RESOLUTION DIRECTING WORK TO JACOBS FOR THE LTCP ADAMS STREET WWTP OUTFALL PROJECT

MOTIONED BY: Friedrich
SECONDED BY: Marotta

WHEREAS, the North Hudson Sewerage Authority (hereinafter "Authority") is a public body, duly formed under the Sewerage Authorities law, constituting Chapter 138 of the Laws of New Jersey of 1946, as amended (Chapter 14A of Title 40 of the New Jersey Statutes Annotated) and possesses the powers set forth therein; and

WHEREAS, JACOBS has been selected under resolution 22-127 to provide engineering services for various capital projects required throughout its service area that must be performed in order to maximize the performance of its waste water treatment facility, the capacity of its combined sewer system and/or to comply with its New Jersey Pollution Discharge Elimination System (NJPDES) permit; and

WHEREAS, JACOBS has submitted a proposal (Exhibit "A") to provide Engineering Services During Construction for the LTCP Adams Street WWTP Outfall Project; and

WHEREAS, the Facilities Review Board has considered this request and proposal and recommends the approval of the full Board.

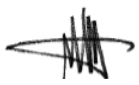
NOW THEREFORE, BE IT RESOLVED that the Authority, as recommended by the Facilities Review Board, directs JACOBS to provide professional engineering services during construction for the Construction for the LTCP Adams Street WWTP Outfall Project not to exceed $748,600.00.

DATED: SEPTEMBER 21, 2023

RECORD OF COMMISSIONERS' VOTE

	YES	NO	ABSENT
Commissioner Kappock			x
Commissioner Marotta	x		
Commissioner Gardiner	x		
Commissioner Friedrich	x		
Commissioner Guzman	x		
Commissioner Velazquez	x		
Commissioner Barrera	x		
Commissioner Zucconi	x		
Commissioner Assadourian	x		

THIS IS TO CERTIFY THAT THIS RESOLUTION WAS DULY ADOPTED BY THE NORTH HUDSON BOARD OF COMMISSIONERS ON SEPTEMBER 21, 2023.



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SECRETARY

Design Services Technical Proposal

LTCP Adams Street Wastewater Treatment Plant Outfall
City of Hoboken

North Hudson Sewerage Authority
September 5, 2023

Jacobs

Water Business Group
Jacobs New Jersey Office
412 Mt Kemble Avenue
Morristown, NJ 07962
O+1 973 267 0555

September 5, 2023

Mr. Donald Conger, PE.
Authority Engineer
The North Hudson Sewerage Authority
1600 Adams Street
Hoboken, New Jersey 07030

Subject: Proposal for Design Services – LTCP Adams Street Wastewater Treatment Plant Outfall Project

Dear Mr. Conger,

Jacobs Engineering Group Inc. (Jacobs) is pleased to provide this proposal to the North Hudson Sewerage Authority (Authority) to undertake the design of the Adams Street Wastewater Treatment Plant Outfall. We are ready to meet this challenge and appreciate the opportunity to present our team, led by an Authority-proven leadership team with Shivani Patel as Project Director and Ken Bienkowski as Project Manager, as well as our detailed approach to this complex design project.

The sheer magnitude and heavy coordination inherent in a tunnel project in an urban area that is highly populated requires a familiar partner who has proven their commitment and technical prowess to the Authority. We bring that commitment coupled with an intimate knowledge of the Adams Street WWTP Service Area hydraulic model, the Authority's operations, and permit requirements. We will hit the ground running at the notice-to-proceed (NTP) with the model scenarios developed as part of the LTCP and further advanced by NHSA.

We are the right team to execute this important project. Typically, we listen to learn before we begin every project, and this will be no different. However, we will listen with a strong understanding already formed from our work with the Authority, which is invaluable when schedule is a project driver. Our understanding of your goals and objectives and our team of Authority-proven staff, as well as our tunneling and trenchless experts, sets us apart from the competition. We will develop straight-forward approaches to challenges that are easily applied in the field peppered with creative alternatives, ideas, and innovation to ensure delivery success.

We are fully committed to this project and excited to begin work alongside you.

Please contact me via email at shivani.patel@jacobs.com or on my cell phone at 213.841.5890 if you require any additional information.

Yours Sincerely,

Shivani Patel

Shivani Patel, PE
Project Director

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Jacobs

1 Executive Summary

We bring a comprehensive understanding of this project's technical challenges & solutions along with innovative, cost-effective approaches.

The Authority is embarking on the next milestone of the LTCP in constructing a new Adams Street Plant Outfall to help meet the NJDEP permit requirements of elimination of or capture for treatment of, a minimum of 85% of combined sewage for the typical year, in accordance with the EPA's mandate to reduce combined sewer overflows (CSOs). The proposed project is crucial to all other projects in the LTCP schedule for the Adams Street System as the remaining projects will contribute additional flow to the system, making it crucial for this project to remain on schedule and achieve the expected performance.

Jacobs: Long-Term, Trusted Partner and Program Manager

Extensive Familiarity with the Authority's System	Unmatched Expertise of Trenchless and Tunneling	Long Relationship with Authority
Value: We have deep background knowledge of the LTCP and are extensively familiar with the Authority's system acquired from providing engineering and O&M services to the Authority. **Benefit:** The Authority will achieve system efficiency and reduced lifecycle O&M costs as we will incorporate O&M considerations into the design.	**Value:** We have started developing alternative trenchless methods and alternative alignments to enhance constructability and have examined the hydraulics to consider options for greater flexibility in managing the range of CSO flows that might occur. **Benefit:** The Authority will receive industry best practices and innovative solutions to address your CSO and flooding issues.	**Value:** We have provided the design for many of your largest projects and developed knowledge of how you plan and execute projects while also building a level of trust and understanding with the Authority. **Benefit:** The Authority will receive a project that is executed efficiently and will meet or exceed your expectations from a consultant that has been your partner for over three decades.

As your long-term engineering and O&M partner, we bring a deep understanding of the Authority, your systems, your goals and objectives.

We bolster this with a local team who understands the challenges inherent in this dense, urban area and a team of national experts in tunneling and hydraulics. In our approach, we detail how this hand-picked team of local and national experts will support you in designing the Adams Street Wastewater Treatment Plant Outfall. **Our deep understanding of both the project and the LTCP, along with our extensive technical capabilities and knowledge of your system and hydraulic model, will be invaluable in developing cost-effective solutions that support your objectives to capture or eliminate 85 percent of CSOs for the typical year, while also reducing flooding in Hoboken.** In addition, we bring a unique O&M perspective to inform the infrastructure and facility design, based on our 40+ years of operating, maintaining, and implementing capital improvements on hundreds of water and wastewater systems for municipalities and the private sector nationwide. This will benefit the Authority by our integration of life-cycle O&M considerations into the proposed design solution to improve cost effectiveness, enhance operator safety, and reduce maintenance efforts.

Although we have worked on the LTCP and performed the initial modeling for the Adams Street Wastewater Plant Outfall Project, we want to emphasize that we will expand the leverage of our national experts to be proactive and objective in seeking cost-effective solutions for the Authority. We will review the work to date, brainstorm new ideas, and seek and evaluate a range of alternatives so that we present you with the best options for meeting your cost, schedule, quality, and performance objectives while minimizing impacts to the public. In that regard, we can sum up our team's commitment to you as: continuity with innovation.

This means we will maintain our progress, institutional knowledge, collection/treatment system and LTCP expertise, and trusted relationships with the Authority without missing a beat – but we are dedicated to continuously seeking ways to improve and innovate in delivering effective design solutions. Indeed, we have already begun digging deeper into the project and the location details, considering potential challenges, and creatively exploring alternatives that reduce risk, improve performance, lower costs, and minimize impacts to the public.

Our local New Jersey team understands how to address community & environmental concerns and proactively take steps needed to gain public support and permitting approval – moving the project forward.

Ken will be **supported by staff from our Morristown, New Jersey office**, in addition to many of professionals who have extensive working knowledge of the Authority's infrastructure, capital programs, and the Authority's policies and procedures. This experience will enable us to provide more **cost-effective and efficient services** to the benefit of the Authority and their rate payers. We maintain experts in all areas of interest to the Authority, and we are ready to provide the best of their individual and collective experience to the benefit of the Authority. In addition, our Executive Sponsor, Russell Ford, will continue the open communication the Authority values to ensure we provide the best service to the Authority. We have also provided world-leading subject matter experts to address some of the key technical aspects of the project.

