

TASK ORDER No. 1 - DESIGN SERVICES  
RICHARD A. HEYMAN ENVIRONMENTAL PROTECTION FACILITY  
AERATION SYSTEM UPGRADE  
CITY OF KEY WEST

**BACKGROUND**

The City of Key West (CITY) has decided to improve their existing aeration system at the Richard A. Heyman Environmental Protection Facility (RAHEPF). The existing aeration system comprises of two multistage centrifugal blowers with associated mechanical piping, electrical and instrumentation and controls components. The City desires to increase redundancy at the facility with the addition of a new blower. The existing layout was designed with space and piping connections for the addition of a third blower unit in the future.

**INTRODUCTION**

Black & Veatch (CONSULTANT) has been requested by the CITY to provide detailed design services to implement aeration upgrades for the RAHEPF. The scope of services includes the following two main phases:

- Evaluation of best blower technology
- Detailed design of blower addition and process control to existing aeration system
  - Structural: Equipment base and pipe supports
  - Instrumentation and Control: Control descriptions, instrumentation and controls upgrades, and new control panel.
  - Electrical: Upgrade to existing electrical system to accommodate new loads. A new MCC , wiring to the administration system, disconnect and potential new transformer.
  - Mechanical: Blower system design including blower, enclosure, associated piping and valves.

An evaluation will be performed to select a blower technology that provides the most economical solution for the City assessing both capital and operation and maintenance costs. The evaluation will also include a review of the existing process control and will provide recommendations targeted to continue to comply with the required treated effluent limits, while incorporating energy savings. It is anticipated that energy savings can be obtained by optimizing process control and by utilizing newer blower technology inherently more efficient. Once the City reviews and approves the recommendations (blower type selection and process control strategy) from the initial evaluation phase; the blower technology and improved process control upgrades will be incorporated into the detailed design phase.

During the detailed design phase, CONSULTANT will develop construction documents for bidding that includes the addition of a new blower including piping, electrical, and instrumentation and controls modifications to the existing blower system.

## SCOPE OF SERVICES

### **TASK SERIES 100 – BLOWER SELECTION EVALUATION MEMORANDUM**

#### **Task 101 – Blower and Air Delivery System Evaluation Memorandum**

- A. Evaluation of Existing Data. CONSULTANT will evaluate the existing data through:
- (1) A site visit and kick off meeting with CITY staff.
  - (2) Reviewing existing design documents. A data request will be prepared and submitted to the CITY. It is anticipated the following information will be reviewed.
    - a) Blowers performance at different loading conditions
    - b) Aeration system process performance information
    - c) Blowers power demand
- B. Blower Evaluation. CONSULTANT will perform the evaluation to select the blower type most appropriate for the application by evaluating capital and operational requirements.
- (1) Using historical process air requirements, diffuser and basin information, determine the new unit's operating conditions.
  - (2) From the process air requirements, establish 3 or 4 operating points and associated weighting factors for each based on how we anticipate the plant will operate.
  - (3) Select 3 blower technology alternatives for evaluation.
  - (4) Utilizing the blower size and type and the operating points, perform a life cycle cost evaluation
  - (5) Develop a summary describing each blower technology and qualitative comparison factors as well as the quantitative ones.
- C. Air Delivery System Evaluation. CONSULTANT will perform an evaluation of the existing blower control strategy to identify alternative control strategies that may result in energy savings.
- (1) Evaluate the existing control strategy for air delivery at the plant, including automation equipment.
  - (2) Develop up to two (2) alternative concept level control strategies which may include most open valve (MOV) or ammonia based DO control.
  - (3) Develop a summary of air delivery alternatives.

CONSULTANT will prepare a memorandum summarizing all the findings and evaluation results and submit two (2) hard copies and one (1) electronic copy to the CITY for review. CONSULTANT will conduct a project review workshop with the CITY to review the memorandum.

- D. Based on the discussions during the workshop, CONSULTANT will incorporate comments from the CITY as necessary into the next design submittal (Preliminary Design).

### **Task Series 100 Deliverables**

The following deliverables are included in Task Series 100:

- Workshop meeting minutes
- Technical Memorandum - Including items A, B and C.

## **TASK SERIES 200 – DESIGN SERVICES**

### **Task 201 – Project Coordination**

Project coordination will encompass efforts required for project set-up, resource management, scheduling, invoicing, trend management, and other requirements needed to effectively and efficiently complete the tasks described in this scope of services. Also, this task includes administration and management of project:

- Prepare project management documents including budget, drafting standards, and quality assurance and quality control.
- Monitor schedule and budget.
- Review progress with CITY on a regular basis.
- Discuss issues with the CITY as they are noted.

