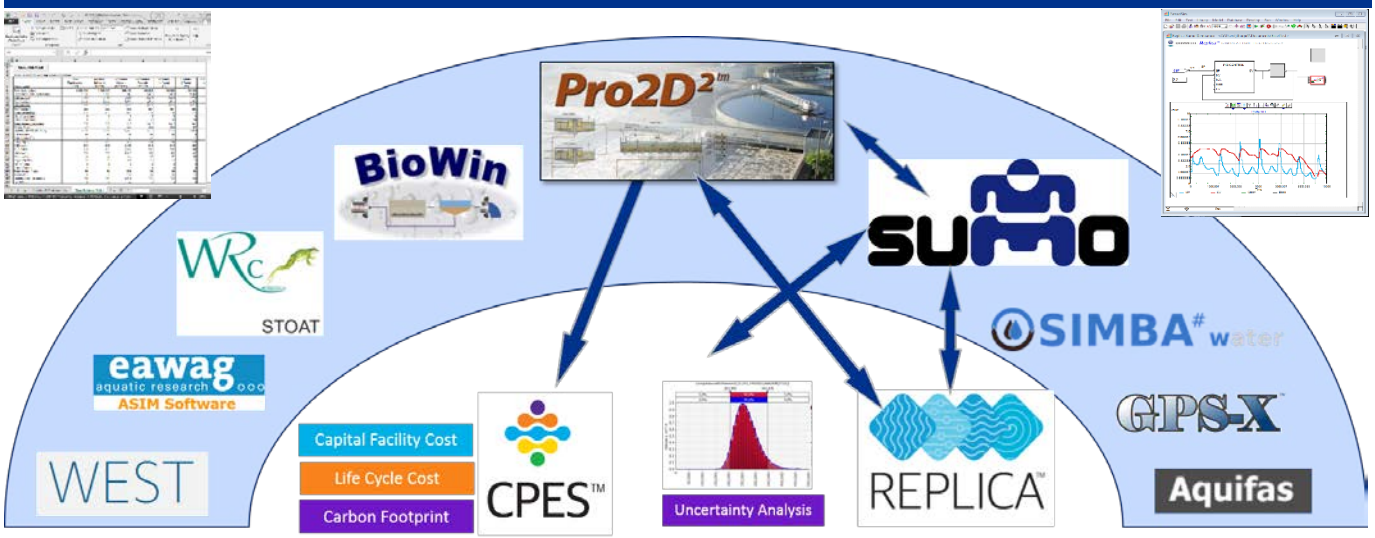
JACOBS

Wastewater Simulation



What is Wastewater Simulation?

Utilization of industry standard models to simulate (steady state or dynamic) and evaluate wastewater resource recovery facilities.

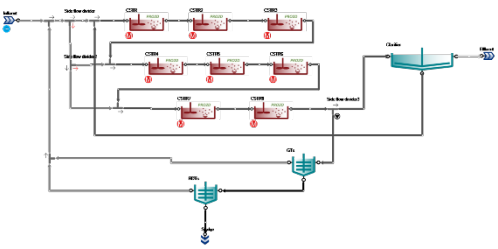
Why Jacobs Wastewater Process?

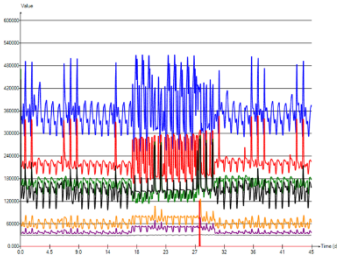
"*Who would you rather have? A person who uses a model? Or the person who wrote the model?*" – Glen Daigger, Professor of Engineering Practice, University of Michigan

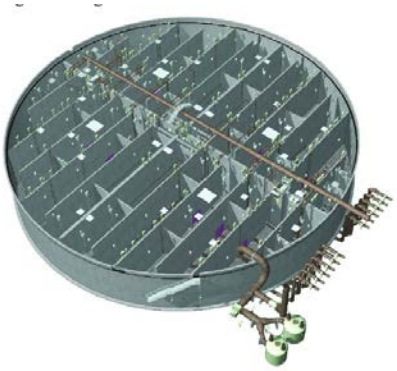
- Jacobs Wastewater Process uses its proprietary Pro2D²™ for wastewater simulation, but can use any other commercial model, based on client preference.
- Jacobs developed Pro2D² to allow for rapid integration of new technologies and design techniques.
- Pro2D² can directly output to the Jacobs industry leading cost estimating (CPES™) and dynamic hydraulic (Replica™) tools
- Software can evaluate the 'whole plant' which means the model is not limited to just the biological treatment process, but also can evaluate and/or design other treatment processes such as primary treatment or residuals treatment systems.

Wastewater simulation software is used on all wastewater projects and is the foundation of Jacobs wastewater process designs

- Simulates biological treatment for numerous technologies such as
  - -Activated Sludge
  - -Biofilms (MBBR, IFAS, Trickling Filters)
  - -Membrane Bioreactors
  - -Anaerobic\Aerobic Digestion
  - -Wetlands
- Rapid evaluation of multiple treatment configurations and/or technologies to determine an optimal solution
- Evaluate the latest treatment technologies such as thermal hydrolysis (THP) and Nutrient (struvite) Recovery
- Capabilities that include linking to Replica to create a full model of hydraulic, air, control and process systems
- Design Information can be transferred to CPES™ to generate an early indication of project cost with minimal up-front information
- Heat, power, and extraction calculations aid in maximizing potential for resource recovery







Aqua Nueva WRF Bioreactor

Denver Metro North

Spokane County (WA) WRF

Woonsocket (RI) Regional WWTP

Wastewater Simulation Examples

Pima County (AZ) Agua Nueva Water Reclamation Facility

A first-of-its-kind dynamic simulation model integrating Replica hydraulics (liquid and air), operations and controls, and wastewater process relationships (Dynamic Pro2D^2) to evaluate proposed process control strategies and control tuning set-points.

- Pioneered High Rate Biological Contactor
- $135M Project Cost

Metro Reclamation District (CO) Northern Treatment Plant

Pro2D^2, Dynamita's SUMO™, and CPES™ used extensively in design, construction, and startup of one of the most advanced nutrient removal treatment facilities in Western US.

- $255M Progressive Design-Build of 24 mgd greenfield facility

Spokane County (WA) Water Reclamation Facility

Innovative, state-of-the-art 8 mgd membrane bioreactor and nutrient removal achieve lowest phosphorus effluent levels in North America. Included the first full-scale post-aerobic digester in North America for nitrogen load and volatile suspended solids reduction

- $132M Construction, $6M/yr 20-yr O&M

Woonsocket (RI) Regional Wastewater Treatment Facility

Designed an innovative and cost effective process to achieve the state-of-the-art limits for the 16 mgd nutrient removal upgrades using an "AB process" within the existing aeration basins.

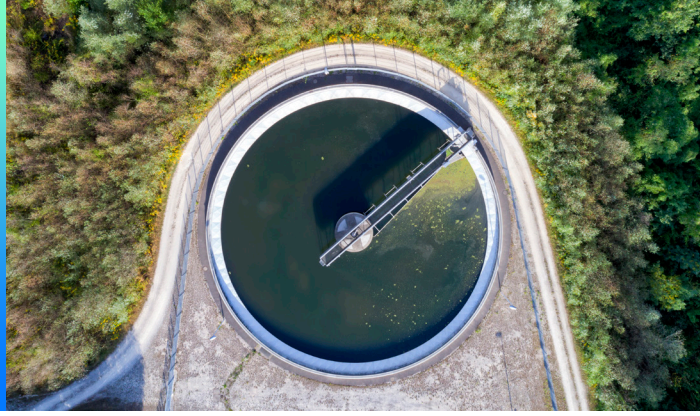
- $84.1M Facility Upgrade ($37M Capacity, $47.3M 20-yr O&M)

Contact Us

For more information on Pro2D^2, please contact:
Bruce Johnson
Technology Fellow and Global Technology Leader in Wastewater Process Simulation
Phone: +1 720-286-5373
Bruce.Johnson2@Jacobs.com

Jacobs

Challenging today.
Reinventing tomorrow.



Your Partner in Infrastructure Investment

Funding Solutions to Advance Critical Projects and Support Economic Recovery

Water Infrastructure Finance and Innovation Act (WIFIA)

The WIFIA program accelerates investment in water infrastructure by providing long-term, low-cost supplemental loans for significant regional projects. The WIFIA program was established by the Water Infrastructure Finance and Innovation Act of 2014.

Eligible Borrowers

- Local, state, tribal, and federal government entities
- Partnerships and joint ventures
- Corporations and trusts
- Clean Water and Drinking Water State Revolving Fund (SRF) programs

Eligible Projects

- Wastewater conveyance and treatment
- Drinking water treatment and distribution
- Enhanced energy efficiency at drinking water and wastewater facilities
- Desalination, aquifer recharge, and water recycling
- Property acquisition if it's integral to the project or that mitigates environmental impact
- A combination of eligible projects secured by a common security pledge or submitted under one application by an SRF program

Jacobs Is a WIFIA Leader

100% Client Success Rate Obtaining WIFIA Loans for Clients

$700M In WIFIA Loan Proceeds to Date for Our Clients

4.5% Cost of Capital down to 1.85%

$50M in Average Savings for $400M Project

Program Features

$20M

Minimum project size for large communities.

$5M

Minimum project size for small communities (population of 25,000 or less).

49%

Portion of eligible project costs that WIFIA can fund.

35 Yrs

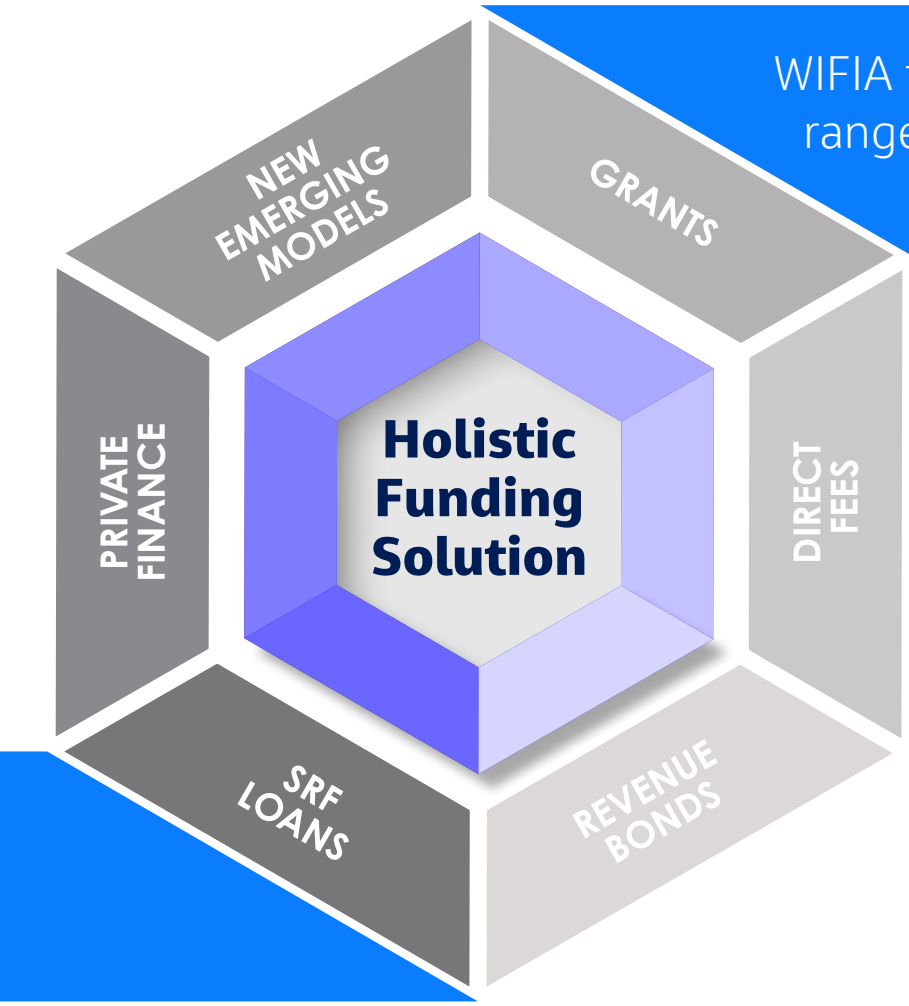
Maximum final maturity date from substantial completion.

5 Yrs

Time that repayment may be deferred after substantial completion.

%

Interest rate will be approximately equal to the U.S. Treasury rate. Current rate is less than 1.5% for a 30-year loan.



WIFIA funding complements a wide range of co-financing options and desired delivery methods

Benefits of WIFIA Program

Jacobs can assist with WIFIA and other funding solutions.

- Lowest cost financing directly from the US Treasury
- Designed for larger programs ($20M - $1B)
- Can be combined with traditional funding mechanisms
- 5-year construction period
- Delayed repayment—up to 10 years before payments start
- Flexible loan terms
- Multiple-source revenue pledge
- Credit quality does not impact interest rate
- Public perception that funding through EPA is desirable (community trust)
- WIFIA loan proceeds can be utilized first, before other higher cost sources, or last as a cash flow management instrument during construction

Recognizing the impact that WIFIA loans could have in improving and securing reliable drinking water supplies for communities in hurricane-prone South Florida, Jacobs partnered with North Miami Beach (NMB) Water to obtain approval for $62 million in WIFIA funding for its Regional Potable Water Improvements Project.

> **"By NMB Water using WIFIA funds, we are able to obtain significant savings that will translate into high quality water at reasonable cost to our customers..."**
>
> Jafeth Baez, Director
> City of North Miami Beach
> NMB Water

Jacobs' team of WIFIA consultants coordinates with local technical, environmental, and engineering staff to meet our clients' funding needs. They are dedicated full-time to WIFIA program developments and coordinate with WIFIA government relations support in Washington DC.

For more information, please contact

Dennis Jackson
720.286.1376
Dennis.Jackson@jacobs.com

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
		a. TOTAL	b. WITH CURRENT FIRM
Ross Kaneko, P.E.	Principal-in-Charge	30	30

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Honolulu, Hawaii

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
B.S./1990/Civil Engineering	Professional Engineer (Civil), Hawaii (8197-C), Exp. 4/30/2022

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Ross is the Client Account Manager for Hawaii and Guam. His responsibilities include the sales and delivery of projects in Hawaii and other Pacific Islands. He has participated in the planning, permitting, design, and construction management of various projects, including water infrastructure assessment and design; wastewater infrastructure assessment and design; water resource studies, assessments, and development; and corrosion engineering.

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION *(City and State)*

Lahaina WWRF Odor Control Project, County of Maui, Lahaina, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2019	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Project manager for the Lahaina WWRF Odor Control Project. The Preliminary Engineering Report evaluated different alternatives for managing and controlling odors at the plant. Proposed alternative configurations included an array of treatment technologies which included chemical scrubbers, carbon absorbers, organic biofilters, engineered media biofilters, biological packed bed scrubbers, and a Hydroxyl Radical Odor Control System. The proposed alternatives were compared based on their cost versus odor treatment level to determine which alternative provides the most value in terms of benefit-to-cost. Final construction documents were prepared.

☒ Check if project performed with current firm

b.

(1) TITLE AND LOCATION *(City and State)*

Honouliuli Wastewater Treatment Plant Ocean Outfall Improvements/Rehabilitation, City and County of Honolulu, Ewa Beach, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Project manager for the condition assessment of the Honouliuli Wastewater Treatment Plant Ocean Outfall for the City and County of Honolulu. The outfall was constructed in 1978 and consists of approximately 9,200 feet of 84-inch diameter reinforced concrete pipe (land portion) and approximately 10,550 feet of 78" reinforced concrete pipe (ocean portion). The current task includes the work planning effort to understand the historical condition and future requirements of the outfall, and development of a plan to assess the current condition and provide recommendations for improvements or rehabilitation of the outfall.

