

# Loxahatchee River District

Water Reclamation | Environmental Education | River Restoration

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D. Albrey Arrington, Ph.D., Executive Director

## MEMORANDUM

TO: D. ALBREY ARRINGTON, Executive Director

FROM: CLINTON R. YERKES, Deputy Executive Director

DATE: AUGUST 12, 2015

SUBJECT: MASTER LIFT STATION #1 REHABILITATION  
Preliminary Engineering Report

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This item is presented for Board approval since the value exceeds the Executive Director's signing authority.

The Master Lift Station is a critical element of infrastructure for the District Collection & Transmission system. Located at the corner of Indiantown Road and Pennock Lane this facility receives all the wastewater collected from the north side of the River, and portions of the area east of the Intracoastal waterway and the Jupiter townsite area.

Much of the pumping facilities and discharge piping are over 30 years old, along with the backup generator electrical service. The proposed study will address 15 items of pumping, piping, metering, electrical service, structural improvements and serviceability improvements for the station. Additionally, prior to determining the appropriate sizing of pumps and piping the engineers will conduct a Flow Analysis for the station. The report will provide a Construction Cost Opinion, design criteria, proposed layout and description of recommended equipment.

Mathews Consultants is one of the District selected engineering firms under our Continuing Contract. Staff has worked diligently with the contractor to define the project Scope and the proposed fee.

The following motion is suggested for your approval:

**“THAT THE DISTRICT GOVERNING BOARD authorize execution of the MASTER LIFT STATION #1 REHABILITATION contract with Mathews Consulting Inc., dated August 7, 2015 in an amount not to exceed \$53,786.20.”**

Should you have any questions regarding this contract, please contact me or Kris Dean, P.E.

V:/cip/proj/liftstations/LS#1/Rehab2015/Board memo-Eng Award

Gordon M. Boggie  
Board Member

Dr. Matt H. Rostock  
Board Member

Stephen B. Rockoff  
Chairman

Harvey M. Silverman  
Board Member

James D. Snyder  
Board Member

**AGREEMENT BETWEEN LOXAHATCHEE RIVER ENVIRONMENTAL  
CONTROL DISTRICT AND MATHEWS CONSULTING, INC.  
FOR PROFESSIONAL ENGINEERING SERVICES**

**“MASTER LIFT STATION NO. 1 REHABILITATION”**

**DATE:** August 7, 2015

**BACKGROUND**

The Loxahatchee River Environmental Control District (District) owns and operates Master Lift Station No. 1 (MLS No. 1) which is located at the southwest corner of the intersection of Indiantown Road and Pennock Lane (refer to **Exhibit A** for location map). The station is currently a triplex station equipped with dry-pit type, non-submersible pumping units. The station serves the surrounding areas through a network of gravity sewers and also serves as a re-pump station for multiple smaller area lift stations. All flow conveyed to MLS No. 1 is discharge via gravity to the influent chamber of the facility. Based on record drawing documents provided to Mathews Consulting, Inc. (MC), various upgrades and improvements were previously completed at the site since the station was constructed in 1979. The facility modifications included the installation of variable frequency drives, installation of temporary station bypass piping and connections, modifications to the influent chamber and wet well as well as upgrades to the onsite odor control system. As part of the current project, the District requested MC to prepare a scope of work to evaluate the necessary work tasks to replace and/or rehabilitate specific process system components which are critical to the functionality of the station during normal and emergency/standby situations.

The District has identified the following design goals and/or tasks for the current project:

- Replacement of the existing dry-pit, non-submersible type pumps. The existing pumps, which are original to the facility, have been re-built multiple times and have reached the end of their useful life. The new pumps will be sized based on an evaluation of the existing facility flows and peak hour peaking factors to be completed by MC.
- Replacement of the existing diesel driven standby generator unit. The existing generator unit is over 40 years old and has reached the end of its useful life. Consideration will be given to the installation of a new unit at the same location as the existing unit or installation of a new generator and sound attenuating enclosure located exterior to the lift station building. Replacement of the existing wall louver and transition cowling for the generator ventilation system will also be evaluated.
- Upon finalizing the size and selection of the replacement diesel driven standby generator unit, an evaluation of the size and adequacy of the existing diesel fuel storage and delivery system will be completed.
- Replacement of the existing pump suction and discharge piping to accommodate the new pumps and discharge valve locations. The existing pump suction valves were replaced as part of the last phase of rehabilitation and shall be reused.

