KC WATER
FACILITIES & PLANTS ENGINEERING

4800 E. 63rd Street
Kansas City, Missouri 64130
www.kcwater.us

816-513-0331
Fax: 816-513-0343

DATE: October 24, 2023

TO: Jeff Martin, P.E., Chief Engineering Officer
Wes Minder P.E., Director

FROM: Kevin White, Project Manager DS kw 10/30/2023

SUBJECT: Design Professional Services Bid Recommendation for Blue River Odor Control Phase III – PN: 81001020/1707

Request for Qualifications/Proposals (RFQ/P) were received for the Blue River Odor Control Project, Project/Contract Nos. 81001020/1707 on October 17, 2023 by 2:00 pm from one (1) respondent, Jacobs. The Project was advertised on the City's website and the KC Planroom website on September 12, 2023.

1. **PROJECT NUMBER(S):** 81001020

2. **CONTRACT NUMBER:** 1707

3. **PROJECT DESCRIPTION:** This Project is intended to identify where hydrogen sulfide (H2S) and other odorous compounds collect within the system causing air quality issues and increased degradation rates for collection system infrastructure and to determine if solutions to these issues exist prior to employing the full battery of odor control mitigation measures. The Basic Scope of Services consists of professional engineering services to provide sampling for and design of odor control and associated improvements for the entire collection system. The selected proposer shall provide design professional services for the following improvements:

    - Develop a sampling and analysis plan (SAP) to sample up to 40 manhole locations that have the highest likelihood for elevated H2S levels;
    - Collect up to 40, 24-hour aliquot samples for H2S and other analytes to supplement the City's influent sampling data set;
    - Provide a Data Report detailing the results of the sampling effort;
        - Within the data report, DP will provide a plan for chemical piloting and other potential mitigation strategies to employ at identified target locations.
    - Conduct chemical piloting and/or other mitigation strategies at locations identified within data report; and
    - Provide City with a Summary Report of results of chemical piloting and/or other mitigation strategies implemented.

- Additional Project scope that will be negotiated after award will include the deployment of H2S dataloggers at all planned sampling location sites, in addition to planned odor logger installs at select tube pump stations.

4. **TASK SERIES LISTING INFORMATION:**

   Task Series 100 – Project Management and Administration
   Task Series 200 – Collection System Assessment
   Task Series 300 – Chemical Pilot Testing
   Optional Services

5. **TOTAL ESTIMATED FEE:** $350,000 (does not include H2S Datalogger scope to be negotiated)

6. **SOURCE OF FUNDS:** TBD

7. **ORDINANCE:** TBD, Ordinance will be required with the additional datalogger scope

8. **MBE/WBE GOALS:** 14% MBE / 14% WBE

9. **PROPOSAL RECEIVED:**

   a. Jacobs

10. **DESIGN PROFESSIONAL SERVICES SELECTION COMMITTEE:**

    No selection committee was requested since one response was received.

11. **PROPOSAL REVIEW:** A summary of the proposal review is provided below. Based on Staff review of the RFQ/P received, Jacobs illustrated a thorough understanding of the Project scope and is qualified to complete the Project.

    - Jacobs illustrated a thorough understanding of the project scope:
      - Proposing to use WATS model to predict odors and corrosion and to simulate performance of mitigation alternatives
      - Acrulog vapor-phase hydrogen sulfide used for continuous measurement installed for up to 2 weeks (~20 locations shown, will be refined by WATS model and City Input)
      - Collection liquid wastewater samples (~20 locations shown, will be refined by WATS model and City input)
      - Pilot Testing and Alternatives evaluation
        - Fan testing is optional task
      - Optional Services to provide conceptual design and estimated life cycle costs
      - Project schedule provided meets expectations
      - CREO Form KC 13 notes that Jacobs intends to meet the approved MBE/WBE goals of 14%/14% with Hg Consult, Inc. and Trekk
    - Jacobs is qualified to complete this project based on a review of personnel and the Experience and Reference Summary Provided:
      - Proposed staffing has relevant experience with executing this project type
      - Jacobs has completed many analogous projects, including:
        - H2S and Odor Mitigation Planning Study for Milwaukee, MI

- Collection System Odor Control Study & Design for Denver, CO
- Systemwide Odor & Corrosion Study and Design for Detroit, MI

12. **KEY FACTORS FOR SELECTION:**
    a. Sufficient staffing to support the project.
    b. Previous experience performing similar work to the current project.
    c. Ability to meet CREO goals.
    d. Experience with Odor Control Studies and Collection System Analysis for major metropolitan areas.

RECOMMENDATIONS:

Based upon staff review of the RFQ/P received, it is recommended that Jacobs be selected for this Project.

Approved: CLH 10-25-2023 (initial/date)
Chris Herrera, P.E., Engineering-Facilities Section Manager

Approved: DS BA 10/30/2023 (initial/date)
Blake Anderson, P.E., Engineering-Facilities Division Manager

Approved: DocuSigned by: Jeff Martin 756D1017BA554BC... 10/31/2023
Jeff Martin, P.E., Chief Engineering Officer Date

Approved: DocuSigned by: Wes Minder 50CCF2C28AE1472...
Wes Minder, P.E., Director Date

cc: Kevin White, Project Manager
Leona Walton, Contract Administrator
Brent Herring, Deputy Director, Wastewater Operations Officer
Lisa Pleasure, Finance Manager
Robbi Jackson, Finance Analyst
Contract File 1707

ENGINEERING AND SMART SEWER QA/QC FORM & CHECKLIST FOR DOCUMENT SUBMITTAL

Project Name: Blue River Odor Control Phase III	**Document Type: Bid Recommendation**
Project Number: 81001020	**Contract Number: 1707**
Project Manager: Kevin White	**Ordinance Number (If Applicable) : TBD**

The Engineering Leadership Team will establish the Quality Assessors based on the type of deliverable. The Project Manager shall submit their request through e-Builder to their Supervisor for assignment of the Quality Assessors. Supervisors shall consult with their respective Officer for assignments. QA/QC Form & Checklist will be routed for review utilizing DocuSign.

Level 1 Review With Checklist	Quality Assessor 1 Deadline:
Project Manager: *I have prepared this document for review. I attest to the quality of the content, accuracy of the content and grammatical work contained herein.* Kevin White — 10/24/2023 **Signature** — **Date**	**Quality Assessor:** *I have reviewed this document, indicated my comments and initialed the Checklist* Debra Heffernan — 10/24/2023 **Signature** — **Date**

Level 2 Review With Checklist	Quality Assessor 2 Deadline:
Project Manager: *I have reviewed the Level 1 version of this document. All indicated comments and edits have been incorporated or resolved to my satisfaction. I have completed the attached Checklist.* Kevin White — 10/24/2023 **Signature** — **Date**	**Quality Assessor:** *I have reviewed this document, indicated my comments and initialed the Checklist.* Chris L Herrera — 10/24/2023 **Signature** — **Date**

Level 3 Review - Final

Project Manager:

I have completed each of the review steps and initialed the Checklist. I have prepared this document for final approval and routing. I attest to the quality of the content, accuracy of the content and grammatical work contained herein.

Signature — **Date**

***QA/QC Form & Checklist must be transmitted with all documents routed for approval. ***

Engineering and Smart Sewer QA/QC CHECKLIST

REFER TO SIGNATURE MATRIX FOR ROUTING OF DOCUMENTS.
QA/QC FORM & CHECKLIST MUST BE TRANSMITTED WITH ALL DOCUMENTS.

	PM Initials	QA 1 Initials	QA 2 Initials
Is the information presented in a logical order?	☐ KCW	☐	☐
Is the document presented in consistent tense?	☒	☑	☑
Is the document written in third person?	☒	☑	☑
Is proper grammar used?	☒	☑	☑
Is proper paragraph and sentence structure used?	☒	☑	☑
Is punctuation properly and consistently applied?	☒	☑	☑
Are abbreviations/acronyms properly defined and consistently used?	☒	☑	☑
Has the content been proofread for typographical/spelling errors?	☒	☑	☑
Would the content make sense to a person unfamiliar with this project/work?	☒	☑	☑
Has the reader's perspective been considered?	☒	☑	☑
Has all supporting documentation/information been included?	☒	☑	☑
Is the correct version of the memo/form being utilized (correct: letterhead and signature lines)?	☒	☑	☑
Has all math been verified as correct?	☒	☑	☑
Are the project and contract numbers correct?	☒	☑	☑
Are the funding strings correct? TBD Once Fee Negotiated	☒	☑	☐
Are the descriptions, justifications and reasons accurate and defendable?	☒	☑	☑
Are the details and information for the ordinance and authorization correct?	☒	☑	☑
For change orders: Are the authorized/spent/remaining funds correct?	NA	N/A	n/a

Request For Qualifications/Proposals for
Design Professional Services Contract for
Project/Contract Nos. 81001020/1707

Blue River Odor Control Phase III

Water Services Department
City of Kansas City, Missouri

October 17, 2023

Jacobs

Challenging today.
Reinventing tomorrow.

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Reinventing tomorrow.

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www.jacobs.com

October 17, 2023
Mr. Kevin White, Project Manager
4800 E. 63rd Street
Kansas City, Missouri 64130

Subject: Blue River Odor Control Phase III – Project/Contract 81001020/1707

Dear Mr. White & Members of the Selection Committee

Kansas City's collection system and sanitary facilities are challenged with high levels of hydrogen sulfide and other odorous compounds, causing air quality issues and increased degradation rates of your valuable assets. Additionally, we recognize Kansas City's challenge of addressing issues while keeping your commitment to your ratepayers, many of whom are at poverty level. Our combination of understanding your infrastructure backed by the fresh perspective and ideas of world-class experts will help you keep your commitment to your ratepayers while protecting your assets.

We offer the following benefits of the Jacobs team:

Industry Leading, Science-Based Approach: We are prepared to develop & execute a comprehensive SAP for 40 key locations in your collection system, conduct piloting to fine-tune and right-size mitigation strategies, & other optional services. Our science-based modeling, supported by the leaders in sewer air flow and odor modeling (The WATS Guys), will take the guesswork out of determining the best sampling locations & expensive pilots. Our approach could reduce the number of sampling points & pilots needed while producing results that can be fully integrated into your collection system & treatment plant models. Your level of service will be elevated, assets protected, & scope delivered through our approach - all without extra cost to you.

Lessons Learned: Our team brings a successful track record of odor control strategies for entire large collection systems, including Denver (CO), San Francisco (CA), Raleigh (NC), London (UK), Albuquerque (NM), and Abu Dhabi (UAE). We are the only team that has conducted projects of similar magnitude and complexity as yours. Our industry-leading experts are supported by over 300 regional staff covering all disciplines of engineering, all backed by our deep bench of technologists.

Project Knowledge and KC Water Familiarity: Our understanding of your organization's processes, expectations, & assets is derived from our ongoing work supporting you & bolstered by my 20 years' experience delivering projects for you. Our team is supplemented by Webster Environmental Associates (odor control & complex sampling leaders), The WATS Guys (experts on WATS modeling), TREKK Design Group (WBE adding local field services & odor control experience), & HG Consult (MBE adding local field services).

We are prepared to deliver immediately upon notice to proceed, if selected. We are invested in you, our community, and your success as an organization. We look forward to strengthening our relationship with you through our highly collaborative professional services.

Sincerely,

Julie A McNiff

Julie A. McNiff, PE, PMP | Project Manager
Mobile: 913.634.8638 | Email: Julie.McNiff@jacobs.com

Statement of Qualifications Form

CITY OF KANSAS CITY, MISSOURI
WATER SERVICES DEPARTMENT
REQUEST FOR QUALIFICATIONS/PROPOSALS
FOR PROJECT NO. 81001020 CONTRACT NO. 1707
BLUE RIVER ODOR CONTROL PHASE III

STATEMENT OF QUALIFICATIONS FORM FOR RFQ/P

Firm Name: Jacobs Engineering Group Inc

Contact Person/E-Mail Address: Julie McNiff Julie.McNiff@jacobs.com Title: Project Manager

A. RELATED EXPERIENCE:

1.

Project Owner	Description of Project	Date of Completion	Owner's Contact Name, Phone #, E-Mail
Milwaukee Metropolitan Sewerage District	H2S and Odor Mitigation Planning Study Project	2020	Micki Klappa-Sullivan, 414.225.2178 mklappasullivan@mmsd.com
Metro Wastewater Reclamation District	Collection System Odor Control Study & Design	2021	Jim Mallory, 303.286.3487 jmallory@mwrd.dst.co.us
Oakland Macomb Interceptor Drain Drainage	Odor Corrosion Control Systems Design and CA/RPR	Ongoing	Joel Brown, 248.410.4908 brownjt@oakgov.com
Austin Water	Chemical Modeling of Austin Water Collection System	Ongoing	Kevin Koeller, 512.972.2055 kevin.koeller@austintexas.go
DC Water	Corrosion Control Strategy Development & Implementation	2022	Eyasu Yilma, 202.612.3520 eyasu.yilma@dcwater.com
Metro Wastewater Reclamation District	Stickney WRF Plant-Wide Dispersion Model & Odor Control Strategies	Ongoing	Jonathan Grabowy, 312.751.5600 grabowyj@mwrd.org

2.	Please indicate your home office location (City and State)	Dallas, TX
3.	How long has your firm been in business?	76 years
4.	How long has your firm had an office in Kansas City, Missouri?	18 years

B. QUALIFICATIONS:

1. How many registered (licensed) design professionals are in your firm?

	Kansas City Office	Total Firm	Combined Years Of Experience (Kansas City Office)	Combined Years Firm Total
Architects		285		Very High
Civil Engineers	5*	847	60	Very High
Mechanical Engineers		326		Very High
Electrical Engineers		275		Very High
Instrumentation/Control Engineers		91		Very High
CADD Technicians		52		Very High
Others	51*	3150	38	Very High

Of 5 total classified as Civil, 2 are registered PEs with an additional 1 awaiting paperwork.

C. CURRENT PROJECTS WITH KANSAS CITY, MISSOURI WATER SERVICE DEPARTMENT:

No.	Project Name	Engineering Fee	Percent Complete
1.	FY22 Water Main Replacement, PN80002338/CN9666	$478,806	Design 20%
2.	Little Shoal Creek Interceptor Lower Extension/PN81000777/CN1334	$1,750,000	Design 100% CPS 0%
3.	I/I Reduction Line Creek Rock Creek Project Area 4, PN1000802/CN1402	$764,200	Design 100% CPS 95%
4.	Middle Blue Area 12 I/I Reduction, PN81000720/CN1510	$505,605	Design 100% CPS 85%
5.	Blue River WWT Solids Improvement Project (Consultant to Carollo)	$2,485,506	93%
6.	Rocky Branch Facility Plan, PN8100100/CN1678	$500,000	Design 8% CPS 0%
7.	Smart Sewer Digital Strategies & Data Analytics, PN81000977/CN1627	$400,000	Design 0%
8.	Private I/I Reduction KOTR Year 5, PN60810046/CN1561-1	$2,000,000	5%
9.	Blue River Facility Plan (Consultant to Carollo)	Negotiation	Negotiation
10.	FY24 Water Main Replacements	Negotiation	Negotiation

D. COMMENTS:

1. If selected, an award will be based on mutually agreeable terms by both parties.
2. As noted in Other Required Documents, the Preliminary Vendor Security Questionnaire Forms 1 & 2 were only filled out by Jacobs. Our subconsultants will fill out the forms and adhere to KC Water security standards, upon selection.

Table of Contents

Part I
Business/Firm Profile and Legal Structure

Part I: Business/Firm Profile and Legal Structure

Firm's Legal Name: Jacobs Engineering Group Inc. (Jacobs)	
Address Headquarters: 1999 Bryan Street, Suite 1200 Dallas TX, 75201 Phone: 214.638.0145 Fax: 214.638.0447 **Website:** www.Jacobs.com	**Project Office:** Julie McNiff, Project Manager 2300 Main Street, Suite 325 Kansas City MO 64108 Phone: 913.634.8638 Email: julie.mcniff@jacobs.com
Federal #: 954081636	**Jacobs Engineering Group Inc. (Jacobs)** was founded in 1947
Total Employees: 62,000+	**Employees in Kansas City:** 56 employees Kansas City and 338 throughout Missouri Region

Services Provided: Jacobs is one of the world's largest, most diverse providers of technical, professional, and construction services, including all aspects of engineering, construction, operations and maintenance, and architecture. We provide specialty consulting services and serve a broad range of companies and organizations, including municipal, government, industrial, and commercial clients across multiple markets and geographies. We lead the global professional services sector with $15 billion in combined revenue, a talent force that is more than 62,000+ employees strong worldwide, and a global network that includes more than 400 locations.

Legal Structure

1. Has the business/firm ever failed to complete work for which a contract was issued? If yes, explain the circumstances.

In August 2020, the Procurement Office of the Arizona Department of Transportation (ADOT) notified Jacobs Engineering Group Inc. (Jacobs) of its intent to terminate an On-Call Acquisition and Relocation Services contract (CTR049970 and CTR049971) for default due to a disputed real estate brokerage licensing requirement. Jacobs has been in the process with ADOT of correcting this administrative default and to secure rescission of the notice. No task orders had been requested or issued under the subject On-Call.

Jacobs has delivered world-class engineering services with ADOT for over 30 years. Jacobs continues to win new contracts and deliver many projects with ADOT. This termination is not expected to have a material adverse effect on Jacobs Engineering Group Inc., or upon the business, financial condition, results of operations, or cash flows for the company.

Private and public clients, in the ordinary course of business, cancel or suspend projects for reasons that do not involve Jacobs. Jacobs does not track this information. However, Jacobs is unaware of any cancellation or suspension which would adversely affect Jacobs consolidated financial statements.

2. Are there any civil or criminal actions pending against the business/firm or any key personnel related in any way to contracting? If yes, explain in detail. Are there any current unresolved disputes/allegations?

Jacobs Engineering Group Inc. and its parent organization, Jacobs Solutions Inc. (JSI), and its related companies and affiliates form a global organization of over 300 subsidiaries and affiliate companies, in excess of 62,000 employees worldwide and revenues approaching $15 billion that has the technical, financial, and professional qualifications and resources to deliver Kansas City's Water Department projects. As a publicly traded company, JSI's annual reports, SEC filings, and Proxy reports can be found at http://invest.Jacobs.com/investors/Jacobs-Filings/default.aspx.

From time to time and in the ordinary course of its business, JSI and its related companies and affiliates are subject to various claims, disputes, terminations, arbitrations, and other legal proceedings. It is the company's practice to vigorously defend itself in such actions, many of which are generally subject to insurance and none of which are expected to have a materially adverse effect on the company's consolidated financial statements. No such litigation is expected to have any impact on the company's ability to perform under the contract.

3. Provide a brief history of the business/firm's contractual litigation, arbitration, and mediation cases for the last five (5) years that are material and relevant to this contract.

Please refer to the response to Question #2 above.

4. Has the business/firm ever been disqualified from working for the City or any other public entity? If yes, explain the circumstances.

The question asks if the business/firm has ever been disqualified from working for the City or any other public entity. The question asks Jacobs for information pertaining to contracts since Jacobs began conducting business.

Jacobs does not have information for the period of time required of this question to adequately answer this question. To the best of its actual knowledge Jacobs Engineering Group Inc. has not been disqualified from working for the City or any other public entity during the past five years.

Please also refer to our response on Question #2 above for further clarification.

Jacobs leads the global professional services sector in delivering solutions for a more connected, sustainable world.

As a recognized industry leader in odor control, wastewater collection systems, and wastewater treatment, we deliver some of the most challenging infrastructure programs throughout the nation and world through our comprehensive design services with solutions provided in nearly every infrastructure market. Our holistic wastewater services are supported by our industry-leading odor studies on large, complex collection system that sets us apart from the rest.

We Know KC Water

Jacobs has over 300 Missouri staff, backed by our global talent force of 62,000+, which have been working with you on numerous programs and projects over the last several years, resulting in a trusted relationship between our two entities as well as bettering the level of service to the community. These projects include Smart Sewer Digital Strategy Data Analytics, Blue River Biosolids, Rocky Branch Facility Plan, Blue River Facility Plan, Little Shoal, and a number of Neighborhood Sewer Rehabilitation (NSR), and Infiltration & Inflow Reduction Projects, illustrating our familiarity with your entire collection and wastewater treatment system.

Our services provided to you include:

- Design and construction rehabilitations of sewer and manholes
- Condition assessment of existing collection systems & assets (including the development of risk-based asset management protocols)
- Modeling of collection systems (including within the Gooseneck Creek & Lower Blue River watersheds)
- Utility coordination
- Design of collection systems
- Public involvement events, including operating telephone and email hotlines
- Construction-phase services, including qualified Resident Project Representatives (RPR) for a variety of projects
- Cost estimation, including Opinion of Probable Construction Cost (OPCCs) at each design phase, preparation of bid packages, and constructability reviews

Each project has served to strengthen our working relationship and helped us develop a more robust understanding of your challenges, policies, and procedures. We plan on leveraging this knowledge to deliver high-value solutions for your Blue River Odor Control project.

Who We Are

Within and across watershed and community boundaries, our clients are tackling complex challenges in sustainably and equity, safely managing the relationship between water sources and water users. Overcoming these challenges requires integrated solutions specific to the regional watershed, beneficial to local communities, and rooted in the context of the global water cycle. The Jacobs team recognizes water's role in the natural cycles of our planet; its connections to land, food, and energy; and perhaps most importantly, its influence on our cities, our societies, and our cultures. We use this perspective to help our clients implement integrated solutions to solve the most pressing water management challenges. We call this our OneWater approach, and it means we bring the people, capabilities, and solutions to overcome the challenges facing the City. Jacobs is a key partner to progressive organizations throughout the country that face similar challenges as you. Though your Blue River Odor Control Phase III project will mostly require our odor control and odor control personnel, our capabilities reach far beyond those specialties enabling us to see odor and corrosion control as a key piece of the whole system.

We're Invested in the City's Success

At Jacobs, we work to make the world smarter, more connected, and more sustainable. We're challenging today to reinvent tomorrow by solving the world's most critical problems for thriving communities, resilient environments, mission-critical outcomes, operational advancement, scientific discovery, and cutting-edge manufacturing, turning abstract ideas into realities that transform the world for good.

That's why we bring a thoughtful and collaborative approach to every one of our partnerships. We know that helping our partners make a positive impact on the world, regardless of the size of the project or agency, starts and stops with respecting everyone's voice.