☒ Check if project performed with current firm

c.

(1) TITLE AND LOCATION *(City and State)*

Kaneohe-Kailua Sewer Tunnel, City and County of Honolulu, Kailua, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2018	2018

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Deputy Project Director for the Kaneohe-Kailua Sewer Tunnel which conveys wastewater 3 miles from Kaneohe's Waste Water Pre-Treatment Facility (WWPTF) to Kailua's Regional Wastewater Treatment Plant (RWWTP). The gravity sewer tunnel was constructed with a tunnel boring machine 15 feet in diameter to install the 10-foot diameter pipe. The tunnel ranges from a depth of 35 to 62 feet below ground level and includes a new influent pump station at the Kailua RWWTP.

☒ Check if project performed with current firm

	(1) TITLE AND LOCATION *(City and State)*	(2) YEAR COMPLETED	
		PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
	Kamehameha Highway Wastewater Pump Station Upgrade Project, Honolulu, Hawaii	Ongoing	
d.	(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE Principal in charge for this project, which planned and designed facility improvements to provide for the future hydraulic capacity of the facility during wet weather storm events, as recommended by the Final Sewer I/I Plan submitted to the US Environmental Protection Agency (EPA). For this project, developed a preliminary engineering report, conducted pump station facility condition assessment and pump capacity testing, developed a design alternatives report, and prepared final construction documents.	☒ Check if project performed with current firm	
	(1) TITLE AND LOCATION *(City and State)*	(2) YEAR COMPLETED	
		PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
	NPDES Storm Water Technical Training, City and County of Honolulu, Honolulu, Hawaii	Ongoing	
e.	(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE Project manager responsible for providing technical training and third-party storm water construction inspection services, related to the City's Municipal Separate Storm Sewer System (MS4) NPDES permit to City staff and City consultants. The technical training encompasses construction site runoff, post-construction storm water management, illicit discharge investigations, pollution prevention and good housekeeping, industrial and commercial activities, and spill prevention, control and countermeasure plans.	☒ Check if project performed with current firm	

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
		a. TOTAL	b. WITH CURRENT FIRM
Tony Ali, P.E., PMP	Project Manager	32	30

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Honolulu, Hawaii

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
M.S./1990/Civil Environmental Engineering B.S./1987/Metallurgical Engineering and Materials Science B.S./1984/Chemistry	Professional Engineer (Civil), Hawaii (13879); Nevada (13682); Maine (9144); Ontario (90251597) Project Management Institute (PMP #1417130); American Petrochemical Institute (API); Project Management Institute (PMP); U.S. Army Corps of Engineers QCM (POH1100074)

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Tony is a senior project manager with over 32 years of leadership experience and Honolulu office lead. He has engineering planning, design, construction, construction management, startup and operations experience with County of Maui, City and County of Honolulu, U.S. Department of Defense, and municipal and industrial programs and projects nationally and internationally. He continues to function as the project manager for the County of Maui on the Lahaina WWRF Stage 1A (WW15-03) project and Lahaina WWRF R-1 Process Expansion (WW20-11) project.

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION *(City and State)*

Lahaina WWRF Stage 1A Improvements (WW15-03), Lahaina, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2017	2020

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Project manager performing engineering design services during construction for wastewater reclamation facility step-feed biological nutrient removal bioreactor. Led Corvallis-based design team. Managed engineering contract and schedule and worked with County of Maui to execute contract amendments.

☒ Check if project performed with current firm

b.

(1) TITLE AND LOCATION *(City and State)*

Kamehameha Wastewater Pump Station 36" Force Main Design, City and County of Honolulu, Honolulu, Hawaii (Local – Planning, Design, Construction)

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2017	Ongoing

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Project manager for Environmental Assessment, permit reparation and detailed design preparation for 36" force main using open trench and horizontal directional drilling construction below Ke'ehi Lagoon Memorial Park, Moanalua Stream, and Kalihi Stream. Led Seattle based design team. Managed engineering contract and schedule and worked with City and County of Honolulu to execute contract amendments.

☒ Check if project performed with current firm

c.

(1) TITLE AND LOCATION *(City and State)*

Waianae WWTP Improvements and Upgrades, Waianae, Hawaii (Local Construction)

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2017	Ongoing

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Project manager for bid services and engineering design services during construction for wastewater treatment including rehabilitation of the primary clarifiers and primary effluent boxes and piping, replacement of the headworks screens. Led Corvallis based design team. Managed engineering contract and schedule and worked with City and County of Honolulu to execute contract amendments.

☒ Check if project performed with current firm

d.

(1) TITLE AND LOCATION *(City and State)*

Marine Corps Base Hawaii, Kaneohe, Hawaii (Federal)

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2017	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Lead Engineer Facilities Maintenance Control Department. Military construction program planning and engineering at Water Reclamation Facility. Prepared design scopes of work and cost estimates for MILCON capital improvement projects including $75M Water Reclamation Facility compliance upgrade for nutrient removal and R1 reuse quality. Briefed program to senior leadership to justify program needs.

☒ Check if project performed with current firm

	(1) TITLE AND LOCATION *(City and State)*	(2) YEAR COMPLETED	
	Suncor Energy Fort Hills Phase 1 Camp Infrastructure (Greenfield) **Fort Hills, Alberta, Canada**	PROFESSIONAL SERVICES 2012	CONSTRUCTION (If applicable) 2014
e.	(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE Process and design management, construction support, startup and commissioning of a greenfield membrane water and a greenfield wastewater treatment facility in support of CDN $10B oil sands mining operation. Lead Engineer, Wastewater Treatment Plant Design, March 2012 – May 2015 – Suncor Energy, Fort McMurray, Alberta, Canada. 3D BIM Design and vendor package review for 350,000 gpd package wastewater treatment plant involving pump station, force mains, membrane operating system, denitrification, phosphorus removal and UV disinfection. Designed collection pumping station wet well, prepared equipment specification, and performed startup and commissioning. Prepared designs including process piping isometrics, composite sampler installation and centrifuge sludge feed and centrate return piping designs.	☒ Check if project performed with current firm	

DIANE A. WAKAMATSU

DBA DW CONSULTANT SERVICES

BACKGROUND

Education/Training

- B.S., Human Development, UH Manoa

Experience in Public Service

- 25+ years in State & County Government

Summary

Diane Wakamatsu possesses extensive experience in public services. As a former Executive Assistant to Mayor Arakawa and Mayor Tavares and a former Deputy County Clerk, she provided professional legislative and administrative services to government officials, Mayor's Advisory Committees and Commissions, and to numerous community groups and organizations. She delivered technical support and assistance in lobbying for Federal and State legislative measures. Ms. Wakamatsu served as a Subconsultant to the CH2 Hill team in the development of a Statewide and Maui District Federal-Aid Highways 2035 Transportation Plan for State Department of Transportation (DOT).

Relevant Experience

Economic Development Specialist to Mayor Lingle, Ms. Wakamatsu served as Maui County's representative on various committees, boards, organizations, and task forces. She monitored County grants and managed leases of County property within agricultural parks. Ms. Wakamatsu established networks with Maui Economic Development Board, Maui Chamber of Commerce, Maui Visitor Bureau, and Maui Hotel and Lodging Association, to promote and sustain small business development opportunities and to initiate and enhance visitor industry attractions and promotions.

Executive Assistant, Ms. Wakamatsu wrote response letters to County Council Members and the Governor's Office. She provided direct support, oversight and training, technical advice, and professional services to each respective Mayor's administrative cabinet and office staff.

Business Associate of Alice Lee, LLC, Ms. Wakamatsu participated in the development of nonprofit affordable housing projects and a proposed medical facility in Kanaha, Maui. She worked with the Mayor's Office and County's Department of Parks and Recreation to promulgate administrative rules for Maui County's Residential Workforce Housing Policy and Waiehu Municipal Golf Course respectively. Her role required proficient oral and written communication, organizational skills, and effective public interaction. Ms. Wakamatsu's knowledge and understanding of government operations, policies and procedures, land use requirements and regulations, along with her ability to effectively network with Federal, State, and County government officials and their staff, are assets to her work performance.

Subconsultant to CH2M Hill, Ms. Wakamatsu provided technical support, logistical assistance, analytical evaluation/input, in networking and providing liaison services for the development of a Statewide Pedestrian Master Plan for State DOT. She facilitated/coordinated DOT site inspections and public (community) meetings held on Maui.

Government Liaison, Ms. Wakamatsu, advised, assessed, and networked with State and County government offices to facilitate required permit approvals for the development of UH Maui College's Aquaponics Greenhouse Facility Project.

Consultant to Lokahi Pacific, Ms. Wakamatsu facilitated, coordinated, and ensured the issuance of required government approvals (including Archaeological Inventory Survey and Archaeological Preservation and Monitoring Plan) for multiple affordable housing projects. She attended and/or conducted meetings to prioritize and address ongoing issues and challenges that occurred. She networked with the project development team (i.e., architect, civil and traffic engineers, attorney, land surveyors, planning consultant, pre-construction and construction contractors, etc.) to minimize time delays, mitigate or resolve problems, and obtain compliance.

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
		a. TOTAL	b. WITH CURRENT FIRM
Abbey Mayer, AICP	Environmental Planner	15	1

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Honolulu, Hawaii

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
B.A./Art/Yale University	American Institute of Certified Planners (AICP) Certification
M.A./English/University of Hawaii, Manoa	#31479
Certificate/Accounting/University of Hawaii, Manoa	Hawaii Chapter, American Planning Association

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Abbey has 15 years of experience with community-based master planning and transit planning, multi-jurisdictional permitting strategies and environmental compliance. As director of State Office of Planning, Mr. Mayer served as Director and Program Manager of the Hawaii Coastal Zone Management Program (CZM), which oversees the statewide Special Management Area (SMA) and Shoreline Setback permit systems. During this same period, he Chaired the State Climate Change Task Force, and Ocean Resources Management Plan Policy Group. As former Director of Planning, Permitting, and Right-of-Way for the Honolulu for Rapid Transit (HART), administered, managed, and coordinated the Planning, Permitting, and Right-of-Way Division for Honolulu's $8.2 billion, 20-mile, 21-station, elevated guideway, light rail transit system (Honolulu Rail).

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION *(City and State)*

Honolulu Authority for Rapid Transit (HART), Light-rail Transit System, Honolulu, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2018	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Managed and directed all transit planning and environmental aspects of the Rail Project, ensuring compliance with Federal environmental Regulatory Acts, Executive Orders, Hawaii Revised Statutes, local land use regulations and agency requirements. Served as the HART Liaison to the FTA, and was responsible for consulting with the FTA and with the Project Management Oversight Consultant (PMOC) on matters related to transit planning and environmental issues. Oversaw preparation of documents to comply with NEPA, other federal environmental regulatory acts including the Endangered Species Act; the Clean Water Act; the Clean Air Act; the National Historic Preservation Act (NHPA); and Section 4(f) of the Department of Transportation Act. Managed 12 NEPA Post-Record of Decision evaluations of proposed project changes. Led an organization of approximately 30 HART staff, along with over 50 project consultants.

☐ Check if project performed with current firm

b.

(1) TITLE AND LOCATION *(City and State)*

Various Planning Projects, Mayer & Associates Consulting Inc., Various Locations, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2016	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

1. Artspace Projects, Inc., Honolulu, HI – Affordable Housing, preconstruction project manager, secured all required environmental clearances and permits, including NEPA compliance, HRS Ch. 343 Environmental Assessment, Hawaii 201H certification, Development and Building Permits.
2. Hawaii Alliance for Community-Based Economic Development (HACBED)
   a. Kau Community Development Plan – drafting and strategic review of the Economic Development chapters including history, current conditions, case studies and recommended future strategies and actions;
   b. City & County of Honolulu – City Council initiative for an Asset-Building Roadmap for family and community financial empowerment;
   c. Hawaii, Statewide– economic development planning for the coordination of future funding for the federal Economic Development Agency and the state Department of Hawaiian Home Lands.
3. Molokai Renewables LLC—managed the Coastal Zone Management Act compliance and permitting plans for the proposed 200 MW Molokai wind farm, inter-island undersea cable, and related facilities.

☐ Check if project performed with current firm

	(1) TITLE AND LOCATION *(City and State)*	(2) YEAR COMPLETED	
		PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
	Director, Hawaii State Office of Planning, Honolulu, Hawaii	2011	
c.	(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE	☐ Check if project performed with current firm	

Abbey served as the Director of the State Office of Planning, presenting the State's position on some of the largest land use district boundary amendments in State history; successfully downzoned the previously-urbanized Ka Iwi Coast into the Conservation District, paving the way for permanent preservation, and; directed and oversaw the state's Coastal Zone Management Program, which oversees the statewide Special Management Area (SMA) and Shoreline Setback permit systems; conducts CZMA Federal Consistency Reviews for all Federal actions affecting the State's coastal zone.

- Authored State's opinion used in HI and CA to secure an injunction against US Navy's use of sonar in the coastal zone.
- SMA permitting authority for all State Community Development District lands.
- Coordinated the State's Geographical Information System (GIS)
- Chair, State Climate Change Task Force
- Chair, Ocean Resources Management Plan Policy Group
- Primary Lead, State Emergency Response Team, FEMA Emergency Support Function #14, Long-Term Community Recovery—in the event of a significant disaster (hurricane, tsunami, etc.) responsibility for directing and coordinating Hawaii's long-term community recovery.

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
		a. TOTAL	b. WITH CURRENT FIRM
Nancy Nishikawa, AICP	Environmental Planner	36	5

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Honolulu, Hawaii

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
M.S./1982/Natural Resource Policy and Management M.U.P/1982/Urban Planning B.A./1979/Political Science	American Institute of Certified Planners (AICP), No. 5068

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Ms. Nishikawa brings 36 years of planning and environmental permitting experience. She provides environmental support to various projects in Jacobs' Honolulu office.

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION *(City and State)*

FHWA, Central Federal Land Highway Division, Hawaii Bridge Program Various Locations, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Environmental support for this IDIQ contract, which provides architect-engineer project development services, design and planning services, related plans, specifications and estimate (PS&E) deliverables, environmental assessment/permitting, as well as post-design services during construction for nine bridge rehabilitation/replacement projects located on Oahu, Kauai, and Hawaii Island.

☒ Check if project performed with current firm

b.

(1) TITLE AND LOCATION *(City and State)*

Oahu Metropolitan Planning Organization, Oahu Regional Transportation Plan, Honolulu, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Providing environmental/transportation support for developing conceptual transportation system projects or programs to address areas of substandard performance and estimating the impact of the transportation projects included in the ORTP on Title VI and Environmental Justice populations on Oahu.

☒ Check if project performed with current firm

c.

(1) TITLE AND LOCATION *(City and State)*

Vineyard Boulevard, Installation of Traffic Signals at River Street, Honolulu, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2018	2019

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Providing environmental and transportation design support for this project to install a signalized actuated pedestrian crosswalk across Vineyard Boulevard. Aa new traffic signal is needed to facilitate traffic movement and allow for pedestrian crossing. The proposed traffic signal will be tied into the existing signal network. Timing will be coordinated with Aala Street and Maunakea Street intersections to minimize impacts to current traffic operations.

☒ Check if project performed with current firm

d.

(1) TITLE AND LOCATION *(City and State)*

Honolulu Rail Transit Project, General Engineering Consultant Support (GEC III) Honolulu, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	Ongoing

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Providing planning and environmental support for the Honolulu Rail Transit Project, a 20-mile elevated rail line with 21 stations. The rail system begins in East Kapolei and will extend to Ala Moana Center. The Jacobs team is providing project scheduling, cost estimating and project controls, interface management, environmental compliance, bus/rail integration, station access and modal interface, TOD, traffic analysis, parking study, and design management services including management of final design contracts, review of final design submittals, system wide signage, landscape, signals, and ITS operational support.