- Replacement and relocation of the existing manually operated plug valves on the vertical pump discharge piping just upstream of the common, horizontal discharge header piping.
- Incorporation of a second temporary bypass connection to provide reliability and redundancy during facility shut-downs.
- Installation of a 30-inch isolation valve on the pump discharge header. The installation of line stop fittings, in lieu of an isolation valve, will also be evaluated.
- Recoating of the interior concrete surfaces, except flooring surfaces and wet well surfaces, of the pump station, including the operations, electrical and dry-pit rooms. All new and existing pumps, piping, conduit and miscellaneous metals, except aluminum and 316 SS unless previously coated, surfaces shall also be coated.
- Installation of a continuous flow metering device to record the instantaneous flow rate and totalized flow conveyed to or from (i.e. at influent or effluent) the lift station will be evaluated.
- Replacement of the existing dry-pit sump pump will be evaluated.
- Installation of a new overhead bridge crane system to provide equipment/material handling capabilities within the dry-pit.
- Evaluation of the impacts the proposed improvements will have on the existing site electrical service and distribution systems. Specific modifications required will be identified and an evaluation of the existing motor control center (MCC) gear with regard to age, capacity, useful life and parts availability will be completed. Based on the findings of the evaluation, replacement of specific items will be considered.
- Evaluation of the hazardous classifications of the pump station areas, specifically the dry-pit and operating rooms. Evaluation will include recommendations for isolation of areas and/or ventilation if classification is required.
- Evaluation of removal of the existing unused aluminum structural members in the dry pit area.
- Evaluation of the condition of the existing discharge header and recommendation for/against replacement, if replacement is not required as a result of the pump replacement.

This Agreement is part of the **Continuing Contract** with the District, and the District has the right to stop work at any time being only responsible for costs incurred up to that time.

### **SCOPE OF WORK**

The District has requested MC to prepare a Preliminary Engineering Report (PER) which is intended to establish and document preliminary design criteria and recommendations for the proposed modifications and upgrades at MLS No. 1. Design criteria and recommendations will be established based on an evaluation of the existing system conditions at the station as well as the current and future wastewater pumping demands of the service area. In order to prepare the report, a series of tasks will be performed which will assist MC with establishing appropriate

design criteria for the mechanical, structural and electrical systems to be incorporated into the final design.

Specific project Tasks shall include the following:

- Task 1 – Lift Station Flow Analysis
- Task 2 - Preliminary Design Criteria Evaluation
- Task 3 – Construction Cost Opinion
- Task 4 – Report Preparation
- Task 5 – Quality Assurance / Quality Control (QA/QC)

### **TASK 1 – LIFT STATION FLOW ANALYSIS**

MC shall perform a detailed lift station flow analysis in order to establish the current average daily and peak hour flow design criteria for the station. The District has indicated that there is some uncertainty in the accuracy of the historical wastewater flow data generated from the station. The District has requested that MC perform a desktop analysis using a combination of three different methods. The flow analysis shall include the following:

1. MC shall perform a population analysis of the Master Lift Station No. 1 service area. The population analysis shall be based on a review of the FDOT Traffic Analysis Zone (TAZ) maps. MC shall assign an appropriate per capita wastewater flow rate for the residential and commercial service accounts to estimate wastewater flows for the service area.
2. MC shall complete an analysis of the historical wastewater flows discharged from the District's Master Lift Station No. 1. Based on the analysis, MC will corroborate the per capita wastewater flow rate established as part of the population analysis. MC shall also review and establish an average daily to peak hour flow peaking factor for comparison purposes. Due to the equalizing capacity of the wastewater collection system it is anticipated that the peaking factor observed at the WWTP will be lower than the peaking factor established for Master Lift Station No. 1. MC shall also complete a review of the seasonal variations in the influent flow to the WWTP as part of the analysis in an effort to determine the system flows on a per annum basis. The District shall provide the previous twelve (12) months of influent wastewater flow data for the WWTP. Based on the flow analysis, MC shall recommend design peak hour, and seasonal peaking factors for Master Lift Station No. 1.
3. MC shall complete an analysis of the pump performance curves based on system operating pressure collected at the discharge header of Master Lift Station No. 1. The District has indicated that the existing pumps have been serviced and re-built on several occasions with all replacement parts being in-kind replacements. Based on this, it is anticipated that the existing pumps are performing similarly to their factory pump performance curves with some minor losses. MC shall coordinate with a metering subcontractor to install a temporary, ultrasonic type, strap-on meter on the existing 30-inch force main aerial crossing at Jupiter Creek. A minimum of two (2) weeks of flow data will be obtained. The metering subcontractor will install, startup and remove the temporary meter as well as download all data and provide a summary report. The District will provide assistance during the meter installation including furnishing a ladder for use by the metering subcontractor and touch up painting of the piping upon removal of the transducers. The District will provide MC with the recorded pump speeds during the



collection period. In addition, the District shall also forward MC the historical pump speed over the prior twelve (12) month period. MC shall combine this data with historical pump run times to estimate historical wastewater flows from Master Pump Station No. 1.

