

**TASK ORDER NO. 04**  
**Jacobs Engineering Group Inc.**  
**Professional Services for Southern Regional**  
**Wastewater Treatment Plant Asset Registry Development and**  
**Condition Assessment**

THIS TASK ORDER is made and entered into by and between the City of Hollywood, Florida, hereinafter referred to as "City" and, Jacobs Engineering Group Inc., hereinafter referred to as "Consultant", consistent with the terms of the Master Agreement for Continuing Engineering Consultant Services, dated \_\_\_\_\_, 2024, between the County and City;

WHEREAS, the Master Agreement between the City and Consultant provides that requirements for professional services are to be set forth in tasks orders;

IT IS AGREED as follows:

**SECTION A. BACKGROUND AND INTENT**

The City requested that Jacobs, from its General Consulting Services Pool (GCSP), provide professional engineering services related to the development of a strategy to improve overall Maintenance and Reliability (M&R) performance. As such, Jacobs is proposing a combination of asset registry development, asset criticality and risk ranking, and condition assessment services that will serve to develop both a near term and longer term set of activities that will work to move the overall maintenance and reliability and asset management program at the Wastewater Treatment Plant (WWTP).

The specific scope of work is detailed in Section C of this task order.

**SECTION B. PROJECT REPRESENTATIVES**

For City of Hollywood:

- Ameer Khan – Asset Manager

For Consultant:

- Raul Alfaro – Project Manager
- Jim Oldach, – Lead M&R Assessor
- Alex English – Lead, CMMS (Cityworks) Assessor
- Matt Crowley – Lead, Condition Assessor

**SECTION C. SCOPE OF WORK**

**Task 1 – Asset Registry Development**

**Task 1.1 Wastewater Treatment Plant Walk Through**

CONSULTANT shall conduct a site walk through of the Wastewater Treatment Plant's buildings (all rooms at each building) to observe all current equipment and assets used, including structural, mechanical, electrical, and instrumentation, so the CONSULTANT can make an initial evaluation and gain a thorough understanding of data available for the processes and assets in each of the areas of the treatment plant. This visit(s) will not be to collect any asset data information but rather to get an understanding of the facility and the task on hand. CONSULTANT may request an on-site City escort for accessibility and health and safety

reasons; however, involvement in this task by City staff will be minimal. CONSULTANT shall obtain the necessary security clearance from CITY to be at WWTP prior to mobilization of personnel to City facilities.

With the information obtained from the initial WWTP site walk through, CONSULTANT shall prepare a workshop (in-person or virtual as requested by City) with City staff to demonstrate the Consultant's understanding of the existing assets to be collected, GIS schemas to be used, and identify any gaps or challenges to conduct the asset data collection and development effort. This workshop may also serve to discuss asset types, asset data development and work to develop the definition of an asset to support the WWTP business processes. The asset data development discussion may include asset definition, preferences on asset hierarchy (physical versus functional), and how asset attribute data is to be utilized. CONSULTANT shall document the results of the workshop in a memorandum to the CITY and minutes from the workshop.

### **Task 1.2 Wastewater Treatment Plant Asset Hierarchy Framework Development**

CONSULTANT shall develop a framework for asset hierarchy and determine how the WWTP asset data will be stored and aligned in Cityworks. This task will use existing data (GIS data, plant drawings, piping and instrumentation diagrams [P&IDs], process flow diagrams, fixed asset registry, equipment manuals, SCADA, etc.) and consultation to the City's GIS and Asset management team to develop a City-approved asset hierarchy framework. This task will utilize information gathered during the initial site visits, develop the draft hierarchy, consult with City teams, and document the assets within the associated subsystems in accordance with the asset definition developed in task 1.

CONSULTANT shall provide input to CITY of the attributes that must be collected for each asset type. As the level of effort to document asset attribute information can be substantial, CONSULTANT promotes the use of both asset criticality and asset type criteria to guide and limit the attribute collection to those assets that will benefit from attribute documentation. This effort will be done by the CONSULTANT and presented to CITY via a technical memorandum.