☒ Check if project performed with current firm

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
		a. TOTAL	b. WITH CURRENT FIRM
Bruce Johnson, P.E., BCEE	Lead Wastewater Process Technologist	32	25

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Denver, Colorado

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
M.E./1988/Environmental Systems Engineering B.S./1986/Chemical Engineering	Professional Engineer, Utah, 1990 American Academy Environmental Engineers Board Certified Environmental Engineer (BCEE) International Water Association Fellow

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Bruce is a Technology Fellow and process engineer in Jacob's Buildings, Infrastructure and Advanced Facilities Group. He formerly held the role of Global Technology Leader for Municipal Wastewater Treatment within CH2M, and the Global Practice Leader for Wastewater Simulation. He has a broad range of capabilities in industrial and municipal wastewater treatment, both domestic and internationally. His specialty has been the design, modeling, and sizing of biological treatment systems, solid-liquid separation equipment, and waste sludge reduction. Bruce has over 30 years of experience in operating, troubleshooting, and designing water and wastewater treatment plants and equipment.

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION *(City and State)*

Honouliuli Wastewater Treatment Plant, Oahu, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	Ongoing

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

CH2M (now Jacobs) was selected with RM Towill Corporation to deliver an upgrade for full secondary treatment and sludge system design for this 42 million gallons per day (mgd) wastewater treatment plant (WWTP). Bruce is the lead technologist and is working with the City and County of Honolulu to upgrade this facility. The expansion includes A-Stage treatment with a DAF Clarifier, an innovative step feed system design, sludge thermal hydrolysis, and sludge drying.

☒ Check if project performed with current firm

b.

(1) TITLE AND LOCATION *(City and State)*

Hampton Roads Sanitation District SWIFT Program, Hampton Roads, Virginia

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2020	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

CH2M (now Jacobs) was selected as the owner's advisor for >$1 billion groundwater augmentation program via managed aquifer recharge. This project consists of an indirect potable reuse program will treat up to 120 mgd of secondary effluent to drinking water standards using advanced treatment for injection into the Potomac Aquifer System. The project drivers are to avoid further nutrient limitations for WWTP discharge and to reduce environmental and commercial impacts associated with continued groundwater depletion. Bruce is serving as the wastewater process and simulation lead for improving the quality of the secondary effluent fed to the indirect potable reuse system.

☒ Check if project performed with current firm

c.

(1) TITLE AND LOCATION *(City and State)*

Changi Water Reclamation Plant Digital Twin, Singapore Public Utility Board

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Wastewater Process Lead for the development of a Digital Twin of the Changi WRP. This digital twin is the first integration in the world of online data analytics with hydraulics, controls and process modeling, coupled with wastewater facility process forecasting. Bruce is responsible for integrating all the components in a way that works well for the way wastewater facilities are run. He is also responsible for the wastewater process simulation part of this work using the Sumo™ whole plant dynamic simulator.

☒ Check if project performed with current firm

	(1) TITLE AND LOCATION *(City and State)* **Northern Treatment Plant, Metro Sanitation District, Denver, Colorado**	(2) YEAR COMPLETED PROFESSIONAL SERVICES: 2013 CONSTRUCTION (If applicable):
d.	(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE CH2M (now Jacobs) was selected to deliver this 24 mgd Greenfield wastewater treatment plant on the progressive design build deliver platform. Bruce is the lead technologist on this project that is worked with the District to design and build the new plant to achieve less than 0.1 mg/L total phosphorus and less than 6 mg/L total nitrogen and includes one of the first post aerobic digesters in North America.	☒ Check if project performed with current firm
	(1) TITLE AND LOCATION *(City and State)* **WRF Design Build Operate Project, Pima County, Arizona**	(2) YEAR COMPLETED PROFESSIONAL SERVICES: 2013 CONSTRUCTION (If applicable):
e.	(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE Bruce was the lead process technologist for the Greenfield 32 mgd Pima County Regional WRF. This plant is designed to achieve low levels of both nitrogen and phosphorus in the effluent, while using an innovated dissolved oxygen control system to control effluent ammonia to specific target levels for the downstream chloramination disinfection system. Bruce also supported startup and acceptance testing of this facility. This facility has won numerous industry awards: • 2014 DBIA National Award of Excellence in Water/Wastewater • 2014 DBIA Merit Award in Water/Wastewater • 2014 DBIA Excellence in Process Award (process in how the DB team delivered) • 2014 AAEES Grand Prize in Design • 2014 ENR Southwest Best Project Award in Water/Environment • 2014 Arizona Water 'Wastewater Treatment Project of the Year' • 2013 Water & Wastes Digest Top Water and Wastewater Project • 2013 Environmental Business Journal Water/Wastewater Project Merit Award	☒ Check if project performed with current firm

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
William Leaf, P.E.	Process Lead/Startup & Commissioning	a. TOTAL: 25	b. WITH CURRENT FIRM: 23

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Boise, Idaho

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
M.E./1997/Civil Engineering (Wastewater Treatment) B.S./1993/Civil Engineering	Professional Engineer, Idaho (9414), 1999; Washington (45464), 2009

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Bill is a principal technologist specializing in wastewater reclamation for Jacobs. He has experience in the planning, design, construction, and startup of wastewater treatment facilities and has been involved in studies for permit negotiation, water quality issues, pretreatment, and user charge systems. Bill has national and international experience and has completed projects for public and private sector clients.

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION *(City and State)*

Lahaina Wastewater Reclamation Facility (WWRF) Stage 1A Improvements, County of Maui, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2020	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

As a senior technology consultant, Bill assisted with the startup and commissioning of the unit processes included in the Stage 1A Project. This included assisting as the on-site process engineer during the June 2019 bypass event around the Secondary Clarifier Splitter Box. Bill also helped as the onsite process engineer during the December 2019 – January 2020 startup and commissioning of the Flexible Aeration Basin (FAB) and Conventional Aeration Basin (CAB).

☒ Check if project performed with current firm

b.

(1) TITLE AND LOCATION *(City and State)*

Riverside Park Water Reclamation Facility (WRF) NLT Related Projects; Spokane, Washington

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Bill is the senior technology consultant providing senior review for the Next Level of Treatment (NLT) related projects. These include the installation of a new primary clarifier, upgrade to the chemically enhanced primary treatment system, modifications to existing aeration basins (to provide anoxic selectors), and other site improvements. These projects position the WRF for the follow-on NLT project, where tertiary membranes are installed to provide for a high level of total phosphorus removal. Bill is currently providing operational training and coordination of the NLT Related Project processes with the NLT (Tertiary Membrane) unit processes. This includes working with City staff to develop and operation strategy for the unit processes that are used to mitigate high storm flow and loads, protecting the tertiary membrane system from overloading. The tertiary membrane system is sized to treat 90-percent of all influent flows at the facility, providing and overall net environmental benefit with the receiving stream.

☒ Check if project performed with current firm

c.

(1) TITLE AND LOCATION *(City and State)*

Spokane County Regional Water Reclamation Facility, Spokane County, Washington

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2016	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Bill was the senior engineer tasked to optimize the treatment facility and develop cost-effective capacity improvements. This involves a detailed calibration and validation of CH2M HILL's (now Jacobs) Pro2D2™ whole-plant process simulator, followed by the development of a calibrated Envirosim Biowin™ process simulation. Several treatment alternatives are evaluated, to provide a cost-effective capacity expansion without a significant impact to the overall site layout at the facility. This evaluation led to the design and construction of primary effluent equalization, maximizing the capacity of the downstream aeration basin and membrane bioreactor system.

☒ Check if project performed with current firm

Bill was the lead process design engineer for the secondary treatment process during the development of the Design-Build-Operate proposal (2007 – 2008) for this green-field treatment facility. This involved completing the conceptual evaluation and design of a secondary treatment process that provides high levels of nitrogen and phosphorus removal. Step-feed biological nitrogen removal, chemical treatment for phosphorus removal, side-stream treatment technologies, and membrane bioreactors are utilized. The process is designed to meet a total phosphorus limit of 0.05-mg TP/L. Bill was also involved in the startup and commissioning of this facility, helping optimize the plant to meet the effluent total phosphorus limit. This involved the development of a dynamic process simulation to help evaluate the treatment facility.

d.

(1) TITLE AND LOCATION *(City and State)*

Nampa Wastewater Treatment Plant Phase 1 Upgrades, City of Nampa, Idaho

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Bill was the senior technology consultant for the CH2M (now Jacobs) team to complete the Nampa Wastewater Treatment Plant (WWTP) Phase 1 Upgrades design. This design incorporates improvements to the facility, allowing the City to meet initial total phosphorus effluent requirements. The project involves infrastructure modifications to their existing primary treatment and trickling filter systems, modification of the existing aeration basins to provide enhanced biological phosphorus removal (EPBR), and installation of a new EBPR configured aeration basin. Bill is currently the senior technology consultant for the Progressive Design-Build proposal for the Project Group F expansion of the Nampa WWTP. The City of Nampa awarded the project to Jacobs, with work commencing August 2020. The expansion of the WWTP includes an additional EBPR aeration basin, blower facility, secondary clarifier, tertiary filtration, UV disinfection, and solids handling improvements. Bill will continue as the Senior Technology Consultant through the duration of the project.

☒ Check if project performed with current firm

e.

(1) TITLE AND LOCATION *(City and State)*

Twin Falls Wastewater Treatment Plant (WWTP) Phase 2 Expansion, Twin Falls, Idaho

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Senior technologist for the Phase 2 Expansion of the WWTP. This expansion provides a 70-percent increase in WWTP process capacity, based around the incorporation of an integrated fixed-film activated sludge (IFAS) process. Bill developed the overall process concepts and layout for the expansion and provided senior review throughout the design process. This expansion maximizes the overall capacity of the WWTP site, allowing for future economic growth in the City's user area.

The WWTP Phase 2 Expansion was commissioned in the summer of 2015 and Bill has been actively involved in the optimization of the system since. Recently, there has been an effort to provide a level of enhanced biological phosphorus removal (EBPR) at the site. This includes looking at nutrient profiles across the bioreactor, evaluating the influent wastewater characteristics, and investigating options to potentially generate supplemental carbon to help drive the EBPR process.

☒ Check if project performed with current firm

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
		a. TOTAL	b. WITH CURRENT FIRM
Dale Gabel, P.E., BCEE	Wastewater QA/QC	42	17

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Englewood, Colorado

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
M.S./1987/Civil Engineering B.S./1975/Civil Engineering	Professional Engineer, Hawaii (PE15692), Exp. 4/30/2022; Colorado (18702); Kansas (17132); Alaska (9272); Nebraska (E-10584); New Mexico (13328) Board Certified Environmental Engineer (BCEE)

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Dale is Jacobs' Wastewater Practice Lead for the western U.S. He has extensive experience providing the full suite of engineering services for wastewater treatment facilities and a strong background in facilities planning and process engineering for municipal and industrial wastewater treatment plants. He has interfaced extensively with local, state, and federal regulatory agencies and has participated in numerous public meetings as a technical expert. His proven expertise as a program and project manager includes projects ranging from $5,000 to $50M and involving the evaluation, permitting, design, and construction of private and public facilities

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION *(City and State)*

Honouliuli WWTP Upgrades, City and County of Honolulu, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Directing the planning and design of a $450M upgrade to the Honouliuli WWTP to meet the requirements of an EPA mandated consent decree and increase the plant capacity to 40 mgd. Key elements of the project include phased conversion of the existing trickling filter/solids contact biological treatment process to an activated sludge system that can be converted to a BNR system in the future when nutrient removal requirements are implemented and upgrading the solids processing facilities to serve as a regional biosolids processing and drying facility to support five additional WWTPs and eliminate landfilling of treated biosolids. The design is focused on repurposing existing structures and achieving net energy neutrality through extensive energy conservation approaches and energy generation in a new combined heat and power (CHP) facility.

☒ Check if project performed with current firm

b.

(1) TITLE AND LOCATION *(City and State)*

Odor Control Master Plan Study, Metro Wastewater Reclamation District Denver, Colorado

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2017	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Directed the project to sample and evaluate sources of odors, provide phased long-term planning of control approaches, and proactively manage future odor control issues and related costs for the 200-mgd Robert W. Hite Wastewater Treatment Facility and associated collection system. The control measures were recommended for phased implementation and ranged from $2M to $48M in total project costs.

☒ Check if project performed with current firm

c.

(1) TITLE AND LOCATION *(City and State)*

Lander Street Water Renewal Facility - 2020 Wastewater Facilities Plan, City of Boise, Idaho

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2020	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

As Senior Consultant, Dale led the decision analysis to compare collection and treatment scenarios to expanding the City's current system and meet future regulatory requirements. Key alternatives evaluated included consolidating the City's two wastewater plants into one or upgrading both and installation of multiple water reclamation facilities in the collection system to provide reuse water near potential customers. The project also evaluated numerous sustainability options such as the "mining" the phosphorus from the upgraded wastewater treatment plants to be sold as a fertilizer and installation of biogas cogeneration systems.

☒ Check if project performed with current firm

	(1) TITLE AND LOCATION *(City and State)*	(2) YEAR COMPLETED	
	Biosolids Management Master Plan Update, Westminster, Colorado	PROFESSIONAL SERVICES 2013	CONSTRUCTION (If applicable)
d.	(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE Directed the master plan update study that included the evaluation of existing thickened solids storage facilities and the Strasburg Natural Resource Farm Capacity. Twelve biosolids management alternatives were developed that incorporated various final disposal options, Class A and Class B stabilization options, and thickening/dewatering options appropriate for the City. Enhanced farming practices and an improved land application monitoring program were recommended. A 20-year capital improvements plan (CIP) was also developed.	☒ Check if project performed with current firm	

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
Kandi Maestri, P.E.	Design Manager	a. TOTAL: 25	b. WITH CURRENT FIRM: 25

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Corvallis, Oregon

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
B.S./Electrical Engineering	Professional Engineer, Oregon (53782PE)

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Kandi is a design manager with Jacobs' in Corvallis, Oregon. She is responsible for managing the overall design effort on projects including staff, schedule, quality and budget controls and coordinating with clients to meet their project needs. As design manager and quality control manager, she is responsible for multidiscipline design and has had design management experience on numerous projects on which she has had both lead electrical and design manager responsibilities.

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION *(City and State)*

Lahaina Wastewater Reclamation Facility Stage 1A Improvements, County of Maui, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2016	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Design Manager responsible for managing an interdisciplinary, design team for the $38-million expansion of a wastewater treatment plant. The plant upgrades include a preselection package for equipment, a new aeration basin, blowers and secondary clarifier and modifications to existing aeration basins, solids processing facility and RAW/WAS systems.

☒ Check if project performed with current firm

b.

(1) TITLE AND LOCATION *(City and State)*

San Jose-Santa Clara Regional Water Reclamation Facility, Headworks Project, City of San Jose, California

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Design Manager for a $125 million design build project that includes a new headworks facility including 280 mgd screens, influent pumping and grit collection, a new force main, and improvements to the existing primary distribution system at the treatment plant. The project includes significant interface and coordination with the $1B Capital Improvement Program. The design build project includes early equipment procurement packages and construction packages.

☒ Check if project performed with current firm

c.

(1) TITLE AND LOCATION *(City and State)*

Grants Pass Wastewater Treatment Plant Improvements, City of Grants Pass, Oregon

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2017	2019

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Design Manager responsible for managing an interdisciplinary design team for the $30M design build project. The project included expanding the current wastewater treatment plant including a new aeration basin, blowers and secondary clarifier and rehabilitation of an existing clarify and gravity thickener and replacement of the existing electrical and control systems. The design build project includes early equipment procurement packages and construction packages.

☒ Check if project performed with current firm

d.