Our team's unique skills complement each other, enabling them together to collectively meet and potentially exceed your expectations. These local, key staff are **fully dedicated** to managing and coordinating project meetings, workshops, and field investigations.

Having partnered with you for more than 35 years, our team is **committed to and invested in the Authority's long-term future.** This service as your reliable partner means we know your expectations and challenges, enabling us to provide highly responsive, quality work, tailoring our activities and integrating lessons learned to meet your unique project needs and objectives. Our thought leaders committed to this project, provide a fresh perspective on this project.

2 Project Understanding

Throughout the LTCP program, Jacobs completed hydraulic modeling at a high-level to estimate the size of the outfall based on the proposed upgrades at the WWTP and within the collection system. This was expanded upon with the hydraulic modeling study for the proposed Grand Street Interceptor which would replace the original proposed LTCP upgrades within the collection system. This next phase will build upon that analysis by combining the operations at the WWTP and the proposed Grand Street Interceptor and pump station with the outfall design to ensure all function properly. Design services for the outfall will include modifications to the Adams Street WWTP Effluent Pump Station, open-cut measures including pile design for the open cut reaches, microtunneling from the launching shaft to the river (dilution study to ensure proper mixing), and all required permitting. This will be completed in a 30% to 100% schedule, following up with Bid Services. An integral portion will also include developing a staging operation to have the WWTP remain in service throughout the duration of construction as well as turning over the existing outfall (001A) to the H6H7 stormwater pump station.

We recognize that this project represents a major next step for the Authority and the community; therefore, this phase of the project is critical as it will begin a long road of improvements to the system. With our team's knowledge of the project and detailed understanding of the technical aspects, we will maintain a focus on anticipating and mitigating potential risks to both project delivery and O&M as the work proceeds, thus setting up the project for long-term success.

Our Understanding of the Project in More Detail

The Authority owns and operates the 48-inch diameter reinforced concrete pipe outfall which conveys treated effluent from the Adams Street WWTP to discharge in the Hudson River, a waterway heavily influenced by surrounding tides. The pipeline was constructed in the 1950s as a gravity pipeline. The existing outfall is approximately 3,700-feet in length extending from the effluent pump station at the Adams Street WWTP, extends along 16th Street, continues on Clinton Street, eventually leading to 15th Street and discharges to a diversion header between Pier 14 and 15. The diversion header includes two 24-inch diameter risers with 15-inch diameter outlets to disperse the effluent flow and avoid turbulence in the river. The existing outfall discharge is approximately 50 feet below the mean water elevation. The new outfall will be designed to discharge approximately 2 blocks north of the existing outfall into Weehawken Cove. A high-level analysis has estimated the length of the outfall to be 1,100 feet when constructed directly east of the WWTP, an advantage from the existing outfall with decreased line and head losses with minimal bends and fittings. The feasibility of this path will be confirmed as part of the design. Preliminary analysis has set the invert at the discharge at EL -15. This will be verified through additional hydraulic modeling as well as permitting requirements with regard to mixing and dispersion.

The outfall pipe was rehabilitated with a CIPP lining in 2013, while maintaining the appropriate capacity. The existing outfall conditions and limitations will be considered in the design of the new outfall as it may have many key similarities, specifically construction on piles and a submerged discharge. The new outfall will account for typical dry and wet weather flows, the proposed wet weather flow, and flows from the proposed Grand Street Pumping Station. This includes considerations on pipe material to ensure head losses remain low so the flow may discharge under submerged conditions.

The effluent pump station was constructed in the early 1990s to allow the outfall to function under gravity or under pressure. This not only increased flow to the outfall but also allowed for the pipe to discharge in pressurized, submerged conditions. There are 4 effluent pumps each with a capacity of 11,100 gpm or 15.4 MGD. The pumps currently operate in an n+1 arrangement. Operation is based on set points for gravity and pumped flow and the pumps operate only when flows at the WWTP exceed 30 MGD, conditions in the Hudson River are at high tide, or outfall capacity is not sufficient for gravity flow. To meet the proposed effluent flow of 52 MGD during large storms when 20 MGD of primary treated and disinfected combined sewage blends with 32 MGD of fully treated effluent, historic flow data will be investigated to determine the optimal capacity based on the projection of storm occurrence and intensity. The wet well dimensions will be analyzed to determine compliance with HI standards within the existing space for the increased capacity or if additional flow correction including baffles or floor cones as needed. Additionally, hydraulic analyses will be completed in coordination with the discharge of the Grand Street pump station to avoid the plant backing up.

Staging for this endeavor will be complex and must be thoroughly detailed at the conclusion of the design process to ensure plant operation is not interrupted through construction as well as operation. Along with the WWTP, the use of the new outfall aligns with the milestone of the H6H7 stormwater pump station to utilize the full capacity of the existing outfall. Not only will project phasing include measures to keep Adams Street WWTP operational, it will also need to ensure operation of the H6H7 pump station is also considered.

The current NJPDES Permit NJ0026085 permits Adams Street to discharge 20.8 MGD of treated wastewater, however this is based on effluent loadings during dry weather flow, allowing for flexibility during dry weather flow. The revised permit as part of the LTCP permits discharge of blended effluent when the influent flows exceed 32 MGD on an hourly average, at which time discharge of 20 MGD receiving primary treatment and disinfection may be blended, equating to 52 MGD total discharged from the WWTP. With the proposed Grand Street Interceptor, the anticipated discharges estimated at 270 MGD must also be coordinated as these will exceed these limits, though be mostly diluted combined sewage. As part of this endeavor, permit updates will be pursued notably the Treatment Works Approval with NJDEP.

3 Technical Approach

The following services will be performed as outlined in the RFP and clarified below.

Task 1: Information Collection and Site Visit

Evaluation and Analysis of Existing Conditions

We will thoroughly review existing documentation pertaining to the project. These documents will include the following: The Authority's Selection and Implementation of Alternatives Report dated May 2022, Proposed Outfall Layout provided as Exhibit 3 in RFP, Boring Information provided as Exhibit 4 in RFP, Drawings provided as Exhibit 5 in RFP. We will supplement this review with interviews, meetings, and correspondences with operators, management, and the Authority engineering staff as well as a site visit to walk the proposed route of the outfall and assess the locations of the connection points along the 17th Street Right-of-Way and towards the Hudson River at Weehawken Cove.

We will review the topographic survey provided by the Authority and supplement it as required for the design of the Outfall. This review shall include a site visit. The site visit shall be documented with photographs. The analysis of existing condition includes a bathymetric survey of Weehawken Cove to determine the depth of water along the subaqueous reach of the proposed outfall. Finally, we will also contact the relevant utilities to obtain any utilities as built drawings available and include them in our basemapping.

Jacobs has extensive experience designing and constructing infrastructure within Hoboken and other mature urban communities throughout the Northeast. We will request utility markouts and document the markouts with photographs. We will use the information to determine potential utility issues. Jacobs will also contact the local utility companies to request as-built drawings of their respective facilities.

Once the mapping has been completed our design engineers will field verify mapping and begin the design process in the field. This is an absolutely critical step in the design process because it will identify traffic control issues, how access to the businesses/residences will be maintained during construction, critical utility impacts and potential overhead utility conflicts. Most importantly, we understand the potential costs of relocating any existing utilities and how they can impact the overall project budget and schedule.

Geotechnical and Structural Analysis

We will perform a desk top review of existing geotechnical databases and published information regarding the existing geotechnical information along the alignment of the proposed outfall, including the review of any available regarding the existence of environmental contamination along the alignment of the proposed outfall.

Jacobs will retain the services of drilling Subcontractor to perform a minimum 13 soil borings to a depth of approximately 90 to 100 feet. The depth of the borings will vary based upon the existing conditions and their review of any current geotechnical information as discussed above. At least four of these borings will be from a barge for diffuser location study.