Part II
Experience

Part II: Experience

Our portfolio of relevant experience consists of over 500 odor and corrosion control projects for wastewater agencies in the United States, Australia, Europe, Canada, and Asia. The variety of challenges faced by these agencies means no problem being unfamiliar and no solution being unattainable. We are the leader in odor and corrosion control research, and we have been involved in almost all major global odor research projects and publications, including those done through the Water Environment Federation (WEF), the Water Environment Research Foundation (WERF), and the International Water Association (IWA). For you, this means we have global experience to ensure we deliver you high-value, proven solutions.

If there is an odor control and corrosion issue in a collection system or wastewater treatment plant, we have seen it and we have solved it.

Jacobs' successful odor/corrosion work on previous wastewater collection system projects has led to significant cost savings on the order of tens of millions of dollars that would have otherwise been spent on additional costly sewer lining projects.

Our firm has completed more than 50 collection system odor and corrosion studies that have used sewer odor/process modeling, many of which were driven by similar objectives. **These studies include large collection systems comparable to KC Water such as: Milwaukee (WI), Denver (CO), San Francisco (CA), Raleigh (NC), London (UK), Albuquerque (NM), Austin (TX), Abu Dhabi (United Arab Emirates), Gwinnett County (Atlanta GA), and Oakland County (Detroit, MI).** For the past 8 years, we have collaborated with Aalborg University (Denmark) to further develop the Wastewater Aerobic/Anaerobic

EXHIBIT 1: Selected Jacobs Collection System Odor Projects

Transformations (WATS) model by leveraging real world data from collection system odor studies around the world. **Our science-based approach is efficient and often saves time and budget.**

Our studies have compared all **odor mitigation options**, and we designed odor and corrosion control systems using virtually all available vapor and liquid phase odor mitigation options. The systems we have designed range from localized systems to some of the largest wastewater odor control systems in existence (with capacities in excess of 1,500,000 cfm).

Our proposed technical leader, **Bill Desing**, leads Jacobs' global odor technology group, with more than 25 odor specialists that work almost exclusively on odor control-related projects - most of which are for municipal wastewater agencies like KC Water. As specialists, they stay current on the latest odor control developments and research. Many of them began their careers as wastewater or collection system engineers, allowing them to understand and address the odor challenges unique to municipal wastewater facilities. These professionals bring the experience, perspective, and practices of working in multiple continents, North America, Australia, Europe, and Asia, to help ensure we can bring the latest technology developments from all parts of the world.

Our large team of odor technologists brings experts not only in odor control but in the specialized areas related to odor projects including:

Odor Sampling: We provide experienced crews that are available to collect additional odor samples and perform odor field measurements. We own most of the equipment required for collecting samples and making in-field measurements, including Odalogs, Nasal Rangers, anemometers, and colorimetric field-testing kits.

Sewer Odor and Corrosion Modeling: In the 1990s, Jacobs developed one of the first sewer process models, INTERCEPTOR, designed to help mitigate odor and corrosion in sewers. Around the same time, researchers led by **Dr. Jes Vollertsen** at Aalborg University (Denmark) developed a similar model known as WATS. In 2014, Jacobs and Dr. Vollertsen entered into an agreement to collaborate to use Jacobs' real-world project experience to refine and expand the capabilities of the WATS model. The WATS model is now the world's leading sewer process model, and our team has used it on more than 50 projects, including wastewater collection systems that serve more than 2 million people. The model can find optimum vapor phase air flow rates and chemical types/dosages needed to mitigate odor/corrosion issues with limited pilot testing. This is done by executing multiple model runs in hours rather than the weeks or months required for an extensive pilot testing program.

Our recent, successful projects with regional clients facing similar challenges in their large, complex collection systems (including Milwaukee, Denver, and Detroit) are summarized on the following pages. Most of these projects were driven by the need to reduce sewer corrosion rates while mitigating recurring odors.

Our recommended corrosion/odor mitigation solutions have extended the remaining useful life of critical assets, minimizing costly additional sewer linings. Our designs extract corrosive sewer gases and treat foul air before emitting into the atmosphere. Coupled with localized sewer lining or coating, our corrosion/odor control facilities have saved tens of millions of dollars and address the root cause of the sewer corrosion problems.

Our successful design and implementation of several corrosion/odor mitigation strategies were due to the following:

- ✓ Close collaboration with our clients
- ✓ Jacobs use of state-of-the-art Wastewater Aerobic/Anaerobic Transformations in Sewers (WATS) sewer models
- ✓ WATS modeling coupled with field sampling as a comprehensive study
- ✓ Our technical knowledge and expertise in sewer odor/corrosion control
- ✓ Our local knowledge of these wastewater collection systems and their operations

005Y07_107_02

Pipeline Condition Assessment and Rehabilitation Services: Jacobs' pipeline Condition Assessment and Rehabilitation Services (CARS) practice provides pipeline asset management services, including field inspection, sewer liner design, and other sewer rehabilitation services. The team includes more than 400 engineers, technologists, and managers, conducting over $250 million per year in business revenue, and has been ranked #1 by Trenchless Technology magazine year after year.

Corrosion Assessment and Mitigation: Jacobs' Corrosion Group designs applications of all types of corrosion control methods for buried, submerged and exposed infrastructure components. Our staff performs failure investigations, material selection relating to corrosion control as well as cathodic protection and protective coatings design. The group also performs sampling, field tests, surveys and assessments to mitigate corrosion.

Air Dispersion Modeling: We have a group of approximately 30 meteorologists, scientists, and engineers who are solely dedicated to air dispersion modeling. These specialists have performed dispersion modeling for hundreds of municipal and industrial emission sources and have extensive experience with commonly used Gaussian dispersion models like AERMOD, as well as more advanced computational fluid dynamic (CFD) models that may be appropriate here. We have extensive experience modeling odors from wastewater collection systems, which is critical because of the unique requirements of collection system modeling, such as estimating sewer air pressures and resulting air emission rates. Jacobs maintains its own cluster of high-performance computers that can run highly complex models in less than an hour, rather than days, as required by desktop computers.

Odor Mitigation Options: We have designed odor control system using virtually all the available vapor and liquid-phase odor/corrosion mitigation options, including biological treatment, carbon, chemical scrubbers, ozone, and multiple types of liquid chemical treatment systems. The systems that we have designed have included systems with capacities of more than 1.5 million cfm—which are likely some of the largest wastewater odor control systems in the world. Our team includes some of the industry's top experts in detailed and theoretical design who have helped advance the state of knowledge and capability in odor control technology.

Advanced Hydraulics: Jacobs Advanced Hydraulics Group is dedicated to solving complex and non-traditional hydraulics issues using the most advanced tools available. Our models provide detailed 3-dimensional simulation of multi-phase fluid flow and provides us with the ability to solve very complex hydraulic flow problems for sewers and hydraulic control structures and drops such as those used for storing wastewater in sewers.

Relevant Experience of the Past Three Years

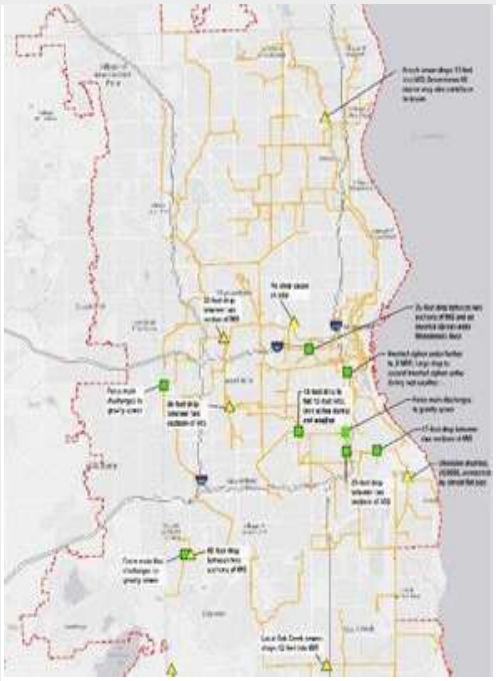
We have provided clients with design and engineering services to improve odor and corrosion issues around the world. A selection **of our relevant experience** from the past 3 years is included in this section.

SYSTEM WIDE H_2S AND ODOR MITIGATION PLANNING & DESIGN, MILWAUKEE METROPOLITAN SEWERAGE DISTRICT, MILWAUKEE, WI

Project Dates: 2019 – 2021

Project Cost: $350,000

Client Reference:
Micki Klappa-Sullivan, Manager of Engineering Planning
414.225.2178
mklappasullivan@mmsd.com



Jacobs performed a holistic, comprehensive study of the H_2S odor and corrosion issues across the Milwaukee Metropolitan Sewerage District's (Milwaukee MSD) conveyance system. The District has had a history of odor issues, caused mostly by H_2S in its collection system. The study addressed additional locations of odor and corrosion in the conveyance system and further verified and documented those identified by the District. The study assisted the District in developing the plan for controlling H_2S odors and corrosion in its entire collection system.

The District's service area covers 411 square miles with 290 miles of interceptor sewers that collect 200+ mgd of wastewater from 28 satellite municipalities and conveys it to the District's two treatment plants. The District's interceptor sewers range in size from 8 to 150 inches in diameter and are mainly constructed from reinforced concrete pipe or monolithically constructed reinforced concrete. The system also includes a deep tunnel to store CSO with 27 miles of tunnels with diameters up to 32 feet and depths up to 340 feet.

Jacobs developed a WATS sewer process model of the entire interceptor system to assist in the evaluation. A focused sampling campaign was conducted to collect wastewater and H_2S and pressure data to calibrate the WATS model. Sampling and model results indicated that sulfide generation occurs mainly within the District's interceptor system rather than customer communities due to the relatively long detention time in the interceptor sewers. Most H_2S issues were determined to be caused by turbulence at drops along with issues at some siphons.

Using the model and Jacobs' odor experience, eight zones were identified to likely require odor and corrosion mitigation. Conceptual designs using liquid and vapor-phase mitigation technologies were completed, and cost estimates were prepared for the eight zones. Noise and visual impacts of the odor control systems to neighbors were also considered. The recommended mitigation technologies included iron salts for liquid-phase treatment and activated carbon and biofilters for vapor-phase treatment. A nonmonetary evaluation of the mitigation options was conducted using the Envision evaluation framework. A prioritized list of the zones was prepared. The project included developing conceptual designs for each of the prioritized zones that will address H_2S odor and corrosion issues across its expansive collection system.

COLLECTION SYSTEM ODOR CONTROL STUDY, METRO WASTEWATER RECLAMATION DISTRICT, DENVER, CO

Project Dates: 2016 – 2021

Project Cost: $950,000

Client Reference:
Jim Mallory, Project Engineer
303.286.3487
jmallory@mwrd.dst.co.us

Interceptor Fan Testing

Transmission System Dispersion Modeling Results

The Denver Metro Wastewater Reclamation District (District) retained Jacobs to perform a comprehensive odor analysis of their entire sewer collection system. Historically, the District had dealt with odor emissions and subsequent odor complaints at multiple locations within their collection system and were looking for cost effective mitigation solutions.

Our team developed multiple liquid phase and vapor phase alternatives and evaluated each using the WATS model. The WATS model was calibrated using extensive sampling results which provided confidence that the model as an accurate representation of the transmission system.

WATS modeling revealed that natural reaeration in the branches appeared to suppress sulfide in the branches, and because of that, the branches were shown not to require odor control. Methyl mercaptan levels were shown to be present at some locations even when H_2S had been oxidized. The presence of methyl mercaptan revealed the need for odor control irrespective of sulfide levels.

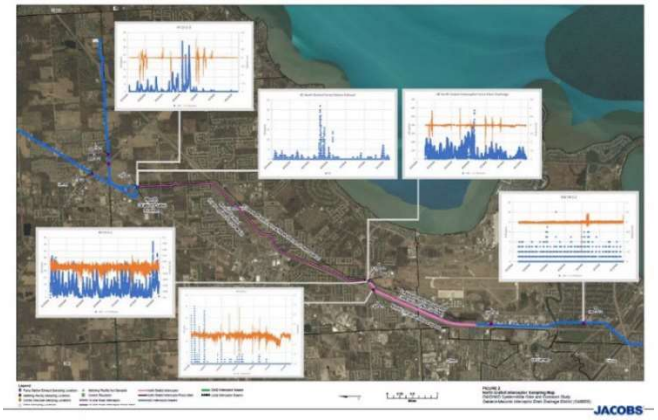
Based on a comprehensive benefit/cost analysis, we recommended technologies that included a combination of organic and engineered media biofilters located at specific locations within the collection system.

SYSTEM WIDE ODOR AND CORROSION STUDY AND DESIGN, MACOMB INTERCEPTOR DRAIN DRAINAGE DISTRICT, AND OAKLAND-MACOMB INTERCEPTOR DRAIN DRAINAGE DISTRICT, OAKLAND AND MACOMB COUNTIES, DETROIT, MI

Project Dates: 2018 - present

Project Cost: $6,500,000

Client Reference:
Joel Brown, Chief Engineer
248.410.4908
brownjt@oakgov.com



North Gratiot Interceptor Sampling Map, MIDDD

The Macomb Interceptor Drain (MID) wastewater collection system has experienced degradation in some sewer reaches due to sulfuric acid formed from H_2S. The H_2S emitted from the interceptor system has also been the source of recurring odor complaints. These issues have been ongoing since the MID system, a large-diameter sanitary sewer system, was originally constructed in the 1970s. There have been past studies performed to begin addressing these issues and some efforts have been made to mitigate them. However, significant problems remained that must be addressed to reduce the rate of further degradation, extend the life of the interceptor sewer system in a cost-effective way, and reduce odor complaints at areas of interest across the system.

Jacobs conducted a detailed, system-wide odor and corrosion evaluation and to develop an odor and corrosion control strategy for the interceptor sewer system. Potential effects on odors and sewer corrosion rates from operating scenarios using existing flow control structures and pump stations were evaluated. An assessment was made of several alternatives to further mitigate odors and corrosion throughout the system. Conceptual designs and planning-level cost opinions for these mitigation alternatives were also prepared. To provide a robust evaluation, the project included an extensive data collection program of sewer air pressure differential and H_2S concentration data at more than 40 locations. These data were used to develop a detailed sewer process model using the WATS modeling platform. The WATS sewer process computational platform predicts odors and corrosion and is used to help determine the most effective locations and alternatives for mitigation. Air dispersion modeling using the latest version of the USEPA's AERMOD program and computational fluid dynamics was also conducted to determine the levels of odor control required to mitigate odors and reduce complaints at areas of interest.

Jacobs conducted a detailed, system-wide odor and corrosion evaluation of the entire 110 miles of Oakland-Macomb Interceptor Drain (OMID) interceptor sewer, flow control structures, and community drop connections and developed an odor and corrosion control strategy. Potential effects on odors and sewer corrosion rates from operating scenarios using existing flow control structures and pump stations were evaluated with field measurements, fan testing, and the WATS model. A detailed cost and non-cost assessment was made of several alternatives to further mitigate odors and corrosion throughout the OMID system. Conceptual and final designs and planning-level cost opinions for these mitigation alternatives were also prepared. Final designs included a 25,000 cfm biotrickling filter, and three carbon systems with a total capacity of more than 40,000 cfm.

Experience of Our Subconsultants

Each subconsultant listed below has worked with Jacobs extensively, either at the local level or the regional level, to successfully deliver a variety of projects, including an extensive number of odor control projects in large collection systems.

The WATS Guys, Inc. – Modeling Guidance

The WATS Guys (TWG) are a small, specialized consulting company that helps wastewater utilities and consulting engineers solve sewer process related problems including ventilation, odors, and corrosion. Company founders Matthew Ward and Jes Vollertsen are global leaders in the field, and have worked on sewer process, odor, corrosion, and ventilation for decades. Specialists in sewer processes and developers of the WATS sewer process model, they have decades of experience in analyzing and solving odor and corrosion problems affecting sewer systems, large and small, around the world. Our partnership with TWG is built on several successful projects and is highly proven.

Webster Environmental Associates, Inc. – Sampling and Piloting

WEA is a full-service consulting environmental engineering firm that specializes in odor control. WEA has been conducting air sampling and testing, data analysis, and odor control system designs for all types of industrial and municipal clients for more than 30 years. They have become a leader in odor control engineering and has completed over 600 odor control projects by providing personalized service with a unique understanding of issues and creative solutions. has developed numerous innovative solutions that have resolved issues at the lowest possible capital and operating cost. WEA was a lead on the Blue River Odor Study Phase I.

TREKK Design Group, LLC - Field Services (WBE)

TREKK Design Group, LLC (TREKK) is a multi-disciplined, woman-owned civil engineering firm dedicated to improving lives in the markets we serve. Their team provides holistic, commonsense solutions to communities across the Heart of America. TREKK's staff of 200 individuals includes civil engineers specializing in water, stormwater, wastewater, transportation, traffic, structural and site development; GIS technicians and asset managers; construction inspectors; surveyors; and field technicians. TREKK offers comprehensive services for the evaluation, condition assessment, diagnosis and rehabilitation of stormwater, sanitary, and combined sewer systems. TREKK also possesses odor control experience with KC Water.

Hg Consult – Field Services (MBE)

Formed in 2010, Hg Consult, Inc. (Hg) is a consulting engineering and planning firm in Kansas City, Missouri. HG's 60 employees are dedicated to providing value through their excellent service and quality work. Hg has been a valued partner with Kansas City on projects related to the EPA consent decree and the Smart Sewer Program management team. Hg has had design and field inspection roles that include the following types of projects: sewer flow meter data analysis, I/I reduction, sewer pipe condition assessments and remediation, sewer separation, green infrastructure design, infiltration testing for pervious pavements/bioretention areas, watermain design/inspection, asset management services, and RPR duties for KC Water and KC Public Works.

Public Contracts Within Last 3 Years

Included in EXHIBIT 2 are a list of public contracts for the last three years with similar scopes to the Blue River Odor Control Phase III project. While EXHIBIT 2 is limited to the past 3 years, our delivery team will lean on experience from projects outside of the specified timeframe to successfully deliver your project.

EXHIBIT 2: Project References

Project Name	Contact Info	Dollar Amount	Study	Design	Piloting	Construction	Contract Terms
System Wide H_2S and Odor Mitigation Planning & Design, Milwaukee MSD (Milwaukee, WI)	Micki Klappa-Sullivan, Manager of Engineering Planning 414.225.2178 mklappasullivan@mmsd.com	$350K	X	X			2019 - 2021
Collection System Odor Control Study, MWRD (Denver, CO)	Jim Mallory, Project Engineer 303.286.3487 jmallory@mwrd.dst.co.us	$950K	X	X	X		2016 - 2021
System Wide Odor and Corrosion Study & Design, Macomb Interceptor Drain Drainage District, and Oakland-Macomb Interceptor Drain Drainage District, Oakland & Macomb Counties (Detroit, MI)	Joel Brown, Chief Engineer 248.410.4908 brownjt@oakgov.com	$6.5M	X		X	X	2018 - 2021
Corrosion Control Strategy Development and Implementation, DC Water (District of Columbia)	Eyasu Yilma, Manager 202.612.3520 eyasu.yilma@dcwater.com	$32K	X				2021 - 2022
Stickney WRF Plant-Wide Dispersion Model and Odor Control Strategies, MWRD (Chicago, IL)	Jonathan Grabowy, Planning Director 312.751.5600 grabowyj@mwrd.org		X	X		X	Ongoing
Tideway Tunnel Odor Emissions Study, Thames Water Utilities Limited (London, UK)	Roger Bailey, Chief Technical Officer 011.44.0203.934.5850 roger.bailey@tideway.london	$6.2M	X		X	X	Ongoing
Chemical Modeling of Austin Water Collection System, Austin Water (Austin, TX)	Kevin Koeller Division Manager, Pipeline CIP Project Delivery Division 512.972.2055 kevin.koeller@austintexas.gov	$275K	X		X		Ongoing

Additional Relevant Contracts

In addition to the contracts listed above, listed below are additional, relevant project executed by members of our team. While the previous two subsections satisfy the requirements set by the City, the experience & lessons learned solving odor & corrosion issues for large, complex collection systems that will be leveraged by our team of experts spans greater than the previous three years.

