WORK ASSIGNMENT NO. 2016-01 PURSUANT TO

THE JUNE 28, 2016 AGREEMENT BETWEEN THE

CITY OF VENICE, FLORIDA AND BLACK & VEATCH

WHEREAS, on June 28, 2016, the City of Venice, Florida ("OWNER") and **Black & Veatch Corporation** ("CONSULTANT"), entered into an Agreement whereby the CONSULTANT would perform professional services for the OWNER pursuant to an executed Work Assignment; and

WHEREAS, the OWNER wishes to authorize the CONSULTANT to perform professional services concerning **Water Treatment Plant RO Efficiency Study** as more particularly described in the Scope of Services herein; and

WHEREAS, the CONSULTANT wishes to perform such professional services,

NOW THEREFORE, in consideration of the premises and mutual covenants contained in the June 28, 2016, Agreement and this Work Assignment, the parties agree as follows:

1. General description of the project: **The Water Treatment Plant RO Efficiency Study project involves a study of the technical, environmental and economic feasibility of increasing the water recovery efficiency of the reverse osmosis treatment process at the City of Venice's water treatment plant.**
2. Scope of services to be performed. CONSULTANT shall perform the services described in the Scope of Services attached hereto as Attachment "A".
3. Compensation to be paid. OWNER shall pay the CONSULTANT the sum of ***Three hundred thirty-three thousand, one hundred ninety-six dollars*** **($333,196)** for performance of the professional services specified in this work assignment.
4. Time for completion. CONSULTANT shall complete the professional services specified in this work assignment within **245** days from the date of this Work Assignment.
5. The terms and conditions of the June 28, 2016 Agreement shall remain in full force and effect until the completion of this Work Assignment; and

IN WITNESS WHEREOF, the parties have executed this Work Assignment on the ___ day of ____, 20__.

BLACK & VEATCH CORPORATION

_____

Brent M. Reuss, P.E., Vice President

CITY OF VENICE, FLORIDA

By: _____

Mayor

ATTEST:

Attachment A – Scope of Services

Water Treatment Plant RO Efficiency Study

PROJECT OVERVIEW

The City of Venice, Florida (OWNER) owns and operates a 4.48 mgd brackish groundwater reverse osmosis (RO) water treatment plant. The water treatment plant produces a finished water product that meets or exceeds all state and federal drinking water requirements before pumping into the distribution system. The groundwater supply is permitted through the Southwest Florida Water Management District (SWFWMD) under permit number #20-005393.009. Special permit condition No. 25 requires the permittee to complete a detailed study regarding the technical, environmental, and economic feasibility of increasing the treatment plant's water recovery efficiency to the highest degree feasible; with a target efficiency of 75% or greater. The study must be completed and submitted to SWFWMD by the end of the permit duration on January 1, 2018.

The current RO system is designed with four skids, and each skid supports a single stage filtration process with 50% recovery of the feed water supply. The OWNER has requested the CONSULTANT to provide services to complete the required efficiency study. The study will evaluate the feasibility of increasing the plant's recovery to 75% or greater, determine if improved efficiency will affect their National Pollution Discharge Elimination Permit (NPDES) for concentrate disposal, investigate the feasibility of deep well injection as a disposal option, and provide an opinion of costs and schedule for feasible options to increase efficiency.

By performing this required pilot study the OWNER will be able to make better use of its current water supply. Increasing the recovery of the OWNER's Reverse Osmosis system will allow the OWNER to be able to reduce daily withdraws from its existing wellfield. This would help reduce the strain on the area's ground water supplies, save in electrical cost by decreasing the number of wells needed to run and provide a more efficient water treatment plant. Finally this will allow the OWNER to meet future supply needs without needing to increase groundwater withdrawals.

SCOPE OF SERVICES

Task 1 – Project Management, Administration and QA/QC Plan

1.1 Project Management and Administration:

CONSULTANT will perform general administrative duties associated with the Project, including project set-up, resource and sub-consultant management, progress monitoring, scheduling, QA/QC plan development and updating, general correspondence, office administration, and invoicing.