(1) TITLE AND LOCATION *(City and State)*

Confidential Oil & Gas Client, Texas

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2016	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Design Manager for this fast-paced program including over 20 different design packages with a total construction value in excess $100-million. The interdisciplinary design team was located in multiple offices across the US. Design included civil works and pump stations at multiple sites. Responsibilities included development of program standards and managing staff to meet client demands including frequent changes to facility locations and design criteria.

☒ Check if project performed with current firm

	(1) TITLE AND LOCATION *(City and State)*	(2) YEAR COMPLETED	
	Carmen Powerhouse Improvements and Turbine Generator Refurbishment Package, Eugene Water and Electric Board, Eugene, Oregon	PROFESSIONAL SERVICES 2013	CONSTRUCTION (If applicable)
e.	(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE Design Manager responsible for managing interdisciplinary design teams for powerhouse improvements on this Construction Manager/General Manager (CMGC) project as well as equipment procurement package for the turbine generator refurbishment. Responsible for successful delivery of the design product and for coordinating between the multiple design packages.	☒ Check if project performed with current firm	

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
		a. TOTAL	b. WITH CURRENT FIRM
Carl Koester, P.E., S.E.	Structural Engineer, Assistant Design Manager	13	12

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Corvallis Oregon

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
M.S./2007/Civil Engineering B.S./2005/Civil Engineering	Professional Engineer: Hawaii (PE -17714); California (76960); New Mexico (24129); Oklahoma (30229 PE); Oregon (76494PE); Rhode Island (10185); Washington (47987) Structural Engineer: Hawaii (PE -17714 SE); Oklahoma (30229 SE); Oregon (76494 SE)

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Mr. Koester has 12 years of experience in structural design in areas of high seismicity. He is experienced in design of hydraulic and building structures for various water and wastewater treatment facilities and has served as the Project Field Engineer during the construction of a design-build-operate wastewater treatment facility. He has also

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION (City and State)

Waianae WWTP Improvements and Upgrade, City and County of Honolulu, Waianae, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE

Performed structural analysis and design for the upgrades project. Compiled specifications and drawings. Assisted the design manager during design and performed as lead design manager for Services During Construction (SDC). Executed design manager role for Phase II design. Project includes replacement of headworks screening equipment, valves, and grit transfer facilities, restoration of concrete surfaces and lining materials in preaeration and primary sedimentation tanks, replacement of primary sludge and scum removal mechanisms.

☒ Check if project performed with current firm

b.

(1) TITLE AND LOCATION *(City and State)*

Lahaina WWRF Modifications, Stage 1A, County of Maui, Lahaina, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Performed structural analysis and design for the Stage 1A project, including design of structural modifications for the existing blower building and solids facility. Also included the structural design of a 2.0-million-gallon concrete bio-reactor. Design manager for the services during construction effort. Project will add new secondary treatment units that will improve the reliability of the facility at the rated 9 MGD design capacity while accommodating maintenance of individual process basins.

☒ Check if project performed with current firm

c.

(1) TITLE AND LOCATION (City and State)

Kamehameha Highway Wastewater Pump Station Upgrade, Honolulu, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Performed design for a seismic upgrade to the existing pump station facility, included analyzing the existing structure and identifying items to enhance performance. Designed the structural upgrades, vaults and miscellaneous structural elements. This project will rehabilitate the concrete walls of the existing influent wet wells of the pump station. It will replace the existing pumps and modify the pump room providing new grating and access. Project will upgrade the structural performance of the building by providing braced frames and modifying the existing foundations.

☒ Check if project performed with current firm

	(1) TITLE AND LOCATION (City and State)	(2) YEAR COMPLETED	
		PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
	San Jose-Santa Clara WWTP Headworks Project, City of San Jose, California	Ongoing	
d.	(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE Mr. Koester is the Assistant Design Manager and Existing Facility Lead for the preliminary treatment program upgrade at the San Jose-Santa Clara WWTP. A new 260 mgd Headworks is being designed to operate in parallel with an existing wet weather headworks for this 400 mgd advanced treatment plant. Mr. Koester is also serving as the Assistant Design Manager through construction of the project.	☒ Check if project performed with current firm	

	(1) TITLE AND LOCATION (City and State)	(2) YEAR COMPLETED	
		PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
	Spokane County Water Reclamation Facility, Spokane County, Washington	Ongoing	Ongoing
d.	(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE Spokane County WRF is a green field wastewater treatment plant (~8mgd). The plant was designed, constructed and continues to be operated by Jacobs. Mr. Koester served as member of the structural design team, completing the design of the Headworks building, Membrane facility and Waste Gas Burner facility. During construction Mr. Koester acted as the resident structural engineer from 2009-2010. During this time Mr. Koester worked as a part of the quality control team working with the contractor overseeing construction. Mr. Koester continues to facilitate operations staff with ongoing engineering services which include designing an aeration basin retrofit, methanol facility, blower building enclosure, flow equalization facility and centrifuge platform.	☒ Check if project performed with current firm	

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
		a. TOTAL	b. WITH CURRENT FIRM
Scott Champlin, P.E.	Mechanical Engineer	14	14

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Englewood, Colorado

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
B.S./2005/Mechanical Engineering	Professional Engineer: Hawaii (No. 16219-M); Exp. 4/30/2022; Colorado (#0045907)

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Scott is a project manager and process mechanical engineer with Jacobs' Water Business Group. He has experience as the mechanical engineer of record for process mechanical design for water and wastewater facilities, including potable water and wastewater pump stations, designing water and wastewater treatment processes, infrastructure condition assessments, hydraulic modeling, rotating equipment, and other aspects of mechanical design for standard design bid and design build delivery. He also performs as project manager for multidisciplinary design teams on small and large water and wastewater infrastructure projects.

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION *(City and State)*

Honouliuli Wastewater Treatment Plant Secondary Treatment Phase 1A – Sludge Drying and Related Facilities, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Design Manager and lead mechanical engineer for solids improvements to the Honouliuli WWTP that includes a Concept Design for overall facility planning and the detailed design of Phase 1A ($60M construction). Project includes conceptual design for implementation of thermal hydrolysis, combined heat and power, and low temperature belt dryers for biological solids. The detailed design included a cake receiving facility, dewatering facility, and belt dryer facility with accommodations for future expansions. Role including leading the mechanical design and managing the design team, design scope and budget, and all engineering for the entire project. Project is currently out to bid for construction.

☒ Check if project performed with current firm

b.

(1) TITLE AND LOCATION *(City and State)*

Wastewater and Water Treatment Systems Statewide Airports, Hawaii Department of Transportation (HDOT), Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2017	Ongoing

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Conducted a preliminary study and design alternatives report for replacing potable water uses for non-potable applications at Honolulu (HNL), Kahului (OGG), Kona (KOA), and Hilo (ITO) International Airports. Projects included use of reuse water for irrigation and HVAC equipment at HNL, designing a scalping plant to treat wastewater to R1 quality for irrigation and HVAC equipment, rainwater catchment system/storage/and conveyance for irrigation and potable water use at KOA and ITO. Developed a 30% design and Request for Proposal (RFP) for a Design Build contract issued by HDOT. Project is currently in construction for project at OGG.

☒ Check if project performed with current firm

c.

(1) TITLE AND LOCATION *(City and State)*

Kamehameha Highway Wastewater Pump Station Upgrade Project Honolulu, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Lead Mechanical Engineer and Project Manager for facility improvements to provide for the future hydraulic capacity of the facility during wet weather storm events as recommended by the Final Sewer I/I Plan submitted to the US Environmental Protection Agency (EPA). For this project, Jacobs developed preliminary engineering report, conducted pump station facility condition assessment and pump capacity testing, developed design alternatives, and completed detailed design and construction documents for the selected alternative. Services during construction is ongoing and includes submittal reviews, site investigations, and responses to RFI's.

☒ Check if project performed with current firm

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
		a. TOTAL	b. WITH CURRENT FIRM
Darren Edwards, P.E.	Mechanical Engineer	25	25

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Corvallis, Oregon

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
B.S./1993/Mechanical Engineering	Professional Engineer (Mechanical): Oregon, 1999 (No. 60026); Washington, 2006 (No. 42486): Arizona, 2019 (No. 69048), California, 2019 (No. 39743)

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Darren is part of Jacobs' Buildings, Infrastructure and Advanced Facilities Group with a focus on the Water industry. His technical experience includes detailed design and construction management of mechanical systems on water and wastewater treatment systems. He also has design experience on hydroelectric powerhouse and fish passage systems. His primary areas of expertise include pumping systems, piping systems, control valves, gates, compressed air systems, cooling water systems, heating water systems, aeration air systems, dewatering systems, digester systems, drain systems, monorail and crane systems, engine generator systems, fuel oil storage systems, and multiple other water and wastewater treatment process equipment systems. Darren's experience includes design team lead roles such as facility lead on digester facilities, process air blower facilities, aeration basins, thickening and dewatering facilities, flocculation basins, raw water flow control systems, water distribution pump stations, raw sewage pump stations, ultraviolet advanced oxidation process, and sand filters. In addition, his design team experience includes lead process mechanical engineer experience on multiple water and wastewater treatment plant designs and design management experience.

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION *(City and State)*

Water Resource Recovery Facility Project, City of San Luis Obispo, California

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2019	Ongoing

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Facility design lead for the digester facilities including existing digester rehabilitation, new digester design, digester sludge storage tank design, digester and storage tank pumped mixing design, digester hot water heating system, and digester gas system design.

☒ Check if project performed with current firm

b.

(1) TITLE AND LOCATION *(City and State)*

Spokane County Water Reclamation Facility, Spokane County, Washington

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2009	2011

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Lead Mechanical Engineer and Solids Process Lead on this Design-Build-Operate (DBO) project. Responsibilities included overall project mechanical discipline coordination. Process lead over the solids treatment facilities design which includes direct supervision of multiple design engineers. Facility lead for the solids handling facility including gravity belt thickening, centrifuge dewatering, sludge pumping, and truck loadout facilities.

☒ Check if project performed with current firm

c.

(1) TITLE AND LOCATION *(City and State)*

Northside Wastewater Treatment plant, Digester 3 and 4 Improvements, City of Tulsa, Oklahoma

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2010	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Responsibilities included overall project mechanical discipline lead. Facility lead over the digester facilities including existing digester gas boiler modifications for improved digester gas utilization.

☒ Check if project performed with current firm

d.

(1) TITLE AND LOCATION *(City and State)*

Oak Lodge Wastewater Treatment Plant Upgrade, Oak Lodge Sanitation District, Oregon

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2009	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Lead Mechanical Engineer and Influent Pump Station Facility Lead responsible for overall project mechanical discipline coordination. Facility lead for a 20-mgd raw sewage influent pump station and plant drain pump station.

☒ Check if project performed with current firm

	(1) TITLE AND LOCATION *(City and State)*	(2) YEAR COMPLETED	
	Rock Creek Facility Phase 6A Expansion and Upgrades, Clean Water Services, Hillsboro, Oregon	PROFESSIONAL SERVICES 2003	CONSTRUCTION (If applicable)
e.	(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE Facility/process lead engineer responsibilities included digester gas flare system analysis, aeration blower system capacity analysis and tertiary treatment flocculation basin rehabilitation design.	☒ Check if project performed with current firm	

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
		a. TOTAL	b. WITH CURRENT FIRM
Bryan Youker, P.E.	Civil Engineer	32	32

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Corvallis, Oregon

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
M.E./1988/Environmental Systems Engineering B.S./1986/Civil Engineering	Professional Engineer, Oregon (16114), 1993; Washington (45708), 2009; Arizona (52424), 2011; Texas (110561), 2012: Oklahoma (29914), 2018

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Bryan is a senior technologist and design engineer in Jacobs' Buildings, Infrastructure and Advanced Facilities (BIAF), Engineering and Design group in Corvallis, Oregon. He has served as a process mechanical engineer for water and wastewater treatment plant design projects for over 30 years.

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION *(City and State)*

Lahaina Wastewater Reclamation Facility Stage 1A Improvements, County of Maui, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2016	2020

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

This treatment plant upgrade project includes Aeration Basin, Secondary Clarifier and Solids Processing improvements. Bryan provided continuous senior oversight, mentoring of junior staff engineer, and QA/QC reviews of milestone delivery sets. During construction phase, Bryan has provided submittal reviews and attended Witnessed Factory Performance Tests for the aeration blowers which are a single-stage centrifugal type manufactured by Howden-Turblex.

☒ Check if project performed with current firm

b.

(1) TITLE AND LOCATION *(City and State)*

San Jose-Santa Clara WWTP Headworks Project, City of San Jose, California

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Bryan is the Senior Process-Mechanical Engineer and Facility Lead for the preliminary treatment program upgrade at the San Jose-Santa Clara WWTP. A new 260 mgd Headworks is being designed to operate in parallel with an existing wet weather headworks for this 400 mgd advanced treatment plant. The project is being executed as a progressive Design-Build project. The new Headworks will consist of three front-cleaned multi-rake mechanical bar screens, a Raw Sewage Pump Station, and a HeadCell-type grit removal system. The facility will incorporate screenings handling and grit washing equipment. In addition, the project includes extensive pipe routing and interties with existing facilities requiring sequencing, temporary pumping, and coordination with existing treatment plant operation.

☒ Check if project performed with current firm

c.

(1) TITLE AND LOCATION *(City and State)*

San Luis Obispo (SLO) Water Resource Recovery Facility (WRRF) Upgrade Project; City of San Luis Obispo, California

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

The SLO WRRF Upgrade Project includes the revision of its current secondary treatment system to a 16 mgd Membrane Bioreactor (MBR) System. Bryan has acted in various roles throughout the project including senior reviewer and mentor to the facility leads, senior technologist to the Membrane Bioreactor (MBR) facility and Primary Effluent screening system lead, and lead designer for the MBR, Primary Effluent facility, and Blower system. The project includes 2 new bioreactors in addition to the existing 2 bioreactors, and 6 new membrane basins. The project includes a complex construction sequence to construct and test the new primary effluent screens, new bioreactors, and new membrane basins prior to retrofitting the existing bioreactors and integrate them into a single complete MBR system.

☒ Check if project performed with current firm

d.

(1) TITLE AND LOCATION *(City and State)*

Haikey Creek Wastewater Treatment Plant Aeration Basin Project; City of Tulsa, Oklahoma

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

The Haikey Creek WWTP converted their oxidation ditch-based secondary treatment plant to new fine-bubble aeration system. The project involved four new 1.5-MG step-feed aeration basins with anoxic and aerobic zones, new aeration system including high-speed turbo blowers, fine-bubble membrane diffusers, and air distribution system, and several tie-ins to the existing treatment plant. Bryan led the final design of the aeration basins, blower building, and tie-in structures. Bryan also developed conceptual construction sequence and outlined the contract documents. When complete, the oxidation ditches will be abandoned and demolished to make space for new primary clarifiers.

☒ Check if project performed with current firm

e.

(1) TITLE AND LOCATION *(City and State)*

Northern Treatment Plant, Metro Wastewater Reclamation District, Denver, Colorado

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2013	2016

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

The Northern Treatment Plant is a new wastewater treatment facility capable of treating wastewater flows up to a peak flow of 51 mgd. During initial design, served as a Quality Control reviewer of milestone deliverables, and provided senior technologist input and continuous quality control for the Influent Pumping and Headworks facility including raw sewage pumping, screenings and screenings handling equipment, grit removal and grit handing equipment, and odor control; the Primary Clarification process including clarifiers, primary influent flow splitting, and primary sludge and scum pumping; the Secondary Treatment process including conventional activated sludge aeration basins with anoxic zone mixing, and fine bubble aeration, blower building with high-speed turbo blowers, secondary clarifiers, and the RAS/WAS Sludge Pump Station; and the Chemical Building.