Additional Relevant Odor Control Projects Executed by Members of our Team
Odor Control Study, Gwinnett County, GA ▪ Performed a comprehensive odor analysis of the entire collection system to provide holistic and cost-effective mitigation solutions ▪ Developed and evaluated liquid phase and vapor phase mitigation alternatives using the WATS model ▪ Team Participation – Adrian Romero, Bill Desing, John Siczka
Sewer Corrosion and Odor Research Program (SCORe), Australian Research Council, Australia ▪ Largest odor research project in the world with a total budget of $21M ▪ Served as lead (and only) consulting firm involved with this WERF ventilation research program. SCORe was delivered by 5 research and 11 industry partners, and remains the largest worldwide municipal wastewater odor research project to date ▪ Project resulted in greater fundamental understanding of the processes involved in various aspects of odor and corrosion, improved collection system odor models; new sampling methods to gather field data for input to modeling tools ▪ Awarded Global Grand Award at IWA's 2014 Project Innovation Awards during World Water Congress and Exhibition in Portugal ▪ Team Participation – Bill Desing, Scott Cowden, Matthew Ward
Odor Emissions Study and Design, Thames Water Utilities Limited, London, UK ▪ Program manager for the $5B Tideway CSO Tunnel Program, with 25 miles of tunnels up to 260 feet below ground ▪ Developed designs for 23 odor control systems with a total of capacity of 240,000 cfm ▪ Designed aesthetically pleasing odor control systems in densely populated urban areas that achieve stringent odor standards ▪ Estimated sulfide generation and odor emissions from a highly dynamic wet weather conveyance and storage tunnel ▪ Emission results used in dispersion modeling to quantify offsite odor and H2S health impacts ▪ Team Participation – Bill Desing, John Siczka, Matthew Ward
Odor Master Plan and Force Main Odor/Corrosion Study, Louisville and Jefferson County MSD, Louisville, KY ▪ Developed a master plan that addressed six plants and significant parts of the collection system, including 6 WWTPs, 230 pump stations, 30 small treatment plants, and more than 3,000 miles of sewer collection systems ▪ Characterized odorous emissions using odor sampling and determined offsite impacts using air dispersion modeling; collected and analyzed over 100 samples; used a collection system computer model to determine liquid- and vapor-phase H2S concentrations

Additional Relevant Odor Control Projects Executed by Members of our Team

- Completed a detailed study of the 10-mile Ohio River Force main; used the WATS model to evaluate numerous solutions
- Team Participation – Bill Desing, John Siczka

Wastewater Collection System Odor and Corrosion Control Project, Salt Lake City Department of Public Utilities, Salt Lake City, UT

- Program manager to address concerns associated with odor and corrosion within the wastewater collection system
- Systemwide odor sampling (31 locations)
- Setup and calibration of Interceptor by WATS process model to simulate odors and corrosion in the wastewater collection system
- Performed systemwide sampling to characterize liquid and vapor phase conditions and calibrate sewer process model
- Evaluated alternative mitigation methods for odor and corrosion
- Used WATS model to develop odor and corrosion mitigation strategies
- Team Participation – Bill Desing, Scott Cowden

Air Flow Management & Odor Control Study, City of Raleigh Public Utility District, Raleigh, NC

- Primary drivers for project include concerns of odor, corrosion, and worker safety. City needed to coordinate & optimize significant odor controls strategies that had been implemented over the years.
- Extensive field sampling program implemented to characterize odors and calibrate a WATS model.
- WATS model built from existing EPA SWMM Hydraulic model & used to run what-if scenarios to evaluate different treatment technologies at different locations.
- WATS model used to identify reaches that were highly deteriorated to the point at which treatment would not be cost-effective.
- Treatment cost was compared to cost of rehabilitation to determine the most cost-effective solution.
- Team Participation – Matthew Ward, Jes Vollersten

Chemical Modeling for the Austin Water Collection System, Austin Water, Austin, TX

- Due to increased community complaints in the vicinity of Walnut Creek WWTP, tasked with determining on-site and off-site odor sources and developing solutions to reduce or eliminate these odor sources.
- Objectives included leading the development & implementation of digital tools to support the analysis using targeted collection of field data, identifying odor sources, and developing system-wide odor control strategies that considered interactions between collection system and treatment plant.
- Used WATS model to develop odor and corrosion mitigation strategies on the entire collection system
- The WATS model was paired with a SUMO process model for the Walnut Creek WWTP to evaluate the impacts of different odor control strategies in the collection system on plant performance
- Conducted pilot studies & utilized findings to develop a system-wide odor control strategy.
- Team Participation – Adrian Romero, Bill Desing, Matthew Ward

Collection System Master Plan, Albuquerque-Bernalillo Water Utility Authority, Albuquerque, NM

- Included in their collection system master plan, the Water Authority tasked us with optimizing odor and corrosion control efforts, including pump stations.

Additional Relevant Odor Control Projects Executed by Members of our Team

- A WATS model was used to develop odor and corrosion mitigation strategies, including screening of alternatives (such as chemical dosing of various dose rates using different chemicals at various locations)
- WATS model was utilized to support migration from reactive to proactive approach in asset management
- WATS model enabled communication to downstream wastewater treatment plant staff regarding potential impacts in the treatment process
- End result was novel and cost-effective strategies with savings to be realized in the order of $1M per year
- Team Participation – Adrian Romero, Matthew Ward

Project/Client Name	Master Plan or Conceptual Planning	Odor Dispersion Analysis/Modeling	Odor Sampling and Monitoring	Treatment/ Mitigation	Study	Design	Liquid Phase Treatment	Vapor Phase Treatment
Allegheny County Sanitation Authority, PA	X		X	X		X		X
City of Beloit, WI	X			X		X	X	X
Abu Dhabi, UAE	X		X	X		X		X
City of Calgary, Alberta		X	X	X				
City of Ft. Wayne, IN	X		X	X		X		X
City of Kitchener, Ontario			X	X		X		X
City of Omaha, NE		X	X	X		X		
City of Ottawa, Ontario	X		X	X		X		X
City of Spokane, WA	X	X	X	X				
City of Toronto, Ontario		X		X		X		X
Grand Chute Menasha West Sewerage District, WI	X	X	X	X				X
Greater New Haven Water Pollution Control Authority, CT		X	X	X		X		X
Green Bay Metropolitan Sewerage District, WI	X		X	X		X	X	X
MCES (Minneapolis), MN			X	X		X		X

Project/Client Name	Master Plan or Conceptual Planning	Odor Dispersion Analysis/Modeling	Odor Sampling and Monitoring	Treatment/ Mitigation	Study	Design	Liquid Phase Treatment	Vapor Phase Treatment
King County Wastewater Treatment Division, WA	X	X	X	X		X	X	X
Metropolitan Sewer District of Greater Cincinnati, OH	X	X	X	X				X
Northeast Ohio Regional Sewer District, OH	X	X	X	X				
Thames Water Utilities Limited, London	X	X	X	X		X	X	X
ACTEW-AGL, Australia	X	X	X	X			X	X
Australian Research Council (ARC) Sewer Odour and Corrosion Research, Australia	X	X	X	X		X	X	X
City of Las Vegas, NV	X	X	X	X		X	X	X
Clark County Water Reclamation District, NV		X	X	X		X	X	X
Delta Diablo Sanitation District, CA			X	X		X	X	X
East Bay Municipal Utility District, CA	X	X	X	X		X	X	X
Gippsland Water, Australia	X	X		X				X
Hampton Roads Sanitation District, VA	X	X	X	X			X	X
Little Blue Valley Sewer District, MO	X	X	X	X		X		X
Louisville and Jefferson County Metropolitan Sewer District, KY	X	X	X	X			X	X
Melbourne Water, Australia	X	X	X	X		X	X	X
Orange County Sanitation District, CA	X	X	X	X		X	X	X
Sacramento Regional County Sanitation District, CA	X	X	X	X		X	X	X
Sanitation District No. 1 of Northern Kentucky, KY			X	X		X		X
Sausalito-Maron City Sanitary District, CA		X	X	X		X	X	X

Part III
Personnel

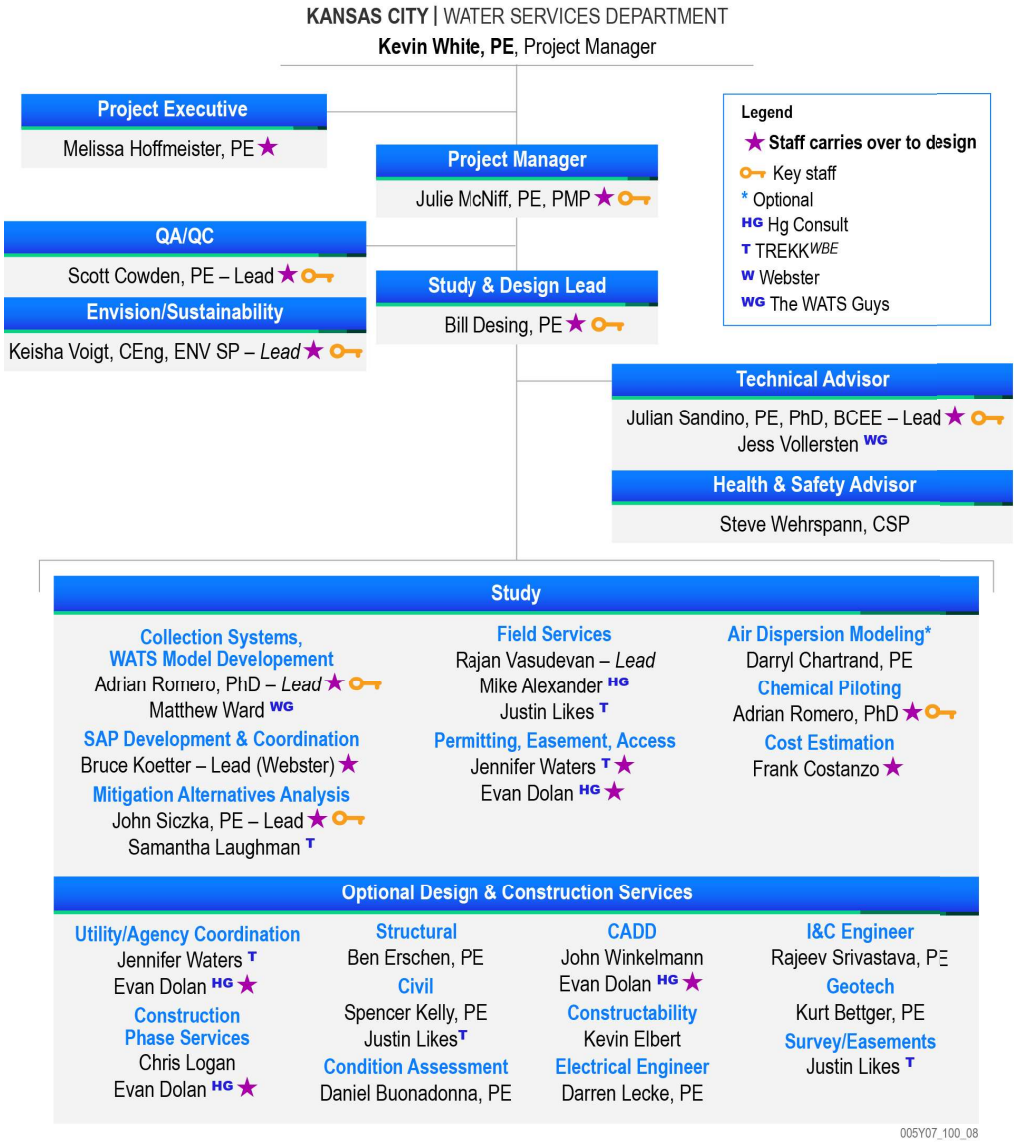
Part III: Personnel

Bringing the Right Team to You

Organization Chart

Our delivery team is structured to provide high-value solutions to you while minimizing project start-up, and project close-out. **Julie McNiff** will lead our team as Project Manager, supported by Project Executive, **Melissa Hoffmeister**, QA/QC lead **Scott Cowden,** and Technical Advisor **Julian Sandino**. **Bill Desing**, our global expert on all things odor & corrosion control, will serve as Study & Design Lead. Additional subject matter experts include **Keisha Voigt** (Envision and sustainability), and **Adrian Romero** (collection systems).

EXHIBIT 3: Proposed Team



Commitment of Key Personnel and Ability to Sustain Loss

Our key personnel are dedicated to fulfilling the entire contract duration. However, if the need arises for a replacement, our Project Executive Melissa Hoffmeister will facilitate a seamless transition. She will work closely with the City to obtain approval for the replacement and oversee smooth coordination with the City so that there is no negative impact on the budget or schedule.

Our integrated delivery approach means a single set of processes, tools, systems, and culture utilized by a talent force of over 62,000 with broad, in-house specialty resources available to all. The key benefits to you include a project team that can integrate seamlessly, bring lessons learned from a global portfolio of projects to apply to your project, and efficient delivery to solve problems. Our integrated delivery approach also means our deep bench provides resiliency in talent that can integrate into projects at any point, allowing us to sustain the losses of key employees due to their familiarity with our standards and procedures.

Key Staff

We have assembled a team of key industry experts and specialists at the forefront of their profession. Their leadership of our technical teams and support personnel will position you with a long-term, sustainable, defensible solution.

Julie McNiff, PE, PMP, NASSCO (PACP, MACP, LACP, ITCP) | Project Manager

Julie has a successful track record managing large-scale sewer rehabilitation programs for public sector agencies. She has demonstrated experience in collection system design and construction including sewer separations, relief sewers, city-wide sewer rehabilitation, I&I reduction, manhole rehabilitation, gravity sewers, force mains, and basin-wide studies. She has extensive experience providing oversight for public engagement programs. She is skilled in interfacing with regulatory agencies including city, state and federal, and experienced providing plan reviews for code and ordinance compliance. **As Project Manager, Julie will be responsible for project administrative duties and will be the single point of contact for KC Water. She will ensure that all aspects of project delivery are to your satisfaction and our team has the resources it needs to be successful.**

Years with Jacobs: 3

City and State of Residence: Kansas City, MO

Time Commitment on Other Accounts: 60%

Education: MS, Environmental Engineering, University of Kansas; BS, Bio-Chemical Engineering, Missouri University of Science and Technology

Registrations: Professional Civil Engineer: KS; Project Management Professional | NASSCO PACP, MACP, LACP | NASSCO ITCP – Manholes | 10-Hour OSHA Construction Safety and Health

Engineer in Charge, Multiple Design and Rehabilitation Projects, KC Water, Kansas City, MO. Providing oversight and quality management for compliance with applicable rules/regulations. Key projects under this contract include:

Project Manager, Little Shoal Creek Interceptor-Lower Extension, KC Water, Kansas City, MO. Performed design drawing and specification QA/QC for the bid phase of 2.5-miles of a new 42-inch-diameter interceptor sewer across rural areas, small tributaries and four-lane divided highway, connecting to an existing main. Conducted constructability review and compliance.

Project Manager, Lower Blue River Neighborhood Sewer Rehabilitation, KC Water, Kansas City, MO. Oversee construction phase services for sanitary sewer design, rehabilitation, replacement; manhole rehabilitation; CIPP linings; sewer laterals, RFIs, WCDs, and change orders. Review submittals, design changes, schedules, and contractor payment applications.

Project Manager, Risk Asset Management Water Plant, KC Water, Kansas City, MO. Project oversight and QA/QC of project engineers' completion of reliability block diagrams, FMEAs, and report for the onsite work. Collectively submitting a recommendation report for asset management on water plant electrical assets.

Project Manager, Keep Out the Rain Private I&I, KC Water, Kansas City, MO. Project implementation oversight of the City's Private I&I Reduction Program. Oversees the evaluation teams, completing over 9,000 evaluations and locating/abating I&I sources at more than 800 properties to date.

Task Lead, Kansas City Overflow Control Program (OCP) and/or Smart Sewer Program, KC Water, Kansas City, MO. Managed internal staff, field crews, subconsultants associated with SSES flow metering, data collection, QA and weekly field work updates for other OCP project engineers, and program controls.

Julian Sandino, PE, PhD, BCEE | Technical Advisor

As Vice President, Director for Global Wastewater Solutions, and Technology Senior Fellow, Julian brings more than 35 years of experience leading and assisting multi-disciplinary teams in more than 350 projects throughout the world including the planning and design for a wide variety of water resource recovery facilities. Relevant to the Blue River Odor Control, he has conducted process evaluations of this facility and he is experienced in process intensification, biological nutrient removal, energy optimization, managing wet-weather flows, sludge handling and stabilization facilities, resource recovery as well as defining biosolids management reuse/disposal solutions. **As Technical Advisor, Julian will lead all technical experts and guide the team through the study and design. In addition, Julian will provide technical expertise to ensure odor and corrosion control measures do not disruption operations at KC Water facilities, including the Blue River WWTP and the future BNR upgrades being considered in the ongoing Facilities Plan.**

Years with Jacobs: 18

City and State of Residence: Overland Park, KS

Time Commitment on Other Accounts: 85%

Education: PhD, Environmental Health Engineering, University of Kansas; MS, Environmental Health Engineering, University of Kansas; B.S., Civil Engineering, Universidad de Los Andes, Bogota, Colombia

Registrations: Professional Engineer: KS; NY, Sanitary Engineer: AZ

Senior Technology Consultant, Blue River WWTP Facility Plan and Improvements Design, Water Services Department, Kansas City, MO. Serving as Senior Technology Advisor to the team developing a Facility Plan to incorporate wet weather flow treatment improvements, upgrade and expand grit removal facilities, and evaluate alternatives and recommend best option for upgrading the facility for biological nutrient removal.

Technology Director, Blue River Wastewater Treatment Plant Biosolids Improvement Project, Water Services Department, Kansas City, MO. Leading the technology resources from Jacobs as part of a team serving as the Owner's Advisor (OA) to complete process and site evaluations, develop design criteria, develop a conceptual design, and advance the preliminary design as part of the overall procurement documents for the design build (DB) teams for a new thermal hydrolysis process (THP) to produce a Class A biosolids product.

Senior Technology Consultant, Conceptual Design Lead and Senior Technology Advisor during Preliminary and Detailed Design, Secondary Treatment and Dewatering Project, Public Works, City of Sunnyvale, CA. Dr. Sandino served as the Conceptual Design Lead and Senior Technology Advisor during Preliminary and Detailed Design of this project. This project involved designing new secondary treatment, thickening, dewatering, digested sludge storage, sludge blending, sidestream treatment facilities, and odor control at the 20 mgd Sunnyvale WPCP. During the Conceptual Design stage, he led the combined Carollo/Jacobs team in the validation of previous Master Plan/Conceptual Design recommendations, the updating of the project's Design Basis (flows, loads and regulatory requirements), and the evaluation and final selection of the adopted updated process configuration. He remained as a senior technical advisor for the subsequent preliminary and detailed design stages of the project. The project covered conceptual design validation through 100% design for conventional design-bid-build delivery.

Bill Desing, PE | Study and Design Lead

Bill has over 34 years of experience in wastewater planning, design, and operations, with significant, recent experience in managing odor control study, planning, and design projects. As Jacobs' Global Leader for Odor Control, Bill manages a group of 20 technologists in North America, Australia, Europe, and Asia who are responsible for developing tools and practices for designing odor control systems for wastewater utilities worldwide. He has significant experience in odor management and wastewater planning, design, and operation, and has assisted more than 50 municipal WWTPs address odor issues, including odor control master planning, odor control system conceptual and final design, and capital and operation and maintenance cost development. **As Study and Design Lead, Bill will be responsible for all aspects of the study and design for odor & corrosion control throughout the lifetime of the project.**

Years with Jacobs: 34

City and State of Residence: Milwaukee, WI

Time Commitment on Other Accounts: 60%

Education: MS, Science, Environmental Engineering, Marquette University**,** BS, Science, Civil Engineering, Marquette University

Registrations: Professional Engineer: WI; IL

Project Manager, H_2S and Odor Mitigation Planning Study Project, MMSD, Milwaukee, WI. Led a team to perform a holistic, comprehensive study of the issues across the conveyance system caused mostly by H_2S. The WATS sewer process computer model was used to predict odors and corrosion and assess the performance of mitigation alternatives for wastewater collection systems. Bill then worked with the team and the District to develop an overall plan for controlling odors in both its conveyance and treatment systems.

Senior Technology Lead, OMID Systemwide Odor and Corrosion Study, OMIDD, Oakland County, MI. Jacobs conducted a detailed, system-wide odor and corrosion evaluation of the entire 110 miles of OMID interceptor sewer, flow control structures, and community drop connections and developed an odor and corrosion control strategy. Jacobs work included developing and validating a comprehensive, state-of-the-art WATS sewer process model. Bill served as senior reviewer for all tasks.

Study Lead Engineer and Design Oversight, Thames Combined Sewer Overflow Tunnel Odor Control Project, London, England. Led a study to estimate odor emissions and odor control mitigation alternatives for the $5B Thames CSO Tunnel. The study included development of dynamic and steady-state models to estimate odor generation, stripping, emissions, and impacts on the population along a 15-mile tunnel route. The study resulted in a recommendation for use of a carbon systems at 23 locations with total capacity of more than 240,000 cfm with air bypass capacities of more than 1 million cfm. Currently leading the oversight for design and construction of all the odor control systems.

Senior Review, Collection System Odor Study, City of San Mateo, CA. Senior reviewer for collection system-wide odor control study for a $900 million Clean Water Program to upgrade the sanitary sewer collection and wastewater treatment system. The study includes collection system sampling and developing a system-wide odor model using WATS.

Adrian Romero, PhD | Collection Systems Lead

Adrian has 13 years of experience in the field of wastewater, Adrian has gained deep understanding on a wide range of wastewater processes and strategies for resource recovery. His expertise extends from sewer processes in collection systems, wastewater treatment processes and technologies, and odor control technologies, to the stabilization, managing, and marketing of biosolids products, and nutrient and energy recovery from wastewater. He is an expert in wastewater treatment process modeling (Pro2D2, Sumo, BioWin) and sewer process modelling (WATS). Adrian's project work includes leading studies, master planning, preliminary, and full design, and equipment commissioning, start-up and optimization. He served as WATS Modeling Lead on the MID and OMID System-wide Odor and Corrosion Studies, the MID Odor/Corrosion As-Needed Engineering Services, and the NI-EA Ventilation Study. **As Sewer Corrosion and Odor Modeling Lead, Adrian is responsible for leading development of the WATS model that will finalize the 40 sampling points desired by the City, in addition to fine-tuning and operating the model for piloting purposes.**

Years with Jacobs: 6

City and State of Residence: Charlotte, NC

Time Commitment on Other Accounts: 60%

Education: PhD, Civil and Environmental Engineering, University of Maryland, MS, Environmental Engineering, Monterrey Institute of Technology, Mexico, BS, Chemistry, UANL, Mexico

Project Engineer, NESPS Odor/Corrosion Study, OMIDDD, Detroit, MI. This study identified and evaluated odor and corrosion control alternatives outside the station as well as HVAC improvements inside the station. It included monitoring vapor phase H_2S and differential pressures at the pumping station and upstream and downstream of the pumping station in the interceptor sewers. Our team conducted air dispersion modeling and fan testing to "right-size" the odor/corrosion control technologies which resulted in a system that was likely less than half the size and cost of a system designed using conventional, more conservative air flow calculations. The recommended control alternative was a single biotrickling filter, which our team designed, along with HVAC improvements, and provided services during construction under a separate contract.

Lead Wastewater Process Engineer, H_2S and Odor Mitigation Planning Study, MMSD, Milwaukee, WI. Development and use of a sewer process model for the complex network to support the determination of priority areas for H_2S and odor control and to screen alternatives. The project is currently in the alternatives evaluation phase comparing liquid-phase and vapor-phase alternatives.

Lead Wastewater Process Engineer, OMID Systemwide Odor and Corrosion Study, OMIDD, Oakland County, MI. Jacobs conducted a detailed, system-wide odor and corrosion evaluation of the entire 21 miles of OMID interceptor sewer, flow control structures, and community drop connections and developed an odor and corrosion control strategy. Jacobs work included developing and validating a comprehensive, state-of-the-art WATS sewer process model. Conducted a pressure test throughout the area of study to locate and size odor control equipment. The project delivered a set of alternatives aiming to enhance asset management in the collection system.

Lead Wastewater Process Engineer, Chemical Modeling for the Austin Water Collection System, Austin, TX. Development and use of a sewer process model for the complex network draining to two different treatment facilities to support the determination of priority areas for H_2S and odor control and to screen alternatives. Project is in initial phases and model is being developed.