CONSULTANT shall develop and schedule a workshop (in-person or virtual as requested by City) to present the proposed asset hierarchy and make recommendations for moving forward. CONSULTANT shall lead the discussions of this workshop to get City's understanding and directive on an agreeable methodology to create the asset hierarchy and perform next tasks.

### **Task 1.3 Wastewater Treatment Plant Asset Data Collection**

CONSULTANT shall prepare a schedule of asset inventory collection for all the buildings and structures at the Wastewater Treatment Plant. The schedule needs to be coordinated with City staff's availability and other City activities. The proposed schedule will also include adequate staff resources from CONSULTANT in accordance with the approved asset hierarchy and asset ranking from previous tasks. The proposed asset collection schedule shall be submitted to the CITY for approval.

CONSULTANT shall conduct field collection and documentation of the asset attribute data for all assets, estimated to be approximately 1500. The collection of asset attribute information needs to be coordinated by the CONSULTANT with the appropriate City teams (GIS, Cityworks, operations, and engineering – as appropriate).

CONSULTANT shall deliver a draft populated file geodatabase for review by City. Upon review and comment, CONSULTANT will update the file and deliver back to the City for final acceptance.

### **Task 1 Deliverables**

- Workshop Agenda and notes for each of the meetings/workshops involved in this task
- Technical Memorandum – Asset data confirmation
- Technical Memorandum – asset hierarchy
- DRAFT populated file geodatabase, named with an appropriate format approved by City.
- FINAL populated file geodatabase for each project, named with an appropriate format approved by City. The FINAL geodatabase shall address all CITY comments of the review of the DRAFT geodatabase until obtaining final acceptance by CITY.

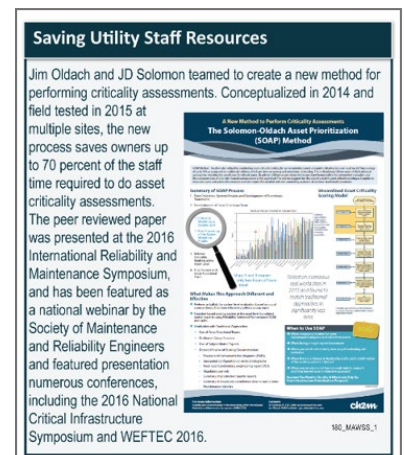
### **Task 2 – Asset Criticality and Risk Ranking**

#### **Task 2.1 Wastewater Treatment Plant Asset Criticality Ranking**

The proposed scope of services is to complete a criticality ranking of all WWTP assets listed in the WWTP Asset Registry as per Task 1 above (estimate approximately 1500 assets located within the Wastewater Treatment Plant). The Solomon-Oldach Asset Prioritization (SOAP) method, is an approach for establishing relative criticality of plant assets based on the consequences experienced upon asset failure. SOAP begins by establishing system level criticality values for all plant systems and then uses the system criticality to establish asset criticality based on the impact of asset failure on system function. To calculate asset risk values, CONSULTANT uses a combination of asset type and asset condition to calculate asset likelihood of failure (LoF) and then calculates asset risk as Criticality x Likelihood of Failure.