☒ Check if project performed with current firm

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
		a. TOTAL	b. WITH CURRENT FIRM
Jennifer Chang, P.E.	Process Engineer	19	19

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Corvallis, Oregon

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
M.S./2000/Civil Engineering B.S./1999/Civil Engineering	Professional Engineer, Oregon (74674PE), Hawaii (PE-17135), Idaho (P-18723)

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Jennifer is a wastewater and water process engineer at Jacobs. She has 19 years of experience working on a variety of projects that have focused on municipal water and wastewater facility operations, as well as hydraulic modelling.

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION *(City and State)*

Lahaina Wastewater Treatment Plant Stage 1A Improvements, County of Maui, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2020	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Process lead for liquids process and facility lead for new and existing bioreactors to achieve secondary treatment requirements for average annual design capacity of 9 mgd. Use of step-feed into bioreactors with instrumentation to achieve simultaneous nitrification/denitrification with optimized dissolved oxygen control. Continued process lead activities during construction and startup, including coordination with contractor, commissioning activities, and onsite support.

☒ Check if project performed with current firm

b.

(1) TITLE AND LOCATION *(City and State)*

Rock Creek Disinfection Alternatives Project, Clean Water Services, Washington County, Oregon

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Process Engineer and Assistant Project Manager for the disinfection study. Developed protocols for bench-scale and pilot-scale testing of preformed monochloramine disinfection, provided technical support and data analysis during testing, determined capacity analysis of existing disinfection facilities and develop recommendation memo for disinfection at the Rock Creek WWTF.

☒ Check if project performed with current firm

c.

(1) TITLE AND LOCATION *(City and State)*

Lander Street Wastewater Reclamation Facility, Boise, Idaho

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Facility lead for new UV disinfection system to replace existing MPHO UV system for average annual design capacity of 13 mgd and a maximum flow of 25.5 mgd with considerations for future Class A reuse.

☒ Check if project performed with current firm

d.

(1) TITLE AND LOCATION *(City and State)*

San Luis Obispo Wastewater Reclamation Facility, San Luis Obispo, California

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Facility lead for new UV disinfection system and retrofit flow equalization for average annual design capacity of 6.1 mgd and a maximum flow of 16 mgd with considerations for future potable reuse.

☒ Check if project performed with current firm

e.

(1) TITLE AND LOCATION *(City and State)*

Grants Pass Wastewater Plant, Grants Pass, Oregon

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2019	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Facility lead for new aeration basin and blower building to increase secondary treatment capacity to 20.8 mgd.

☒ Check if project performed with current firm

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
		a. TOTAL	b. WITH CURRENT FIRM
Stephanie McGregor, P.E.	Instrumentation & Controls (I&C) Engineer	7	7

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Portland, Oregon

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
B.S./2013/Bioprocess Engineering	Professional Engineer, Oregon (87419PE)

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Stephanie brings seven years of experience with I&C design, dynamic simulation, programming and commissioning of water and wastewater facilities.

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION *(City and State)*

Lahaina Wastewater Reclamation Facility Stage 1A Improvements, County of Maui, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2018	2020

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Stephanie led the controls workshops with the client, developed the Rockwell code and FactoryTalk screens and commissioned the control system on site. She provided operator and technician training on the new control system.

☒ Check if project performed with current firm

b.

(1) TITLE AND LOCATION *(City and State)*

Woodland-Davis Regional Water Treatment Facility, Woodland Davis Clean Water Agency, Woodland, California

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2013	2016

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Stephanie was involved in the design, programming and commissioning of the Woodland Davis Regional Water Treatment Facility. She programmed the PLC and HMI and performed on site commissioning.

☒ Check if project performed with current firm

c.

(1) TITLE AND LOCATION *(City and State)*

Winneke Water Treatment Plant, Melbourne Water, Australia

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2017	NA

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Stephanie developed a dynamic simulation model to test the new filter control strategy. She coordinated PLC logic changes with plant's integrator to stabilize filter flow. This project won an Environmental Business International award for technology merit.

☒ Check if project performed with current firm

d.

(1) TITLE AND LOCATION *(City and State)*

San Jose-Santa Clara Regional Wastewater Facility, City of San Jose, California

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2020	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Stephanie developed a dynamic simulation model to optimize the City of San Jose Headworks pump station control strategy.

☒ Check if project performed with current firm

e.

(1) TITLE AND LOCATION *(City and State)*

Good Year Water Treatment Facility, City of Goodyear, Arizona

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	Ongoing

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Stephanie is currently leading the software integration team for the City of Goodyear PLC programming. She will provide on-site commissioning services of the control system next year.

☒ Check if project performed with current firm

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
		a. TOTAL	b. WITH CURRENT FIRM
Lionel Wood, P.E.	Senior Control System Engineer	35	34

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Corvallis, Oregon

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
B.S./Chemical Engineering	Professional Engineer, Oregon (16112); Washington (32661)

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Lionel is a senior control system project manager, senior control system lead engineer, and senior control system QC engineer. He has extensive experience in all project phases of control systems implementation. His experience includes project management, design, software, and commissioning of control systems. Lionel is experienced with Allen-Bradley ControLogix PLCs, and Rockwell Automation FactoryTalk View SE, Intellution iFix, and Wonderware InTouch HMI.

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION *(City and State)*

Lahaina Wastewater Reclamation Facility Phase 1A Project, County of Maui, Lahaina, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2016	2020

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Lead Control System Engineer for design, software development, and commissioning for the wastewater treatment plant expansion project. Design completion in 2016 with commissioning completed in 2020. Project includes aeration basin DO control and aeration blower controls with redundant Allen-Bradley ControLogix PLC's, FactoryTalk View SE HMI.

☒ Check if project performed with current firm

b.

(1) TITLE AND LOCATION *(City and State)*

EWEB Aquatic Management Plan (AMP) Project, and Carmen Powerhouse (CP) Project, Oregon

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2013	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Lead Control System Engineer responsible for design of AMP and project to add fish ladder and fish screen and CP project to refurbish the 50 MW hydro turbine generators and balance of plant equipment. Project includes Allen-Bradley ControLogix PLC's and Owner furnished Rockwell Automation RSView.

☒ Check if project performed with current firm

c.

(1) TITLE AND LOCATION *(City and State)*

Southeast WPCP Biosolids Digester Facilities Project, San Francisco Public Utilities Commission (SFPUC), California

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
On Going	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Lead Control System Engineer for the large multi-firm consulting engineering team. Project includes design of Emerson Ovation Distributed Control System (DCS) control system that will interface with existing Southeast WPCP DCS, and in conjunction with an SFPUC DCS Upgrade Project that will replace the existing DCS with an Emerson Ovation DCS, PROFIBUS instrumentation, and Intelligent MCCs.

☒ Check if project performed with current firm

d.

(1) TITLE AND LOCATION *(City and State)*

Davis Woodland Water Supply Project, Woodland, California

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2014	2016

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Lead Control System Engineer responsible for design-build-operator (DBO) water treatment plant project. Design completion in October of 2014. Project includes redundant Allen-Bradley ControLogix PLC's, FactoryTalk View SE HMI.

☒ Check if project performed with current firm

	(1) TITLE AND LOCATION *(City and State)*	(2) YEAR COMPLETED	
	Teck Coal, Fording River Operations Pilot Plant Project, Elkford, British Columbia	PROFESSIONAL SERVICES 2013	CONSTRUCTION (If applicable) 2013
e.	(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE Lead Control System Engineer responsible for the design of an industrial water treatment pilot plant project. Design completed in the spring of 2013 and commissioning during the fall of 2013. Project included redundant Allen-Bradley ControLogix PLC's, FactoryTalk View SE HMI.	☒ Check if project performed with current firm	

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
		a. TOTAL	b. WITH CURRENT FIRM
Scott Cowden, P.E.	Odor Control Technologist	32	23

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Corvallis, Oregon

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
B.S./1986/Mechanical Engineering	Professional Engineer, California, 1993 (M29146); Minnesota, 2002 (40642); Oregon (84296PE); Washington (45727)

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Scott is a mechanical engineer with extensive experience in process mechanical systems; odor control systems; HVAC; plumbing; and fire protection involving mechanical design, QA/QC, life cycle cost evaluations, specification writing, cost estimating, and construction administration. Other experience includes digester gas systems, cryogenic systems, and compressed air systems. This work has been for a variety of building types, including wastewater treatment plant facilities, office buildings, computer rooms, and laboratories.

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION *(City and State)*

Lahaina WWRF Odor Control Project, County of Maui, Lahaina, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2019	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Senior technologist for the Lahaina Wastewater Reclamation Facility Odor Control Project. The Preliminary Engineering Report evaluated different alternatives for managing and controlling odors at the plant. Proposed alternative configurations included an array of treatment technologies which included chemical scrubbers, carbon absorbers, organic biofilters, engineered media biofilters, biological packed bed scrubbers, and a Hydroxyl Radical Odor Control System. The proposed alternatives were compared based on their cost versus odor treatment level to determine which alternative provides the most value in terms of benefit-to-cost.

☒ Check if project performed with current firm

b.

(1) TITLE AND LOCATION *(City and State)*

Waianae WWTP Improvements and Upgrade, City and County of Honolulu, Waianae, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Lead Odor Control Engineer for the design of a new odor control facility for enclosed structures at primary clarification. Project includes structural rehabilitation and replacement of major process equipment at headworks and primary clarification. Involved with preparation of design plans, specifications, and cost estimate for headworks, primary clarification, effluent monitoring, and utility water pumping and distribution.

☒ Check if project performed with current firm

c.

(1) TITLE AND LOCATION *(City and State)*

Odor Control Optimization Project, Oceanside WWTP (OSP), SFPUC, San Francisco, California

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Lead Odor Control Engineer for the implementation of odor control mitigation measures for improving removal performance while reducing overall energy consumption at the Oceanside WWTP (OSP). Currently, the plant operates duel bed carbon vessels that consume approximately 50 percent of the entire energy demand of the treatment plant. New systems will reduce energy consumption while meeting strict offsite odor goals.

☒ Check if project performed with current firm

d.

(1) TITLE AND LOCATION *(City and State)*

Air Flow Management and Odor Control Study, Metro Wastewater Reclamation District, Denver, Colorado

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2013	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Updated previous comprehensive odor control masterplan for Metro Denver by evaluating both the Robert W. Hite Treatment Facility (RWHTF) and the entire sewer

☒ Check if project performed with current firm

Transmission System with regards to odor generation and mitigation. Project included extensive sampling, odor dispersion modeling, collection system monitoring, in situ fan de pressurization testing, collection system modeling using WATS (Wastewater Aerobic/Anaerobic Transformations in Sewers), and technology evaluation and alternatives development and costing. Odor control projects were developed to help the District meet their Strategic Plan objectives.

e.

(1) TITLE AND LOCATION *(City and State)*

Agua Nueva WRF, Pima County, Arizona

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2013	2013

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Lead odor control engineer for design of an engineered media biofilter system and carbon adsorption system. Biofilter design was unique in that the biofilter infrastructure was designed around a proprietary engineered media as opposed to using a more costly packaged system approach. Carbon system was designed to serve the bioreactor basins, which typically exhibit lower odor emissions. Design was intended to meet strict offsite odor goals. A sophisticated odor monitoring system with multiple Enoses was also included in the design. Agua Nueva uses dissolved air flotation for primary clarification at the beginning of the liquids train, rather than in solids—creating a highly compact treatment process with improved nutrient removal. The world's first such large scale application, this arrangement combines grit removal, flocculation, solids liquid separation, and solids thickening into a single step, providing an already thickened sludge ready for processing at significantly reduced costs.

☒ Check if project performed with current firm

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
		a. TOTAL	b. WITH CURRENT FIRM
Alexander Demith	Mechanical Engineer	8	8

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Corvallis, Oregon

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
B.S./2012/Mechanical Engineering	N/A

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Alex Demith is a mechanical engineer with experience in process mechanical systems, odor control systems, involving mechanical design, life cycle cost evaluations, dispersion modeling, INTERCEPTOR modeling, WATS Modeling, depressurization testing, field sampling, performance testing, specification writing, and cost estimating. Other experience includes operation and preventative maintenance of conventional water filtration plants.

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION *(City and State)*

Lahaina WWRF Odor Control Project, County of Maui, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2016	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Odor control design engineer for design of a 9,000 cubic feet per minute (CFM) bio-trickling filter odor control system to control odors in the Headworks.

☒ Check if project performed with current firm

b.

(1) TITLE AND LOCATION *(City and State)*

Bio-trickling Filter Design, Waianae Wastewater Treatment Plant, Waianae, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2019	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Lead odor control design engineer for design of 1,800 CFM bio-trickling filter odor control system to control odors from the primary clarifiers effluent launders, scum pits and influent/effluent distribution chambers.

☒ Check if project performed with current firm

c.

(1) TITLE AND LOCATION *(City and State)*

Solids Facility Odor Control, Bureau of Environmental Services, Portland, Oregon

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Lead Engineer/Designer for this project which consists of design of temporary (3-4 year) 36,000 activated carbon odor control system to replace existing odor control and remove odors in the existing solids facility and a permanent 30,000 CFM engineered bio-filter to remove odors for the new solids facility. Project tasks included the following

- Evaluation of the solids facility odors which included sampling, dispersion modeling, and technology evaluation.
- Sizing and locating each odor control system.
- Development of specifications and design drawings.

☒ Check if project performed with current firm

d.

(1) TITLE AND LOCATION *(City and State)*

Odor/Corrosion Study, Salt Lake Public Utilities, Salt Lake City, Utah

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2020	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Lead Engineer/Modeler/Designer for this project which consists of extensive collection system sampling and analyses, technology evaluation and selection for both vapor phase and liquid phase technologies. Analysis includes building a WATS powered by INTERCEPTOR model for the entire collection system.

- Liquid and Vapor Phase sampling was conducted at over 30 locations.
- WATS model included for all pipes in Salt Lake City ranging from 12 to 72 inches in diameter.
- Depressurization testing using 10,000 CFM mobile carbon adsorption system.

☒ Check if project performed with current firm

	• Cost analysis and pre-design of three 1,000 to 10,000 CFM remote odor control systems coupled with pre-design of multiple liquid phase dosing systems throughout the collection system.	
e.	(1) TITLE AND LOCATION *(City and State)* **Airflow Management and Odor Control Study, Metro Wastewater Reclamation District, Denver**	(2) YEAR COMPLETED PROFESSIONAL SERVICES: 2018 CONSTRUCTION (If applicable):
	(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE Lead Engineer/Modeler for this project which consists of extensive collection system sampling and analyses, technology evaluation and selection for both vapor phase and liquid phase technologies. Analysis included WATS powered by INTERCEPTOR modeling for the entire collection system. Air Dispersion modeling and Depressurization testing were conducted to verify results of WATS model. • Liquid and Vapor Phase sampling was conducted at over 30 locations. • WATS modeling was included over 15 sub basins all with pipes ranging from 12 to 72 inches in diameter. • Depressurization testing was conducting at 4 locations using 10,000 CFM portable Odor Control Unit.	☒ Check if project performed with current firm

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
		a. TOTAL	b. WITH CURRENT FIRM
Larry Schimmoller, P.E., PMP	Principal Water Reuse Technologist	33	28

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Englewood, Colorado

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
M.S./1995/Environmental Engineering B.S./1991/Civil Engineering	Professional Engineer: Colorado (32335); Virginia (0402029956)

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Larry is a vice president, senior project manager, and senior principal technologist in Jacobs' water business group. He is also Jacobs' Global Technology Leader for water reuse. Larry has extensive experience in the planning, piloting, process selection, design, and construction of water, wastewater, and water reuse treatment projects. He is a proven project manager and has a track record of delivering high-quality projects on time and at or under budget. Larry is a member of the WateReuse Research Foundation's Research Advisory Committee which develops the multi-million-dollar research agenda for this international organization. He has also served as Principal Investigator for multiple water reuse research projects and has authored and presented numerous papers at regional, national, and international water reuse conferences and publications.

