

TASK ORDER 2-13 SWR

ENGINEERING SERVICES FOR THE DESIGN, PERMITTING, AND BID PHASE SERVICES FOR THE VFD UPGRADES TO WASTEWATER PUMP STATIONS A, B, C, D AND DA

This TASK ORDER 2-13 SWR is issued under the terms and conditions of the AGREEMENT TO FURNISH GENERAL ENGINEERING SERVICES TO THE CITY OF KEY WEST ("AGREEMENT") between the City of Key West ("CITY") and CH2M HILL, Engineers, Inc. ("CONSULTANT") dated November 19, 2012 which is incorporated herein by this reference.

A. SCOPE OF SERVICES

Specific services that the CONSULTANT agrees to furnish are summarized on the attached statement entitled TASK ORDER 2-13 SWR SCOPE OF SERVICES. The Scope of Services defines the work effort anticipated for the Task Order.

B. TIME OF COMPLETION

Work under this Task Order will begin immediately following acceptance and be completed expeditiously subject to coordination with the City of Key West staff.

C. COMPENSATION

Compensation for the labor portions of TASK ORDER 2-13 SWR, Task A and B will be on a lump sum fee basis as stipulated in Article 5, Paragraph 5.1.1 of the AGREEMENT. Compensation for the labor portions of Tasks C and D and all expenses will be on a Cost Reimbursable-Per Diem basis as stipulated in Article 5, Paragraph 5.1.2 of the AGREEMENT. The estimated compensation is shown on the attached statement entitled TASK ORDER 2-13 SWR COMPENSATION.

D. ACCEPTANCE

By signature, the parties each accept the provisions of this TASK ORDER 2-13 SWR, and authorize the CONSULTANT to proceed at the direction of the City's representative in accordance with Article 3, SCOPE OF SERVICES. Start date for this Project will be no later than ten (10) days after execution of this authorization.

For CH2M HILL, Engineers Inc.

For CITY OF KEY WEST

By: William D. Beddow
William D. Beddow, P.E.
Vice President

By: _____
Bob Vitas
City Manager

Andrew H. Smyth
Andrew H. Smyth, P.E.
Key West Office Manager

Dated the _____ day of _____, 20__

ATTEST: _____

TASK ORDER 2-13 SWR

ENGINEERING SERVICES FOR THE DESIGN, PERMITTING, AND BID PHASE SERVICES FOR THE VFD UPGRADES TO WASTEWATER PUMP STATIONS A, B, C, D AND DA

SCOPE OF SERVICES

Project Description

The City of Key West and CH2M HILL performed pump drawdown tests on nine pump stations ("A", "B", "C", "D", "DA", "F", "Q", "S", and Sigsbee) during the preliminary design of the Pump Station F Improvement project. The tests results were compared to existing pump curves to determine the operating efficiency of the pumps.

The results of the pump drawdown tests showed that most of the pumps were operating inefficiently. The pumps appear to be operating to the right of their curves (i.e., low pressures, and therefore, higher flows). Although higher flows are desirable, operating to the right of their curves indicates that the pumps are cavitating, which causes additional maintenance, such as the frequent replacement of impellers and motors. In addition, the pumps are frequently cycling on and off, which results in higher energy costs and shorter motor life.

The low pressures appear to be attributed to the pipe rehabilitation that occurred in the 1990s, which reduced infiltration and inflow into the wastewater collection system. Since 2001, the flows to the WWTP have been significantly reduced, decreasing from 8.2 million gallons per day (mgd) to approximately 4 mgd. The lower flow produces lower system pressures causing pumps to operate to the far right of their curves, and in some cases off the curve.

Cavitation causes excessive vibration, which has been observed at these pump stations. The effects of cavitation and the frequent cycling of the pumps have resulted in the replacement of motors, motor starters, and the rebuilding or replacement of impellers.

The CITY plans to add Variable Frequency Drives (VFD) to the drive units at Pump Stations A, B, C, D and DA which will allow the pumps to operate more efficiently, minimize the number of start and stops, and decrease damage to the impellers and motors caused by cavitation and excessive vibration. The addition of the VFDs will allow the pumps to operate when the flows to the pump stations are minimal by operating at a lower speed and during large storm events the pumps will be able to ramp up to the maximum speed to accommodate higher flows. With the addition of the VFDs, the pumps will operate towards the center of their curves, where the pumps are most efficient.