CONSULTANT will maintain an accurate project documentation and project cost accounting system throughout the project to include the following:

- Maintain a project filing system throughout duration of Project to use for storage and retrieval of Project documents.
- Prepare monthly status reports and invoices for engineering services in the format required by the contract. Status reports will include a summary of work completed during the previous month.

CONSULTANT will update the project execution schedule based upon the OWNER NTP date and distribute the updated schedule at the project initiation meeting. The project schedule will identify the following information:

- Key project tasks and deliverables.
- Critical dates for data submission, deliverable reviews, and decisions by the OWNER.
- Meetings and workshops.

CONSULTANT will review, update and submit to OWNER updated Project schedule periodically upon completion of major project elements. Each updated schedule will track original target completion dates.

Our Fee for Project Management and Administration services is based on the estimated project duration of 8 months.

1.2 Quality Assurance / Quality Control Plan :

CONSULTANT will prepare a QC-Verification plan and monitoring checklist and maintain continuous control over the quality of all its work efforts. This will include oversight and review by the lead technical engineer(s), project manager, senior technical staff and managerial staff. This task includes time for development and management of the QA/QA plan / program. Hours for actual QC reviews have been included in other tasks.

Task 2 – Kickoff Meeting and Site Investigation

2.1 Kickoff Meeting: Conduct a kickoff meeting with the OWNER to confirm the project goals, the roles and responsibilities of the team members, and a review of the Scope of Work. CONSULTANT shall prepare an agenda and meeting minutes for distribution to the team members.

2.2 Collect and Review Plant Data : CONSULTANT will prepare and submit a data request to OWNER and review plant data and documents provided by the OWNER to gain a thorough understanding of the RO system, its operation, and water quality. Review of these documents may lead to additional data requests to the OWNER. CONSULTANT is reliant upon the OWNER's support in the acquisition of such documentation.

2.3 Site Investigation: In conjunction with the Kickoff meeting, CONSULTANT will conduct a site investigation of the RO plant with OWNER staff. The site investigation will focus on the existing RO system and membrane performance, RO chemical feed systems, RO feed pumps, and a space assessment in the RO and electrical rooms. The concentrate disposal system will be reviewed at the

plant, and the surface water disposal location will be observed as accessible. During the evaluation pipe size and materials, piping pressure class and types of piping connections will also be documented, as needed to plan for the pilot testing.

Task 3 – Desktop Evaluation of Treatment Alternatives

3.1 Screen New Technologies and Develop Alternatives: In consideration of the treatment requirements and recovery goals, CONSULTANT will perform a high level review of existing and emerging technologies to help improve recovery of the RO system. CONSULTANT will identify and develop a high level description of a minimum of 4 alternatives for increasing recovery. Alternatives may include:

- Increasing recovery with current system through operational changes or minor system modifications, potentially including a change of antiscalant or increase in feed pressure.

- Increasing recovery by modifying the process configuration (two and three stage RO), different scale inhibitors, other technologies such as semi- batch RO system, etc.

CONSULTANT will summarize and make recommendations regarding alternatives that may be capable of increasing recovery and are also potentially implementable at the full scale facility. CONSULTANT will schedule and participate in a conference call with OWNER staff to discuss the findings and come to consensus on the alternatives to move forward with in evaluations.

3.2 Desktop Evaluations: CONSULTANT will conduct an evaluation of viable alternatives developed in the prior subtask. Evaluation will include desktop modeling of each such alternative to investigate the feasibility of implementation and if feasible, development of conceptual level costs. Feasibility will be based on degree of modifications required, foot print required, conceptual capital costs and operating costs.

3.3 Desktop Evaluation Technical Memorandum and Review Meeting: CONSULTANT will develop and submit a Technical memorandum to document the results of the desktop evaluations and cost development. The Technical Memorandum will include recommendation of up to two potentially feasibly alternatives for pilot testing. The memorandum will be submitted to the OWNER in draft. CONSULTANT will attend a review meeting with OWNER staff, including preparation of an agenda and meeting minutes. Following the review meeting, CONSULTANT will address OWNER comments and submit the final Technical Memorandum

Task 4 –Pilot Testing of Existing RO System Optimization

CONSULTANT will provide services in support of pilot testing the alternative identified through the Desktop Evaluations that involves optimizing recovery with the current system through operational changes or minor system modifications, potentially including a change of antiscalant, modified antiscalant dose, or change of feed pressure.