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION *(City and State)*

Feasibility Study for Direct Potable Reuse, Sao Paulo, Brazil

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2015	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Senior technical consultant for the evaluation of a direct potable reuse scheme in Sao Paulo, Brazil to alleviate severe water shortages being experienced in the city due to record droughts. Developed a wastewater and advanced water treatment process to produce purified water for blending directly into the city's distribution system via an existing distribution pipe. Consulted with City staff on a myriad of technical issues, including wastewater source control, pathogen and trace organics removal requirements, water quality sampling, advanced treatment technologies, blending requirements, and public outreach and education.

☒ Check if project performed with current firm

b.

(1) TITLE AND LOCATION *(City and State)*

Denver Water Potable Reuse Feasibility Study, Denver, Colorado

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2015	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Senior technical consultant for this project that developed potable reuse schemes for reclaiming 20 to 60 mgd of water from the South Platte River, developed water quality and treatment goals and objectives with Denver Water, and developed treatment scenarios and cost estimates for each scenario. Also produced a summary document of the water quality considerations and treatment options.

☒ Check if project performed with current firm

c.

(1) TITLE AND LOCATION *(City and State)*

Western Corridor Recycled Water Project, Brisbane, Australia

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2011	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Senior process engineer for the design, construction, and commissioning of the 20 -mgd Luggage Point Advanced Water Treatment Plant (AWTP). Plant treatment processes include flocculation and sedimentation for phosphorus removal, microfiltration, reverse osmosis, and ultraviolet (UV)—advanced oxidation with hydrogen peroxide addition. He also served as senior process engineer for extensive piloting conducted prior to and during design that provided critical information related to the advanced treatment processes. The Luggage Point AWTP is part of the Western Corridor Recycled Water Project, a multi-billion-dollar project. This project, in association with the Western Corridor Recycled Water Project, won the GWI 2009 Water Reuse Project of the Year.

☒ Check if project performed with current firm

d	(1) TITLE AND LOCATION *(City and State)* **Prairie Waters Project, Aurora Water, Aurora, Colorado**	(2) YEAR COMPLETED PROFESSIONAL SERVICES: 2010 CONSTRUCTION (If applicable):
	(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE Quality control manager for design of the $80M natural purification system and $200M Aurora Reservoir Water Purification Facility (ARWPF). The natural purification system incorporates riverbank filtration and soil aquifer treatment for the reduction of nitrates, pathogens, and micro pollutants. Further treatment is provided at ARWPF through softening, advanced ultraviolet oxidation, biologically active filtration, and granular activated carbon adsorption.	☒ Check if project performed with current firm
e	(1) TITLE AND LOCATION *(City and State)* **WateReuse Research Foundation Project 13-09: Indirect Potable Reuse Investigation, Tucson, Arizona**	(2) YEAR COMPLETED PROFESSIONAL SERVICES: 2016 CONSTRUCTION (If applicable):
	(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE To meet the water needs of the greater Tucson Metropolitan area, Tucson Water is exploring the concept of indirect potable reuse to diversify and expand their water supply portfolio. Larry is part of the team, which includes Tucson Water, University of Arizona, and Jacobs, who are collaborating to pilot test the effectiveness of soil aquifer treatment, nanofiltration membranes, ozone, and biologically active carbon filtration for potable reuse. The team is conducting water quality sampling and operational testing during this 6-month pilot to evaluate the effectiveness of the proposed treatment scheme, which will advance the science of potable reuse treatment, especially for inland utilities struggling with reverse osmosis concentrate disposal problems.	☒ Check if project performed with current firm

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
		a. TOTAL	b. WITH CURRENT FIRM
Alex Firth, P.E., LEED AP	Structural Engineer	34	34

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Corvallis, Oregon

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
B.S./1986/Civil Engineering Graduate Studies/Structural Engineering	Professional Engineer, Hawaii (PE-16749), 2015; Oregon (15977), 1992 U.S. Green Building Council (USGBC): LEED Accredited Professional (46999)

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Alex is a structural engineer with Jacobs Water Business Group in Corvallis, Oregon. He has worked on a variety of structural projects, including water and wastewater treatment plants, Industrial facilities, resident construction inspection, and bridge inspection. He is also the firm's source matter expert in the structural engineering aspects of anti-terrorism and force protection (AT/FP) design and has completed assessments of four overseas U.S. Air Force Bases to determine their compliance with federal AT/FP standards.

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION *(City and State)*

Goodyear Water Treatment Facility, City of Goodyear

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Lead structural engineer for a new, greenfield 8 mgd water treatment project. Project included multiple concrete treatment basins and the associated treatment facilities. The project also included the design of an operations building.

☒ Check if project performed with current firm

b.

(1) TITLE AND LOCATION *(City and State)*

North Texas Water District, Leonard Texas Water Treatment Project

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

Lead structural engineer for a new, greenfield 75 mgd water treatment project. Project included the design of multiple, large concrete treatment basins including pre-treatment, ozone, filtration, and chlorine contact/clearwell. The design also included all the supporting chemical and treatment buildings including operations, maintenance and a warehouse facility. Two of the facilities were designed for improved performance for tornado loads.

☒ Check if project performed with current firm

c.

(1) TITLE AND LOCATION *(City and State)*

Agua Nueva Water Reclamation Facility, Pima County, Arizona

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Project includes design and construction of a new 24-mgd, $158-million water reclamation facility for seven separate facilities, as well as pipeline, basins, and tanks. Scope includes innovative treatment process uses DAF clarification and 5-stage Bardenpho, enhanced with step-feed capabilities. This process is then followed by deep tanks

☒ Check if project performed with current firm

d.

(1) TITLE AND LOCATION *(City and State)*

Changi Water Reclamation Plant; Republic of Singapore

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2000	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Lead structural engineer for the design of a 210-mgd wastewater treatment and reclamation plant for the Republic of Singapore. The design produced 23 separate contract packages consisting of three, large diameter, deep concrete shafts; above-grade influent pump station complex; headworks facility; large liquids treatment facility; solids treatment facility; a digester facility consisting of five modified egg-shape digesters; a major electrical building; and an operations and

☒ Check if project performed with current firm

	maintenance facility. All of the facilities were designed to local Singapore building codes in conjunction with internal CH2M HILL design standards. Responsible for overall management of the structural engineering effort and development of the structural three-dimensional/database delivery strategy. Managed the structural engineering design team in Corvallis, Oregon, and coordinated efforts among structural design staff in Corvallis, Toronto, and Singapore.	
e.	(1) TITLE AND LOCATION *(City and State)* **Robindale Wastewater Treatment Plant Renovation and Expansion, Brownsville Public Utilities Board, Brownsville, Texas** (3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE Led the structural design for a $32 million design-build project, the first municipal design-build project in Texas. The project expands the plant's treatment capacity from 10 million gallons per day (mgd) to 14 mgd. The project also includes a retrofit of existing facilities to support Modified Ludzack-Ettinger (MLE) treatment process. Pretreatment headworks features fine screens, Eutek Headcell grit removal, and screenings sluice and compactor system. UV disinfection facility features of two channels with low pressure, high intensity UV lamps in horizontal configuration.	(2) YEAR COMPLETED PROFESSIONAL SERVICES: 2012 CONSTRUCTION (If applicable): ☒ Check if project performed with current firm

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
		a. TOTAL	b. WITH CURRENT FIRM
Katrina Pearson, P.E., S.E., LEED AP	Structural Engineer	16	12

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Corvallis, Oregon

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
B.S./2004/Architectural Engineering	Structural Engineer, Alaska (14021), 2021 Professional Engineer, Alaska (12509), 2010-2021; California (73811) 2009-2021; Oregon (83054), 2009-2020; Washington (47890), 2011-2022 LEED® AP, USGBC, 2006

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Katrina is part of Jacobs' Advanced Facilities & US Federal Solutions group. She has extensive experience working across delivery units to serve our clients, including work with water and wastewater treatment, industrial, commercial, and energy and chemicals. Katrina specializes in advanced areas of structural engineering including seismic design, structural rehabilitation and security engineering. Her experience includes design using reinforced concrete, masonry, timber, structural steel, cold-formed steel, and structural glass. She has experience in structural design of a diverse range of federal government facilities, including courthouses, large-scale family housing, maintenance facilities, hangars, training centers, clean rooms and data centers. Katrina has provided structural engineering for a wide range of private sector projects, including low income housing, high profile religious facilities, public and private educational facilities, adaptive re-use and restoration of historic structures.

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION *(City and State)*

F4227 FNMOC Bld 700 Upgrades, NAVFAC Southwest/NAVIFOR, Monterey, California

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Performed structural engineering, specifications and quality reviews for retrofit schemes and construction sequencing associated with equipment access and structure modifications for a retrofit of an existing facility to accommodate a power upgrade. Served as the Design Manager to work with other disciplines to assist with coordination issues and value engineering considerations. Provided input on seismic anchorage and bracing as well as Special Inspection considerations. Provided support during construction, including shop drawing review and RFI responses.

☒ Check if project performed with current firm

b.

(1) TITLE AND LOCATION *(City and State)*

National AEI Services for Anchorage Federal Buildings Non-Structural Component Seismic Bracing Evaluation and Study, Anchorage, Alaska

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2020	Ongoing

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

In response to the November 2018 Anchorage Earthquake, Jacobs deployed a team comprising structural engineers, an Architect, a cost estimator, and a historic preservation expert to inspect damaged structural and non-structural components of three General Service Administration (GSA) buildings, including one building registered on the National Register of Historic Places. The buildings contained multiple Federal tenants, including active Federal Courtrooms. Assisted in project proposal development. Lead the post-earthquake inspection of the Anchorage Historic Federal Building. Assisted in inspecting the Federal Annex and James Fitzgerald Federal Building. Prepared damage assessment reports. Developed scopes of work and bridging document for a design build contractor. Assisted the cost estimator in developing detailed cost estimates.

☒ Check if project performed with current firm

c.

(1) TITLE AND LOCATION *(City and State)*

Grace Hopper Data Center Power Upgrade, NAVFAC Southwest, Navy Base Coronado, CA,

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2019	Ongoing

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Performed structural engineering design, specifications and quality reviews for retrofit schemes and construction sequencing associated with equipment access and structure modifications. During construction, provided quality assurance and submittal reviews to confirm requirements for seismic-resistant equipment and distribution systems were applied correctly. Performed structural analysis, design, and specification for a retrofit of an existing facility to accommodate a power upgrade. Worked with other disciplines to assist with coordination issues and value engineering considerations. Provided input on seismic anchorage and bracing as well as Special Inspection considerations. Provided support during construction, including shop drawing review and RFI responses.

☒ Check if project performed with current firm

d.

(1) TITLE AND LOCATION *(City and State)*

Air Mobility Command (AMC) Headquarters Renovation, US Air Force, Scott AFB, Illinois

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2018	2020

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Quality control reviewer for full D-B-B documentation to modernize a 40-year-old Four Star Command and Control Headquarters Facility including structural, seismic and antiterrorism upgrades, HVAC, plumbing, electrical, life safety, fire protection, telecommunications/IT, security systems and interior finishes. Performed quality control for calculations related to the structural design. Led efforts to verify compliance with UFC 3-301-01.

☒ Check if project performed with current firm

e.

(1) TITLE AND LOCATION *(City and State)*

JBER Post-Earthquake Evaluation, US Air Force, Anchorage, Alaska

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2019	Ongoing

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

In response to the November 2018 Anchorage Earthquake, Jacobs deployed two teams of structural engineers for on-site evaluation of damage to structural and non-structural components. Damage reports were developed into design-build bridging documents. Assisted in project proposal development. Lead one of two teams of engineers for post-earthquake inspections on 21 facilities, including 2 secure facilities. Issued daily reports to the client to address critical hazards. Prepared damage assessment reports to develop detailed cost estimates. Developed design-build bridging documents for ten of the original buildings including written scope of work, concept repair drawings, cost estimated, hazmat surveys, and ASCE 41 Tier 1 and 2 evaluations.

☒ Check if project performed with current firm

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
		a. TOTAL	b. WITH CURRENT FIRM
Geoffrey Kirsten, RA, AIA, NCARB, LEED AP	Architect	24	22

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Corvallis, Oregon

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
BAARC/1996/Architecture	Registered Architect, Hawaii (17245), 2016; Oregon (5141), 2006; Washington (9500), 2008; Nevada (6358), 2009; Colorado (401829), 2009; California (C33068), 2011; Utah (10090684-0301), 2016; Texas (26787), 2017; Arizona (71558), 2020 National Council of Architectural Registration Boards (NCARB); Certified (2007, No. 62354) Accredited Professional: Leadership in Energy and Environmental Design (LEED®); 2004 Accredited Professional: Leadership in Energy and Environmental Design (LEED®) BD&C; 2011

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Geoff is an architect with more than 22 years of experience. He has worked throughout the United States on projects including municipal water and wastewater treatment plants, military facilities, and educational facilities. As a senior project architect, his architectural responsibilities include report preparation, design, specification production, project coordination, quality control and services during construction. He is experienced in coordinating projects that involve many disciplines, including structural, mechanical, electrical, HVAC, plumbing, instrumentation and control, and landscape architecture. He is experienced with industrial building design including design for hazardous occupancies. Geoff is currently the Deputy Group Leader, for the architectural discipline in Corvallis, and is responsible for technology, scheduling, staffing, and administrative issues.

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION *(City and State)*

Water Resource Recovery Facility Project, City of San Luis Obispo, San Luis Obispo, California

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2019	Ongoing

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Architectural scope of work included new process support buildings and structures and quality control review of a sub-consultant for a new water resource center. The architectural design satisfied architectural review board requirements. Responsible for concept design, design development, construction documents and services during construction.

☒ Check if project performed with current firm

b.

(1) TITLE AND LOCATION *(City and State)*

Temecula Valley Regional Water Reclamation Facility 23 MDG Expansion; Eastern Municipal Water District, Temecula, California

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2017	2019

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Architectural scope of work included three new buildings: Blower Building and Electrical Building. The new structures consisted primarily of load-bearing masonry walls with single-ply membrane roofing over steel roof framing. Responsible for concept design, design development, construction documents and services during construction.

☒ Check if project performed with current firm

c.

(1) TITLE AND LOCATION *(City and State)*

3Kings Water Treatment Plant, Park City Municipal Corporation, Park City, Utah

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2020	Ongoing

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Architectural scope of work included replacement of an existing water treatment plant that was embedded in the Park City Municipal Golf Course and directly adjacent to restaurants and shops. The new plant consisted of eight new buildings housing functions that included operations and maintenance, process and pumping, electrical equipment, and chemical storage that were organized to fit between two holes of the golf course. The architectural treatment for the project sought to reflect the local mountain resort

☒ Check if project performed with current firm

and traditional mining influences. The visual treatment of the buildings and the associated landscaping was carefully selected to address stringent architectural review board requirements. Responsible for concept design, design development, construction documents and services during construction.

d.

(1) TITLE AND LOCATION *(City and State)*

Northern Treatment Plant, Metro Wastewater Reclamation District (Design-Build), Denver, Colorado

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2014	2016

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Architectural scope of work included more than 20 new buildings. Most of new structure consisted of load-bearing masonry or concrete walls with brick veneer with single-ply membrane roofing over steel roof framing. Responsible for concept design, design development, construction documents and services during construction.

☒ Check if project performed with current firm

e.

(1) TITLE AND LOCATION *(City and State)*

Camp Pendleton Advanced Water Treatment Plant (Design-Build), NAVFAC Southwest, Marine Corps Base Camp Pendleton, San Diego County, California

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2013	2020

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Provided quality control review for architectural and LEED scope of work that included four new buildings: Operations, Chemical Storage, Reverse Osmosis, and Plant Pump Station. The new structures consisted primarily of load-bearing masonry walls with sheet metal roofing over steel roof framing. The project targeted LEED® Silver certification.