We have teamed with Geotechnical Drilling subcontractor Craig Test Borings to conduct the subsurface exploration borings. Craig has performed many borings throughout Hoboken, is very knowledgeable of the City's requirements, and most recently performed borings for the Authority's 5th Street Pump Station Flood Resiliency Project in May 2023. We will provide a full-time onsite geotechnical inspector during these 13 borings. It is assumed that one boring can be conducted in a single day and, therefore, the boring program will take 15 days.

The goal of the exploration is to confirm the conditions identified in the available geologic mapping and to provide key soil parameters necessary for the generation of a Geotechnical Baseline Report (GBR) to serve as a contractual definition of the subsurface conditions to be encountered during construction.

Additionally, the exploration will include laboratory testing on samples and hydrogeological study (pumping tests, permeability, piezometer installation etc) to confirm and identify the best pipe jacking technology, and the "launching shafts" SOE method.

According to the RFP an early memorandum summarizing the available geotechnical findings of the boring and testing program which will include a recommendation for the open cut sections, support of excavation for the shafts, and the microtunnel technique.

Hydraulic Analysis

Our team has intimate knowledge of the Authority's Adams Street WWTP and LTCP targets, having performed the Adams Street WWTP service area characterization, evaluated alternatives for development of the LTCP, and performed the modeling to provide an initial high-level assessment on the feasibility and effectiveness of the Grand Street Interceptor. These are in addition to other hydraulic modeling analyses performed by Jacobs over the past decade. Because of our intimate knowledge of the Adams Street WWTP service area hydraulic model and LTCP, the Authority's operations, and percent capture requirements, our team will jump right in upon Notice to Proceed, expanding on the model scenarios developed for the LTCP and finalizing the Adams Street Outfall design.

Our team will pick up where we completed the preliminary analysis of the Grand Street Interceptor that followed development of the LTCP and determine the optimal path forward in rerouting the discharge at the existing Adams Street Plant Outfall to the new plant outfall. This includes reviewing the existing operation of the Adams Street effluent pump station to analyze performance with the upgraded plant capacity and with operation of the Grand Street Pump Station. For the new outfall prior to the construction of the Grand Street Interceptor and remainder of the LTCP, we will review the existing flow rates and set points to evaluate the existing pumps in each scenario. This includes the existing dry weather flows of 13 MGD, existing wet weather flows of 32 MGD, and the proposed wet weather flow of 52 MGD. Existing set points will be confirmed and adjusted as needed based on modeling against high and low tides as well as 100-year flood elevations. This will confirm operation in the interim until full buildout of the LTCP. The next steps would include analyzing pump operation against the addition of the Grand Street Interceptor pump station into the new outfall also against high and low tides. Overcoming the head of the flow from the interceptor as well as the various tide scenarios is complex but conditions we're well versed in for the Adams Street service area. Confirming this operation scenario will be crucial to the remainder of the LTCP and our existing experience will allow for a streamlined analysis.

In addition to optimizing the operation and performance of the Adams Street Effluent Pump Station, we will incorporate the length of the outfall into the hydraulic analysis. This includes gathering expected line losses and any existing or new appurtenances including check valves and flow control valves at all flow rates. The appropriate pipe material will be selected based on the anticipated losses and finding a balance between overcoming the head at the discharge and avoiding pipe deterioration from scaling or other common issues. The hydraulic analysis will culminate in designing the diffuser assembly below the water surface at the discharge in the Hudson River. The discharge location in Weehawken Cove must be dealt with appropriately being a high traffic area.

Task 2: 30% Schematic Design Phase

Schematic Design Report

After the completion of Task 1, we will prepare a Schematic Design Report that will outline the following items:

- Basis of design criteria and process descriptions for each system and discipline for the proposed improvements such as, but limited to electrical, architectural, site, civil, mechanical and structural

- P&IDs and mechanical schematic and layout drawings
- Proposed specifications list
- Draft of selected major specifications: Jacobs has a comprehensive collection of specifications for all project elements, in particular on the microtunnelling aspect
- List of drawings
- Conceptual Cost Estimate
- Photographs from Site Visit
- Geotechnical Memorandum; Jacobs will prepare a geotechnical memorandum that will encompass all the information available at the submission, along with a comprehensive explanation of the technical solutions. This will cover aspects such as the selection of the cut and cover and the shafts support of excavation (SOE) type, hydraulic issues and their respective solutions (including shaft bottom plug and/or dewatering methods), as well as the selection of microtunnelling methods and lining solutions.
- Design Schedule
- Conceptual Construction Schedule

We intend to have a virtual meeting with the Authority after the completion of the draft SDR. However, we would also request a weekly update with the Authority to make sure all parties are on the same page as we progress the SDR. After receipt of comments from the Authority, we will incorporate them into a final SDR and freeze the design concepts.

Dilution Study

A dilution study will be performed as part of the 30% design with results used to guide the detailed design of the diffuser section of the outfall. Objectives of the dilution study are to determine diffuser requirements, such as number of ports, port diameters, and port spacing required to meet NJDEP water quality requirements for discharge of both treated effluent during dry weather conditions and combined sewer during wet weather conditions for the range of expected ambient river conditions.

The dilution study will involve an initial data collection task to establish the characteristics of the effluent and the range of ambient river water conditions. It is assumed that effluent and combined sewer discharge flows and temperatures will be provided by the North Hudson Sewerage Authority (the Authority) based on modeling and data. Ambient river conditions required for dilution calculations include the range of water velocities at the project site and seasonal profiles of water temperature and salinity.

A dilution study workplan will be developed following preliminary evaluation of available data. Based on the data evaluation, the workplan will describe the receiving water characteristics and define the range of dilution modeling scenarios that will be used to establish mixing zones for various outfall diffuser configurations. A draft workplan will be delivered to NJDEP personnel for their review and concurrence. Jacobs will schedule a meeting with NJDEP to discuss any modifications to the workplan or additional requirements.

Dilution modeling will be performed with either the Visual Plumes or the CORMIX modeling systems, both EPA-approved plume modeling software packages. In the absence of the availability of site-specific water velocity data and to avoid costly field monitoring work on the Hudson River, it is assumed that the project team will acquire water depth, velocity, temperature, and salinity calculations made with the 3-dimensional hydrodynamic model of the Hudson River being used by New Jersey CSO NJPDES permit holders.

Hydrodynamic model calculations will be acquired for upstream and downstream of the proposed outfall discharge location to calculate plume characteristics for minimum, average, and maximum river/tidal velocities for minimum/maximum flood, low and high slack, and minimum/maximum ebb tidal conditions. Dilution factors will then be calculated using the dilution model to calculate water quality characteristics within the plume for these conditions. These calculations will then be used to guide the outfall diffuser design and for submitting NJDEP permits.

Mictotunnel Design

Microtunneling is a form of pipe jacking, where a string of jacking pipe is launched from a shaft using hydraulic jacks within the launching shaft to advance the pipe. Excavation is performed by a rotary microtunnel boring machine (MTBM) located at the leading end of the pipe string. Cuttings from the excavation are transported via slurry pipes to the surface where they are removed in a separation plant and the slurry recycled to the cutting head of the MTBM.

Jacking pipe could consist of reinforced concrete pipe (RCP) or fiber-reinforced pipe (FRP), both of which would be expected to generally weigh less than the soil they would replace once installed. This would suggest that the pipes themselves would not be subject to additional settlement, above that which is occurring regionally in the Hoboken area. The MTBM however is very heavy, with a center of gravity closer to the cutterhead and drive motor(s). This unbalanced condition can cause significant issues in very soft soils. The MTBM would likely sink, resulting in a tendency for the operator to "steer" upwards to correct the vertical deviation. This in turn can result in ploughing, which causes additional ground loss above the MTBM and excessive settlement of the ground and utilities above. As part of the microtunnel design, we will assess these risks and design mitigation measures.