John Siczka, PE | Mitigation Alternatives Analysis Lead

John is a Senior Technologist and Jacobs' Wet Weather Treatment Global Technology Leader with 26 years of experience in wet weather technology evaluation, bench-scale testing, pilot testing, and design. He has expertise in wet weather treatment technology evaluation, pilot testing, and design including clarifier analysis. He led development of Jacobs' 3D secondary clarifier CFD modeling capabilities. **As Mitigation Alternatives Analysis Lead, John is responsible for developing odor & corrosion mitigation alternatives in collaboration with the City based on sampling & piloting data**.

Years with Jacobs: 27

City and State of Residence: Milwaukee, WI

Time Commitment on Other Accounts: 60%

Education: MS, Environmental Engineer, Virginia Polytechnic Institute and State University; BS, Civil Engineering, Virginia Polytechnic Institute and State University

Registrations: Professional Engineer: WI

Odor Control Engineer, NESPS Odor and Corrosion Control Study, OMIDDD, Detroit, MI. Developed liquid and vapor phase sulfide sampling protocol and led sampling at the Northeast Sewage Pump Station. The pump station conveys about 85 to 95 mgd of raw wastewater during dry weather operating conditions. Water discharged from the pumps drops 35 feet into the downstream sewer resulting in significant turbulence and stripping of sulfide. Vapor phase H_2S has caused corrosion of the downstream sewer and electrical equipment within the pump station and strong odors. Air dispersion modeling was conducted to assess off-site impacts and the impact of vapor phase treatment. Sampling data was used to evaluate odor mitigation technologies. Developed fan testing protocol and led the fan test to size vapor phase odor control equipment. Prepared project report and odor control technology recommendation.

Odor Control Engineer, NESPS Biotrickling Filter Design and CA/RPR, OMIDDD, Detroit, MI. Following our successful study phase services, Jacobs was contracted by OMIDDD to complete the preliminary and final designs and perform services during construction for a biotrickling filter odor/corrosion control system and heating, ventilation and air condition (HVAC) improvements at the Northeast Sewage Pumping Station (NESPS).

Senior Engineer, Preliminary Modeling of Odor for Thames Tideway Tunnel, Thames Water Utilities, London, England. Led modeling efforts to estimate the likely concentration and character of odors generated within the drop shafts, main tunnel, and rider tunnels of the Thames Tideway Tunnel and Lee Tunnel and proposed preliminary, conceptual mitigating measures for odor control. Used existing computer models and developed new models to perform the analysis. Estimated liquid sulfide emissions and mass of hydrogen sulfide stripped to the tunnel headspace throughout the length of the tunnel.

Odor Control Engineer, H_2S and Odor Mitigation Planning Study, MMSD, Milwaukee, WI. Development and use of a sewer process model for the complex network to support the determination of priority areas for H_2S and odor control and to screen alternatives. The project is currently in the alternatives evaluation phase comparing liquid-phase and vapor-phase alternatives.

Scott Cowden, PE | QA/QC Lead

Scott is a mechanical engineer with considerable experience in process mechanical systems, odor control systems, heating, ventilation, and air conditioning (HVAC), plumbing, and fire protection involving mechanical design, QA/QC, life cycle cost evaluations, specification writing, cost estimating, and construction administration. Odor control expertise includes both vapor phase and liquid phase technologies. He also has extensive experience in the area of odor control master planning including site sampling, emissions modeling, and dispersion modeling. Scott has designed vapor phase odor control systems from 500 cfm capacity to greater than 1,500,000 cfm capacity. He also has a broad range of expertise in liquid phase and vapor phase technologies, including oxygenation, precipitants, pH. adjustment, inhibition, and other proprietary systems, and chemical scrubbers, dry media adsorption, biotechnology, and other proprietary systems, respectively. He has presented on the topics of odor control technologies and design considerations at many conferences and authored or co-authored more than 25 papers on the topic of odor control. He has also been involved in high visibility odor control projects requiring close synergy with architects to achieve a visually appealing design. **As QA/QC Lead, Scott is responsible for quality review and oversees project delivery, using his past experiences on similar odor control & corrosion projects to meet the requirement and satisfaction of the City.**

Years with Jacobs: 25

City and State of Residence: Corvallis, OR

Time Commitment on Other Accounts: 70%

Education: BS, Mechanical Engineering, University of California, Santa Barbara

Registrations: Professional Engineer: CA; MN; OR; WA; AZ

Lead Odor Control Engineer, Odor Control Masterplan, Metro Wastewater Reclamation District, Denver, CO. Updating of the previous odor control masterplan for Metro Denver. Project includes extensive sampling, dispersion modeling, collection system monitoring, and collection system modeling utilizing the Interceptor Powered by WATS in-house model. Development of mitigation alternatives for meeting strict offsite odor goals.

Senior QA/QC Reviewer, Headworks Facility Odor Control Facility, Tres Rios Water Reclamation Facility, Pima County, AZ. Acted as senior QA/QC reviewer for the design of a large, engineered media biofilter for serving an existing Headworks Facility. The project was challenging in that the biofilter had to be located in the same location as existing chemical scrubbers. Furthermore, existing carbon scrubbers were to remain as optional polishing units. Project includes Services During Construction.

Senior QA/QC Reviewer, Solids Treatment Capacity Improvements, City of McMinnville WWTP, McMinnville, OR. Acted as senior QA/QC reviewer for the design of a large two-cell biofilter serving a Headworks Facility and Autothermal Thermophilic Aerobic Digestion (ATAD) and Storage Nitrification Denitrification Reactor (SNDR) biosolids facility. Project was challenging due to high concentrations of complex odorants to be treated from the biosolids facilities.

Senior QA/QC Reviewer, Odor Control Design, Southwestern Pump Station Gas Monitoring and Splitter Structure No. 1 Odor Control, Louisville and Jefferson County Metropolitan Sewer District, Louisville, KY. Acted as senior QA/QC reviewer for the design of a new bioscrubber odor control system for serving a splitter box and headworks facility.

Keisha Voigt, CEng, ENV SP | Envision/Sustainability Lead

Keisha is the subject matter expert (SME) for Jacob's Resilient and Sustainable Infrastructure Planning practice. In this role, Keisha assists project teams in using the Envision framework to evaluate a project's outcomes against the Envision rating system, based on the sustainability goals established for the project. She also encourages quality assurance on projects by providing oversight where the Envision framework is being implemented through Sustainability and Resilience Management Plans, design guidelines, or basis of design documents. **As Sustainability Lead, Keisha will oversee strategies that will increase sustainability with considerations towards environmental quality, social equity, and economic vitality as they apply to this project.**

Years with Jacobs: 22

City and State of Residence: Washington, DC

Time Commitment on Other Accounts: 85%

Education: Master of Public Policy, George Mason University, Bachelor of Science, Environmental Science, University of South Florida

Registrations: Institute for Sustainable Infrastructure Envision Sustainability Professional; Senior Environmental Scientist/Planner & Sustainability & Resilience Subject Matter Expert

Envision Sustainability Professional Blue River WWTP, Kansas City, MO. Envision® scope of work for the construction and commissioning phases of the Biosolids Facility project. Responsible for updating and evaluating the Design-Build Phase Credits and other relevant credits and completing the Envision project verification if WWTP pursues an Envision rating.

Sustainability and Resilience Subject Matter Expert, River Renew, Alexandria Sanitation Authority (AlexRenew), Alexandria, VA. The RiverRenew project is a result of the Virginia Assembly passing a new resolution requiring the remediation of four combined sewer outfalls (CSO) owned by the City of Alexandria. The project includes designing and constructing a storage and conveyance tunnel system, pumping stations, and wet weather treatment to capture and redirect CSO discharges from the existing combined sewer system to a new storage and conveyance tunnel system. This program is planned to bring more flow to the plant (capacity will be increased from 108 to 116 MGD peak flow) AlexRenew and the City of Alexandria and will establish a plan to secure a compliant, comprehensive CSO improvement program to be in place by July 2025. Keisha is an integral part of the project's sustainability team that is tasked with preparing and implementing the project's Sustainability and Resilience Management Plan and sustainability matrix tools that are being used to manage sustainability and resilience across all disciplines of the project.

Envision Sustainability Professional, State-of-the-Art Nitrogen Upgrade Program (SANUP), Alexandria Sanitation Authority (AlexRenew) Alexandria, VA. The Nutrient Management Facility (NMF) project constructed under the SANUP program State-of-the-Art Nitrogen Upgrade Program (SANUP), have been shown to have a high degree of alignment with the Institute for Sustainable Infrastructure's (ISI) Envision Framework for infrastructure projects. Some aspects of the project included cleanup of an adjacent landfill and incorporation of an athletic field on top of the NMF. Keisha helped lead the AlexRenew project team in assessing and completing the registration and verification process to obtain the Envision Platinum Award, the highest Envision award level for a sustainable infrastructure project.

Bruce Koetter, PE | SAP Development and Coordination Lead

Bruce has designed air treatment systems for wastewater collection and treatment facilities since 1993. He has performed over 200 odor evaluations and designed dozens of odor control systems including biofilters, bioscrubbers, chemical scrubbers, carbon adsorbers, and chemical feed systems ranging in size from less than 1,000 cfm to over 150,000 cfm. His experience includes the management of construction for numerous industrial and municipal odor control system projects. **As SAP Development and Coordination Lead, Bruce will be responsible for leading the development of the sampling and analysis plan and will oversee its execution (including field services).**

Years of Experience: 36

City and State of Residence: Louisville, KY

Time Commitment on Other Accounts: 50%

Education: BS, Construction Engineering, Purdue University

Registrations: Professional Engineer: KY; OH; PA; CA; AK; IA

Senior Engineer, Blue River Odor Control Study, Kansas City Water Services Department, Kansas City, MO. Led all sampling efforts as a subcontractor.

Senior Engineer, H_2S and Odor Mitigation Planning Study, MMSD, Milwaukee, WI. Led all sampling efforts as a subcontractor. The project is currently in the alternatives evaluation phase comparing liquid-phase and vapor-phase alternatives.

Senior Engineer, Stickney Water Reclamation Plant Plant-Wide Dispersion Model and Odor Control Strategies, Stickney, IL. Developed conceptual drawings and cost estimates for six alternatives to treat odorous emissions from the plant to meet District goals.

Project Manager, Odor Control System, Whitman, Requardt, and Associates, LLP (Philadelphia Water Department), Philadelphia, PA. Project Manager for design of 11,000 cfm odor control system for the gravity thickener facilities and a 27,000-cfm odor control system for the preliminary treatment facilities. The 11,000-cfm system is currently under construction and the 27,000-cfm system design was completed in 2015 but construction is on hold while property is being acquired.

Project Manager, Various Odor Control Projects, Louisville and Jefferson County Metropolitan Sewer District, Louisville/Jefferson County, KY. Project Manager on numerous odor control projects over the past 20 years. Completed numerous odor evaluations, pilot projects and designs including major odor control designs at their six primary treatment plants and odor control designs at more than ten (10) pumping stations. On-call services contract with MSD since 1997.

Project Manager, Inglewood Hills Lift Station Odor Evaluation, Sammamish Plateau Water and Sewer District, Sammamish, WA. Project Manager for this Inglewood Hills Lift station odor evaluation. This project consisted of a detailed testing plan, alternatives analysis and cost estimates which had to be completed in a compressed schedule to meet budgeting deadlines.

Project Manager, Tupelo Bayou Wastewater Treatment Plant, Conway Corporation, Conway, AR. Project Manager for design of odor control improvements at the Tupelo Bayou WWTP in Conway, AR. Improvements include 14,000 cfm bioscrubber and 17,700 cfm carbon absorber. The design project was preceded by an Odor Control Evaluation that identified and prioritized odor sources at the site.

Mike Alexander, PE, ENV SP | Field Services

Mike is an associate vice president and manager of Hg's Water Services Group. He has extensive project management experience on water resources projects through the nation. Mike's expertise includes hydraulic modeling, H&H studies, highway and site drainage, stream bank stabilization, Best Management Practices, bridge scour, and floodplain management. Mike has experience with HEC-RAS, Microstation, Inroads, Storm and SelectCAD, HEC-HMS, Arcmap, Pondpack, HY8, and Geopak programs. Mike is NASSCO certified for PACP, MACP, and LACP, and received ITCP Manhole and CIPP inspection training. He has managed numerous projects for Kansas City Water Services and has an excellent working relationship with several City project managers.

Years of Experience: 19

City and State of Residence: Kansas City, MO

Time Commitment on Other Accounts: 50%

Education: BS, Civil Engineering, University of Missouri Science & Technology

Registrations: Professional Engineer: MO; KS; TX; AR; ENV SP Certified Professional

Project Manager, Neighborhood Sewer Rehabilitation Brush Creek Project Area 2, City of Kansas City, MO, Kansas City, MO. Mike analyzed available GIS data for Water-in-Basement (WIB) occurrences; prioritized and rated pipe segments based on vicinity to WIB complaints; and identified pipe segments that crossed under roadways, railroads, buildings (critical infrastructure), streams, and segments that ran parallel to streams. Each occurrence was rated based on the guidance provided. he also provided quality control services by reviewing CCTV inspection results and verifying the recommended solutions.

Project Manager, Northeast Industrial District (NEID) Green Infrastructure/Smart Sewer Project, City of Kansas City, MO, Kansas City, MO. Mike performed the hydraulic and hydrologic analysis and design for four bioretention areas, infiltration trenches, and green inlets at the Gardner Avenue, Southwest Site (between Gardner Avenue and Nicholson Avenue). He also prepared the technical specifications in the new Smart Sewer format.

Project Manager, Overflow Control/Smart Sewer Program Management, City of Kansas City, MO, Kansas City, MO. Mike and his team are assisting Burns and McDonnell with the planned modification to the EPA consent decree. He is helping draft the Draft Green Streets Manual and technical details. Mike is also currently creating the new Smart Sewer specifications database in SpecsIntact. Additional tasks include: Project Management Assignments, permeability testing for pervious pavements, flow meter analysis, and RPR duties.

Project Manager, Turkey Creek Basin Sewer Separation: 31st & Broadway, City of Kansas City, MO, Kansas City, MO. Mike provided design support to Tetra Tech for the preliminary and final design of the Turkey Creek Sewer Separation project in the area of 31st Street and Broadway Boulevard. Design elements included both new piping and pervious pavers to achieve separation. He assisted with the dyed water testing, storm water management alternative analysis, pervious pavement design, and preliminary cost estimate.

Justin Likes, PE, ENV SP | Field Services

Justin oversees TREKK's civil design teams across the company. He provides project management and design for municipal infrastructure projects including roadway, storm and sanitary sewer, waterline and site development projects.

He has designed open and closed storm sewer systems, sanitary sewers and waterlines, as well as developed Stormwater Pollution Protection Plans (SWPPP) and participated in re-channelization and bank stabilization projects.

Justin has experience with permitting through the U.S. Army Corps of Engineers, Departments of Natural Resources, and local entities such as counties and cities. Justin has experience helping communities navigate the regulatory and funding process and provides consultation and assistance with capital improvement planning. He has designed projects with funding through Community Development Block Grant (CDBG), Small Community Engineering Assistance Program (SCEAP) and/or Clean Water Engineering Report Grants (CWERG), Missouri State Revolving Fund (SRF) Program, Local Public Agency (LPA) funding and Federal Emergency Management Agency (FEMA) for disaster relief funds.

Years of Experience: 16

City and State of Residence: Kansas City, MO

Time Commitment on Other Accounts: 50%

Education: BS, Civil Engineering, University of Missouri; BA, Physics, Central Missouri State University

Registrations: Professional Engineer: MO; Envision Sustainability Professional

Project Manager, Blue River Wastewater Treatment Plant Odor Control Project, Kansas City Water Services Department/Foley & Black & Veatch, Kansas City, MO. Project Manager for the design of concrete pads and grading and survey for odor control improvements at the Blue River WWTP.

Project Manager, Blue River Wastewater Treatment Plant Biosolids Facility Project, Kansas City Water Services Department, Kansas City, MO. Project Manager responsible for topographic and LiDAR survey and civil site design improvements for improvements at the Blue River WWTP. Civil site aspects include paving, grading, storm water and yard piping. The project consisted of site and facility improvements to convert solids handling from incineration to THP treatment.

Project Manager, Westside Wastewater Treatment Plant Facility Plan, Kansas City Water Services Department, Kansas City, MO. Project Manager responsible for civil site design and assisted with process design services for the expansion of the Westside Wastewater Treatment Plant. Design services include new clarifiers, disinfection basin, chemical building and ancillary yard piping, including piping between existing and new facilities, new access roads and parking lot.

Project Manager, Round Grove Pump Station, Kansas City Water Services Department/AECOM, Kansas City, MO. Project Manager responsible for civil site design for the rehabilitation of the Round Grove Pump Station. Services include design of sidewalks, parking lot, fences, storm sewer, grading and erosion control, SWPPP development and yard piping.

Project Manager, Buckeye Creek Pump Station, Kansas City Water Services Department, Kansas City, MO. Project Manager responsible for civil site design and traffic control associated with approximately 4,000 LF horizontal directional drill of 24" force main to the Buckeye Creek Pump Station.

Jes Vollertsen, PhD | Technical Advisor

Jes is one of the world's leading researchers regarding odor and corrosion issues in collection systems. He is a co-developer of the WATS model, the only fully dynamic model designed to estimate generation and fate of hydrogen sulfide in sewers and its impacts on odor and corrosion. He has overseen the development of many projects using WATS modeling. He has published more than 200 scientific publications, including the only comprehensive book regarding sewer odor, ventilation and corrosion issues. Jes provided WATS Model QA/QC for the District's H_2S and Odor Mitigation Planning Study.

Years of Experience: 34

City and State of Residence: Denmark

Time Commitment on Other Accounts: 75%

Education: PhD, Environmental Engineering, Faculty of Engineering and Science, Aalborg University; BSc, Environmental Engineering (Akademiingeniør), Aalborg University

WATS Modeling, H_2S and Odor Mitigation Planning Study, MMSD, Milwaukee, WI. This study laid the groundwork for developing an overall plan to control conveyance and treatment system odors. Using the calibrated WATS model and historical odor complaint and corrosion data, 15 zones were identified for further evaluation of odor and corrosion issues. Additional sampling, modeling, and evaluation identified 8 of the 15 zones as likely to require odor and corrosion mitigation. The model was used to assess/compare effectiveness and costs for chemical treatment alternatives and sewer ventilation for vapor phase control.

WATS Modeling, Clean Water Program, City of San Mateo, San Mateo, CA. The collection system wide odor control study was part of a $900 million Clean Water Program (CWP) to upgrade San Mateo's sanitary sewer collection and wastewater treatment system. The odor control study included sampling the collection system and developing a system-wide collection system odor model using WATS. The model was used to identify and confirm areas with high odor complaints and select technologies to mitigate odors. Fan tests were conducted to assess the zone of influence of vapor phase treatment on the collection system.

WATS Modeling, MID Systemwide Odor and Corrosion Study, MIDDD, Macomb County, MI. The project involved a system-wide odor and corrosion evaluation and develop an odor and corrosion control strategy for the MID interceptor sewer system. Potential effects on odors and sewer corrosion rates from operating scenarios using existing flow control structures and pump stations were evaluated. An assessment was made of several alternatives to further mitigate odors and corrosion throughout the MID system. The project included an extensive data collection program of sewer air pressure differential and H_2S concentration data. The data was used to develop a detailed sewer process model using the WATS modeling platform.

WATS Modeling, OMID Systemwide Odor & Corrosion Study, OMIDDD, Oakland & Macomb Counties, MI. The project involved a system-wide odor and corrosion evaluation of the 21 miles of OMID interceptor sewer, flow control structures, and community drop connections and developed an odor and corrosion control strategy. Potential effects on odors and sewer corrosion rates from operating scenarios using existing flow control structures and pump stations were evaluated with field measurements, fan testing, and the WATS model. Conceptual designs and planning-level cost opinions for these mitigation alternatives were prepared. This project included an extensive data collection program of sewer air pressure differential and H2S concentration data. Air dispersion modeling using the AERMOD program was also conducted to determine the levels of odor control required to mitigate odors and reduce complaints at areas of interest.

Matthew Ward, PE | WATS Model Development

Matthew is a wastewater odor control and sewer process expert with 20+ years of related experience. He is an internationally recognized expert in sewer network air pressure and ventilation analysis and modeling. Matthew developed, the world's first operational sewer ventilation module, which is now integrated with WATS. He has conducted many studies on sewer ventilation, corrosion, and odor all over the world, and has worked with Jacobs on many occasions, performing similar projects. He has authored several scientific publications on sewer ventilation, given many presentations for professionals and scientists in the field, as well as written engineering guidelines for example for the US Water Environment Research Foundation for sewer ventilation and odors. He has authored several scientific publications on sewer ventilation, given many presentations for professionals and scientists in the field.

Years of Experience: 21

City and State of Residence: Salem, NC

Time Commitment on Other Accounts: 75%

Education: MS, Environmental & Water Resources Technology, The University of Texas at Austin; BS, With Highest Honors, Civil Engineering, The University of Texas at Austin

Registrations: Professional Engineer: NC, TX

ATS Modeling, MID Systemwide Odor and Corrosion Study, MIDDD, Macomb County, MI. The project involved a detailed, systemwide odor and corrosion evaluation and developing an odor and corrosion control strategy for the MID interceptor sewer system. Potential effects on odors and sewer corrosion rates from operating scenarios using existing flow control structures and pump stations were evaluated. An assessment was made of several alternatives to further mitigate odors and corrosion throughout the MID system. To provide a robust evaluation, the project included an extensive data collection program of sewer air pressure differential and H2S concentration data. These data were used to develop a detailed sewer process model using the state-of-the-art (WATS) modeling platform.

WATS Modeling, OMID Systemwide Odor and Corrosion Study, OMIDDD, Oakland and Macomb Counties, MI. The project involved a detailed, system-wide odor and corrosion evaluation of the entire 21 miles of OMID interceptor sewer, flow control structures, and community drop connections and developed an odor and corrosion control strategy. A detailed cost and non-cost assessment was made of several alternatives to further mitigate odors and corrosion throughout the OMID system. Conceptual designs and planning-level cost opinions for these mitigation alternatives were also prepared. This project also included an extensive data collection program of sewer air pressure differential and H2S concentration data. Air dispersion modeling using the AERMOD program was also conducted to determine the levels of odor control required to mitigate odors and reduce complaints at areas of interest.