### **Task 202 - Detailed Design - Construction Documents Level 2**

- A. Level 2 design shall commence only after the CITY has accepted the Task 101 - Blower Selection Memorandum deliverable. Level 2 progress activities are as follows:

- (1) Basis of Design Memorandum
- (2) Summary report with engineering design parameters
- (3) Layouts of piping and major equipment
- (4) Power distribution functional diagram
- (5) Site plan
- (6) Sections and details showing major equipment

- (7) Power plans
  - (8) Electrical fixture schedules
  - (9) Specifications, including front and back end documents
  - (10) Internal quality control review and refinement before delivery to the CITY
  - (11) Quality assurance and quality control plan and log update
  - (12) Opinion of probable construction cost
  - (13) Project schedule update
  - (14) Project trend register update (if applicable)
- B. CONSULTANT will provide two (2) hard copy sets and one (1) electronic set of the Level 2 drawings and specifications to the CITY for review.
- C. CONSULTANT will conduct a project review workshop with the CITY to review the Level 2 drawings and specifications. Based on discussions during the workshop, CONSULTANT will refine the drawings and specifications, and incorporate the applicable comments into the next submittal (Level 3).

### ***Task Series 202 Deliverables***

The following deliverables are included in Task Series 202:

- Basis of Design Memorandum (including preliminary drawings and specification list).
- BODM workshop meeting minutes.

### **Task 203 - Detailed Design - Construction Documents Level 3 and Level 4**

- A. Level 3/Level 4 design shall commence only after the CITY has accepted the Level 2 deliverables. Level 3/Level 4 progress activities are as follows:
- (1) Final review set of CAD drawings
  - (2) Final review set of specifications and construction contract documents
  - (3) Opinion of probable construction cost update
  - (4) Internal quality control review and refinement before delivery to the CITY
  - (5) Quality assurance and quality control plan and log update.
  - (6) Project schedule update
  - (7) Project trend register update.

- B. CONSULTANT will provide two (2) hard copy sets and one (1) electronic copy of the Level 3/Level 4 documents to the CITY for review.
- C. CONSULTANT will conduct a project review workshop with the CITY to review the Level 3/Level 4 documents. Based on discussions during the workshop, CONSULTANT will refine the documents, if necessary.
- D. CONSULTANT will revise the documents to prepare the Level 4 submittal for advertising as necessary to reflect any decisions taken at this level. CONSULTANT will provide the CITY with three (3) signed/sealed hard copy sets and one (1) electronic copy.

## **TASK SERIES 300 – BID AND PRE-AWARD SERVICES**

### **Task 301 – Bid Services**

- A. The Bid Services Task will include the following activities.
  - (1) Pre-Bid Conference. Conduct at a date and time selected and a place provided by the CITY a pre-bid conference to:
    - a. Confirm the types of information required by the contract documents and the format in which bids should be presented.
    - b. Review special project requirements and contract documents in general.
    - c. Receive requests for interpretations that will be issued to plan holders.
    - d. Prepare minutes of conference and issue to plan holders.
  - (2) Interpretation of bidding documents. Interpret bidding documents. Prepare and issue addenda to the construction contract documents when required.
  - (3) Bid Opening. Assist CITY during bid opening. Answer questions, make preliminary tabulation of bids, and review questionnaires and bids for completeness. Final review set of specifications and construction contract documents

### **Task 302 – As Bid Documents Preparation**

The following services are included under this Task.

- A. As Bid Construction Contract Documents. Refine construction contract documents according to addenda.
- B. Distribute three (3) sets of the construction contract documents to the successful bidder.
- C. Prepare and distribute three (3) sets of conforming copies of the construction contract documents.

## ASSUMPTIONS

1. It is assumed that the new blower will be housed either outside (similar to the existing units) and in a prefabricated enclosure. No provisions for the design of a new blower building have been included in this scope of work.
2. Process and instrumentation drawings (PI&Ds), and Project Design Report for the plant will be made available to the CONSULTANT.
3. Construction inspection services are not included under this scope of work, but can be provided as additional services if desired by the CITY.

## BUDGET

Tasks 100 thru 400 as described in this scope of work document would have the following lump sum fees:

TASK SERIES	LUMP SUM FEES
Task 100 – Blower Selection Evaluation Memorandum	\$37,136
Task 200 – Design Services	\$130,612
Task 300 – Bid and Pre-Award Services	\$20,070
Direct Costs	\$3,069
<b>LUMP SUM TOTAL</b>	<b>\$190,887</b>

**CITY OF KEY WEST**

**BLACK & VEATCH CORPORATION**

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

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

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

By: Rafael E. Frias III, P.E

(Print Name)

(Print Name)

Title: \_\_\_\_\_

Title: Associate Vice President

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

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