☒ Check if project performed with current firm

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
		a. TOTAL	b. WITH CURRENT FIRM
Ryan Harbert, P.E., LEED AP	Electrical Designer	18	18

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Corvallis, Oregon

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
B.S./2002/Electrical Engineering	Professional Engineer, Hawaii (15786), 2016; Oregon (71826PE), 2007; Maryland (35052), 2007; Rhode Island (10127), 2013; Washington (52587), 2015; California (21673), 2016 LEED Accredited Professional, 2003 (LEED AP™)

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Ryan has 18 years of experience working on a variety of projects, including public and private facilities design, water and wastewater treatment plants, and lighting systems for airports. He provides detailed electrical design for required facility systems with his primary responsibility for delivery of the electrical project work deliverables (drawings, specifications, reports, etc). Additionally, Ryan is a technology leader in photovoltaic power systems, including technical specification coordinator for the firm's master specification on grid-tied photovoltaic systems, and completion of North American Board of Certified Energy Practitioners certification training for grid-direct solar electric facilities.

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION *(City and State)*

Lahaina, WWRF Stage 1A Improvements, County of Maui, Lahaina, Hawaii

(2) YEAR COMPLETED	
PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2017	2020

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Lead electrical engineer for plant expansions and upgrades, including a new electrical room and upgrades to existing electrical rooms, lighting systems, support for new and existing aeration basin improvements, blower building improvements, solids building improvements, new secondary clarifier, and various other plant upgrades. Provided new automated system control to existing standby generator. Project required close coordination with owner and construction staff to develop the design and construct improvements while still operating the facility.

☒ Check if project performed with current firm

b.

(1) TITLE AND LOCATION *(City and State)*

Water Resource Recovery Facility Project, City of San Luis Obispo, California

(2) YEAR COMPLETED	
PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2020	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Lead Electrical Engineer for a design project to support the expansion of an existing wastewater facility. Project included upgrades to existing plant liquids and solids handling facilities, and construction of new UV disinfection, Membrane Bioreactors, and effluent cooling towers. Electrical upgrades include new service equipment, medium voltage distribution, low voltage distribution, and networkable motor control centers. Worked closely with a local controls subconsultant to coordinate electrical design with instrumentation and controls.

☒ Check if project performed with current firm

c.

(1) TITLE AND LOCATION *(City and State)*

North City Water Reclamation Plant Expansion and North City Pure Water Facility Influent Pump Station and Pipeline Clean Water Services, San Diego, California

(2) YEAR COMPLETED	
PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2018	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Managed and led an electrical design team to support the expansion at this existing wastewater facility. Project included four distinct design packages, and work was shared with electrical design sub-consultants. Work included four new secondary clarifiers, new equalization tank, expanded primary treatment facilities, new and refurbished secondary treatment processes, new influent pump station to a new pure water facility (pure water facility by others), replacement of all unit substations, provisions for new 15kV service switchgear, relocation of existing gas fired power generator, and various other improvements at almost every process facility onsite.

☒ Check if project performed with current firm

d.	(1) TITLE AND LOCATION *(City and State)* **Renewable Energy Consultant, King County Department of Natural Resources and Parks, Water Treatment Division, Washington**	(2) YEAR COMPLETED PROFESSIONAL SERVICES: 2018 CONSTRUCTION (If applicable):
	(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE Developed multiple conceptual ground photovoltaic array layouts at two County wastewater plants including siting considerations, maintenance access, row spacing, shading issues, recommended tilt angle for maximum annual energy production, cost estimates, power production estimates and electrical interconnection details.	☒ Check if project performed with current firm
e.	(1) TITLE AND LOCATION *(City and State)* **Durham AWWTF Cogeneration and Brown Grease Facilities, Clean Water Services, Tigard, Oregon**	(2) YEAR COMPLETED PROFESSIONAL SERVICES: 2019 CONSTRUCTION (If applicable):
	(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE Performed electrical design for a new Cogeneration Facility and Brown Grease Facility at the Durham AWWTF. Cogeneration uses digester and natural gas and is sized to provide a majority of plant electricity on an annual basis. Project included new unit substation with paralleling switchgear, and all motor control equipment required to support the Cogeneration, gas handling, and Brown Grease facility processes.	☒ Check if project performed with current firm

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
Tiana Michaud, P.E.	Electrical Engineer	a. TOTAL: 11	b. WITH CURRENT FIRM: 8

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Corvallis, Oregon

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
B.S./2009/Electrical and Computer Engineering	Professional Engineer, Oregon #83208; Washington #52948; California #E22654; Nevada #027330

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Tiana brings a variety of experience from working in an electric utility that had generation, transmission and industrial retail interconnection agreements; along with a background in customer service; and skills in electric distribution design for Jacobs. During Tiana's time at the utility, she was able to touch on several fields of knowledge including SCADA communications, PLCs, meters, transformers, contracts, service pricing, and maintenance. Her experience continues with design for water treatment, wastewater treatment, and lift stations as well as construction services support post design. Currently, she is designing systems including motor control centers, lighting, motor loading, and performing arc flash studies.

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION *(City and State)*

San Jose Regional Wastewater Reclamation Facility Headworks, San Jose, California

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Led the electrical work for the design of a new 420 mgd headworks 3 facility at the existing San Jose wastewater treatment plant. Included medium voltage distribution with medium voltage switchgear and relaying. Implementation of medium voltage drives for large raw sewage pumps as well as their controls and protection. Design to detailed owner standards for spare capacity, raceways, lighting criteria, and manufacturer preferences. Attend and present at regular and detailed workshops with owner to coordinate design and needs of the owner and site.

☒ Check if project performed with current firm

b.

(1) TITLE AND LOCATION *(City and State)*

Salmon Creek Phase 5B Package 1, Salmon Creek, Washington

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2019	Ongoing

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Incorporation of new odor control facilities in existing electrical infrastructure. Included design of additional ancillary improvements to existing waste water treatment plant and coordination of multiple concurrent projects by Jacobs as well as by others.

☒ Check if project performed with current firm

c.

(1) TITLE AND LOCATION *(City and State)*

Flamingo Water Resource Center Demolition of Retired Facilities, Las Vegas, Nevada

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Provided quality control and guidance for electrical work. Work includes, demolition and decommissioning of tertiary treatment facilities and unused support facilities on the East and West Campuses at the Clark County Water Reclamation District's Flamingo Water Resource Center.

☒ Check if project performed with current firm

d.

(1) TITLE AND LOCATION *(City and State)*

Cutter Lateral Reach 21 Water Treatment Plant and Associated Items, Bloomfield, New Mexico

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2020	2020

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Resident Engineer providing onsite construction services at remote water treatment plant near Bloomfield, New Mexico. Work tasks included coordinating between multiple sub-contractors on a Design Build construction project for the Navajo Gallup Water Supply. Facilitating construction resolution between sub-contractors and design office. Overseeing document management and tracking sub-contractor deliverables during construction. Monitor quality of field work and assist in tracking timely construction.

☒ Check if project performed with current firm

e.

(1) TITLE AND LOCATION *(City and State)*

Spokane Riverside Wastewater Reclamation Facility Phase 2, Spokane, Washington

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2018	Ongoing

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Led the electrical work for design of a new membrane filtration facility to an existing 125 mgd wastewater treatment plant. Design included a new membrane filtration facility, modifications to existing chemical storage facilities, new diversion structure and new pumping stations. Electrical work included lighting design for nearly an acre size facility with multiple levels; integration into the existing medium voltage distribution loop; upgrade of existing 13.2kV monitoring for increased current capacity; addition of 3.75MVA unit substations; distribution design for 12 each 250HP pumps; integration of radio, public address and fiber systems; design of new and changes to existing motor control centers; layout of new duct banks and connecting to existing duct bank system; and upgrades in wiring to existing instrumentation in remote locations.

☒ Check if project performed with current firm

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
		a. TOTAL	b. WITH CURRENT FIRM
Roger Collette, P.E.	Electrical Engineer	30	25

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Corvallis, Oregon

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
B.S./1989/Electrical Engineering	Professional Engineer, Oregon (61373PE), 2002; Washington (40605), 2004 RAM-W Certified

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Roger has 30 years of experience on a variety of large and small projects including wastewater and water treatment plants, environmental, aviation, military hangar, high technology, and specialized government facilities. He has been involved in many phases of projects, including contract negotiations, project setup, conceptual design, final design, services during construction, and contract closeout. Roger has delivered approximately 100 federal projects throughout the U.S. and around the world. He specializes in electrical system services for facilities and power distribution systems, from planning through construction. He provides design innovations for the development and renovation of complex uninterruptible power supply systems, power distribution systems, fire alarm and high-security systems. Roger's breadth of experience also includes site and utility infrastructure analyses, and assessment and design solutions using sustainable technologies. He has successfully delivered facilities in Haiti, Mexico, Afghanistan, Iraq, Kuwait, Germany, Italy, United Kingdom, and India.

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION *(City and State)*

Mission Critical Design-Build Services, Pacific Air Operations Center, Hawaii Air National Guard, Hickam Air Force Base (AFB), Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2006	2006

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Responsible for QC of electrical design elements for the fast-track D-B renovation of a 66,000-SF Air Operations Center, and conversion of historic Hangar 3 into a state-of-the-art Command and Control Center for all of the USAF PACAF forces theatre-wide. Provided the designer of record with technical support by incorporating lessons learned from past high security projects, as well as providing real time QA/QC for the electrical components for this renovation. Specific areas of support included defining the construction requirements for the Sensitive Compartmentalized Information Facility areas. Cost: $20.8 million (construction)

☒ Check if project performed with current firm

b.

(1) TITLE AND LOCATION *(City and State)*

C-17 Corrosion Control/Maintenance Hangar; Hickam AFB, Honolulu, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2003	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Served as technical specialist and advised the electrical designer how to mitigate the hazardous classifications in the hangar bay as well as other hangar related electrical issues.

☒ Check if project performed with current firm

c.

(1) TITLE AND LOCATION *(City and State)*

Rock Creek Advanced Wastewater Treatment Facility, Hillsboro, Oregon

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2000	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Electrical designer for the Phase 3 design, upgrading the plant from 15 million gallons per day (mgd) to 32 mgd (this work was done in three phases beginning in 1988 for a total construction cost of $50 million).

☒ Check if project performed with current firm

d.

(1) TITLE AND LOCATION *(City and State)*

Centralia Wastewater Treatment Plant, Centralia, Washington

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2003	2003

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Lead electrical engineer for the new plant. The electrical distribution system is rated for 1.8 megavolt-amperes with provisions for future site expansion. Total estimated construction costs are $17 million.

☒ Check if project performed with current firm

	(1) TITLE AND LOCATION *(City and State)*	(2) YEAR COMPLETED	
	Troutdale Water Pollution Control Facility, Troutdale, Oregon	PROFESSIONAL SERVICES 2001	CONSTRUCTION (If applicable) 2001
e.	(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE Electrical design lead for the new wastewater treatment plant. The electrical distribution system is rated for 1.5 megavolt-amperes with critical system loads backed up with a standby diesel generator. Worked extensively with the electrical contractor during construction to provide real-time inspections and clarification. Total construction costs were $15.5 million.	☒ Check if project performed with current firm	

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
		a. TOTAL	b. WITH CURRENT FIRM
Matthew Baldwin, P.E.	Civil Engineer	16	14

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Corvallis, Oregon

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
M.S./2004/Civil Engineering B.S./1999/Mechanical Engineering	Professional Engineer (Civil), Hawaii (PE-17133), 2016; California (C71817), 2007; Oregon (60202PE), 2014; Washington (57827), 2019 Land Surveyor-in-Training: Oregon (2004, 62020LSIT)

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Matt is a civil engineer with almost 16 years of experience in many aspects of site design including site layout, grading, yard piping, stormwater management, erosion control, and pavement design. He is an organized, highly-motivated and detail-directed problem solver known for developing high-quality design drawings and specifications for permitting and construction.

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION *(City and State)*

Lahaina Wastewater Reclamation Facility Stage 1A Improvements, County of Maui, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2020	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Lead Civil Engineer for the expansion of the wastewater treatment plant for the County of Maui. Performed site design at the step feed aeration basin and the headworks splitter box and site paving as well as site layout, and yard piping connections in an already congested yard. Established site demolition plans; designed grading, and access; and coordinated yard piping and pipe connections throughout the plant. Supported project during construction through submittal and RFI responses and was engaged in resolving field issues with the contractor.

☒ Check if project performed with current firm

b.

(1) TITLE AND LOCATION *(City and State)*

On Call Services, City of Millersburg, Oregon

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Project Manager responsible for meeting with the client on a regular basis to check in on their engineering needs. Tasks were identified, scoped and budgeted including small repair and construction projects within the city limits. Matt managed junior engineering staff to complete the design work, facilitate soliciting quotes for the work and perform construction inspection.

☒ Check if project performed with current firm

c.

(1) TITLE AND LOCATION *(City and State)*

North City Water Reclamation Plant, City of San Diego, California

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2019	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Lead yard piping engineer for the expansion of the wastewater treatment plant for the City of San Diego. Pipe materials included reinforced concrete pipe, ductile iron, FRPMP, HDPE, and PVC ranging in size from 8- to 96-inches in diameter.

☒ Check if project performed with current firm

d.

(1) TITLE AND LOCATION *(City and State)*

Waianae Wastewater Treatment Plant Improvements and Upgrade, City and County of Honolulu, Waianae, Oahu, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2017	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Civil Engineer of Record for the wastewater treatment plant improvement and upgrades for the City and County of Honolulu. Project included new piping for the plant recycled water system and connections to all existing service points. Supported project during construction through submittal and RFI responses, coordination with owner's representative and was engaged on resolving field issues.

☒ Check if project performed with current firm

	(1) TITLE AND LOCATION *(City and State)*	(2) YEAR COMPLETED	
	Carmen-Smith Improvements Project, Eugene Water and Electric Board, Eugene, Oregon	PROFESSIONAL SERVICES 2013	CONSTRUCTION (If applicable)
e.	(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE Matt was the Lead Civil Engineer for the fish passage improvements required by the FERC relicensing Settlement Agreement at the Carmen-Smith Hydropower Project. He also served as the facility lead for designing downstream fish passage at Trail Bridge Dam, temporary fish passage at Sweetwater Creek, and flow release study at Smith Dam. During this course of the project, Matt designed access roads, grading and coordinated with geotechnical engineers with respect to dam penetration and excavation details. He also collaborated with fish and terrestrial biologists to meet fish passage requirements and construction impacts within sensitive habitat areas. He developed impact management plans for structurally complex habitat area.	☒ Check if project performed with current firm	

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
		a. TOTAL	b. WITH CURRENT FIRM
Jim Sackinger, P.E.	Lead Mechanical Engineer	35	17

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Corvallis, Oregon

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
B.S./1983/Environmental Engineering	Professional Engineer (Mechanical), Washington (30676), 1994; California (M25582), 1988; Colorado (46239), 2012; Hawaii (17074), 2016; Nebraska (E-15793), 2015; Oregon (14585PE), 1989; Texas (119574), 2015

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Jim is a discipline lead for Building Mechanical Engineering at Jacobs. He has extensive experience in mechanical design, specification, and construction. He designs heating, ventilation, and air conditioning (HVAC), utility piping, industrial plumbing and piping systems, boilers and chillers, compressed air, and pumping systems. Jim also performs energy, acoustic, code, hazard, and corrosion analysis for processes and buildings. He is an effective supervisor and has provided quality control services for engineering and design on numerous projects.