This alternative will be pilot tested within the full scale plant and is anticipated to involve implementing operational adjustments, sequentially increasing the target recovery rate in incremental stages, and operating the plant at that recovery rate for a period of time to monitor performance and review plant operational and water quality data. The number of stages and amount of change with each stage will be established in conjunction with the OWNER. The overall duration of this pilot testing is anticipated to be up to 4 months. CONSULTANT will provide the following services in support of this pilot test:

4.1 Testing Protocol: CONSULTANT will develop and submit a written pilot testing protocol and facilitate conference call with OWNER's staff to discuss the OWNER's input on the proposed protocol and review operational requirements. CONSULTANT will incorporate revisions as agreed and submit the final protocol.

4.2 Coordination with FDEP: CONSULTANT will contact FDEP to advise of the proposed modifications, to the extent the modifications require such notification and otherwise keep FDEP informed during the testing. At a minimum, coordination is anticipated to be required to confirm NSF acceptability of a proposed new antiscalant. CONSULTANT has budgeted up to 8 hours for FDEP coordination.

4.3 Startup Support: CONSULTANT will be on site for two days to work closely with OWNER's staff in support of starting up this pilot test. This may be conducted on two consecutive days or may be one day to start up and one day for follow up.

4.4 Continuing on-site support: CONSULTANT will be on site two days per month over the course of the four month pilot testing period to work with OWNER's staff in monitoring plant performance and/or implement sequential stages of the testing.

4.5 Continuing consultation support: CONSULTANT will provide as-needed support and coordination with the OWNER's staff throughout the duration of pilot testing, including analyzing plant operational data or water quality data on a periodic basis and corresponding with OWNER via email or telephone. CONSULTANT anticipates 12 hours per week of continuing consultation support during the four month testing period.

OWNER Participation: The assistance and participation of the OWNER is needed to support this pilot testing program, as described in the OWNER Participation section of this Work Assignment.

Task 5 –Pilot Testing of a Modified RO System Configuration

CONSULTANT will provide services in support of pilot testing the alternative identified through the Desktop Evaluations that involves increasing recovery by modifying the process configuration, potentially including two / three stage RO, different scale inhibitors, or possibly other technologies such as semi- batch RO system, etc.

This alternative will be pilot tested using a vendor-provided skid-mounted pilot unit temporarily installed and operated at the WTP. The pilot unit is generally anticipated to operate on a continuous basis, seven days per week for a duration of up to 3 months after installation and startup. CONSULTANT will provide the following services in support of this pilot test:

5.1 Testing Protocol: CONSULTANT will develop and submit a written pilot testing protocol and facilitate conference call with OWNER's staff to discuss the OWNER's input on the proposed protocol and review operational requirements. CONSULTANT will incorporate revisions as agreed and submit the final protocol.

5.2 Coordination with FDEP: CONSULTANT will contact FDEP to advise of the proposed pilot testing, to the extent required and otherwise keep FDEP informed as needed during the testing. Pilot water disposal is an anticipated point of interest for FDEP, as well as verification that the pilot product water is not being used for distribution. CONSULTANT has budgeted up to 8 hours for FDEP coordination.

5.3 Procurement, Installation, and Startup Support: CONSULTANT will subcontract with one or more vendors to supply the pilot unit, RO membranes, and certain consumables and services in support of the installing, starting up and maintaining the pilot equipment. This subtask includes management and coordination of the Vendors by CONSULTANT to facilitate procurement, delivery, installation, and other Vendor services. Actual Subconsultant costs for the Vendor are covered in a separate subtask.

CONSULTANT will be on site to coordinate and support the delivery, installation, and startup of the pilot unit and participate in pilot operation training provided by the Vendor.