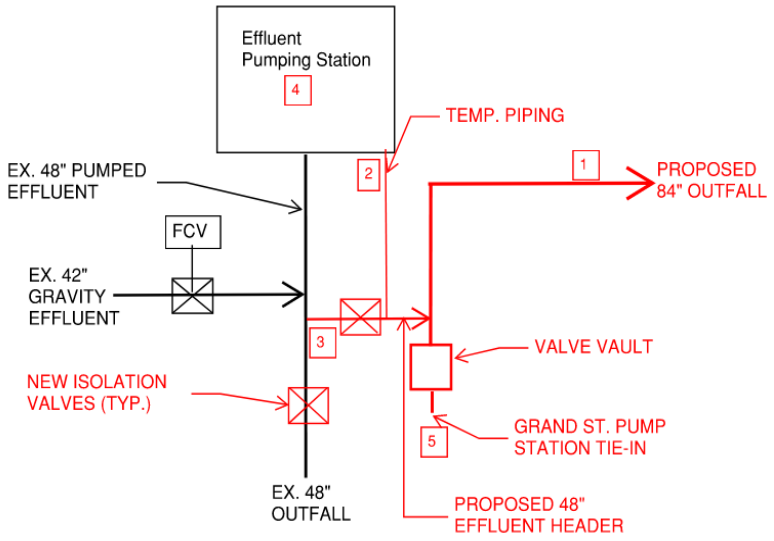
Settlement Assessment

With any underground construction project in an urban area, prediction of settlement resulting from shaft and tunnel construction, and the evaluation of its effects on adjacent utilities, pavement, and structures will be critical for this project. We use a proprietary tool called TunDRA to rapidly assess settlement. The tool works within the CAD environment, allowing seamless and rapid identification of zones of critical impact. These are often associated with tunnel work shafts where additional soil loss can occur during launching and receiving the TBM or MTBM. Using the program with the CAD environment can provide quick screening-level assessment of alignment alternatives as well as rigorous final-design-level damage assessments that can be used to design mitigations and plan construction monitoring requirements.

Construction Sequencing

One of the keys to the overall success of this project is the ability to maintain plant operations throughout the duration of the project. A well-planned construction sequence is critical to meeting this goal. Jacobs has developed one potential sequencing scheme that should allow for a low risk integration of the new outfall pipe while maintaining plant operations and allowing for the necessary upgrades to the Effluent Pump Station. The sequencing is detailed below and keyed to the below graphic.

1. Fully construct and test new 84" Outfall Pipe along with new 48" header pipe, valve vault and isolation valves
2. Install temporary pumps (similar to what was done during lining project) and connect to new 84" temp. connection point via temporary piping.
3. Isolate existing gravity effluent discharge via the flow control valve isolate new 48" header via new isolation valves. Energize the temporary pumps and make final connection to new 48" header.
4. With temporary pumps still in operation, ensure wet well is dewatered sufficiently to allow for replacement of all effluent pump station check valves and isolation valves.
5. Tie-in Grand St. Pump Station when complete utilizing new valve vault.



Effluent Pump Station Modifications

As part of this project, NHSA desires to replace all of the valving at the Effluent Pump Station as well as conduct a hydraulic evaluation of the outfall and pump station to determine any impacts the proposed flow scenarios would have on the overall system. A preliminary analysis of worst-case system hydraulics, which would include up to 300 MGD of combined flow in the new outfall pipe, yields potential issues as it relates to the existing effluent pump station. At those flows, the effluent pump station will see increased headlosses from the point of interconnection with the Grand Street Pump Station down to its discharge point in the Hudson River with velocities in excess of 12 fps. This will have negative impacts on the effluent pumps and will likely result in capacity reductions during certain times when the proposed Grand St. Pumping Station is in operation. This potential capacity reduction will need to be closely evaluated and considerations may need to be given to increasing the size of the effluent pumps. Based upon the results of our hydraulic analysis, Jacobs will make recommendations for improvements to the station as necessary.

Permits

Jacobs will coordinate with the Authority's Consulting Engineer who has begun the preparation of the regulatory permit applications, easements, and the I-Bank Loan Application. All permit requirements will be incorporated into the design and included in the project specifications. In addition, Jacobs will submit to the Hudson, Essex, Passaic Soil Conservation District for Plan Certification. Any additional requirements from other agencies (i.e. Utility Agencies and Hoboken) will be reviewed and included in the design.

Task 3: 100% Draft Final Design

Construction Plans

Upon review and approval of the SDR, the design will progress towards the 100% Final Design. Complete construction documents will be prepared and advanced to the 100% level and will include the following:

- General Notes
- Outfall Plan and Profiles
- Soil Erosion and Sediment Control Plans
- Construction Details
- Foundation and pile plans
- Support of excavation design for the launching and receiving shafts
- Diffusor Assembly Details
- Mechanical drawings for the upgrades to the effluent pumping station
- Settlement assessment: Plans will be prepared with settlement contours.. This is intended to provide a clearer understanding of the potential damage risk to surface structures and to establish settlement limits in alignment with the design assumptions
- Instrumentation and Monitoring Plans for the Microtunnel will be founded upon settlement analysis, ensuring that the design assumptions are upheld throughout the construction process

In preparing the final design, Jacobs will:

- Conduct a teleconference with NHSA and the Operators to review the documents developed in the previous submittal
- Refine the documents developed in the previous submittal in response to Authority and Operator comments.
- Incorporate internal QC Comments
- Compile the updated documents, cross check against comments received and make final markups
- Prepare final design documents, including drawings, technical specifications, and specification front ends
- Finalize the construction documents in preparation for public bidding
- Submit ten (10) copies of the contract document to the Authority

As per the RFP, we have assumed the following conditions apply during the design services:

- The design drawings and specifications will be incorporated into one single general prime construction contract suitable for public bid
- NHSA's Consulting Authority Engineer, Mott MacDonald, will be the primary coordination contact with NJDEP and the state with regard to project financing requirements

- NHSA's Consulting Authority Engineer, Mott MacDonald, will provide complete and I Bank compliant "Front End"

Specifications and Estimate

In addition to the drawing set the following specifications shall be prepared:

- Project Specific Front End Specifications
- Technical Specifications
- Geotechnical Baseline Report
- Geotechnical Data Report
- Prepare a final design cost estimate, Class 1 (+15%/-10%) per AACEI

We will prepare a Class 3 cost estimate and include it in the SDR. We will also prepare a bar chart Project Schedule in Microsoft Project which will include design, permitting, bidding, and construction. Lead times for major items and equipment will be taken into consideration and illustrated to mitigate delays.

Request Authorization to Advertise

This task includes the submission of 100% design documents with a request to authorize the Authority to advertise for the procurement of construction services. The deliverables for this task will be submission of a request letter and three (3) sets of final signed and sealed design documents. The final construction cost estimate will also be submitted. Jacobs will prepare contract drawings, specifications, and procedural documents for one general construction contract for the Project

Task 4: Bidding Services

Jacobs will assist the Authority during the bidding services phase with the following tasks:

- Coordinate with the Authority and NJDEP to obtain Authorization to Advertise the project
- Prepare for and attend a pre-bid meeting for potential bidders
- Prepare up to two Addenda. It is anticipated that the addenda will not require any substantial redesign and will be provided for additional clarification to the potential bidders
- Attend bid opening and prepare a bid tabulation sheet and bid report
- Issue a recommendation of award to the Authority and discuss recommendation with the Authority as required.

Task 5: Project Management

Jacobs has designated Ken Bienkowski, PE as the Project Manager. He is licensed in the State of NJ and will be providing the overall direction to the project team. He will be responsible for budgets, coordination and communication with the Authority and design team over the duration of the project.

Jacobs will coordinate this project with the other on-call engineers that are currently working on other aspects of the Authority's Long Term Control Plan and also coordinate with the Rebuild Design Project. Jacobs will meet with the Authority staff on a monthly basis for the duration of this project and shall prepare minutes or meeting notes for each meeting. The Engineer shall submit a project schedule for deliverables coordinated with monthly meetings. The Engineer shall schedule a one-week period for review and approval of all documents and drafts by the Authority and municipal officials.

4 Project Team

We deliver a local team supported by national tunneling expertise to provide exceptional services to the Authority.

We offer a team with a proven track record of success in delivering projects for you – a team that is poised to meet any project challenges that may arise. Our staff has worked on numerous projects for the Authority. We have expert knowledge of the collection system, WWTPs, pump stations, and solids/floatables facilities. More importantly, our staff knows the way you plan and execute projects and know your expectations of consultants.