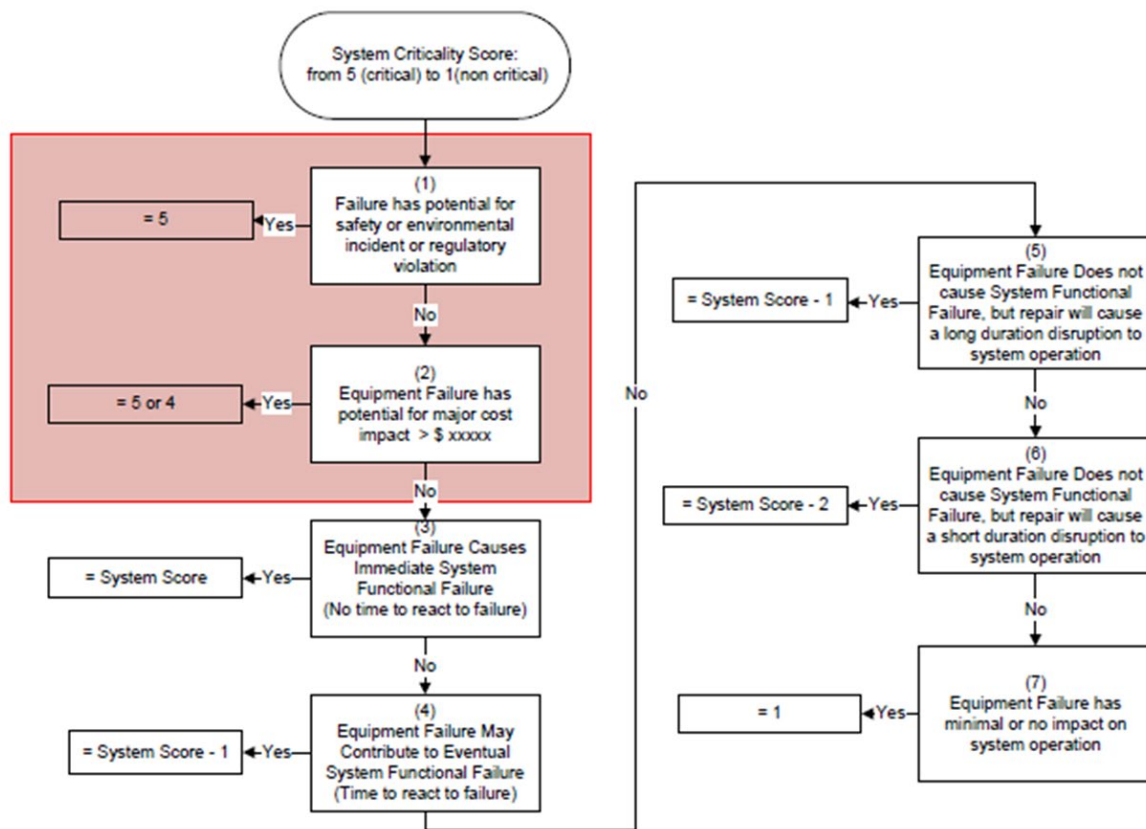
SOAP has been documented to save 50 to 70 percent of staff time compared to traditional assessment methods and it yields 80 to 95 percent similar results. SOAP makes use of process block diagrams, process and instrumentation control diagrams (P&IDs), equipment listings, maintenance histories, and facility performance data to a greater extent than most criticality assessment methodologies. Additional previous assessments will also be used to the extent practicable. The approach consists of:

1. Data Collection, Systems Review, and Development of Function(s) Statements
2. Establishment of Cross-Functional Team
3. Criticality Workshop at System Level (team-based activity)
4. Post-Processing of the Workshop Results
5. Relative Criticality Ranking at the Asset Level
6. Asset Criticality Scoring Review with Cross-Functional Team (team-based activity)
7. Assignment of Likelihood of Failure (LoF) scores and calculation of asset risk values



SOAP was developed, and beta tested in 2014 and 2015 and officially released in a peer reviewed paper in January 2016 at the international Reliability and Maintenance Symposium (RAMS). The method applies to all types of industrial systems. It has been used successfully at numerous water utilities, including as the primary tool in major risk-based asset management programs for Gwinnett County (GA), Seminole County (FL), Commission of Cocoa (FL), Mount Pleasant Waterworks (SC), Kansas City Water, New Jersey District Water Supply Commission, Billings (MT) the Commission of Rocky Mount (NC), Great Lakes Water Michigan, Clark County Wastewater, Nevada, and Ft Lauderdale Wastewater.

CONSULTANT will apply the results of the work completed in the System Level Criticality Workshop to the plant assets. Each asset will be assigned a criticality number based on the impact of asset failure on the primary and secondary functions and based on our maintenance and reliability experience. The asset criticality assignment process uses the decision diagram:



Note that impact of asset failure on system function is largely dependent on the asset type and therefore our assignment process uses formulas to assign asset criticality based on the asset type. In review of the asset information provided, the asset types (failure class) for some assets are not at the level required to calculate the failure impact. One example is VALVE where this classification is used for all valves regardless of type. In these cases, CONSULTANT will be assigning the appropriate asset type to be used in the criticality assignment. Note that the population of assets that fall into this category are minimal. The level of effort provided in this proposal accounts for this activity.