5.4 On-site Pilot Operation: CONSULTANT will be on site two days per week over the course of the three month pilot testing period to operate the pilot unit, check operation, mix chemicals, and record analytical data. OWNER's staff assistance is needed to record analytical data from the pilot unit on days when CONSULTANT is not on site.

5.5 Consultation During Pilot Operation: CONSULTANT will provide as-needed support and coordination of the pilot operation throughout the duration of pilot testing, including analyzing data and recommending any adjustments to the pilot program. CONSULTANT anticipates 12 hours per week of continuing consultation support during the three month testing period.

5.6 Subconsultant services by Pilot Unit Vendor: This Work Assignment includes a $57,000 allowance for subconsultant supply and services, including the items listed below anticipated to be necessary in support of a three month pilot duration described in this Task. A proposal from Harn RO is attached for reference.

- Pilot unit rental (to support installation, startup, and three months of operation)
- Purchase RO membrane elements, including freight.
- Vendor startup assistance / training
- R/O pilot unit expendables
- Periodic cleaning of the pilot
- Delivery (including freight), mobilization, and demobilization of the pilot unit
- Installation of temporary piping to support the pilot
- Installation of electrical to support the pilot unit (by a licensed electrician)

OWNER Participation: The assistance and participation of the OWNER is needed to support this pilot testing program, as noted above and described in the OWNER Participation section of this Work Assignment.

Task 6 –Concentrate Disposal Evaluation

6.1 Investigate Impact on NPDES permit: CONSULTAT will conduct an investigation of the environmental / regulatory feasibility of continuing to dispose of RO concentrate to Roberts Canal under the alternatives to increase recovery, which will result in a higher concentration of salinity and other constituents in the concentrate stream. Based on the results of the Desktop Evaluations, CONSULTANT will develop an estimate of the concentrate stream flowrate and water quality. Up to two scenarios may be considered if the concentrate water quality varies significantly among the alternatives identified in the Desktop Evaluations.

CONSULTANT will review the NPDES permit and governing regulations, and will research existing data on the flows and characteristics of Roberts Creek, as available. CONSULTANT's Environmental Scientist will make a trip to Venice to meet with the OWNER's staff and visit the plant and discharge point. CONSULTANT will schedule and attend a meeting with FDEP to discuss the permit and potential impact. If possible, this meeting will be scheduled to coincide with the Environmental Scientists trip. Conclusions and recommendations will be provided in the report under Task 7.

6.2 Alternative Deep Well Injection Disposal: CONSULTANT will review governing regulations regarding deep injection well disposal of concentrate in consideration of predominant local hydrogeological conditions and the projected characteristics of the concentrate flow stream. CONSULTANT will have a conference call with FDEP staff to confirm the governing requirements. CONSULTANT will give consideration to the feasibility of partnering with a neighboring utility to share an existing DIW or jointly drill a new one, including discussing any potential opportunities known to the OWNER, and having phone conversations with up to two potential regional partners. CONSULTANT will develop conceptual level cost for a potential deep injection well disposal option. Conclusions and recommendations will be provided in the report under Task 6.

Task 7 – WTP RO Efficiency Study Report & Review Workshop

7.1 Draft Technical Report: CONSULTANT will prepare and submit a draft Report to summarize the results of all prior tasks. In general, the report will address the following:

- Background and Introduction
- Summary of existing plant, water quality, treatment and recovery goals
- Summary of new technologies
- Identification and desktop evaluation of alternative configurations
    - Summary of alternative configurations
    - Conceptual costs
    - Footprint / layout
    - Methodology and results
- Pilot Testing
    - Methodology and results
- Concentrate disposal

    - Impacts to existing NPDES permit
    - Alternative disposal options
- Summary of conclusions and recommendations, including:
    - Economic, technical, and environmental feasibility
    - Conceptual cost and schedule for implementation

7.2 Draft Technical Report Workshop: CONSULTANT will conduct a Draft Report workshop with the OWNER to discuss findings within the report and receive OWNER comments and input for the report. CONSULTANT will prepare an agenda and develop meeting minutes from the workshop.