Ken Bienkowski will be supported by staff from our Morristown, New Jersey office, in addition to many of professionals who have extensive working knowledge of the Authority's infrastructure, capital programs, and the Authority's policies and procedures. This experience will enable us to provide more cost-effective and efficient services to the benefit of the Authority and their rate payers. In addition, our Project Director, Shivani Patel, will continue the open communication the Authority values to ensure we provide the best service to the Authority. We have also provided world-leading subject matter experts to address some of the key technical aspects of the project.

Our Teaming Partners

We have carefully selected two subconsultants familiar with the Authority, to complement our team's strengths to help achieve the Authority's objectives.

Craig Geotechnical Drilling Co, Inc. is fully equipped and professionally staffed to provide a complete range of subsurface explorations. During this Sewer Interceptor project for the Authority, Central Mine Equipment (CME) Truck Rigs will be used to perform borings to 100 feet in Hoboken, NJ. These rigs are operated by NJDEP licensed and experienced drillers who utilize driven casing, hollow stem auger, and mud rotary drilling methods. Among the soil testing services available are standard penetration sampling, auger borings, rock coring, installation of groundwater observation wells, and installation of groundwater monitoring wells and geotechnical instrumentation.

Colliers is a trusted provider of multi-discipline engineering, surveying, subsurface utility engineering (SUE), utility coordination, CE&I, and consulting services delivering customized solutions to both public and private clients. Colliers specializes in topographic and boundary surveys, construction stake outs, as-builts surveys, subsurface utility engineering, using both conventional and high technology methods such as geospatial scanning and high-definition laser scanning. Colliers Engineering & Design is headquartered in Red Bank, New Jersey and has 45 offices throughout the United State. Colliers will perform the bathymetric survey in Weehawken Cover.

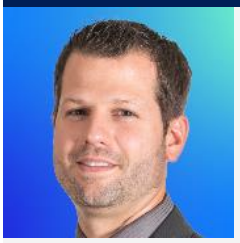
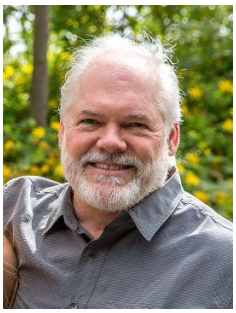
Key team members to deliver Design Services for the Adams Street Wastewater Plant Outfall Project

We carefully evaluated the scope of work and assembled a top-ranked team to deliver every service needed to meet or exceed your requirements for quality, efficiency, and timeliness. We structured our key team to provide you with highly qualified specialists who are recognized leaders in their field and have demonstrated experience in their respective areas. Within the next section, we present the credentials of our proposed staff. All our team members have demonstrated experience on similar projects.

Staff	Short Bio	Stats
 **Shivani Patel, PE** **Project Director**	With more than 24 years of directly relevant experience, Shivani has managed or held key roles on numerous projects in New Jersey. She has close to 20 years of experience working with NJDEP and New Jersey Environmental Infrastructure Trust (NJEIT) for State Revolving Loan Fund projects. Shivani's experience with the Authority includes: Project Director for Jacobs Engineering Support to the Authority, Project Director for H6/H7 CSO LTCP Phase 1 SDC Engineering Support, Project Director for design of the H6/H7 CSO LTCP Phase 2 Project, Program Manager for the Authority's CSO Long Term Control Plan, Project Manager for the design and permitting of the Authority's Four Wet Weather Pump Station Projects; Project Manager W1234 Solids/Floatables Facility Design; and Design Manager for Several Combined Sewer Rehabilitation Projects including Madison Street, Grand Street, and Jackson Street.	**Education** BS, Environmental Engineering, University of Southern California Professional Engineer: NJ, NY, CA
 **Ken Bienkowski, PE** **Project Manager**	With over 30 years of experience as an engineer and project manager, Ken has provided professional engineering services and completed designs and studies for clients across the United States, with the majority of his work focused in New Jersey and New York. Ken has been responsible for the oversight of projects ranging from water/wastewater distribution system designs and construction services to transportation projects that involved subsurface utility engineering and vast relocations and designs of utilities. Over the last two years Ken has been increasingly involved in projects with the Authority and has become familiar with the Authority's service areas and procedures. Ken is currently the Project Manager for the NHSA 5th Street Pump Station Flood Resiliency Project and is providing technical oversight on the Boulevard East Sewer project.	**Education** MBA, Management, Pace University, Lubin School of Business BS, Civil Engineering, Rutgers University, College of Engineering Professional Engineer: NJ, NY
 **Jay Horton, PE** **Pump Station Improvements Lead**	He has 30 years of experience in the evaluation, planning, permitting, regulatory agency coordination, design, construction, testing, start up, and operation of water and wastewater facilities and pump stations. His expertise includes pumping station design, hydraulics, and instrumentation and control (I&C) technical design services. Jay has a solid background in pump station design and construction, including designs of multiple raw water intakes, WWTP influent pump stations, collections pump stations, and WWTP effluent pump stations for capacities ranging from less than 1 mgd to 200 mgd. He has a Pump System Assessment Certificate from the Hydraulic Institute and is knowledgeable in Hydraulics Institute (HI) standards.	**Education** ME, Mechanical Engineering, University of Florida BME, Mechanical Engineering, Georgia Institute of Technology Professional Engineer: GA, CT

Staff	Short Bio	Stats
 **Andrew Finney, PE** **Microtunnel Leader**	With 29 years of experience with geotechnical engineering and hydrogeologic experience, Andrew is well-suited to lead this task. Currently, Andrew is the Global Technology Lead for Trenchless Design at Jacobs. His geotechnical engineering and hydrogeologic experience include intakes, pipelines, tunnels, structures, retaining walls and water holding embankment design for levees, canals, and impoundments. Andrew is also experienced in the analysis of soft ground and rock tunneling, settlement, soil deflection analyses, site surcharge and preload design, seepage analysis, stabilization of slopes and walls using tiebacks and soil nails, excavation support systems, and deep foundation design. He also has extensive experience in the evaluation of settlement resulting from tunnel and shaft construction and their impacts to build the environment	**Education** MS, Civil Engineering, University of Washington BS, Civil Engineering, Bucknell University Professional Engineer: NY, CA, CO, TX, NM, LA, FL, HI,
 **Christina Lehr, PE** **Project Engineer**	Christina has over ten years of experience in stormwater and wastewater management with a focus on capital planning, process mechanical design, and water resources management. Her water resources background ranges from project management to design and evaluation, through construction and operation. She served as the Deputy Program Manager for the development of the Long-Term Control Plan for the Adams Street and River Road WWTPs. She has over 10 years of experience on combined sewer systems in the tri-state area, including utility coordination and public outreach. Christina also has over five years of experience working directly with the Authority on projects for both the collection system and WWTPs.	**Education** BS, Environmental Engineering, University of Central Florida, Orlando, FL Professional Engineer: NY
 **Victoria Berry, PE** **Hydraulic Modeling**	She has led the hydraulic modeling efforts for the Authority for nearly a decade. Her experience includes wastewater collection systems, stormwater systems, water distribution systems, water quality research, water and wastewater plant operations, data management and analysis in Access and Excel, GIS and data display in ArcMap, and hydraulic and water quality modeling using InfoWorks ICM, SWMM, WaterGEMS, and HAMMER, EPANET, H2OMap, InfoWater, and Mike Urban. She also has experience with contamination warning system design, deployment, and evaluation, with a focus in online water quality monitoring and event detection systems. Victoria is the Collection System Modeling Community of Practice Lead for Jacobs.	**Education** BS, Chemical Engineering, University of Cincinnati **Registrations** Professional Engineer: OH