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION *(City and State)*

Solids Handling Improvements, Clackamas County Water Environment Services/Tri-City Water Resource Recovery Facility, Clackamas

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2018	Ongoing

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Jim engineered a complex remodel and expansion of existing solids facilities in restricted space. He designed HVAC utilizing cogenerated hydronic heat and utilized non-mechanical cooling for the electrical room. Jim navigated complex Fire Code issues and was responsible for designing HVAC, plumbing and fire protection for hazardous and corrosive spaces, and he is currently providing construction support.

☒ Check if project performed with current firm

b.

(1) TITLE AND LOCATION *(City and State)*

Headworks Facility, City of San Jose/Santa Clara Water Reclamation Facility, San Jose, California

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Jim served as Building Mechanical Engineer on this design-build project for the largest tertiary wastewater treatment plant in the western United States. He designed redundant non-mechanical cooling for the electrical building and control room, provided ventilation of hazardous corrosive areas, plumbing, drainage and fire protection design.

☒ Check if project performed with current firm

c.

(1) TITLE AND LOCATION *(City and State)*

Cogeneration Facility, City of San Jose/Santa Clara Water Reclamation Facility, San Jose, California

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2018	Ongoing

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Jim engineered complex interfaces between the new 18-megawatt cogeneration plant and existing cogeneration, hydronic heating, chilled, and domestic facility systems on this design-build project. He provided a feasibility study and follow-through to design. Jim designed engine cooling and sound attenuation, converted a 250-ton heat absorption type chiller system to mechanical vapor compression, and provided plumbing, drainage and fire protection design for three buildings.

☒ Check if project performed with current firm

d.

(1) TITLE AND LOCATION *(City and State)*

Water Pollution Control Plant Upgrades, City of Midland, Midland, Texas

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2018	Ongoing

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

As mechanical engineer on this design-build project, Jim designed process drainage, plumbing, and fire protection for seven new buildings in this existing sewage treatment plant.

☒ Check if project performed with current firm

	(1) TITLE AND LOCATION *(City and State)*	(2) YEAR COMPLETED	
	Oxygen Plant Improvements, Central Tacoma Wastewater Treatment Plant, City of Tacoma, Washington	PROFESSIONAL SERVICES 2011	CONSTRUCTION (If applicable) 2013
e.	(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE Jim was responsible for air side and water side heat rejection improvements for this pressure swing absorption (PSA) oxygen facility utilizing three each, 400-hp air compressors. He provided a proof-of-concept study for heat rejection to wastewater and then provided additional design for ventilation cooling and controls, including acoustic analysis.	☒ Check if project performed with current firm	

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
		a. TOTAL	b. WITH CURRENT FIRM
Michael Eller, P.E.	Geotechnical Engineer	12	10

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Corvallis, Oregon

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
M.S./2010/Civil Engineering B.S./2006/Civil Engineering	Professional Engineer (Civil), Hawaii (17039), 2016; California (75762), 2010; Oregon (89805), 2015

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Michael is a geotechnical engineer with experience in design and project management. His geotechnical expertise includes planning and leading geotechnical exploration programs for foundation design, performing seismic hazard evaluations and site-response analyses, settlement and slope stability evaluations. A significant portion of Michael's professional experience has involved the evaluation and design of dams, levees, reservoirs, and water and wastewater treatment facilities in seismically active areas like the west coast of the U.S. and Hawaii. As a design and project manager, Michael has experience leading multi-disciplinary design teams and has served as assistant project manager for several design and construction projects.

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION *(City and State)*

Lahaina Wastewater Reclamation Facility Stage 1A Improvements, Maui, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2016	2020

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

The County of Maui looked to restore the treatment capacity at the Lahaina wastewater reclamation facility by adding several new structures, including an aeration basin and secondary clarifier. Involvement included serving as Geotechnical Lead, coordinating exploration program, performing analysis and summarizing design recommendations including seismic hazard evaluations, and developing specifications and construction documents. During construction, Michael was on site to provide geotechnical support during construction, particularly with the deep excavations required for the new infrastructure.

☒ Check if project performed with current firm

b.

(1) TITLE AND LOCATION *(City and State)*

Pacific In-Flight Interceptor Communication System Data Terminal, U.S. Army Corps of Engineers, Oahu, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2020	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

In support of the proposed Homeland Defense Radar – Hawaii, the new Data Terminal will provide additional capability to the Ballistic Missile Defense System. The project was a joint effort with a partnering firm, while cross-collaborating with other design firms and the USACE working at the site. Michael served as the Geotechnical lead for the design of the Data Terminal, coordinating the geotechnical exploration program of the project, performing analysis and developing design and construction recommendations. Project was put on hold at 35% Design Level.

☒ Check if project performed with current firm

c.

(1) TITLE AND LOCATION *(City and State)*

Riverside Park Water Reclamation Facility, Phase 1 and 2 Improvements, City of Spokane, Washington

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
	Ongoing

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

The City of Spokane is expanding and improving their wastewater treatment facility along the Spokane River, and will include a new primary clarifier, chemical storage building, and membrane treatment facility that is capable treating 150 mgd. Michael served as the geotechnical engineer, coordinating the site exploration program, performing analysis and design to support design and construction of the facilities, which included the design of a large, 40-ft high anchored soldier pile wall and 600-feet long, 60-feet high reinforced soil slope to accommodate the construction. Phase 1 has been constructed and Phase 2 is currently under construction. During construction, Michael provides engineering support to the City and the Contractor as needed.

☒ Check if project performed with current firm

d.

(1) TITLE AND LOCATION *(City and State)*

Tri City Water Resource Recovery Facility Solids Handling Improvements Project, Clackamas County, Oregon

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
	Ongoing

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Clackamas County is looking to expand their wastewater treatment capacity by adding a new digester and several additional structures, including a dewatering feed tanks, digester feed tanks, and a digester control building. The site is already developed and several structures are adjacent to the proposed work area. In addition to the tight site constraints, the design must also account for potential seismic hazards such as liquefaction and slope instability. Michael performed geotechnical investigation and seismic hazard evaluations to assess the lateral spreading susceptibility of the site, and to assess potential settlement due to liquefaction. Ground improvement methods were assessed and developed for design, including the development of an anchored secant pile wall for excavation support for the new digester while maintaining the stability of the existing adjacent structures.

☒ Check if project performed with current firm

e.

(1) TITLE AND LOCATION *(City and State)*

Beaver Creek Water Supply and Treatment Project, Seal Rock Water District, Oregon

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2020	Ongoing

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Project consists of river intake, raw water pump station, approximately 2 miles of 14-inch HDPE pipeline, and water treatment facility including two welded steel tanks with capacity of 0.25 MG and 0.5 MG. Project is situated along Oregon coast and susceptible to strong seismic ground motions. District's goal was to produce a seismic resilient system. Michael served as geotechnical engineer, performing site exploration and design for the project. Extensive coordination with design and permitting teams was required throughout design. Intake and pump station are situated on soft compressible soils, requiring several different methods to address static settlement and potential settlement due to a seismic event. Project construction is currently underway.

☒ Check if project performed with current firm

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
		a. TOTAL	b. WITH CURRENT FIRM
Paul Davis P.E., G.E.	Geotechnical Engineer	24	24

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Corvallis, Oregon

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
M.S./1996/Geotechnical Engineering B.S./1995/Civil Engineering	Geotechnical Engineer, Oregon (65715PE) Professional Engineer, Hawaii (PE-17359); Washington (41562), 2005

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Paul is a geotechnical engineer with Jacobs' Design and Construction Group. He performs geotechnical and civil engineering evaluations and prepares plans and specifications for a variety of construction projects. Specializations include evaluations relating to foundations, retaining structures, embankments, solid waste management, geosynthetic design, soil liquefaction and amplification and other engineering services for projects requiring earthwork consulting. He coordinates geotechnical field exploration programs, evaluates geotechnical field and laboratory testing information, develops design recommendations, and prepares design reports for a wide variety of geotechnical engineering projects.

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION *(City and State)*

Honolulu Authority for Rapid Transit (HART) Consolidation Cell Design, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Soil Debris Pile Construction. RHS Lee Baseyard. Pearl City, Oahu. Design of Consolidation/Impoundment Cell of solid waste materials.

☒ Check if project performed with current firm

b.

(1) TITLE AND LOCATION *(City and State)*

HART Geotechnical Baseline Report for Pearl Highlands Parking Structure, Transit Center, and H2R1 Ramp. Pearl City, Oahu, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2017	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Submitted August 2017. Honolulu Authority for Rapid Transit. Honolulu Rail Transit Project.

☒ Check if project performed with current firm

c.

(1) TITLE AND LOCATION *(City and State)*

Waianae Wastewater Treatment Plant Improvements and Upgrade, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2017	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Lead geotechnical engineer for improvements and additions to existing facility. Design analyses and contract documents package.

☒ Check if project performed with current firm

d.

(1) TITLE AND LOCATION *(City and State)*

Lead Geotechnical Engineer, HI ANG TFI F-22 Beddown – Add to Bldg 3385 (Communications/Control), Joint Base Pearl Harbor-Hickam, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2013	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

Addition to the existing Communications Facility Building 3385 and associated pavements supporting the beddown of PAA, F/A-22 aircraft. Prepare scope of work for geotechnical exploration subcontractor services, geotechnical/foundation design, and construction oversight of micro-pile foundation system. Oversight Pacific Geotechnical subcontracting engineer for procurement of driller and preparation of geotechnical report.

☒ Check if project performed with current firm

	(1) TITLE AND LOCATION *(City and State)*	(2) YEAR COMPLETED	
	Lead Geotechnical Engineer; HI ANG, F-22 LOCRF, Joint Base Pearl Harbor-Hickam, Hawaii	PROFESSIONAL SERVICES 2012	CONSTRUCTION (If applicable)
e.	(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE Through a TO under an IDIQ, oversight of geotechnical investigation and data reports, and provided foundation engineering designs for this 38,000-SF facility. Used knowledge and understanding of island soils (lagoonal deposits over loose sand, coral, and bedrock) and to provide geotechnical design services for deep foundations including seismic techniques. Used stone columns in lieu of piles to mitigate for seismic hazard mitigation (liquefaction and lateral spreading). The facility received LEED Gold certification. Project awarded 2013 USAF Design Award. Cost: $2.9M (Professional Services). Cost: $22.M (construction). Oversight of Pacific Geotechnical subcontracting engineer for procurement of driller and preparation of geotechnical report.	☒ Check if project performed with current firm	

E. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS SERVICE CATEGORY

(Complete one Section E for each key person.)

12. NAME	13. ROLE IN THIS CONTRACT	14. YEARS EXPERIENCE	
		a. TOTAL	b. WITH CURRENT FIRM
Tom Jones	Senior Cost Estimator	25	13

15. FIRM NAME AND LOCATION *(City and State)*

Jacobs, Corvallis, Oregon

16. EDUCATION *(DEGREE AND SPECIALIZATION)*	17. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
University of New Mexico, various undergraduate classes United States Air Force, Engineering Assistant Training	N/A

18. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*

Tom has more than 25 years of experience in the construction industry, including construction project management, estimating, contract administration, scheduling, material and equipment procurement, and communications with Owner and engineer. He has experience developing construction and cost estimates for a range of infrastructure projects, including nearly $1B of water and wastewater treatment facilities. Tom's experience also includes estimating complex projects, anticipating market conditions, prevailing wages, production rates, and other factors that affect costs. Proven record in producing cost estimates that are accurate in scope and within the range of accuracy established by AACE International.

19. RELEVANT PROJECTS

a.

(1) TITLE AND LOCATION *(City and State)*

Honouliuli WWTP Secondary Treatment, Phase 1A-Sludge Drying and Related Facilities, City and County of Honolulu, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2018	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

The project is completing the Phase 1A Design and providing Bid Phase Support Services for the Honouliuli WWTP (HLIWWTP) Secondary Treatment Expansion Project. Phase 1A will include a new Cake Receiving Facility, a new Dryer Facility, dried product screening and quality control equipment, new Dewatering Centrifuges, new Pellet Storage and Unloading Facility, a new Temporary Pellet Storage Facility, a new Operations Building attached to the new Dryer Facility for contract operations, and the demolition of existing facilities. Approximate construction costs of $66 million. Final engineers estimate was within 13% of the low bidder. Tom was responsible for the preparation of a Class 3, Class 2, and Class 1 cost estimates based upon design documents. Collected data and performing quantity take-offs to uses as inputs for the cost estimate to determine and reconcile project scope. Applied costs to scope items and compiled the information into a Basis of Estimate document. Worked with project team to review and confirm project scope and estimate pricing.

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b.

(1) TITLE AND LOCATION *(City and State)*

Waianae Wastewater Treatment Plant Improvements and Upgrade Project, City and County of Honolulu, Hawaii

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2019	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

The City and County of Honolulu is evaluating improvements needed at the Waianae Wastewater Treatment Plant (WWTP) to meet regulatory requirements and future wastewater demands. Approximate construction costs of $13 million. Final engineers estimate was within 5% of the low bidder. Tom was responsible for the preparation of a Class 3, Class 2, and Class 1 cost estimates based upon design documents. Collected data and performed quantity take-offs to uses as inputs for the cost estimate to determine and reconcile project scope. Applied costs to scope items and compiled the information into a Basis of Estimate document. Worked with project team to review and confirm project scope and estimate pricing.

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c.

(1) TITLE AND LOCATION *(City and State)*

City of Tracy WWTP – Phase 2B Expansion, California

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
Ongoing	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

This project includes the work required to expand the treatment capacity of the existing WWTP, including site work, Septage Receiving, Headworks, Grit Removal, Primary Clarifier, Dewatering Pump Station, Aeration Basin, Digesters, Dewatering Facility, and modifications to existing facilities. Approximate construction costs of $50 million. Tom is

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a Senior Cost Estimator for the project and is responsible for the preparation of a Class 3 and Class 2 cost estimates based upon design documents. Collecting data and performing quantity take-offs to uses as inputs for the cost estimate to determine and reconcile project scope. Applying costs to scope items and compiled the information into a Basis of Estimate document. Working with project team to review and confirm project scope and estimate pricing.

d.

(1) TITLE AND LOCATION *(City and State)*

Haikey Creek – Activated Sludge Management Rehabilitation, Oklahoma Department of Environmental Quality, Regional Metropolitan Utility Authority, Oklahoma

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2019	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

The purpose of the Regional Metropolitan Utility Authority (RMUA) Haikey Creek Wastewater Treatment Plant (HCWWTP) Activated Sludge project is to improve operations at HCWWTP by increasing the Maximum Month Average Day capacity to 16 MGD. The facilities that are included in this project are a new Blower Building, Aeration Basins, Headworks Junction Box and a Mixed Liquor Junction Box. Approximate construction costs of $19 million. Final engineers estimate was within 2% of the low bidder. Prepared Class 3, Class 2, and Class 1 cost estimates based upon design documents. Collected data and performing quantity take-offs to uses as inputs for the cost estimate to determine and reconcile project scope. Applied costs to scope items and compiled the information into a Basis of Estimate document. Worked with project team to review and confirm project scope and estimate pricing.

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e.

(1) TITLE AND LOCATION *(City and State)*

Water Station #1 – Phase 2, Reservoir and Security Upgrades, City of Vancouver, Washington

(2) YEAR COMPLETED

PROFESSIONAL SERVICES	CONSTRUCTION (If applicable)
2019	

(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE

This project is for the construction of two 4MG Prestressed Concrete Tanks and a 1MG Steel Standpipe at the Water Station #1 in Vancouver, Washington. Approximate construction costs of $23 million. Final engineers estimate was within 10% of the low bidder. Prepared Class 3, Class 2, and Class 1 cost estimates based upon design documents. Collected data and performing quantity take-offs to uses as inputs for the cost estimate to determine and reconcile project scope. Applied costs to scope items and compiled the information into a Basis of Estimate document. Worked with project team to review and confirm project scope and estimate pricing.

☒ Check if project performed with current firm