Purpose

The CITY has requested that the ENGINEER provide engineering services for the preparation of a preliminary engineering design memorandum, detailed design, permitting and bid phase services for the VFD upgrades to Pump Station A, B, C, D and DA. This Task

Order describes the ENGINEER's Scope of Services. Specific activities to be performed under this Task Order include:

- Preliminary Design Memorandum
- Provide detailed and final design with submissions of 60% and 90% documents for review and provide bid documents
- Permitting
- Bid Phase Services

Scope of Services

The following tasks describe the activities to be performed and the work products to be prepared by the ENGINEER.

Task A - Preliminary Design Memorandum

This task includes the preliminary design efforts to evaluate space requirements, determination if a pre-cast concrete building or platform is required, potential electrical savings, proposed layout, validate existing pump information and coordinate with VFD manufacturer and a site visit to verify available space at each pump station.

Potential energy savings or energy optimization in a pumping system is how much horse power goes in to the system as input and what is the output horse power. The input HP is directly related to electrical kW input which can be measured using a power meter connected to the power feeder. The output horsepower also termed as water horse power can be computed by measurement of pump discharge flow and pressure. The term wire to water efficiency (WWE) is derived from the fact that this efficiency directly relates water output to electrical input of a pump and is an indicator of the pumping system's cost effectiveness. Higher WWE indicates a more efficient pumping system. Each pump station will be evaluated to determine the wire to water efficiency with the installation of VFDs to maximize electrical consumption.

Subtask A.1 - Field Survey and Geotechnical Investigation

The ENGINEER shall retain a professional land surveyor to conduct a topographic survey of pump station sites A, B, C, D, and DA. The survey shall locate all known existing infrastructure and other physical features within the depicted survey limits, including existing above and below ground utilities. The survey shall also include the boundaries of the Pump Station sites.

Elevations will be provided in accordance with accepted standards using NGVD 1929 Datum. Horizontal coordinates shall be in U.S. Survey feet and reflect a projection of grid coordinates in the State of Florida Plane Coordinate System Transverse Mercator-West Zone, NAD 1983-1990.

An allowance of \$19,000 is included as part of this task to cover the cost of retaining a professional land surveyor.

The Engineer will also retain the services of a geotechnical subconsultant to conduct a geotechnical investigations at Pump Stations A, B, C, D, and DA. The investigation will include five (5) Standard Penetration Test (SPT) (ASTM D-1586) borings up to twenty (20)

feet below land surface (bls) at each pump station site. The borings will not be terminated in very loose or deleterious material. Sieve analyses will be conducted on the five (5) soil samples collected from split spoon samples taken from the borings.

The ENGINEER and geotechnical subconsultant will prepare a geotechnical report documenting the results of the geotechnical field investigation. The report will include discussion of field procedures, boring logs, soil test data, and maps indicating the locations of all borings.

An allowance of \$6,000 is included as part of this task to cover the cost of retaining a geotechnical subconsultant.

Deliverables

The following deliverables will be provided under this Task:

- One (1) copy of full size survey
- Two (2) copies of half size survey
- One (1) electronic copy of survey
- Two (2) copies of geotechnical report
- Prepare a Draft Preliminary Design Memorandum.
- Utilizing the results of the review meeting prepare a Final Preliminary Design Memorandum.

Task B-Design of VFD Upgrades

This task includes activities related to the design of the VFD upgrades at Pump Stations A, B, C, D and DA. This task is divided into two subtasks that would correspond to logical review milestones for the CITY.

Subtask B.1 - Detailed Design

The ENGINEER will perform the work necessary to develop the design, based on the approved preliminary Design Report and pump station layouts. The objectives of this task are to finalize design of each pump station's electrical building, location, additional pump station modifications required for implementation, and to communicate the design tasks to the CITY. The ENGINEER will conduct a design review meeting with the CITY prior to the conclusion of this task.

Specific work activities in this task are identified below:

- Develop pump station layout sheets for Pump Stations A, B, C, D and DA.
- Prepare preliminary electrical building layouts and set preliminary elevations for each pump station based on the floor of the electrical building being one (1) foot above the 100-year flood elevation for each site.

- Replace the existing RTUs with TCUs for SCADA at each pump station.
- Identify any potential constructability issues.
- Prepare budget-level cost estimate.
- 60% Design Review Meeting.

Deliverables

- Six (6) copies of detailed design, which includes preliminary drawings, design data, catalog cut sheets and 60% complete review documents, and an outline of the technical specifications (two (2) of these copies are for OMI).
- Six (6) copies of 60% construction cost estimate (two (2) of these copies are for OMI)
- Two (2) copies of 60% review meeting minutes

Subtask B.2 – Final Design

During this subtask, the ENGINEER will complete the technical design based on the outcome of the 60% Design Review. This will involve structural platform design for the electrical building, electrical service requirements, and any pump station modifications. At the end of this subtask the design documents will be considered complete and ready for bidding.