Following the completion of Task 3, asset condition assessment, CONSULTANT will apply the condition scores as one factor combined with an asset type LoF factor to calculate the asset Likelihood of Failure (LoF) score. Finally, the asset risk will be calculated as Criticality x Likelihood of Failure.

**Meetings:**

- Criticality Workshop at System Level (4 hours on site)
- Asset Criticality Scoring Review with Cross-Functional Team (up to 4 hours virtual workshop)
- Asset Risk Scoring Review with Cross-Functional Team (up to 4 hours virtual workshop)

**Task 2 Deliverables:**

- Workshop agendas, materials, and notes.
- Summary of process level criticality ranking
- Complete asset registry with criticality and risk values assigned in format chosen by the City

**Task 3 – Condition Assessment of Wastewater Treatment Plant**

Consultant shall provide the following services to the City, as described herein, in the form of condition assessment of a selected subset of the City’s Wastewater Treatment Plant assets. The subset of assets qualifying for the condition assessment will be selected based on a combination of asset criticality, asset type, and WWTP staff input.

**Task 3.1 – Wastewater Treatment Plant Assessment Planning**

The purpose of this task is to plan and solicit concurrence for the condition assessment work of Task 3.

- A review of the information furnished by City for Consultant’s development of the treatment plant’s asset registry.
- Planning Workshop No. 1. Consultant shall facilitate a workshop (via in Person and MS Teams) with City to discuss Consultant’s review of City data, draft asset inventory, condition rating scale, proposed asset types to be assessed, asset-groupings, assessment criteria, assessment field logistics and schedule. If required a follow up meeting will be scheduled to finalize any action items from Workshop No. 1.
- Consultant will use its Asset Condition Evaluation System (ACES) database for the condition assessment. ACES is a data management tool for centralized storage of condition assessment data including asset list, condition information, asset attributes, photos and reports. Using the results of Planning Workshop 1, Consultant will populate the ACES database with available asset information. Asset registry gaps will be reconciled, based on definition of asst types for assessment in Planning Workshop 1, during the onsite condition assessments.
- Consultant will describe required operating conditions per asset and City WWTP staffing support needs during field assessment work of Task 3.2.
- A Field Work and Safety Plan will be created describing the details and logistics of the assessment. This document will be made available to the City if desired.

**Task 3.2 – Wastewater Treatment Plant On-Site Condition Assessment**

Consultant shall implement the Field Assessment Plan developed as part of Task 3.1 with

three experienced Consultant condition assessment professionals. The level of effort budget for the CONSULTANT field assessment team is based on a team of three assessing plant assets during normal working hours for the City in accordance with the following:

- Assessment to include WWTP mechanical, electrical, instrumentation, structural and site assets related to the operation of the treatment plant.
- Electrical components such as transformer, automatic and manual transfer switches, electrical switchgear and VFDs are expected to be included in the assessment.
- HVAC systems where relevant
- Exposed structural components.
- Visual evaluation of coatings.
- Observation of noise, odors, and vibration.
- Observation of equipment operation flow, pressure using existing instruments
- Field electrical measurements including voltage and amperage measurements under load where possible, and insulation resistance of electrical equipment. This service is limited to working live 480V Category 2 Arc Flash.
- Consultant shall provide the requisite tools and instruments required for the condition assessment data collection.
- Consultant shall not plan to enter permit required confined spaces as part of this scope. Wet wells / buried tanks will be inspected from the deck without breaking the plane of the hatch cover.
- Consultant shall have no authority to exercise control over, nor shall they bear any responsibility for, the health and safety of parties other than Consultant's field assessment team.
- No heavy cleaning or asset maintenance by Consultant are included in this scope of work.