Staff	Short Bio	Stats
 Andrew Bursey, PE, PG QA/QC Trenchless	Andrew leads Jacobs' tunnel engineering group. The group designs tunnels and other underground facilities and provides engineering services for underground construction projects. Andrew has held design and construction management roles on rock TBM tunneling projects on a routine basis for over 20 years. He has prepared tunnel designs for large rock TBM projects, including the 8.5-mile long, 33-ft bored diameter TBM tunnel for the Metropolitan St. Lewis Sewer District tunnel project. As part of this work, he evaluated anticipated ground behavior and factors affecting TBM productivity for a range of rock mass conditions.	**MSc,** Geotechnical Engineering, Virginia Tech **BSc,** Geological Engineering, Geotechnical Option., Queen's University **Mining Technology Courses,** Cambrian College, Sudbury, Ontario **Professional Engineer:** GA, TX, FL, NC, MA, MO, NV **Professional Geologist:** GA, NC
 Ned Johnson, PE QA/QC Trenchless	Ned has more than 30 years of experience in process mechanical design and construction services support for municipal water and wastewater treatment works. He has significant experience in water resources planning and water treatment engineering, including water quality and numerous other study components. He has worked on various water and wastewater treatment projects, serving as project manager, project engineer, and coordinating plant construction and facility startups. Ned's experience includes urban knowledge in design and construction services for water resource planning and infrastructure in the AOR, with background in dams, water supply, and ecosystem restoration.	**MS,** Civil Engineering, Michigan Technological University **BS,** Civil Engineering, Michigan Technological University **Professional Engineer:** MI, MD, CT, VA
 Mark Johnson, CEng QA/QC Risk	Mark has more than 29 years of experience in tunnel engineering and has performed feasibility studies for water/wastewater/CSO tunnels and rail projects, as well as detailed design of tunnel linings, shafts and other underground structures. Mark is currently Jacob's Global Director for Tunnel & Ground Engineering, representing a group of more than 900 tunnel and geotechnical engineers located around the world. He is also currently a member of the Executive Committee for the Underground Construction Association. Mark has developed and managed risk management processes for many tunnel projects. He has performed evaluations of the condition and assessments of the deterioration mechanisms of tunnel linings and has formulated repair methods and techniques to control water ingress.	**29** Years' Experience **BEng,** Civil and Structural Engineering, Sheffield University **Professional Registration:** CEng, UK

Staff	Short Bio	Stats
 Joseph Bongiovanni, PE QA/QC Civil	Joseph is a Senior Level Civil and Environmental Engineer and Project Manager with 25 years' experience in the planning, design, permitting, financing, and construction management of water and wastewater facilities as well as subsurface utilities. In his career, he has led a variety of treatment and distribution projects for several agencies in the New York and New Jersey area. Most recently these include SUEZ, American Water, North Jersey District Water Supply Commission, and Bayshore Regional Sewerage Authority.	**MS,** Civil and Environmental Engineering, Rutgers University **BS,** Civil and Environmental Engineering, Rutgers University **Professional Engineer:** NY, NJ
 Samer Sadek, PhD, PE QA/QC Geotechnical	Samer is a principal tunnel engineer with over 27 years of professional experience in management of underground projects at various design stages from planning stages, conceptual design, through final design and construction. Throughout his career, Samer worked in various projects with various procurement delivery methods, Design-Bid-Build, Design-Build and PPP. Samer's geotechnical engineering design experience includes planning and implementation of geotechnical investigation programs, geotechnical data interpretations, numerical modeling of soil-structure interaction, design of retaining walls, and development of geotechnical baseline reports for complex underground structures.	**PhD,** Civil Engineering (Geotechnical), Polytechnic University **MS,** Civil Engineering, Ain Shams University **BS,** Civil Engineering, Ain Shams University **Professional Engineer:** MA, WA, CT, NY, WI
 Guido Castrogiovanni, PE Geotech/Trenchless	Guido is Jacobs' Regional Tunnel Lead for the US North Region. He has over 28 years of experience in the design and project management of major tunnels and underground infrastructures, including water facilities, metros, and transit. He has led some of the most significant underground projects constructed around the world. He served as the head of tunnels and underground tunnels in Rome, Italy and he led a large group of underground specialists in New York.	**MS,** Civil Engineering, First University of Rome "La Sapienze" **Professional Engineer:** NY, CT, VA, Rome (Italy)
 David Wilson, PE Dilution Studies	Mr. Wilson has designed and directed over seventy studies to evaluate water quality compliance for chemical and thermal effects. These studies and engineering evaluations have included field and modeling analyses to address NPDES permit requirements, to evaluation and design improvements to outfall performance, and to provide technical defenses in challenges to waste load allocations (TMDLs). These studies have ranged from field dilution performance tests and dilution modeling of outfalls to complex receiving water studies and hydrodynamic & water quality modeling. These projects were needed to address existing or newly implemented water quality standards, 303(d) listing of waterbodies, NPDES permit compliance requirements, and ESA listings of salmon species. Over 40 years of experience with water quality studies to document water quality conditions, minimize wastewater discharge impacts, and design discharge improvements.	**Education** M.S., Marine Sciences, Oregon State University B.S., Aquatic Sciences, Oregon State University

5 Experience and Qualifications

We have a proven record of delivering quality service to the Authority.

Our experience has enhanced our understanding of the many elements of sewer, combined sewer, and stormwater system performance, including local projects with large-scale combined sewer conveyance and treatment facilities (such as the H1 Wet Weather Pump and Screening Facility, H5 Wet Weather Pump Station, and the W1234 Solids/Floatables Facility) and also large tunnels for CSO storage. We provide a wide array of pipeline assessment, rehabilitation, and design services. Our clients benefit directly from our industry leadership in trenchless installation and rehabilitation projects, and our local team includes global subject matter experts for pressure pipeline rehabilitation.

We have a proven track record of successfully providing services to the Authority. Our long track record of industry firsts provides the Authority with the knowledge that we have the internal mechanisms, and the experience, to successfully deploy innovative treatment processes. Our innovative and creative engineering solutions have enabled our clients to significantly improve their operations' performance and efficiency. Our clients include municipal wastewater, water, and stormwater utilities, as well as electric, power, and communication providers in major urban centers around the world. In addition, our lessons learned from past work for the Authority; some highlighted in the table on the next page helps us deliver the best possible solutions.

We are an industry leader in planning, designing, constructing, and commissioning major conveyance, storage, and tunnel programs worldwide; and have been recognized as the country's No. 1 Trenchless Engineering Design Firm by Trenchless Technology Magazine nine times in the past ten years. Our services include wastewater treatment, tunnels, pipelines, pump stations, and wet weather-related facilities. Jacobs' experience in delivering wet weather tunnels, pump stations, and shafts—particularly for CSO projects—is recognized throughout the world. It includes decades of experience in successfully planning and designing small- to large-diameter tunnels and shafts for challenging projects in urban environments. An example is our design of DC Water's Blue Plains Tunnel—**ENR Magazine's 2016 Project of the Year.**

Our tunneling portfolio includes extensive planning and design experience and technical expertise in both soft, and hard-rock tunneling. Our high degree of proficiency with pressurized-face TBM and segmental tunnel linings helps manage risks like settlement, protecting structures throughout this highly urbanized area. It also mitigates the potential for the CSO tunnel's aggressive interior environment to prematurely degrade the tunnel lining and diminish the tunnel's service life. Also, having designed some of the largest pump stations in the world (e.g., the world's largest, deepest, 261million-litre-per-day (MLD) Thames Tideway Deep Shaft PS in London), we've received global recognition for developing efficient technologies saving millions of dollars in power costs while delivering high-performance systems.