Specific work activities in this task are identified below:

- Prepare 90% contract documents, which include legal and technical specifications and drawings.
- Conduct 90% review meeting and incorporate review comments from CITY into the design documents,
- Based on the 90% documents prepare updated final construction cost estimate and bid documents.
- Submit bid documents to the CITY.

Deliverables

- Two (2) copies of final construction cost estimate
- Two (2) copies of 90% review meeting minutes
- Six (6) copies of 90 % review documents: 11 x 17 drawings and specifications (two (2) of these copies are for OMI)
- Six (6) copies of final bid documents, including drawings and specifications (two (2) of these copies are for OMI)
- One (1) CD of the final bid documents for upload to DemandStar

Task C – Permitting

ENGINEER will prepare a letter for FDEP stating the proposed improvements to the individual pump stations and request confirmation that a permit is not required. The ENGINEER will submit a draft of the proposed letter to the CITY for review and comments.

Deliverables

Two (2) copies of the final FDEP letter.

Task D – Bid Phase Services

Bidding services are based on a Bid Period of 30 days. The ENGINEER will provide the following services to the CITY to assist in the bidding process:

- Coordinate with CITY to provide contract documents, in PDF format, to DemandStar for bidding.
- All direct communications with bidders on matters related to the technical aspects of the design will be handled directly by the ENGINEER.
- Coordinate and conduct one pre-bid meeting to familiarize each bidder with the scope of work and to answer any questions that may arise.
- Issue up to two (2) ADDENDA, if required.
- Bids will be received, opened, and read aloud by the CITY at the designated time and location.
- Review and evaluate bids for compliance and completeness. The ENGINEER will prepare an award letter for the CITY recommending the successful bidder.
- After award, the ENGINEER will distribute to the successful contractor five sets of contract documents for execution. The contractor will be directed to return the documents to the ENGINEER for compliance review of the bidding requirements. After the ENGINEER reviews the contract documents, these five sets of documents will be sent to the CITY for final review and signatures.
- Prepare conformed contract documents for use by CITY, ENGINEER, and Contractor during construction.

Bid services will be considered complete upon the ENGINEER's review and forwarding of the Contractors executed documents to the CITY, and submittal of conformed documents to the CITY.

Deliverables

- Two (2) copies of Pre-bid meeting minutes
- Two (2) copies of recommendation of award letter
- Five (5) copies of Contract Documents for execution

- Six (6) copies of Conformed Contract Documents (two (2) of these copies are for OMI), two (2) full size set of drawings and one (1) CD containing specifications and drawings in PDF format.
- One (1) full size set of drawings, and one (1) CD containing specifications and drawings in PDF format to awarded contractor

Assumptions

The following assumptions were used in the development of this Task Order:

- The design work on this project will be completed by the end of the first quarter of calendar year 2014.
- The design will be based on the federal, state, and local codes and standards in effect at the start of the project. Any changes in these codes may necessitate a change in scope.
- The design documents will be prepared for a single construction contract.
- The ENGINEER's master specifications will be used as the basis for all technical sections in Divisions 1 through 49. The ENGINEER's master specifications incorporating CITY requirements will be used for General Conditions, Supplemental Conditions, and other front end documents.
- Legal, easement, or plat surveys are not included in the scope of work. If additional property is required it shall be the responsibility of the City to obtain.
- Existing pump station has sufficient area for location of an electrical building. Pump Station C has space available for an electrical building within 400 lineal feet of the pump station.
- No instruments will be added or modified at any pump station.
- DFS will be sole sourced for the change out from the RTU to TCU since it is proprietary equipment.
- This Task Order assumes that no FDEP permit is required for each pump station.
- This Task Order does not include any Building Department permit applications for the electrical buildings.
- The contract will be awarded after the first bidding process. Re-bidding will be considered as an "Additional Services".

Obligations of the CITY

To assist meeting schedule and budget estimates contained in this proposal, the CITY will provide the following:

- Prompt review and comment on all deliverables (within 10 working days of receipt).
- Facilitate access to any required facilities.
- Prompt response to data requests for existing pump stations as necessary to validate the updated force main model technical memorandum.

- Attendance of key personnel at meeting as requested.

Additional Services

The ENGINEER will, as directed, provide additional services that are related to the project but not included within this Scope of Services. These and other services can be provided, if desired by the CITY, as an amendment to the Task Order. Work will begin for the Additional Services after receipt of a written notice to proceed from the CITY. Additional services may include, but are not limited to, the following:

- Re-bidding any, or all, portions of this project.
- Construction phase services.
- Permitting the Florida Department of Environmental Protection if required

Compensation

The estimated compensation for TASK ORDER NO 2-13 SWR, is shown on Attachment A entitled TASK ORDER NO. 2-13 SWR, COMPENSATION.