WATS Modeling, OMID Odor and Corrosion Control Systems, Design and CA/RPR, OMIDDD, Oakland and Macomb Counties, MI. This project is the next phase of a system-wide odor/corrosion study of the entire OMID system and is considered a continuation of the successful 25,000 cfm Biotrickling Filter project at the Northeast Sewage Pumping Station (NESPS). Provided model-based guidance on extending the useful life of the Oakland-Macomb Interceptor Drain System by reducing the rate of corrosion in the interceptors and on reducing the level of odors that have impacted residents of Oakland and Macomb Counties.

Our Staffing Plan

We will design and manage your project using our regionally based resources. Each team member has available capacity and is committed to delivering the Blue River Odor Control Phase III project on time and within budget, and they are all ready to begin at Notice to Proceed (NTP).

EXHIBIT 4: Project Team Summary

Team Member	Office Location
Julie McNiff 🔑 | Project Manager	Kansas City, MO
Melissa Hoffmeister | Project Executive	St. Louis, MO
Bill Desing 🔑 | Study and Design Lead	Milwaukee, WI
Jes Vollersten | Technical Advisor	Denmark
Julian Sandino 🔑 | Technical Advisor	Kansas City, MO
Steve Wehrspann | Health and Safety Advisor	Pittsburgh, PA
Scott Cowden 🔑 | QA/QC Lead	Corvallis, OR
Keisha Voigt 🔑 | Envision/Sustainability Specialist	Washington, DC
Adrian Romero 🔑 | Collection Systems Lead	Charlotte, NC
Bruce Koetter (Webster) | SAP Development and Coordination Lead	Louisville, KY
Mike Alexander (Hg Consult) | Field Services	Kansas City, MO
Justin Likes (TREKK) | Field Services	Kansas City, MO
Jennifer Waters (TREKK) | Permitting, Easement, Access	Kansas City, MO
Evan Dolan (Hg Consult) | Permitting, Easement, Access	Kansas City, MO
Matthew Ward | WATS Model Development	Salem, NC
Darryl Chartrand | Air Dispersion Modeling	Toronto, Ontario
John Siczka 🔑 | Mitigation Alternatives Analysis Lead	Milwaukee, WI
Samantha Laughman (TREKK) | Mitigation Alternatives Analysis	Kansas City, MO
John Winkelmann | CADD	St. Louis, MO
Kevin Elbert | Constructability	St. Louis, MO
Frank Costanzo | Cost Estimation	Greenwood Village, CO
Rajan Vasudevan | Field Services Lead	Kansas City, MO
Chris Logan | Construction Phase Services	Kansas City, MO
Ben Erschen | Structural	St. Louis, MO
Spencer Kelly | Civil	St. Louis, MO
Darren Lecke | Electrical Engineer	Milwaukee, WI
Rajeev Srivastava | I&C Engineer	Milwaukee, WI
Kurt Bettger | Geotech	St. Louis, MO

Our Process for Streamlined, Efficient Delivery

The success of your project be achieved by creating a collaborative environment and building trust between our team and yours, as well as key stakeholders. It all starts at the beginning with a strong focus on meaningful and proactive communications.

Based on our extensive experience working with you, we possess a robust understanding of your expectations and requirements. Our project manager, **Julie McNiff**, and our team are well-versed in managing multi-office teams with multiple subconsultants. Our communication plan is based on a well-documented process that begins upon selection. Our effective project evaluation and development process relies on proactive information sharing, active listening, and partnering to meet your overall objectives. Our understanding of odor & corrosion mitigation strategies in large collection systems paired with our knowledge of your expectations and requirements will enable us to effectively assign resources amongst our staff and the staff of our four subconsultants. Starting with the project kick-off meeting, our team will attend required progress meetings, workshops, and distribute meeting minutes as appropriate. We will also include KC Water staff for regular planning meetings, including at important project milestones such as initial SAP development and piloting commissioning to ensure field services and other critical path items are on track. **Julie** will plan on holding, at a minimum, the following check-in meetings at three intervals:

1. **Weekly Check-In Meetings (internal, our task teams)**

   Example: our field services team, led by Webster with local staff from HG Consult and TREKK supporting, are conducting sampling after the SAP has been finalized. The team meets weekly to discuss priorities, any additional information or materials they might need to request, questions for our technical advisors, and share their own progress against the schedule and deadlines.

2. **Regular bi-weekly check-in meetings (our task leads including partners, advisors, and our project manager)**

   Provide status updates and identify information needs between concurrent teams to verify the project stays on track. These check-ins will be key to facilitate communication between teams conducting sampling, conducting piloting, and our technical advisors and subject matter experts.

3. **Monthly client progress meetings (key KC Water staff with our project manager, technical advisors, and task leads)**

   Share work in progress, schedule status, budget status, invoicing, stakeholder involvement, or potential scope adjustments. Progress meetings with KC Water will be used to gather feedback on sampling points, piloting, and other key aspects of the project.

Pay Certification

Jacobs certifies that we will pay all employees who will work on this Contract in the city limits of Kansas City, Missouri at least $12.50 per hour in compliance with the City's Quality Services Assurance Act, Section 3-66, Code of Ordinances.

We do more than just meet MBE and WBE goals

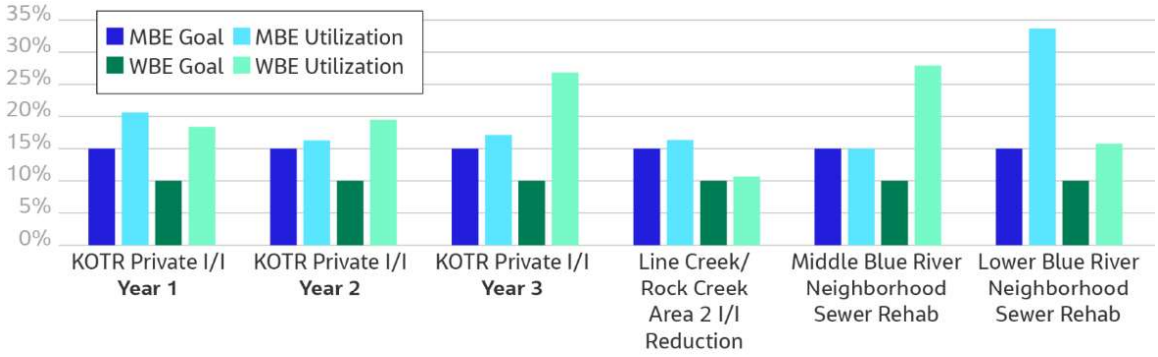
We recognize the value of providing opportunities to Minority Business Enterprises (MBEs) and Women Owned Business Enterprises (WBEs) and have a successful and long history of mentoring these firms. The effectiveness of our policy has been recognized by the Environmental Protection Agency (EPA), resulting in our receipt of EPA's Administrator's Award for Outstanding

Accomplishments by a Prime Contractor numerous times since 1983.

What this means to you is that we strive to find meaningful roles for our MBE and WBE subconsultants to help them develop new skills and build their capacity. We do this in two ways: first, by assigning subconsultants that are considered experts to leadership roles, and second by mentoring subconsultants that want to work with us to develop new skills to expand their capabilities for future projects. We recognize that the Blue River Odor Control project provides a unique opportunity to upskill local MBE and DBE firms – partnering TREKK and HG Consult with The WATS Guys and Webster will help transfer valuable skills in odor control & corrosion mitigation.

We are committed to meeting your M/WBE participation goals for the Blue River Odor Control project. Presented below are some of our past projects where utilization exceeded project participation goals.

EXHIBIT 5: M/WBE Participation Goals and Results



Part IV
Project Approach

Part IV: Project Approach

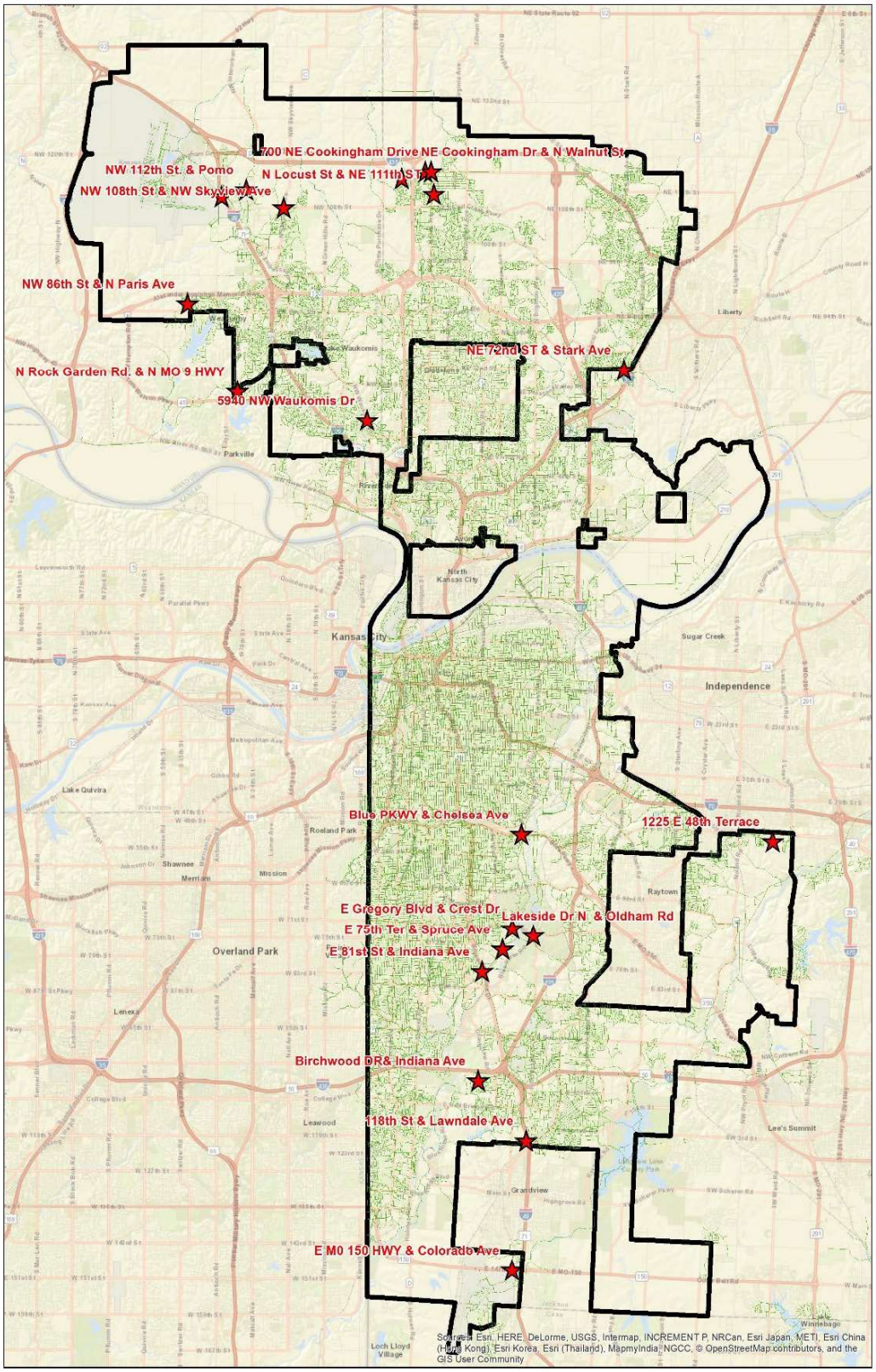
Project Understanding and Overview

Dating as far back as 1850, Kansas City's sewer systems extend more than 3,400 miles, which includes both storm and sanitary sewers. Roughly 2,800 miles of separate and combined sewer systems collect waste from homes and businesses and are treated at one of the City's six wastewater treatment plants. While over 270 miles of sewer have been rehabilitated and over 51% of the sewer system digitally inspected through the Smart Sewer Program, KC Water plans to continue repairing and/or replacing the system that has reached the end of its useful life. As part of that effort, KC Water would like to identify where hydrogen sulfide (H_2S) and other odorous compounds collect within the system causing air quality issues and increased degradation rates for their collection system infrastructure.

Again, the City desires to determine where H_2S and other odorous compounds are present in the wastewater collection system and evaluate methods for mitigating odors and sewer degradation. To help do this, the project will first identify sampling locations based on past City measurements and the system features such as force main discharge locations. A sampling plan will be developed, and sampling will be conducted up to 40 collection system locations and samples will be analyzed for a variety of parameters. Based on the results of the sampling, and previous chemical dosing done by the City, pilot testing of chemicals or other mitigation strategies will be conducted. Design of odor mitigation systems may be done in the future at the City's option.

EXHIBIT 6 shows starred locations that represent multiple manholes that you have identified for potential sampling along with a discussion of potential causes of the odor and degradation. The RFP requests that from these 89 sites, 40 will be selected as sampling sites.

EXHIBIT 6: Potential Sample Locations



APPROACH

Our team will complete the sampling and pilot testing as described in the RFP through Task Series 100 – Project Management and Administration, Task Series 200 – Collection System Assessment, and Task Series 300 – Chemical Piloting. Our approach could reduce the number of sampling points & pilots needed while producing results that can be fully integrated into your collection system & treatment plant models. Your level of service will be elevated, assets protected, & scope delivered through our approach - all without extra cost to you.

TASK 100 —PROJECT MANAGEMENT AND ADMINISTRATION

We will manage, direct, and oversee each element throughout the project to successfully manage and complete the work outlined in the Basic Scope of services of the RFP. This includes project correspondence, supervision and coordination of services, implementation of a specific work plan, scheduling and managing resources, and monitoring progress.

Kickoff Meeting

Our project manager and other key staff will prepare for and attend a half-day kickoff meeting with KC Water. We propose that the meeting occur immediately after Notice to Proceed. This would allow us to quickly develop a sampling plan and get it reviewed, approved, and implemented as soon as possible to allow sampling to proceed quickly. The objectives of the kickoff meeting will include identifying major project stakeholders, determining project success factors, understanding historical odor data and issues and refinement of the project schedule, deliverables and develop the foundation of the workplan.

TASK 200 —COLLECTION SYSTEM ASSESSMENT

Evaluate Existing Information

Our team will collect information and data related to your historical odor and corrosion issues. This will include any available information regarding pipe inspections, odor complaints, existing corrosion and past odor mitigation efforts.

To help aid in the execution of Task Series 200 and developing a Sampling and Analysis Plan, we propose to use, at no added cost to you, the Wastewater Aerobic/Anaerobic Transformations in Sewers (WATS) sewer process computer model. The model, further described on the following pages, can be used to:

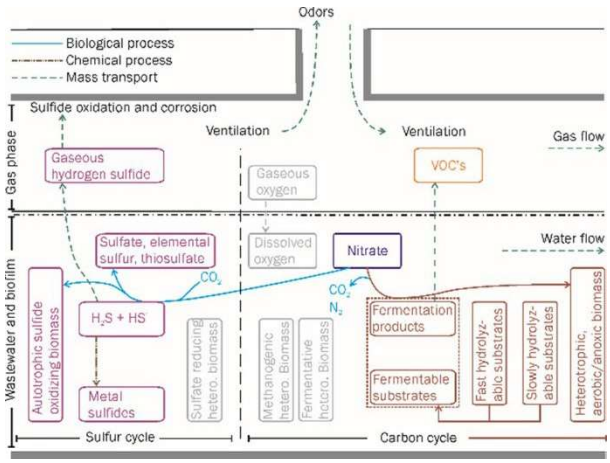
- Help determine what locations have odor and degradation issues.
- Determine the best sampling locations, possibly reducing the total number of sites requested.
- Determine what chemicals and other mitigation methods may be effective and should therefore be piloted.
- Determine the locations where the pilot systems should be installed in order for them to be most cost-effective.

WATS Model Background and Description

The WATS model, a key tool that the Jacobs Team will use for the project, **is the only model that has been thoroughly proven on large, complex collection systems (like KC Water's) to accurately predict odors and corrosion and simulate the performance of mitigation alternatives.** Seven years ago, Jacobs established a collaborative agreement with the model developers at Aalborg University (Denmark) to refine the WATS sewer process model by combining their academic research with Jacobs' empirical, real-world project experiences. We continue to refine the commercially available model through our collaborations with Aalborg on numerous large collection system odor projects. WATS considers many more variables and processes than previous simplified models, allowing our team to address the challenges of

controlling odors and corrosion in highly dynamic, complex collection systems. The WATS sewer process model evaluates chemistry; aerobic, anoxic, and anaerobic biological processes; liquid and vapor mass transfer; releases of gas to the environment; impact of drop structures; and corrosion **(EXHIBIT 7)**.

EXHIBIT 7 – Processes Simulated in the WATS Model



Prior to the development of the WATS model, attempting to find the optimum mitigation alternatives usually involved highly simplified spreadsheet models and piloting of many chemicals or mitigation methods at numerous locations at a wide range of chemical dosages resulting in costly, and time-consuming pilot testing. Using the WATS model allows the nearly optimized pilot locations, chemicals, and dosages to be determined (See example in EXHIBIT 8). WATS can also identify the best locations and required air flows for vapor phase controls (e.g. carbon, biofilters) to be located along with estimated air flow rates and **H_2S loadings**. Then pilot testing of chemicals and ventilation rates (fan tests) can be used to confirm the modeled chemicals, dosages, and air flow rates. The model can also be used to estimate variations in dosages and air flow rates due to normal variations in wastewater characteristics, flows and operating conditions avoiding the need to run pilots over the long periods of time needed to capture all of the changing conditions. **This results in a much lower cost pilot program with a reduced duration.**

The WATS model will estimate H_2S concentrations and corrosion rates (in/year) in each and every pipe in the collection system. In several cases, the model will identify areas with high H_2S or corrosion that utilities were not previously aware, as shown in EXHIBIT 9. This may be because manholes were sealed which contains odors, sewers are in areas not near people who may complain and the ewers may not have been inspected for corrosion.

EXHIBIT 8: WATS Model Simulation Mitigation Models – Example of How the WATS Model Can Quickly Simulate Mitigation Methods (With and Without Oxygen Addition)

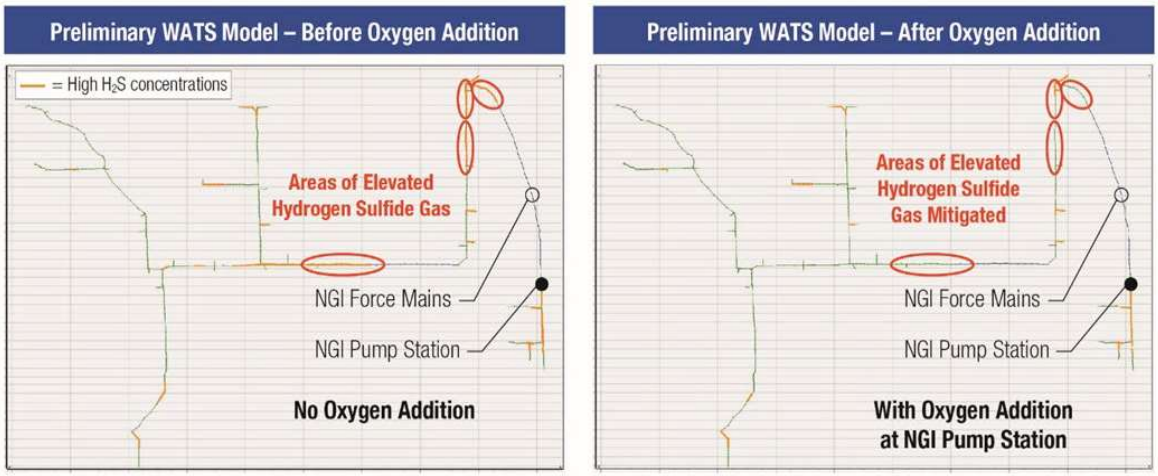
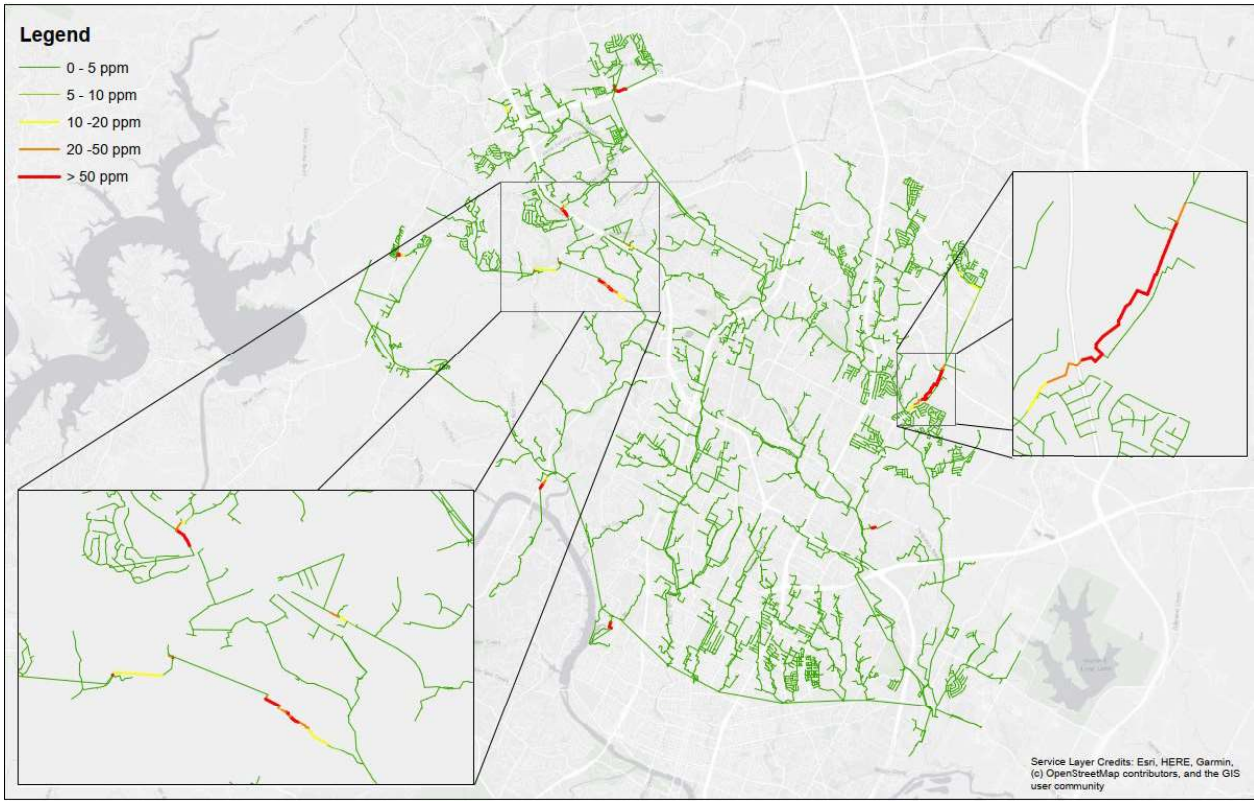


EXHIBIT 9: Austin Water entire collection system WATS Model illustrating H_2S levels in pipes, color coded by concentration.