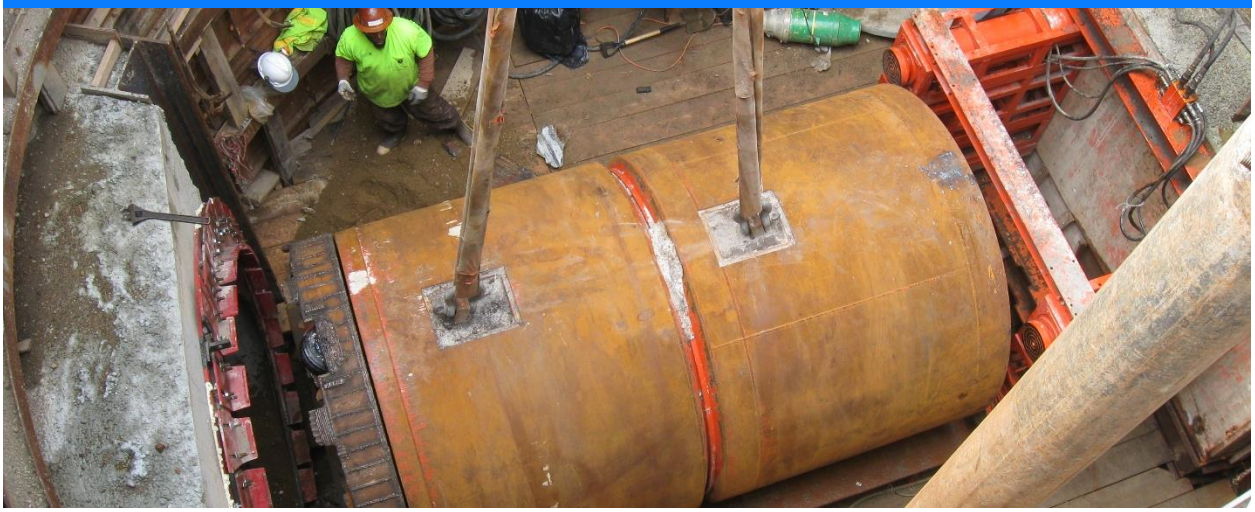
> "As trenchless technologies continue improving, more of our clients will look to companies like ours to help repair or replace their aging underground infrastructure or install new buried infrastructure, and that's another honor we're most excited about - bringing these excellent solutions to our client partners."
>
> **— Mark Johnson**
> ***Jacobs Global Tunnel and Ground Engineering Director***

Listed below is some of our most relevant, similar project experience delivering high performance systems. The Belmont North Relief Interceptor project in Indianapolis and the Gravity Sewer Interceptor project in Miami are detailed on the following pages which shows our experience in microtunnel design for pipelines of similar size and complexity. In addition, the Cockburn and Calrossie Sewer project listed below involved 48-inch to 108-inch microtunnels and the Blue Plains CSO Tunnel project listed below involved a 23-ft diameter tunnel.

Project Description	Soft and Loose Soils	Tunneling	Building & Utility Settlement Assessment and Protection	Combined Sewer Modelling Flood Mitigation	Flood Mitigation	Gravity Sewer Conveyance
H6/H7 Long Term Control Plan, CSO Reduction Project – Ph 1 **Client:** North Hudson Sewerage Authority				●	●	●
Belmont North Relief Interceptor **Client:** Citizens Energy Group (formerly City of Indianapolis)		●			●	●
Gravity Sewer Interceptors for Master Pump Station No. 3 **Client:** Miami-Dade Water and Sewer Department		●				●
Cockburn and Calrossie Sewer Relief Works **Client:** City of Winnipeg	●	●	●	●	●	●
Blue Plains CSO Tunnel **Client:** DC Water	●	●	●			●

Belmont North Relief Interceptor

Citizens Energy Group (formerly City of Indianapolis) ▪ Indianapolis, IN



The City of Indianapolis, Department of Public Works' Belmont North Relief Interceptor (Belmont North) Project included construction of 5,250 LF of 72-inch diameter RCP gravity sewer. 4,000 LF of the alignment was constructed by microtunneling, using a slurry TBM (MTBM). The carrier pipe was jacked into place directly behind the MTBM. The alignment included nine liner plate construction shafts, 24-ft to 40-ft in diameter and approximately 26-ft to 36-ft deep (34-ft average depth). The microtunnel segment had three active sewer tie-ins ranging in diameter from 42- to 78-inches, with flumes. The approximate cost of the project was $19-million and the project was completed in 2011.

The City's project designer was Clark Dietz Engineers (Clark Dietz) of Indianapolis, and Jacobs was retained to provide design and engineering for the microtunnel segments. Jacobs' scope of work included microtunnel design, and engineering consulting for the geotechnical exploration program. Jacobs prepared design drawings and specifications for microtunneling and performed geotechnical analysis and prepared the project Geotechnical Baseline Report (GBR). Jacobs provided engineering services for contracting and project planning, as well as assistance with bidding and construction issues related to tunneling.

Challenges & Solutions

Challenge: The Belmont North Project was constructed in a developed area of Indianapolis, and microtunneling was employed to limit surface disruption. Microtunnel alignments were located primarily below City streets, including several major traffic arteries for the City. Jacobs worked with Clark Dietz to delineate work areas for microtunnel staging, with the goals of minimizing disruptions to existing neighbors and utilities and allowing adequate space for economical tunnel construction.

Solution: Jacobs developed a comprehensive geotechnical site investigation for the project. In addition to conventional boring methods, bucket auger rigs were employed to evaluate the distribution of potential boulder obstructions. Jacobs developed pump testing programs and performed detailed analyses to evaluate groundwater pressures, and requirements for dewatering and groundwater disposal.

Jacobs interpreted geological conditions and established baseline geotechnical conditions compatible with the microtunneling design. The GBR presented ground conditions that the Contractor was to expect, with the aim of communicating potential variability and reducing bidder contingencies. The GBR identified geotechnical considerations for tunneling and shafts.

Gravity Sewer Interceptors for Master Pump Station No. 3

Miami-Dade Water and Sewer Department ▪ Miami, FL

The purpose of this project was to increase an existing gravity system capacity from 4.7 mgd to 29 mgd to meet future development growth projections within the downtown Brickell area. As the primary designer, preliminary drawings, technical specifications, basis of design technical memorandum, geotechnical characterization program and construction administration services were delivered. Jacobs was also responsible for responding to and resolving requests for information (RFIs). Project has the large diameter microtunnel and similar shaft construction and successfully installed pipe in a single 1,400-ft-long drive. The approximate cost of the project was $12-million and the project was completed in 2016.

Challenges & Solutions

Challenge: The project required intense coordination with six local and state jurisdictions and stakeholders. Additionally, construction and maintenance of traffic was coordinated with simultaneous ongoing projects for the Miami Avenue Bridge repair, Brickell Avenue improvements, the massive Brickell City Centre development, and numerous other ongoing development projects within the Brickell Downtown District.

Solution: To meet an aggressive 20-month design and construction schedule, the project was divided into three distinct delivery packages, each with their respective permits and coordination elements through the Department of Regulatory and Economic Resources (RER), City of Miami, Miami-Dade County Public Works, Miami Downtown Development Authority, Miami-Dade Transit, and District Six of Florida Department of Transportation (FDOT).

To limit disruption to the neighborhood and businesses, selection of shaft locations and equipment staging setups were optimized to as few locations as possible. In doing so, drive shafts were strategically sited at the two locations.

A versatile mixed-face cutterhead was selected to suit the variable conditions anticipated within the Miami Limestone, including rock of highly variable strength and the potential to encounter soil zones at unpredictable locations within the limestone. This cutterhead was equipped with scrapers, clay tools and disc cutters.