7.3 Final Technical Report: CONSULTANT will finalize report based on decisions and discussion from the workshop. The Final Technical Report will be submitted to the OWNER (Electronically in pdf format and five printed copies).

OWNER's Allowance

This Work Assignment includes an OWNER's Allowance of **$25,000.00** for unforeseen tasks required to complete the project, which will only be used with the written approval of the OWNER. A scope description and fee breakdown will be provided to the OWNER for any proposed use of the OWNER's Allowance.

PARTICIPATION BY THE OWNER

Section needs work, particularly as to help we need with pilot set up and data collection

The following participation by the OWNER will be needed to support execution of work under this Work Assignment:

- Provide CONSULTANT with available relevant data to support the assessments within 2 weeks of a request.
- Provide CONSULTANT Staff with access to the WTP facilities for information gathering purposes.
- Review and comment on draft submittals within 2 weeks of submittal dates.
- Participate in meetings, calls and workshops with CONSULTANT as identified herein.
- The following participation by the OWNER is anticipated to be needed in support of the pilot testing of the existing RO System Optimization as covered in Task 4:
    - Participate in meetings and conference calls with CONSULTANT and coordinate with CONSULTANT during site visits as needed
    - Implement operation changes in the plant as agreed per the testing protocol.
    - Provide new antiscalant or other chemicals / consumables needed in support of the testing
    - Perform operation of the plant during testing
    - Obtain RO Feed water quality analyses from a laboratory at the initiation of the testing and at strategic times during the testing (approximately monthly)
    - Provide CONSULTANT with operational data and water quality data.
- The following participation by the OWNER is anticipated to be needed in support of pilot testing of a modified RO System configuration as covered in Task 5:
    - Record daily operational and analytical data from the pilot on days when CONSULTANT is not on site (5 days per week).
    - Obtain RO Feed water quality analyses from a laboratory at the initiation of the testing and at strategic times during the testing (approximately monthly)
    - Correspond with CONSULTANT staff as needing during piloting.

PROPOSED IMPLEMENTATION SCHEDULE

The proposed implementation schedule for the Water Treatment Plant R.O. Efficiency Study is outlined below. The Notice to Proceed shall be the date of approval of the Work Assignment by the OWNER (City Council or Mayor). The following schedule assumes that OWNER's reviews will be completed within 2 weeks and that the OWNER's staff can be available for participation in meetings and interviews in the timeframes indicated.

Proposed Implementation Schedule	
Deliverable or Activity	**Target Completion Following NTP**
Data request	1 week
Kickoff and Site Evaluation	2 weeks
Draft Desktop Evaluation Technical Memorandum	8 Weeks
Review Workshop	10 Weeks
Complete Setup and Start Pilot Testing under Task 4	12 Weeks
Complete Setup and Start Pilot Testing under Task 5	14 weeks
Complete Pilot Testing Phase	29 weeks
Draft R.O. Efficiency Study Report	32 Weeks
Review Workshop	34 Weeks
Final Report	35 Weeks

COMPENSATION

For the Scope of Services described in this Work Assignment, CONSULTANT shall be compensated on an Hourly Rates Method basis for Tasks 1 through Task 7 in the amount of $308,196. In addition, this Work Assignment includes an Owner's Allowance in the not-to-exceed amount of $25,000. The resulting Work Assignment total is $333,196. Invoicing and compensation shall be in accordance with the Master Agreement. The table below summarizes the fee by scope task.

Proposed Fee Breakdown	
Task	**Hourly Rates Method Compensation**
Task 1 – Project Management, Administration, and QA/QC Plan	$14,404
Task 2 – Kickoff Meeting and Site Investigation	$9,238
Task 3 – Desktop Evaluation of Treatment Alternatives	$44,524
Task 4 – Pilot Testing of Existing RO System Optimization	$58,994
Task 5 – Pilot Testing of Modified RO System Configuration	$125,610
Task 6 – Concentrate Disposal Evaluation	$23,856
Task 7 – WTP RO Efficiency Study Report & Review Workshop	$31,570
Subtotal (Hourly Rates Method)	**$308,196**
OWNER's Allowance	$25,000
Work Assignment Total	**$333,196**