The WATS sewer process model offers the following benefits to KC Water:

- **The ability to run "what-if" scenarios to simulate a variety of mitigation alternatives.** For example, using the model, we can evaluate different chemicals at multiple dosing points in the collection system to quickly find the optimum, cost-effective chemicals and locations to control odors and corrosion that should be pilot tested. Similarly, we can evaluate different vapor phase ventilation rates and locations to help size and site vapor phase systems for preliminary design.

Accurate prediction of headspace H_2S concentration under various conditions. H_2S levels can be determined using H_2S monitors (e.g. Odalogs). The data from these monitors can be used for calibrating the WATS model, but the monitoring period may be relatively short. This information alone may not be able to determine how H_2S levels may change over longer-term conditions, such as seasonal flow variations, future **I/I** changes, and changes in wastewater characteristics. Potential future changes in variables like flow rate, BOD, and temperature can be quickly simulated to determine the effects of the changes over long periods of time in the model.

The ability to estimate ventilation rates needed to maintain a negative pressure for a given area of sewer that would exhaust to an odor treatment device. Fan/pressure testing is often an effective way to accomplish this, but WATS modeling can be less costly, simulate a wide variety of changing conditions, and even characterize very large areas and high air flow rates when a large enough portable fan may not be available. However, in some cases fan testing can still provide value to further refine the sizing of the odor control system.

Key Odor and Corrosion Issues

The following steps constitute our proposed approach, as shown in **EXHIBIT 10**.

- **Quantify Odors/Corrosion—**Concentrations of odors and corrosion rates throughout the sewers in the KC Water system will be estimated based on sewer sampling and pressure monitoring and through development of the WATS sewer process model. Forty (40) locations where odors and corrosion are high will be identified throughout the KC Water's system.
- **Establish Goals—**Determine what levels of odor and corrosion rates may be acceptable within the community. The level of acceptability depends upon the concentration and frequency of odors at a receptor (e.g., the closest house to a manhole). We will determine an acceptable sewer corrosion rate that will achieve the City's desired asset life.
- **Determine Impacts—**Using the WATS model, the corrosion rates and estimated pipe life will be estimated for each segment of the collection system. The H_2S concentrations will be estimated using the WATS model and those concentrations along with measured and estimated sewer pressures and air dispersion modeling will be used to estimate odor impacts at key locations.
- **Evaluate Control Alternatives—**First, determine the level of control required to achieve odor and corrosion goals. Then compare advantages, disadvantages, and costs of control alternatives, including lining, liquid phase, vapor phase, and changes in design and operations.
- **Select Control Alternatives—**Select the most appropriate odor and corrosion control technologies that cost-effectively meet the City's needs and prepare preliminary designs of the facilities that incorporate those technologies.

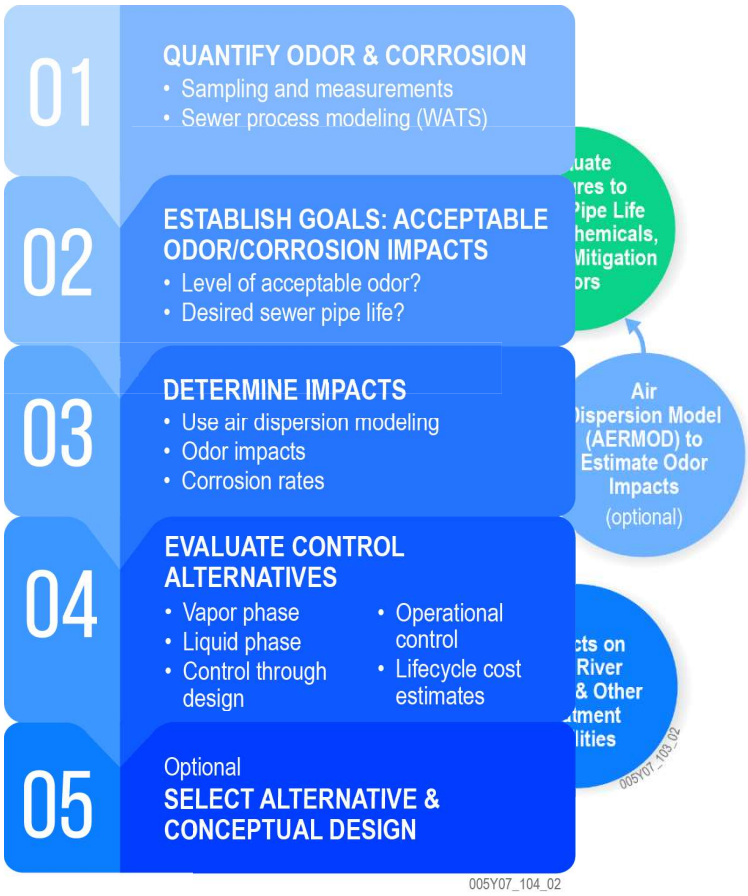


EXHIBIT 10: Approach to Odor and Corrosion Control

Integrating Models to Evaluate Odor and Corrosion Issues

The key to implementing the above approach is to seamlessly integrate multiple computer models. EXHIBIT 11 shows how the various models will be linked, as our team has done successfully on other similar projects. The key to the modeling approach will be development of a properly calibrated WATS model – something we have done on more than 35 other projects. The WATS model will be linked with hydraulic, air dispersion, and wastewater treatment process models – each of which will be executed by one of our modelers who specializes in each model. The models will be developed using the proper data sets, including sewer pressures, water quality, atmospheric data, and other relevant data. The wastewater process model for the Blue River WWTP was developed by Jacobs lead team on the Biosolids Improvements Project, and we will fully leverage those efforts for the project at hand – see subsequent section for more details.

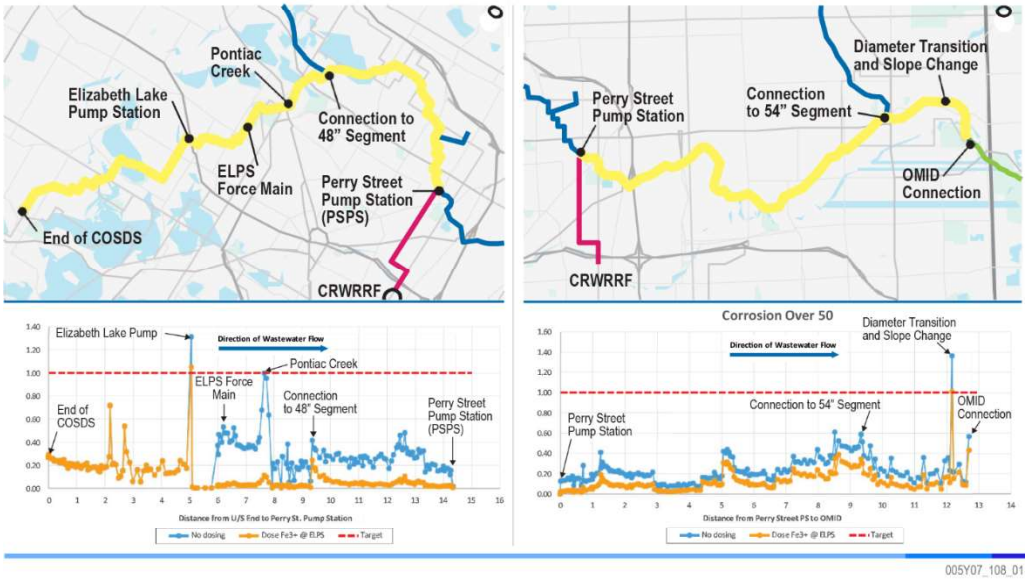
Model calibration using sampling results in reliable, cost-effective tool

Field sampling alone has historically been used to try to estimate emissions throughout wastewater collection system. However, the ability of sampling to do this is limited because the sampling is often done over a limited time period, making it challenging to capture all the variations in flow, temperature, and other wastewater characteristics that will occur over a long period that impact emissions. Fully characterizing the full range of flows and wastewater characteristics in a system as large as KC Water's typically requires monitoring more than the RFP requested 40 locations. The WATS model can help better define the 40 locations out of the 89 possible and may even determine less than 40 locations are needed.

Another purpose of sampling is to validate the model to help demonstrate its accuracy. Following field calibration, modeling can be used to estimate odor and corrosion impacts under various current and future flow and load conditions.

We will develop a detailed sampling plan for the City's system that indicates sampling locations and the types of analyses done for each.

EXHIBIT 11: Example of How the WATS Model Quickly Simulated Mitigation Methods (With and Without Ferric Chloride Addition)



OPTIONAL TASK – AIR DISPERSION MODELING:

Determine the impact of odorous sources on the surrounding community

The WATS sewer process model will estimate the H2S concentration in the sewer headspace throughout the KC Water collection system. That information— combined with estimates or measurements of air flow (based on measured sewer pressures) from collection system vents, pump stations and manhole covers—will be used to estimate the "odor mass," or the air flow times the odor concentration.

Determining odor mass is a good first step in finding the largest odor sources and prioritizing sources, but it may not identify the sources that will cause the most odor complaints in the community around the facilities or manholes. Odors from some sources, such as a taller structure ventilation stack, will disperse well because of high discharge velocities, whereas others, such as ground-level manholes or vents, disperse poorly and can result in high-strength odor concentrations and complaints from citizens living near the facilities. The most effective and comprehensive method to account for the dispersion is the use of computer air dispersion modeling. Air dispersion modeling is a powerful tool because it can be used to estimate the following:

- The number of people affected by an odor source
- The frequency, typically expressed as hours per year, that each person will be affected
- The odor "strength," expressed as dilution-to-threshold (D/T), that each person will experience each hour of the year

Though dispersion modeling is a highly recommended tool, it is an optional task and not required to meet the goals of the project. However, it does provide the following benefits:

- It can determine if odorous emissions are high enough to cause complaints. In collection system H2S concentrations may be relatively in a sewer headspace but the odor "mass" (concentration x air flow) may not be high enough to cause complaints.
- Determine the level of odor control that is needed to mitigate complaints. High levels of control (e.g. 99%) are often not needed to mitigate complaints and dispersion modeling often determines that a lower, (and less costly) control device is required.

Establish goals for odor/corrosion control

Dispersion modeling can be used to develop "what-if" scenarios to determine which sources should be controlled and to what level in order to achieve acceptable impacts on the community. An important prerequisite to dispersion modeling will be to establish the level of odor acceptable in the surrounding community. Odor complaints are primarily triggered by the following:

- Odor strength
- Frequency in which the odor is perceived (commonly expressed as number of times per year that a certain odor dilution-to-threshold is exceeded and estimated using dispersion modeling)
- Duration of how long the odor "event" is experienced
- Offensiveness and intensity of the odor
- Propensity of people living near the source to complain

Several states, wastewater utilities, and air quality agencies have established regulatory odor limits, often using a combination of D/T and frequency. The limits generally range from 5 to 20 D/T, with an acceptable frequency of 5 to 50 hours per year. **EXHIBIT12** shows a range of generally acceptable limits based on a range of odor intensifies, frequency of exceedance, and

EXHIBIT 12: Acceptable Hours per Year of Odor Exceedance at Various Odor Units

	Odor Units				
Hours Exceedance per Year	3-5	7-10	20	50	100
Intensity	Very Weak	Weak	Distinct	Strong	Very Strong
0-10 | 99.9%	Acceptable	Acceptable	Acceptable	Marginal	Not Acceptable
10-50 | 99.5%	Acceptable	Acceptable	Marginal	Not Acceptable	Not Acceptable
50-100 | 99%	Acceptable	Marginal	Not Acceptable	Not Acceptable	Not Acceptable
100+	Marginal	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable

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Jacobs' wastewater odor experience. Often a true "zero" level of odor impacts (no odors, ever) is not used as a goal because it is typically cost-prohibitive and sometimes not feasible to achieve. Our team will work with you to select an acceptable odor limit based on your goals for odor control, the needs of neighbors and receptors living near the interceptor, drop manholes, pump stations, or other facilities. That limit would then be used to select and design mitigation systems that meet the acceptable offsite odor limits.

Determine Level of Control Needed to Reduce Impacts on Surrounding Communities

Once the odor threshold and frequency are established, odor modeling can be used to identify improvements needed to achieve the goals. EXHIBITS 13 and 14 show the results of air dispersion modeling displayed graphically before and after odor control improvements for a collection system pump station, respectively. Displaying data using an air dispersion model post-processor, such as BEAST, in this way rather than using only peak odors, can be key to understanding the potential for complaints. In addition, historical odor complaint data can be correlated with modeling to validate and adjust modeling results.

EXHIBIT 13: Air Dispersion Contours Before Controls at Example Pump Station, Showing the Number of Hours per Year That Exceed the Odor Nuisance Threshold of 7 D/T BEFORE Controls

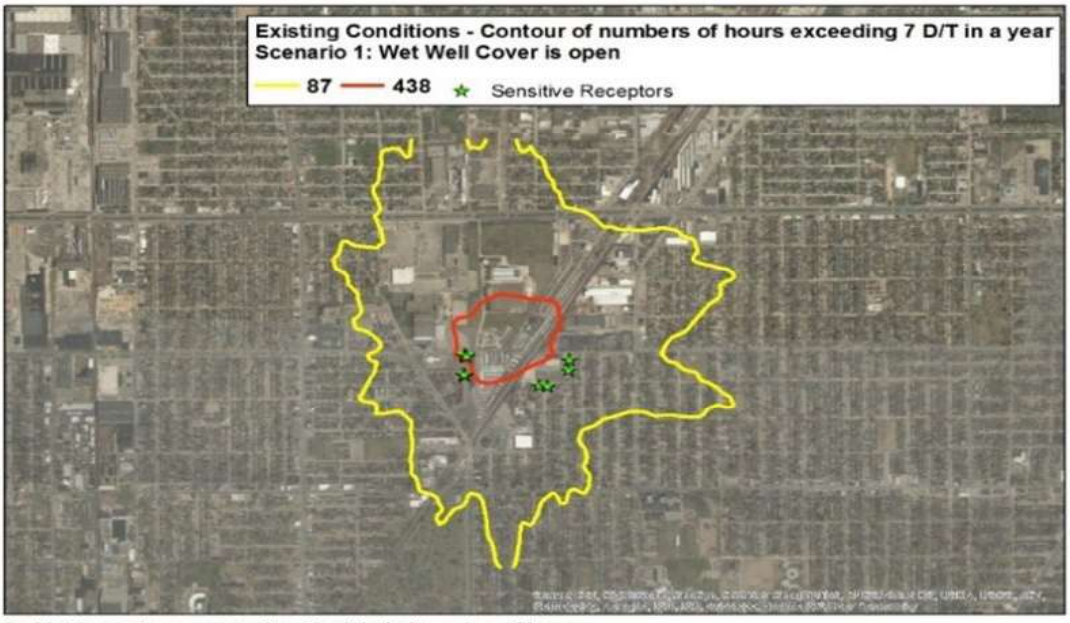
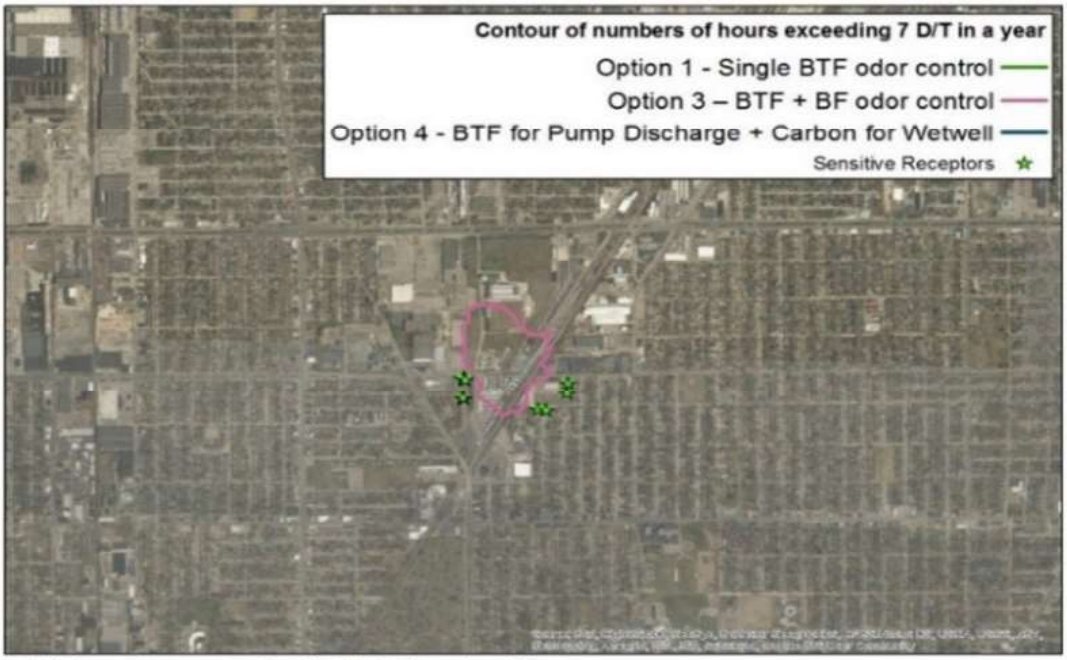


EXHIBIT 14: Air Dispersion Contours After Controls at an Example Pump Station, Showing the Number of Hours per Years that Exceeds the Odor Nuisance Threshold of 7 D/T AFTER Controls



Dispersion modeling can be used to prioritize control of odorous sources by evaluating what-if scenarios for controlling a source to determine which control types and efficiencies will result in the fewest complaints at the lowest cost. It is often found that a significant decrease in odor complaints can be achieved for a relatively modest cost, but as a zero-odor impact goal is approached, the costs of control increase significantly.

Evaluate the Required Controls to Reduce Odor and Corrosion Impacts

There are many means by which to mitigate odors and corrosion. Determining which is best for each location within a collection system can be challenging. The optimum alternative for each situation will depend on many factors, and those factors differ for each utility, odor source and location. We will work with the City to present information regarding the available alternatives and identify advantages and disadvantages for each to help the City select the solutions that best meet its needs. **EXHIBIT 15** shows three categories of mitigation alternatives that will be considered and discussed.

Vapor-phase treatment - Odorous and corrosive environments are ventilated, both dilutes the odorous air stream and conveys it to a treatment system.

Liquid-phase treatment - Chemicals are added to the wastewater to reduce odors through such mechanisms as oxidation or precipitation.

Design changes - Collection system improvements can be designed to minimize odor formation or odor release. Examples include decreasing the wastewater drop heights; modifying drop designs to decrease turbulence and odor release; making pipes smaller to decrease sewer detention times to decrease odorous sulfide formation; and providing sufficient slopes to prevent accumulation of solids that cause anaerobic, sulfide- forming conditions. Lining can also be installed to prevent corrosion.

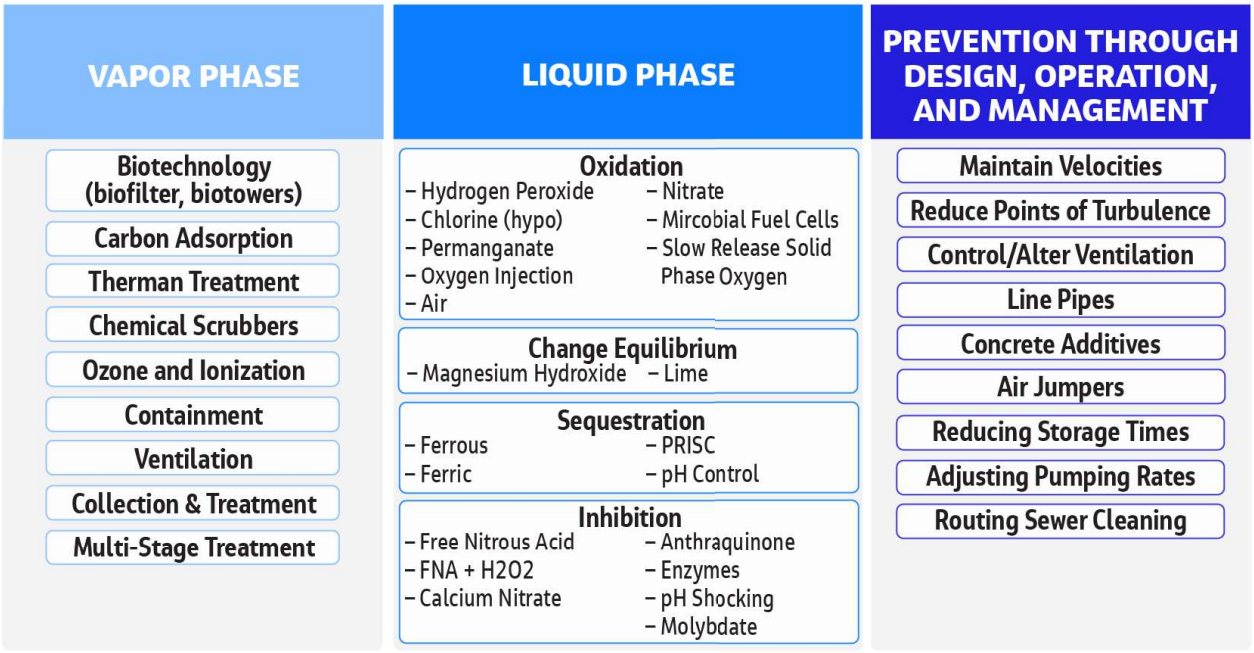


EXHIBIT 15: Three Categories of Odor Control Mitigation Alternatives

Operational changes - The operation of a collection system is modified to reduce the potential for the formation and release of H2S. For example, changing storage times, pumping rates, and hydraulic profiles may affect emissions.

Within each general category of odor mitigation, there are several sub-alternatives to choose from. Vapor-phase control is one of the most common and effective odor mitigation methods and may be feasible for some locations. This may be especially true areas of the City's system that are "tight" with small or few openings. In that case, the vapor systems can be relatively small/low flow and lower cost because large amounts of air are not required to maintain a negative pressure through the small openings. However, ventilation rates must still be high enough to prevent high H2S concentrations which could cause corrosion or present worker safety issues.