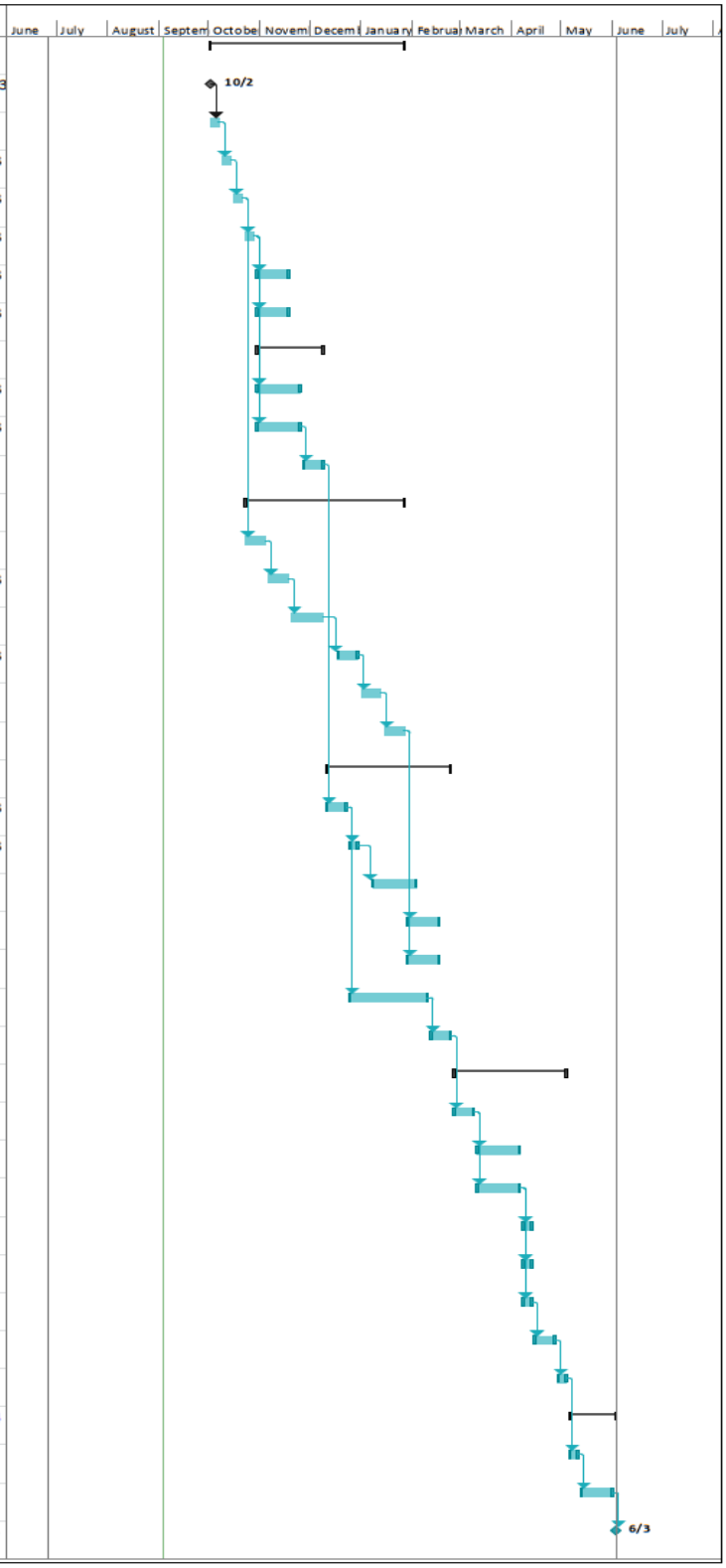
When navigating the MTBM along the entire alignment to protect against refractions, an additional hydraulic water leveling system determines the vertical deviation for the longer drives of up to 1,640-ft (500 meters).

The segment along 13th Street was completed in a single drive approximately 1,400-ft long, facilitated using intermediate jacking stations within the pipe string. Removable covers were installed at intermediate and connecting shafts, so that the traffic flow could continue over the shafts during periods when access was not required for construction.

6 Schedule

A schedule identifying major tasks and their duration, and the overall project duration is provided below. This schedule conforms to the schedule outlined in the RFP as part of Addendum 2.

ID	Task Name	Duration	Start	Finish
1	**Task 1 - Information Gathering**	**85 days**	**Mon 10/2/23**	**Fri 1/26/24**
2	NTP and Signed Agreement	0 days	Mon 10/2/23	Mon 10/2/23
3	Project Prep and Kickoff	5 days	Mon 10/2/23	Fri 10/6/23
4	Review Documentation	5 days	Mon 10/9/23	Fri 10/13/23
5	Site Visit and Location Assessment	5 days	Mon 10/16/23	Fri 10/20/23
6	Establish Initial Criteria	5 days	Mon 10/23/23	Fri 10/27/23
7	Obtain Utility Information	15 days	Mon 10/30/23	Fri 11/17/23
8	Bathymetric Survey	15 days	Mon 10/30/23	Fri 11/17/23
9	**Hydraulic Analysis**	**30 days**	**Mon 10/30/23**	**Fri 12/8/23**
10	Model Outfalls based on 4 Scenarios	20 days	Mon 10/30/23	Fri 11/24/23
11	Determine Pump Station Upgrades	20 days	Mon 10/30/23	Fri 11/24/23
12	Prepare Hydraulic Memo	10 days	Mon 11/27/23	Fri 12/8/23
13	**Geotechnical Analysis**	**70 days**	**Mon 10/23/23**	**Fri 1/26/24**
14	Prepare Boring Plan	10 days	Mon 10/23/23	Fri 11/3/23
15	Boring Plan Approval and Permitting	10 days	Mon 11/6/23	Fri 11/17/23
16	Execute Borings on Land (9 borings)	15 days	Mon 11/20/23	Fri 12/8/23
17	Execute Borings in Water (4 borings)	10 days	Mon 12/18/23	Fri 12/29/23
18	Lab Tests	10 days	Mon 1/1/24	Fri 1/12/24
19	Prepare Geotech Memo	10 days	Mon 1/15/24	Fri 1/26/24
20	**Task 2 - 30% Schematic Design Phase**	**55 days**	**Mon 12/11/23**	**Fri 2/23/24**
21	Prepare BOD Criteria	10 days	Mon 12/11/23	Fri 12/22/23
22	Construction Sequence	5 days	Mon 12/25/23	Fri 12/29/23
23	Diffuser Design and Dilution Study	20 days	Mon 1/8/24	Fri 2/2/24
24	Microtunnel Design	15 days	Mon 1/29/24	Fri 2/16/24
25	Foundation Design	15 days	Mon 1/29/24	Fri 2/16/24
26	Prepare Concept Drawings	35 days	Mon 12/25/23	Fri 2/9/24
27	Submit Schematic Design Report	10 days	Mon 2/12/24	Fri 2/23/24
28	**Task 3 - 100% Final Design Phase**	**50 days**	**Mon 2/26/24**	**Fri 5/3/24**
29	Discuss and Address NHSA Comments	10 days	Mon 2/26/24	Fri 3/8/24
30	Prepare Plans, Profiles, Details	20 days	Mon 3/11/24	Fri 4/5/24
31	Pump Station Upgrade Plans	20 days	Mon 3/11/24	Fri 4/5/24
32	Front End and Tech Specs	5 days	Mon 4/8/24	Fri 4/12/24
33	Geotech Baseline and Data Reports	5 days	Mon 4/8/24	Fri 4/12/24
34	Cost Estimate	5 days	Mon 4/8/24	Fri 4/12/24
35	Submit Final Design Document	10 days	Mon 4/15/24	Fri 4/26/24
36	NJDEP Authorization to Advertise	5 days	Mon 4/29/24	Fri 5/3/24
37	**Task 4 - Bidding Services**	**20 days**	**Mon 5/6/24**	**Mon 6/3/24**
38	Advertise and Pre-bid Meeting	5 days	Mon 5/6/24	Fri 5/10/24
39	Address RFIs	15 days	Mon 5/13/24	Fri 5/31/24
40	Bid Award	0 days	Mon 6/3/24	Mon 6/3/24



7 Cost

The following table is a summary of hours and costs for each Task.

Phase	Task Description	Proposed Hours	Proposed Cost ($)
Task 1	Information Collection and Site Assessment	580	$242,600
Task 2	30% Schematic Design Phase	1,300	$264,600
Task 3	100% Final Design	780	$171,400
Task 4	Bidding Services	100	$22,200
Task 5	Project Management	200	$47,800
Total		2,960	$748,600

Notes and Assumptions:

1. Cost shown in Task 1 includes the $125,000 allowance for geotechnical borings. Jacobs has included this amount as required in the RFP, however, please note that our Geotechnical Contractor has indicated that the fee will likely be more and depending on the details of the Geotechnical Program, could be in the range of $185,000 to $230,000. This is due in large part to the four borings to be conducted in Weehawken Cove.
2. Police protection, if required, for geotechnical drilling is not included.
3. Permit fees will be paid by NHSA and are not included as per the RFP.
4. Borings are assumed to be completed in 15 days.
5. Efforts associated with easement procurement will be performed by the Authority's Consulting Engineer.
6. Note that the efforts for the Diffuser design and Dilution study are included in Task 2. The Dilution Study was added as part of Addendum No. 2.
7. Fee includes design of the shaft support of excavation (SOE) only for cost estimation purposes, and not for submission to the Contractor. It is assumed that the Contractor will develop the SOE design.