Completion Dates

See the preliminary project schedule presented in Attachment B.

Attachment A
Compensation

TASK ORDER 2-13 SWR VFD Upgrades SWR COMPENSATION

Engineering Services for Design, Permitting and bid Phase Services for the VFD Upgrades to Wastewater Pump Stations A, B, C, D and DA

Task	Hours	Labor	Expenses	Total Cost
Task A - Preliminary Design	278	\$37,130	\$25,100	\$62,230
Task B - Design of VFD Upgrades	935	\$118,658	\$900	\$119,558
Task C - Permitting	26	\$3,594	\$50	\$3,644
Task D - Bid Phase Services	162	\$18,722	\$550	\$20,760
Total	1401	\$178,104	\$26,600	\$206,192

COMPENSATION BREAKDOWN					
Task Order 2-13 SWR VFD Upgrades					
TASK NO.	TASK DESCRIPTION	HOURLY RATE	TOTAL HOURS	LABOR EXPENSES	TOTAL COST
A Preliminary Design					
	Principal Project Manager	\$ 182.00	6	\$1,092	\$1,092
	Sr. Technologist/Sr. Project Manager	\$ 167.00	14	\$2,338	\$2,338
	Project Manager, Engineering Specialist	\$ 154.00	98	\$15,092	\$15,092
	Project Engineer	\$ 132.00	96	\$12,672	\$12,672
	Technician 5	\$ 111.00	24	\$2,664	\$2,664
	Technician 4	\$ 99.00	16	\$1,584	\$1,584
	Specification Processor	\$ 87.00	8	\$696	\$696
	Clerical	\$ 62.00	16	\$992	\$992
	Surveying				\$19,000
	Geotech				\$6,000
	PRINTING/REPROGRAPHICS/PHONE				\$100
Preliminary Design Total			278	\$37,130	\$25,100
B Design of VFD Upgrades					
	Principal Project Manager	\$ 182.00	28	\$5,096	\$5,096
	Sr. Technologist/Sr. Project Manager	\$ 167.00	70	\$11,690	\$11,690
	Project Manager, Engineering Specialist	\$ 154.00	242	\$37,268	\$37,268
	Project Engineer	\$ 132.00	195	\$25,740	\$25,740
	Technician 5	\$ 111.00	196	\$21,756	\$21,756
	Technician 4	\$ 99.00	80	\$7,920	\$7,920
	Specification Processor	\$ 87.00	60	\$5,220	\$5,220
	Clerical	\$ 62.00	64	\$3,968	\$3,968
	PRINTING/REPROGRAPHICS/PHONE				\$900
Design SUBTOTAL			935	\$118,658	\$900
C Permitting					
	Principal Project Manager	\$ 182.00	2	\$364	\$364
	Sr. Technologist/Sr. Project Manager	\$ 167.00	2	\$334	\$334
	Project Manager, Engineering Specialist	\$ 154.00	12	\$1,848	\$1,848
	Project Engineer	\$ 132.00	4	\$528	\$528
	Technician 5	\$ 111.00	2	\$222	\$222
	Technician 4	\$ 99.00	0	\$0	\$0
	Specification Processor	\$ 87.00	2	\$174	\$174
	Clerical	\$ 62.00	2	\$124	\$124
	PRINTING/REPROGRAPHICS/PHONE				\$50
Permitting Subtotal			26	\$3,594	\$50
D Bid Phase Services					
	Principal Project Manager	\$ 182.00	14	\$2,548	\$2,548
	Sr. Technologist/Sr. Project Manager	\$ 167.00	10	\$1,670	\$1,670
	Project Manager, Engineering Specialist	\$ 154.00	44	\$6,776	\$6,776
	Project Engineer	\$ 132.00	22	\$2,904	\$2,904
	Technician 5	\$ 111.00	20	\$2,220	\$2,220
	Technician 4	\$ 99.00	14	\$1,386	\$1,386
	Specification Processor	\$ 87.00	14	\$1,218	\$1,218
	Clerical	\$ 62.00	24	\$1,488	\$1,488
	PRINTING/REPROGRAPHICS/PHONE				\$550
Bid Phase Services SUBTOTAL			162	\$18,722	\$550
PROJECT TOTALS					
TOTAL HOURS			1,401		
TOTAL FEE ESTIMATE				\$178,104	\$26,600
					\$206,192

Attachment B
Project Schedule