Odor management practices - These include practices designed to mitigate or minimize odors, such as more frequent sewer cleaning, keeping doors and windows of buildings containing odorous sources closed, and minimizing sewage storage times. In addition, this could include providing sufficient staff and resources for operation and maintenance of odor systems, establishing responsibilities for odor assessment prevention, response, and control, etc.

Vapor-phase controls can be highly effective, but if not properly selected and designed, vapor-phase mitigation can be very costly and may not achieve high removal efficiencies. An important factor to consider in selecting a vapor-phase mitigation method is odor source characteristics. Different types of sources contain different types of odorous compounds. In some cases, it can be critical to identify the compounds and then select a mitigation option that can effectively control them. Jacobs has significant experience regarding which vapor-phase control devices are most effective at controlling different odorous compounds based on our past research and testing. This means that it may be important to

analyze odorous sources for several compounds so that an appropriate treatment technology can be selected. However, a comprehensive analysis like this is not necessarily required, because a technology can sometimes be selected based on experience with similar odorous sources from other collection systems or treatment plants.

Determine Impacts on Wastewater Treatment Plants

If chemicals are added to the collection system or if operational changes are made to the collection system, operation of the Blue River Wastewater Treatment Plant could be affected positively or negatively in several ways. For example:

- Adding iron salts such as ferric chloride could reduce odors from headworks and primary clarifiers by precipitating sulfides, enhance primary clarifier settling and improve clarifier performance, decrease aeration energy, increase primary sludge production to increase digester biogas production, and decrease H2S in digester gas. Adverse impacts of ferric chloride addition could include increased costs associated with higher sludge production and capacity of the THP system. Impacts on phosphorus removal would depend on the downstream process, which a credit to a CEPT approach can be gained by dosing ferric upstream in the collection system while a potential biological phosphorus removal could be carbon-limited due to the carbon redirection in the primaries and the potential need to supplement alkalinity for process stability.
- Dosing hydrogen peroxide oxidizes sulfides present in the collection system and maintains aerobic conditions to prevent sulfides from being formed. It's a proven and effective tool for sulfide management. However, it also oxidizes soluble substrates that are needed for biological nutrient removal that the BRWWTP is evaluating. Our experience has been that in some cases, the cost of supplemental carbon or alkalinity at the WWTP due to this oxidation of soluble organic matter can overshadow the benefits of dosing peroxide in the collection systems.
- Increasing wastewater storage time in the collection system by reducing flow rates or increasing pipe sizes would increase the formation of volatile fatty acids (VFAs), which could enhance biological phosphorus removal. However, sulfide generation in the collection system would increase due to decreased sewer velocities.

To address these issues and others like them, we can as discussed previously link the WATS collection system model with existing wastewater process models (either SUMO or Biowin) to determine how chemical addition in the collection system and other changes may affect the treatment plants. The WATS sewer process model estimates the concentrations of numerous wastewater characteristics such as BOD, COD, VFAs, dissolved oxygen (DO), pH, sulfides, and others at the terminus of the collection system at the treatment plant inlet. These concentrations are linked to the input files to the wastewater process model. The wastewater process model can be run to determine how collection system changes such as adding chemicals will affect the treatment plant operations. We have used the linking method on other projects to identify impacts of collection system changes.

Example of Drop Structure Odor Project

Non-Monetary Considerations

In addition to cost considerations, we typically recommend that non-monetary factors be evaluated when choosing an odor control method. A multi-attribute utility analysis (similar to your quadruple bottomline approach) is one method we have used for a non-monetary evaluation. This multi-criteria analysis approach was used on several other odor control projects and it allows comparison of these factors, along with life-cycle costs, to aid in the selection of odor/corrosion control devices that meet the specific preferences of KC Water by weighting them based on importance to you.

TASK 202 SAMPLING AND ANALYSIS PLAN

We will use the results of the sampling to calibrate the WATS model. The WATS sewer process model will be configured and used for evaluating and recommending odor and corrosion solutions. The WATS sewer process model will also be used to refine the sampling plan in order to identify sampling areas best suited for model calibration. Sampling would be done during dry, hot weather, and the WATS sewer process model would be used to simulate wet weather conditions and flow splits to downstream facilities.

Data Acquisition/Sampling

Using the sampling plan, our team will execute the sample collection and analysis. The following is assumed for this task:

- The Acrulog vapor-phase hydrogen sulfide used for continuous measurement will be installed for up to 2 weeks. It is assumed that there will be a period of about 1 week of relatively dry weather while installed.
- Our team will install instruments and collect liquid wastewater samples. Liquid samples will be delivered to a local laboratory for analysis.
- The number and location of samples, shown on EXHIBIT 6, may vary based on input during the kickoff meeting and further refinement of the WATS sewer process model.
- Based on our knowledge of your collection system and experience on other similar projects, confined space entry will not be required for this effort. However, knowing that our field crews will be in close proximity to hydrogen sulfide and other potential dangers, safety is a priority.
- It is assumed that the KC Water will provide the following to our team:
  - Access to facilities, such as pumping stations and drop structures
  - Analysis of grab samples for COD, filtered COD, and VFAs

WATS Model Development

Using the sampling results Data Acquisition/Sampling and past odor studies, a collection system sewer process model will be developed for the City's Collection System using the WATS sewer process model. Pipe sizes below a minimum diameter may not be included. The Jacobs team's familiarity with the collection system configuration and flow rates will ensure accurate geometry (e.g., pipe slopes, diameters) and flow inputs from your collection system hydraulic model into the WATS odor/corrosion model. The WATS model will estimate odor emission rates and corrosion rates throughout the system and will be displayed graphically.

Air Dispersion Modeling [Optional]

The WATS model results can be used to execute air dispersion modeling that will be done using the U.S. EPA's AERMOD model. Surface meteorological data can be obtained from the available operated rain gauges in KC Water's service area, as well as both commuter airports within the KC Metro Area. The 5-year Integrated Surface database and ASOS 1-minute data can be downloaded from National Oceanic and Atmospheric Administration's National Center for Environmental Information website.

Several input data components using five ancillary pre-processing tools assembled and preprocessed for use in AERMOD:

- Source characterization
- Terrain characterization
- Land use characterization
- Meteorological characterization
- Offsite odor threshold and frequency targets

Each input parameter will be preprocessed by an auxiliary software tool to convert data into a format ready for use in AERMOD. We anticipate that the following odorous emissions sources will be modeled:

- A typical pump station vent
- A typical siphon vent
- Emissions from typical manholes for a range of different pressures and hydrogen sulfide concentrations. Emissions for up to four different pressures and four different H_2S concentrations will be modeled. H_2S concentrations will be correlated to D/T using past project data and the sampling done on this project.

TASK 300 – CHEMICAL PILOT TESTING

We will conduct a chemical pilot and/or other mitigation strategies at selected locations identified within Data Sampling Plan Report with a focus on conducting tests in series for different chemicals to determine efficiency and total cost of ownership.

Fan testing during piloting is an optional task that can be implemented at the City's request if it is determined to be of value. When vapor-phase technologies that are actively ventilated by an exhaust fan are the likely technology for odor/corrosion control, fan testing is one method that has been used to right-size these systems. Fan tests are typically completed by Webster with engineering consultant support. For the test, the contractor connects an exhaust fan with a variable speed drive at a desired location within the collection system. Sewer differential pressure and H_2S loggers are installed at strategic locations within the collection system to provide continuous measurement of these parameters while the fan operates. While operating, the contractor varies the speed of the fan incrementally to identify the required air flow rate required at the installed location to induce a negative pressure within the sewer. This enables the system designer to characterize the fan "zone of influence" at various air extraction rates. Though Jacobs has a high degree of confidence in the ventilation calculations that are completed in WATS, field testing may be found to be useful if WATS modeling finds unique air flow issues.

Alternatives Evaluation

Alternatives to reduce odors and corrosion to acceptable levels in the collection system will be identified and evaluated. The calibrated WATS sewer process model will be the primary tool used to do that. The following general types mitigation methods will be considered:

- Liquid-phase treatment (i.e., chemical addition)
- Vapor-phase treatment (e.g., biofilters, carbon)
- Sewer pipe lining
- Changes in operation, such as changes in pump speeds, flow diversions, etc.
- Changes in design, such as changes in sewer slopes, pipe sizes, drop configurations etc.

The WATS sewer process model will be used to run several what-if scenarios to determine the levels of odor/corrosion reduction that each alternative could achieve. The model will also be used to help estimate alternative costs by estimating chemical dosing rates and ventilation rates. The impacts of each alternative on wastewater treatment plant operation will be evaluated to determine the

Fan Test

potential positive and negative impacts on the treatment process and operating costs.

We will work with the City to document the available options to support the selection of solutions from the results of our evaluations. Alternatives for odor control will be presented to City staff in a workshop and include technology descriptions and advantages and disadvantages of each control method.

Conceptual Design/Optional Services

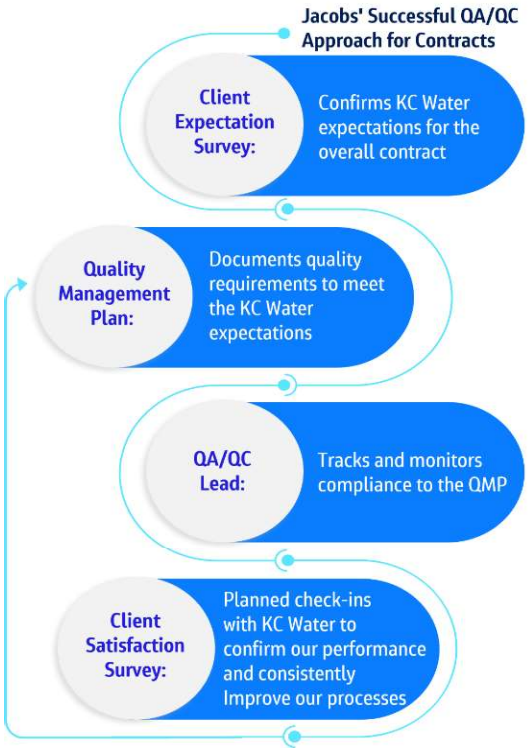
Based on the discussions held with the City staff during the workshop, we can propose alternative control technologies for comparison for each location. We can prepare the following for each technology:

- A description of the technology
- Advantages and disadvantages and non-monetary attributes of the technology
- Preliminary design criteria, such as dosing rates, tank sizes, air flow rates, media types, and empty bed retention time
- Estimated capital, operational, and maintenance costs and 20-year life cycle costs. Cost estimates will be Class 5 based on Association for the Advancement of Cost Engineering 18R-97 guidance

A workshop would be held to select the preferred alternative for each location. Then a basis of design for each selected system can be prepared.

Quality Assurance Plan

Providing quality deliverables is integral to developing a clear, concise, and well-documented project for the City. We will confirm the quality of our work prior to your staff receiving it for review so that the focus can be on content and not inaccuracies. To confirm this project is delivered with your specific requirements and vision in mind, our **Project Manager Julie McNiff** and **QA/QC Lead Scott Cowden** will develop our Quality Management Plan (QMP) to achieve your guidelines.



Our team implements proven methodologies and procedures based on a well-defined and diligently enforced internal QA/QC processes. Our approved check method requires detailed inspections of electronic versions of documents to verify conformance with codes, standards, technical accuracy, and project requirements within Bluebeam Revu® software. Internal Bluebeam sessions provide a collaborative space for the project team to simultaneously review, record and adjudicate report comments in real-time. Our review process with you is anticipated to be with face-to-face meetings to review reports and address questions. However, should you and your stakeholders prefer, we can instantly connect in multiple BlueBeam sessions, expanding collaboration on the project, saving time and becoming more sustainable with less printed documents.

Julie will engage our technical leads, task leads, and our subconsultants to clearly define project processes and clarify responsibilities and methods to establish, monitor, assess, and maintain the quality of our deliverables through all project phases. **Scott** will manage the QA/QC

process as well as engage our Study and Design Team(s) to review project process and methodology from a technical perspective to maintain the quality of our project deliverables.

Specific responsibilities for quality checks and reviews are clearly identified in our QMP so expectations are clear and documented, performance is easily measured, and accountability metrics are defined. As we progress through the project phases, the QMP may be modified to account for changes in the project direction. The QMP will be a living document that is regularly updated to maintain quality standards established and expected from both our team and you.

As a unique best practice, our client/project-specific satisfaction program begins Julie, Scott, and Project Executive Melissa Hoffmeister discussing your specific expectations in a Client Expectation Survey (CES) at the start of the project. Periodically, Melissa will meet with your Project Manager to check-in about project progress. A Client Satisfaction Survey (CSS) will give you an opportunity to provide positive or negative feedback. You will have direct access to our leadership whenever required. Our project leadership and QA/QC team members will have clearly established responsibilities for implementation of our quality program.

QA/QC Team Members' Roles and Responsibilities

Project Manager Julie McNiff

- Your primary point-of-contact for work quality and accountability
- Stewards for all aspects of project delivery to your satisfaction
- Adherence to the City's protocols and processes
- Verifies quality of milestone and final deliverables
- Tracks project cost
- Monitors performance and implements corrective action, if needed

Project Executive Melissa Hoffmeister

- Provides executive oversight and direct access for you if issue resolution is not able to be resolved at the team level
- Leads the CES and CSS to understand your expectations and quality standards
- Provides executive sign-off to confirm that QMP was followed

QA/QC Lead Scott Cowden

- Manages team schedule, including timing for quality reviews
- Develops QMP and project-specific quality expectations and standards, reviews processes and protocols from a technical perspective, and assists Julie managing the overall QA/QC process
- Manages subconsultants' quality and integrability with the overall design

Project Schedule

We have tailored a schedule based on the unique tasks associated with the Blue River Odor Control. The proposed schedule is approximately 540 calendar days (78 weeks) from the Notice to Proceed. We've outlined some critical milestones in the table below, which also are reflected on the schedule shown on the following page. As demonstrated on recent projects for you that we successfully completed on schedule, **we can work with you to adjust the schedule to be more or less aggressive to meet your project needs or specific weather requirements for sampling.**

Schedule Milestones	
Notice to Proceed (NTP)	Week 0
Task 100 Project Management and Administration Complete	**Week 78**
Project Kick-Off (Following NTP)	*Week 2*
Project Work Plan	*Week 4*
Task 200 Collection System Assessment Complete	**Week 39**
Sampling Analysis Plan - Draft	*Week 12*
Sampling Analysis Plan - Final	*Week 16*
H_2S Sampling	*Week 36*
H_2S Sampling Data Report	*Week 39*
Task 300 Pilot Testing Complete	**Week 78**
Pilot Testing Report Summary - Draft	*Week 76*
Pilot Testing Report Summary - Final	Week 78

Part V
Sustainability

Part V: Sustainability

Jacobs recognizes that the ongoing climate emergency is one of the greatest challenges and opportunities of our generation, and we are proud to lead the global charge in the fight against climate change. Our capabilities in resilient infrastructure, clean water, green, energy, and creating social value provide opportunity to play a pivotal role in benefitting people and operations. Our climate commitments:

- Target very project to become a climate response opportunity
- Achieve net-zero greenhouse gas emission across the value chain by 2040
- Maintain carbon neutrality status and 100% low-carbon electricity for our operations

In support of our commitments, our Climate Action Plan and PlanBeyond 2.0 advances us toward our goals. PlanBeyond is Jacobs' global sustainable business strategy that amplifies our purpose to create a more connected sustainable world. Our strategy propels the integration of sustainability throughout our operations and client solutions in alignment with the United Nations Sustainable Development Goals (SDGs) (EXHIBIT 16).

Addressing the Established Policies of Kansas City and Sustainability and Envision™ Credits

Kansas City has adopted an overall policy supporting a greater use of "green solutions" or enhanced sustainability measures that considers environmental quality, social equity, and economic vitality.

To incorporate sustainability and throughout the planning, design, implementation, operation, and maintenance of your project, Project Manager **Julie McNiff**, Envision Specialist **Keisha Voigt**, and Study and Design Lead **Bill Desing** will work with you to confirm sustainability goals. Our team will identify a list of potential opportunities for you to pursue to make sure sustainability is incorporated into the project, where applicable. Since the project scope includes potential mitigation locations spread throughout the

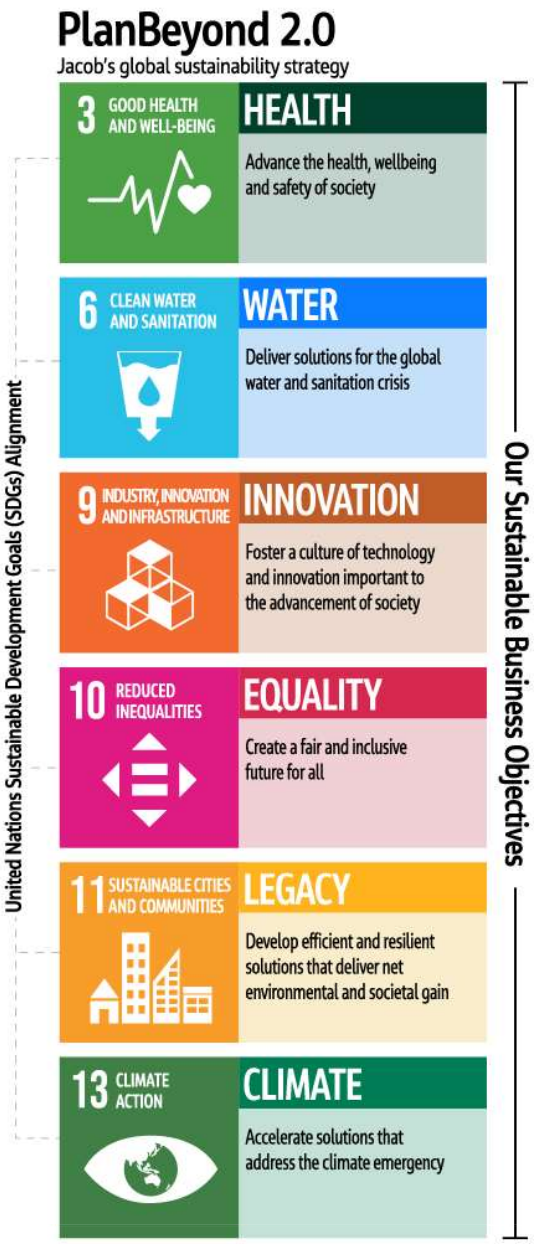


EXHIBIT 16: Our PlanBeyond 2.0 is aligned to your sustainability goals

collection system and includes pump stations and other KC Water facilities, the project will include elements of both below- (Underground Systems) and above-ground (Facilities) components. The project team will evaluate the Tier 1 credits for Underground Systems and Facilities as a baseline but will also evaluate other Envision credits that may be applicable.

Integrating Sustainability and Efficiency into the Project

The achievement of the project's sustainability requirements for the project will be dependent upon collaboration with personnel from the design and construction teams, other subconsultant teams, and the City. Under the guidance of **Julie, Keisha, and Bill**, these personnel will interface with each other throughout the project timeline to verify compliance with the sustainability requirements, as well as providing accountability and continuity with respect to achieving those requirements.

Our team will evaluate the project at each scoped phase of design and construction based on the City's Sustainability Playbook for Tier 1.
This project has an opportunity to improve the safety and quality of life for the community by decreasing the rate of asset degradation and reducing the buildup of harmful hydrogen sulfide gas. **In addition, we offer an industry-unique modeling approach to determining the production & off-gassing of methane within collection systems, which can be utilized towards CR1.2 credits & support your climate change goals.**

Our team will use the Envision Framework to help select the odor mitigation methods that best meet your needs and identify and evaluate sustainable alternatives. In addition, our team will take great care to build resiliency, sustainability, and safety into piloting and full-scale implementation, as many of the sampling locations occur in areas of ecological value, areas where KC Water customers reside, critical city operations, and areas of commerce or industry. Areas of high ecological value would need to be preserved, and areas of business, residence, and commerce would require minimization of construction impacts, but would provide opportunities for enhancement of public space and amenities.

While the project will initially focus primarily on Underground Systems, additional credits that could be evaluated include:

- QL1.6 Minimize Construction Impacts
- QL3.4 Enhance Public Space and Amenities

TIER 1 CREDITS

Envision credits evaluated under Tier 1 are separated into four groups by project type. These credits were chosen based on their relevance to the type of project and attainability.

QL = Quality of Life | LD = Leadership | RA = Resource Allocation | NW = Natural World | CR = Climate and Resilience

CREDITS	Facilities	Underground Systems	Linear Surface Systems	Area Surface Systems
QL1.1 Improve Community Quality of Life		●	●	●
QL1.2 Enhance Public Health & Safety	●	●	●	●
QL1.3 Improve Construction Safety		●		
QL1.4 Minimize Noise & Vibration	●	●		
QL2.1 Improve Community Mobility & Access		●		
QL2.3 Improve Access & Wayfinding			●	
QL3.3 Enhance Views & Local Character			●	●
QL3.4 Enhance Public Space & Amenities			●	●
LD1.2 Foster Collaboration & Teamwork	●	●	●	●
LD1.3 Provide for Stakeholder Involvement	●	●	●	●
LD2.2 Plan for Sustainable Communities	●	●	●	●
LD3.1 Stimulate Economic Prosperity & Development				●
LD3.3 Conduct a Life-Cycle Economic Evaluation	●	●	●	●
RA1.1 Support Sustainable Procurement Practices		●		
RA1.2 Use Recycled Materials	●	●	●	●
RA1.5 Balance Earthwork On Site	●	●	●	●
RA2.1 Reduce Operational Energy Consumption	●			
RA3.1 Preserve Water Resources	●		●	●
RA3.2 Reduce Operational Water Consumption	●	●		
NW1.1 Preserve Sites of High Ecological Value	●			●
NW1.4 Preserve Undeveloped Land	●			
NW2.2 Manage Stormwater	●		●	●
NW2.4 Protect Surface & Groundwater Quality	●	●	●	●
NW3.2 Enhance Wetland & Surface Water Functions			●	●
NW3.3 Maintain Floodplain Functions	●	●	●	●
CR1.2 Reduce Greenhouse Gas Emissions	●			
CR1.3 Reduce Air Pollutant Emissions	●			
CR2.6 Improve Infrastructure Integration	●	●	●	●
Total	19	16	17	18

- RA1.1 Support Sustainable Procurement Practices
- LD1.1 Provide Effective Leadership and Commitment
- LD2.1 Establish and Sustainability Management Plan
- RA1.4 Reduce Construction Waste
- CR1.2 Reduce Greenhouse Gas Emissions
- CR1.3 Reduce Air Pollutant Emissions
- Additional Tier 1 Facilities Credits

Our preliminary thoughts include reducing construction waste by diverting construction and demolition waste to recycling and reuse, sustainable procurement of chemicals for piloting and full-scale implementation, and sustainable procurement of other materials if selected (such as GAC). In many cases, our clients are integrating sustainable concepts into their projects, but are just beginning to delineate opportunities of each project. We will lean on lessons learned from our experience around the country to build sustainability into each step of the project.