### **Task 3.3 – Wastewater Treatment Plant Condition Assessment Report**

Consultant shall prepare a WWTP Condition Assessment report that summarizes the results of the Task 3.1 planning and Task 3.2 field work as well as presenting the following key elements. Additionally, recommendations and estimated costs for repair, rehabilitation, and/or replacement of assets shall be presented. In summary, the report shall include the following key elements related to the assets assessed:

- WWTP asset registry
- Asset condition scoring
- Asset remaining useful life
- Photographs of each asset and noted deficiencies (as applicable)
- Identification of deficiencies per asset
- Recommended repair, rehab, replacement strategies and associated costs for each deficiency
- Prioritization of repair, rehab, replacements and assignment to three basic time horizons (e.g. 0-2 years; 2-5 years; 6-10 years)
- Recommendations for additional, targeted assessment, or other strategies to enhance maintenance efforts at the WWTP, if applicable

Consultant shall prepare a draft of the WWTP Condition Assessment report and submit it to City for review and comment. Consultant shall facilitate a teleconference via MS Teams to review City comments. Consultant shall finalize the report based on City review comments.

### **Task 3 Deliverables**

- Workshop agenda and minutes
- Finalized list of WWTP asset types for condition assessment

- Finalized assessment criteria by asset type
- Final WWTP Condition Assessment report

**SECTION D. CITY’S RESPONSIBILITY**

Task 1 – WWTP Asset Registry Development

- Support of Consultant’s team for initial plant walk through
- Provide Consultant access to all plant buildings and structures where assets are installed
- Timely response of submitted documents for City review

Task 2 – WWTP Asset Criticality and Risk Ranking

- Provide a process diagram for the WWTP
- Attend all workshops
- Timely response of submitted documents for City review

Task 3 – WWTP Condition Assessment

- City shall provide staff with Wastewater Treatment Plant experience to escort Consultant to all areas of the plant.
- Assets are expected to be operating under normal operating conditions and loading at the time of the assessment. Assets which cannot be observed operating under close-to-normal operating conditions and loading shall only be visually observed.

**SECTION E. SCHEDULE**

Deliverables shall be provided per the following schedule:

<b>Task</b>	<b>Description</b>	<b>Calendar Days from NTP</b>
1	WWTP Asset Registry Development	60
2	Asset Criticality and Risk Ranking	90
3	WWTP Condition Assessment	120

**SECTION F. BASIS OF COMPENSATION**

The Consultant proposes to perform the work described in Section C is on a time and materials basis. The total engineering fee including labor and expenses is \$356,910 as shown in the table below.

<b>Task</b>	<b>Description</b>	<b>Fee</b>
1	WWTP Asset Registry Development	\$160,520
2	Asset Criticality and Risk Ranking	\$63,230
3	WWTP Condition Assessment	\$119,160
	Reimbursable Expenses	\$14,000
	<b>Total</b>	<b>\$356,910</b>

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**SECTION J. ACCEPTANCE**

IN WITNESS WHEREOF, the parties hereto have executed this Amendment on the dates indicated below.

ATTEST:

For: City OF HOLLYWOOD, FLORIDA

As approved by the board on

Date: \_\_\_\_\_

By: \_\_\_\_\_

\_\_\_\_\_

WITNESS:



\_\_\_\_\_

Raul Alfaro, P.E.

For: Jacobs Engineering Group Inc.

By: \_\_\_\_\_



David Ashman, Vice President



**EXHIBIT A**  
Fee Schedule

Jacobs Engineering Group Inc.								
	Technologist/Engineer 8	Technologist/Engineer 7	Project Manager /Engineer 6	Technician 6	Planner/Engineer 4	Engineer 3	Technician 2	Total Fee
Hourly Rate	\$310	\$275	\$230	\$190	\$175	\$150	\$110	
<b>Task 1.</b> WWTP Asset Registry Development	100	40	150	8	300	200		\$160,520
<b>Task 2.</b> Asset Criticality and Risk Ranking	100		96		58			\$63,230
<b>Task 3.</b> WWTP Condition Assessment	32		248	200		80	20	\$119,160
Reimbursable Expenses								\$14,000
<b>Totals</b>								<b>\$356,910</b>

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