Part VII
Other Required Documents

Other Required Documents

00410.01 Experience and Reference Form

KCMO Preliminary Vendor Security Questionnaire Forms 1 and 2

CREO KC Form 13 – Affidavit of Intended Utilization

00410.01 Experience and Reference Form

EXPERIENCE AND REFERENCE SUMMARY

Project/Contract Numbers: 810001020/1707

Project Title: Blue River Odor Control Phase III

Firm's Legal Name	Jacobs Engineering Group Inc
Mailing Address	2300 Main Street, Suite 325, Kansas City, MO 64108
Contact – Name & Email	Julie McNiff (Project Manager) Julie.McNiff@jacobs.com
Contact – Phone & Fax	P: 913.634.8638 F: 214.638.0447

NO.	PROJECT & LOCATION	OWNER NAME & ADDRESS CONTACT & PHONE NUMBER	PROJECT DURATION & DATE COMPLETED	$ VALUE
1.	H2S and Odor Mitigation Planning Study Project Milwaukee, MI	Milwaukee Metro Sewerage Design | 260 W. Seeboth St, Milwaukee, WI 53204 | Micki Klappa-Sullivan | 414.225.2178	2019 - 2020	$350,000
2.	Collection System Odor Control Study & Design Denver, CO	Metro Wastewater Reclamation District | 6450 York St, Denver, CO 80229 Jim Mallory | 303.286.3487	2016 - 2018	$950,000 fee
3.	Odor & Corrosion Control Systems Design & CA/RPR, Detroit, MI	Oakland-Macomb Interceptor Drain Drainage District | 1 Public Works Drive, Bldg 95 W, Waterford, MI 48328 Joel Brown | 248.410.4908	2022 - Ongoing	$10,000,000 including construction
4.	MBR 13 and LBR Kansas City, MO	Kansas City Water Services Department | 4800 E 63rd St, Kansas City, MO 64130 Russ Strom-Olsen 816.533.0288	Ongoing	$472,000
5.	Corrosion Control Strategy Development and Implementation, District of Columbia	DC Water | 1385 Canal Street SE, Washington, DC 20003 Eyasu Yilma | 202.612.3520	2021 - 2022	$32,000
6.	Stickney WRF Plant-Wide Dispersion Model & Odor Control Strategies, Chicago, IL	MWRD | 100 E. Erie St, Chicago, IL 60611 Jonathan Grabowy | 312.751.5600	2019 - Ongoing	$295,000
7.	Systemwide Odor & Corrosion Study & Design, Detroit, MI	Oakland-Macomb Interceptor Drain Drainage District | 1 Public Works Drive, Bldg 95 W, Waterford, MI 48328 Joel Brown | 248.410.4908	2021 - 2022	$1.4M
8.	Tideway Tunnel Odor Emissions Study, London, UK	Thames Water Utilities Limited | Clearwater Ct, Vastern Rd, Reading RG1 8DB Roger Bailey | 011.44.0203.934.5850	Ongoing	$6.2M
9.	Chemical Modeling of the Austin Water Collection System, Austin, TX	Austin Water | 635 E 10th St, Austin, TX 78701 Kevin Koeller | 512.972.2055	Ongoing	$2.5M

KCMO Preliminary Vendor Security Questionnaire Forms 1 and 2

For additional detail on each question, please see included responses from our team on the attached pages.
In addition - only Jacobs filled out the Preliminary Vendor Security Questionnaire Forms 1 & 2. Upon selection, other members of our team will fill out the forms and adhere to KC Water cybersecurity standards.

KCMO PRELIMINARY VENDOR SECURITY QUESTIONNAIRE

FORM 1

This vendor or 3rd party-vendor cybersecurity questionnaire is required to be completed by all potential vendors proposing or already doing business with the City of Kansas City, Missouri (KCMO) or with any KCMO affiliated agency or department.

Additional information may be requested depending on the answers or lack of answers that are provided. (Please attach all related information and documentation including contact information).

This information is discoverable under the MO Sunshine Law. No redactions will be allowed.

Vendor Questions: (Please provide requested details under each question or append to the end of this document with reference to the specific question being answered)

1. ☒ Yes ☐ No - As a supplier to the City of KCMO, does your company have a pre-employment screening policy for employees and contractors? Please explain the process or attach policy/operating procedure. Jacobs uses the E-Verify program. To comply with KC Water sustainability goals, we have only included the first page and signature page of our agreement.
2. ☐ Yes ☒ No - As a supplier to the City of KCMO, does your company carry cybersecurity insurance. If yes, please provide information regarding carrier, limits and any special coverages you may purchase. We carry Cyber Liability insurance. ACE American Insurance Co. Policy limits: $1M per claim; $1M aggregate.
3. ☐ Yes ☐ No - As a supplier to the City of KCMO, will you comply with all applicable privacy and security laws for KCMO business? Please explain how. Please see attachment
4. ☐ Yes ☐ No - As a supplier to the City of KCMO, do you have certifications (ex. ISO 27001, SOC, PCI, HIPAA, etc.). Please provide documentation. Please see attachment
5. ☐ Yes ☐ No - As a supplier to the City of KCMO, will KCMO files and records be periodically reviewed for retention and purging purposes? Pease explain how you will meet legal, contractual, and service level requirements. Please see attachment
6. ☐ Yes ☐ No - As a supplier to the City of KCMO, do you have formal process for purging all files and records and removing accesses upon completion of the service, task, or contract? Please provide description or policy. Please see attachment
7. ☐ Yes ☐ No - As a supplier to the City of KCMO, will you commitment to a response time if KCMO has a question or emergency? Please describe them and any "off" hours. Please see attachment

8. ☐ Yes ☐ No - As a supplier to the City of KCMO, does your company maintain up-to-date versions of anti-virus software, anti-malware, antispyware, and operating systems security patches? Please elaborate. Please see attachment

9. ☐ Yes ☐ No - As a supplier to the City of KCMO, will KCMO always retain ownership of its data? Please see attachment

10. ☐ Yes ☐ No - As a supplier to the City of KCMO, do you plan to or have agreements with any third parties that could allow them to collect or use KCMO data? Please see attachment

11. ☐ Yes ☐ No - As a supplier to the City of KCMO, does your company hire an external audit firm to perform a compliance review of your operational controls? If yes, how often. Please see attachment

12. ☐ Yes ☐ No - As a supplier to the City of KCMO, will third party vendors (e.g., subcontractor, managed shared hosting) be used by your company and be restricted from having access to the system or application data of KCMO? Please see attachment

KCMO PRELIMINARY VENDOR SECURITY QUESTIONNAIRE

FORM 2- CONFIDENTIAL and PROPRIETARY

This vendor or 3rd party-vendor cybersecurity questionnaire is required to be completed by all potential vendors proposing or already doing business with the City of Kansas City, Missouri (KCMO) or with any KCMO affiliated agency or department.

Additional information may be requested depending on the answers or lack of answers that are provided. (Please attach all related information and documentation including contact information).

This information has been deemed non-discoverable under the MO Sunshine Law. The City will not be releasing this form under the MO Sunshine Law.

Vendor Questions: (Please provide requested details under each question or append to the end of this document with reference to the specific question being answered)

13. ☐ Yes ☐ No - As a supplier to the City of KCMO, does your company have a written controls plan that contains the administrative, technical, and physical safeguards you use to collect, process, protect, store, transmit, dispose, or otherwise handle KCMO data (e.g., Information Security Plan)? Please provide. Please see attachment

14. ☐ Yes ☐ No - As a supplier to the City of KCMO, does your system or application which will be storing our company data provide access control mechanisms (e.g., unique user IDs, passwords standards, role-based access)? Please explain. Please see attachment

15. ☐ Yes ☐ No - As a supplier to the City of KCMO, does the system or application provide multi-tenant controls for separation of users and data within the service? If yes, please provide policy/procedures. Please see attachment

16. ☐ Yes ☐ No - As a supplier to the City of KCMO, does your company utilize encryption methods for data in transit and data at rest where technically possible and legally permissible? Please explain i.e. use of data serialization for privacy. Please see attachment

17. ☐ Yes ☐ No - As a supplier to the City of KCMO, does your company have a written business continuity/disaster recovery plan, which is tested on a periodic basis? Please elaborate and provide a copy your plan(s) Please see attachment

18. ☐ Yes ☐ No - As a supplier to the City of KCMO, does your company ensure adequate steps are taken to guard against unauthorized access to KCMO data (e.g., firewall)? Please list the technology and processes that are in place. Please see attachment

19. ☐ Yes ☐ No - As a supplier to the City of KCMO, does your company maintain up-to-date versions of anti-virus software, anti-malware, antispyware, and operating systems security patches? Please elaborate. Please see attachment

20. ☐ Yes ☐ No - As a supplier to the City of KCMO, will your company actively monitor and manage your IT security environment to prevent security incidents or breaches? Please elaborate. Please see attachment

21. ☐ Yes ☐ No - As a supplier to the City of KCMO, does your company perform application security testing? Please describe and provide samples along with methodology. Please see attachment

22. ☐ Yes ☐ No - As a supplier to the City of KCMO, does your company have a written plan to promptly identify, report, and respond to breaches of security related to KCMO data (e.g., incident response plan)? Please see attachment

23. ☐ Yes ☐ No - As a supplier to the City of KCMO, will third party vendors (e.g., subcontractor, managed shared hosting) be used by your company and be restricted from having access to the system or application data of KCMO? Please see attachment

24. ☐ Yes ☐ No - As a supplier to the City of KCMO, does your company provide assurance (in the form of a written report) for you and your third-party vendor's security and controls while KCMO data is being collected, processed, and retained? If yes, please provide your most current report Please see attachment

25. ☐ Please provide the results of your last security audit you have for your company and any relevant third-party service provider your company contracts. Please see attachment

26. ☐ What specific services are included in KCMO monthly service fee? What services will be an additional fee? Please see attachment

27. ☐ What is or will be the length of this contract? What is or will be the Service Level Agreement (SLA) with KCMO and how often is KCMO able to change or modify this SLA? Please see attachment

ADDITIONAL INFORMATION

1. KCMO reserves the right to perform an audit at any time during the term of any agreement between KCMO and a vendor to verify their compliance with the

answers provided.

2. KCMO may require additional information based the answers or lack of answered provided.

3. Vendors should provide copies of requested documentation including any certifications, prior assessments, or test results.

KC Cybersecurity Questionnaire - Responses

1. (Pre-employment screening). **Yes. We utilize the e-Verify program. To comply with KC Water sustainability goals, we have only included the first page and signature page of our agreement.**
2. (Cyberinsurance). **Yes. We do have cybersecurity insurance but do not release our coverages to external parties.**
3. (Privacy and security laws). **Yes. Not sure how to answer how. As a US corporation, Jacobs follows all US laws and regulations as part of our standard operating procedures.**
4. (Certifications). **No. Jacobs does not have any of these certifications with regards to locations in the US where this work may be performed. Only our US data center in Las Vegas is covered under ISO 27001**.
5. (Records retention and purging). **Yes. Jacobs can abide by the client's record retention and purge process, once known, otherwise Jacobs records retention policies would apply.**
6. (Purging). **Yes. Jacobs can abide by the client's purge process, once known, otherwise Jacobs records retention policies would apply. We typically do not immediately purge records once a contract ends so this is a special requirement, but not unreasonable to provide.**
7. (Response time). **Jacobs has an Incident Response team, we operate a 24/7/365 Security Operations Center (SOC) for information security issues. Otherwise, our team will respond to questions or emergencies from the City of KCMO within 24 hours or within a reasonable timeframe (holidays & hours outside of typical working hours not withstanding).**
8. (Antivirus). **Yes. Jacobs is currently under contract with commercial antivirus., antimalware and advanced endpoint detection and response (EDR) vendors for this function. Jacobs also has a formal vulnerability management process that addresses OS patching.**
9. (Ownership of data). **As reasonable to projects & contracts agreed upon between Jacobs and City of KCMO, yes. Though Jacobs may retain copies for future or ongoing project use, as complies with KCMO Cybersecurity Standards.**
10. (Third parties). **Jacobs is not aware of any agreements or plans of agreements between Jacobs and any third parties that would allow collection or utilization of KCMO data.**
11. (Compliance Review). **No.**
12. (Third Party Vendors). **Yes. Jacobs utilizes Microsoft Azure and O365 products for some processing and storage of Jacobs data. Data is stored within a non-public, secure tenant provisioned for Jacobs use.**
13. (Controls Plan). **Yes. Jacobs does have an information security plan that addresses administrative, technical and physical safeguards of data however we do not release our program information to external parties.**
14. (Access Control). **Yes. Jacobs processes and stores client data via various mechanisms. Client data is stored on encrypted storage arrays, or in the cloud via separate logical partitions, away from other Jacobs client data and access to these partitions is controlled via unique user IDs granted with need to know access.**
15. (Multi-tenant Control). **Yes. Jacobs does have an information security program that addresses administrative, technical and physical safeguards for the separation of data, however we do not release it to external parties.**
16. (Encryption). **Yes. Jacobs has implemented cloud, endpoint and server level encryption for the protection of data at rest. Applications used to process data utilize encryption in transit methods, such as TLSv1.2, HTTPS, etc., depending upon the system in use.**
17. (BCP/DR). **Yes.**

18. (Unauthorized Access). **Yes. Jacobs processes and stores client data via various mechanisms. Client data is stored on encrypted storage arrays, or in the cloud via separate logical partitions, away from other Jacobs client data and access to these partitions is controlled via unique user IDs granted with need to know access.**

19. (Antivirus- Duplicate). **Yes. Jacobs is currently under contract with commercial antivirus., antimalware and advanced endpoint detection and response (EDR) vendors for this function. Jacobs also has a formal vulnerability management process that addresses OS patching.**

20. (Security Incidents). **Yes. Jacobs operates a Security Operations Center (SOC) that runs 24/7/365. Security logging is enabled across the IT system estate and logs are sent to our centralized SIEM for capture, review, analysis, and further action as required.**

21. (Application Security Testing). **Yes. Jacobs performs application security testing in-house via a currently supported commercial vulnerability and application testing platform. Applications hosted on the internet are subjected to an annual penetration test. Jacobs does not release detailed information regarding our security testing program due to the risk to our company and our clients of this data being lost or mishandled by a third-party outside of our control.**

22. (Incident Response Plan). **Yes. However, Jacobs does not release the details of our IR Plan to external parties.**

23. (Third Party Vendors - Duplicate). **Yes. Jacobs utilizes Microsoft Azure and O365 products for processing and storage of Jacobs data. Data is stored within a non-public, secure tenant provisioned for Jacobs use.**

24. (Assurance Report). **If this is a requirement for procurement, we can discuss with KCMO.**

25. (Security Audit). **No. Jacobs does not release internal security information to external third parties due to the risk to our company and our clients of this data being lost or mishandled by a third party outside of our control.**

26. (Specific services) **We are unsure what this question refers to & are unsure of its relevance to this procurement. If a requirement, we can discuss with KCMO.**

27. The scope of services refers to a contract duration. A service level agreement is not relevant to this work. We are unsure what is meant by the Service Level Agreement (SLA) with KCMO – changes or modifications to the SLA can be discussed and agreed upon, per typical KCMO and Jacobs procedures, as needed throughout the contract.

E-Verify

Company ID Number: 11557 **Client Company ID Number:** 885319

THE E-VERIFY MEMORANDUM OF UNDERSTANDING FOR EMPLOYERS USING A WEB SERVICES E-VERIFY EMPLOYER AGENT

ARTICLE I
PURPOSE AND AUTHORITY

The parties to this agreement are the Department of Homeland Security (DHS), the Jacobs Engineering Group Inc (Employer), and the Web Services E-Verify Employer Agent. The purpose of this agreement is to set forth terms and conditions which the Employer and the Web Services E-Verify Employer Agent will follow while participating in E-Verify.

E-Verify is a program that electronically confirms an employee's eligibility to work in the United States after completion of Form I-9, Employment Eligibility Verification (Form I-9). This Memorandum of Understanding (MOU) explains certain features of the E-Verify program and describes specific responsibilities of the Employer, the E-Verify Employer Agent, the Social Security Administration (SSA), and DHS.

References in this MOU to the Employer include the Web Services E-Verify Employer Agent when acting on behalf of the Employer.

For purposes of this MOU, the E-Verify browser refers to the website that provides direct access to the E-Verify system: https://e-verify.uscis.gov/emp/. You may access E-Verify directly free of charge via the E-Verify browser.

Authority for the E-Verify program is found in Title IV, Subtitle A, of the Illegal Immigration Reform and Immigrant Responsibility Act of 1996 (IIRIRA), Pub. L. 104-208, 110 Stat. 3009, as amended (8 U.S.C. § 1324a note). The Federal Acquisition Regulation (FAR) Subpart 22.18, "Employment Eligibility Verification" and Executive Order 12989, as amended, provide authority for Federal contractors and subcontractors (Federal contractor) to use E-Verify to verify the employment eligibility of certain employees working on Federal contracts.

ARTICLE II
RESPONSIBILITIES

A. RESPONSIBILITIES OF THE EMPLOYER

For purposes of this MOU, references to the Employer include the Web Services E-Verify Employer Agent when acting on behalf of the Employer.

1. By enrolling in E-Verify and signing the applicable MOU, the Employer asserts that it is a legitimate company which intends to use E-Verify for legitimate purposes only and in accordance with the laws, regulations and DHS policies and procedures relating to the use of E-Verify.

E-Verify

Company ID Number: 11557

Client Company ID Number: 885319

Approved by:

Employer Jacobs Engineering Group Inc	
Name (Please Type or Print) Julie Tchida Brown	Title VP, Human Resources Global Compensation, Benefits and HR Ops.
Signature	Date 6/18/2015
E-Verify Employer Agent HireRight, Inc. (v26)	
Name (Please Type or Print) Kathleen Magelssen	Title
Signature Electronically Signed	Date 06/10/2015
Department of Homeland Security – Verification Division	
Name (Please Type or Print) Amanda M. Palmer	Title Sr. MPA
Signature Amanda M. Palmer	Date 6/18/2015

CREO KC Form 13 – Affidavit of Intended Utilization

AFFIDAVIT OF INTENDED UTILIZATION

(This Form must be submitted with your Bid/Proposal)

Blue River Odor Control Phase III
(Department Project)

Jacobs Engineering Group Inc (Bidder/Proposer)

STATE OF Missouri)
)ss
COUNTY OF St. Louis)

I, Melissa Hoffmeister of lawful age and upon my oath state as follows:

1. This Affidavit is made for the purpose of complying with the provisions of the Civil Rights & Equal Opportunity Department's submittal requirements in the bid/proposal specifications on the above project and is given on behalf of the Bidder/Proposer listed below.

2. Bidder/Proposer assures that it presently intends to utilize the following MBE/WBE participation in the above project if awarded the Contract:

PROJECT GOALS:	14 % MBE	14 % WBE
BIDDER/PROPOSER PARTICIPATION:	14% MBE	14% WBE

3. To the best of Bidder's/Proposer's knowledge, the following are the names of certified MBEs or WBEs with whom Bidder/Proposer, or Bidder's/Proposer's subcontractors, presently intend to contract if awarded the Contract on the above project: ***(All firms must currently be certified by Kansas City, Missouri Dept. Of Civil Rights & Equal Opportunity)***

   a. Name of M/WBE Firm Hg Consult, Inc.
   Address 7733 N. Wallace Avenue, Kansas City, MO 64158
   Telephone No. 816.256.5153
   I.R.S. No. 27-1675196
   Area/Scope of work Field services
   Subcontract amount _____

   b. Name of M/WBE Firm TREKK Design Group, LLC
   Address 1411 East 104th Street, Kansas City, MO 64131
   Telephone No. 816.874.4655
   I.R.S. No. 43-1953275
   Area/Scope of work Sampling and piloting
   Subcontract amount _____

   c. Name of M/WBE Firm _____
   Address _____
   Telephone No. _____
   I.R.S. No. _____
   Area/Scope of work _____
   Subcontract amount _____

(List additional MBE/WBEs, if any, on additional pages and attach to this form)

4. Bidder/Proposer will identify before contract award, those MBE/WBE subcontractors with dollar amounts and scopes of work which apply to or exceed the MBE/WBE goals for the Project on the ***Contractor Utilization Plan/Request for Waiver (CREO KC 08)***.

5. Bidder/Proposer agrees that failure to meet or exceed the MBE/WBE Goals for the above project will automatically render this bid/proposal non-responsive if Bidder/Proposer fails to establish good faith efforts towards meeting the goals as set forth in the CREO KC Forms and Instructions.

6. If applicable, Bidder/Proposer assures that it will meet or exceed the minimum employment goals of 10% minority and 2% women during the term of its contract with City, or request a waiver of the goals. **NOTE: This paragraph is applicable ONLY if you are submitting a bid/proposal on a construction contract that was estimated by the City, prior to solicitation, as requiring more than 800 construction labor hours and costing in excess of $300,000.00.**

7. I am authorized to make this Affidavit on behalf of the Bidder/Proposer named below as:

Client Account Manager of Jacobs Engineering Group Inc
(Title) (Name of Bidder/Proposer)

Dated: 10/17/2023

By: Melissa Hoffmeister (Carvec)
(Affiant)

Subscribed and sworn to before me this 17th day of October, 2023

My Commission Expires: 8/18/2028

Notary Public

Amanda C. Oliveira
NOTARY PUBLIC
Commonwealth of Massachusetts
My Commission Expires
August 18, 2028

Contact:
Julie McNiff
Project Manager
1.913.634.8638
julie.mcniff@jacobs.com

Kansas City Office:
2300 Main St, Suite 325
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Reinventing tomorrow.