## **TASK 2 – PRELIMINARY DESIGN CRITERIA EVALUATION**

MC shall perform a detailed evaluation of the existing mechanical, electrical and structural systems at MLS No. 1 in order to establish preliminary design criteria for the proposed modifications and improvements. Evaluation shall include the following:

1. Assessment of the required modifications to the existing mechanical and pumping systems at MLS No. 1 in order to determine the feasibility of completing the proposed station improvements. Where specific modifications are required, MC shall provide specific recommendations and/or design criteria for the proposed improvements.
2. Assessment of the required modifications to the existing electrical service and distribution system at MLS No. 1 in order to determine the feasibility of completing the proposed station improvements. Where specific modifications are required, MC shall provide specific recommendations and/or design criteria for the proposed improvements. The evaluation of the electrical systems will be performed by MC's sub-consultant Electrical Design Associates, Inc. (EDA)
3. Assessment of the structural supports and/or systems required to implement the proposed improvements or modifications at MLS No. 1, including completing a preliminary assessment of the feasibility to install a bridge crane hoisting system within the existing dry-pit and removal of the existing out-of-service structural aluminum in the dry pit. Consideration will also be given to specific structural systems and/or details necessary to accommodate the proposed modifications to the existing mechanical and electrical systems including pump supports, pipe supports, wall penetrations and louver details, where required. The evaluation of the structural systems and improvements will be performed by MC's sub-consultant Bridge Design Associates, Inc. (BDA).

As part of the evaluation, MC and its sub-consultants will complete a site visit, if required, to verify and confirm the feasibility of the proposed improvements and preliminary design criteria to be included within the PER.

## **TASK 3 – CONSTRUCTION COST OPINION**

MC shall prepare a construction cost opinion for the proposed improvements to be incorporated into the Master Pump Station No. 1 Rehabilitation Project. The construction cost opinion shall be based on the findings and design criteria established in the PER and will include a contingency and an upper and lower estimate range for the proposed scope of work. A DRAFT construction cost opinion will be incorporated into the DRAFT PER. Upon review and receipt of comments from the District a FINAL construction cost opinion will be prepared and incorporated into the FINAL PER.

## **TASK 4 – PRELIMINARY ENGINEERING REPORT PREPARATION**

MC shall prepare a detailed Preliminary Engineer Report (PER) to document the results and findings of the evaluation. The PER shall include specific design criteria for the proposed improvements as well as a preliminary layout and description of the recommended equipment and

appurtenances. Four (4) copies of the DRAFT report will initially be submitted to the District for review and comment. MC, and its sub-consultants, shall conduct one (1) meeting with the District to review and discuss the findings and recommendations presented in the DRAFT PER. MC shall incorporate the items discussed during the meeting as well as any other comments provided by the District in the FINAL version of the PER. MC shall submit five (5) copies of the FINAL report to the District, along with one PDF copy.

#### **TASK 5 – QUALITY ASSURANCE / QUALITY CONTROL (QA/QC)**

MC shall provide internal QA/QC reviews for the tasks listed above.

#### **ADDITIONAL SERVICES**

MC shall provide additional engineering as requested by the District for engineering services that are not covered under this Scope of Work. Services shall be reimbursed in accordance with Mathews Consulting's fee schedule included in **Exhibit C**. Services performed under this task will be on as-directed basis in accordance with a written Notice-to-Proceed from District. The Notice-to-Proceed issued shall contain the following information and requirements.

- A detailed description of the work to be undertaken.
- A budget establishing the amount of the fee to be paid in accordance with the Agreement.
- A time established for completion of the work.

#### **ASSUMPTIONS**

Work described herein is based upon the assumptions listed below. If conditions differ from those assumed in a manner that will affect schedule or Scope of Work, MC shall advise District in writing of the magnitude of the required adjustments. Changes in completion schedule or compensation to MC will be negotiated with District.

1. The scope and budget presented herein are based on the required tasks necessary to prepare a detailed Preliminary Engineering Report. The scope does not include the costs associated with the preparation of detailed design documents and/or permit applications or fees.
2. The District shall provide MC with all available record drawing information and data for MLS No. 1.
3. The District shall provide historical (minimum last 12-month period) flow data, pump run times and speed data for MLS No. 1. If available, the District shall provide the specific pump performance curves for the existing dry-pit submersible pumps. If pump performance curves are not available, or there is reason to believe that the existing pumps do not accurately reflect the current pump operating performance then the District shall provide specific operating criteria (flow and total dynamic head) for each of the three (3) existing pumps.
4. Geotechnical services are not anticipated as part of the current scope of work therefore the costs for such services has not been included.

5. Surveying services are not anticipated as part of the current scope of work, therefore the costs for such services has not been included.

**GENERAL CONDITIONS**

1. MC will invoice the District on a monthly basis for services completed to date. Payment of all applicable costs will be made by District to MC within 30 days of receipt of invoice.
2. MC shall purchase and maintain insurance for coverages listed below:
  - a. Workers Compensation
 

State	Statutory
Employer’s Liability	\$100,000 / \$500,000
  - b. Comprehensive General Liability
 

Bodily Injury and Property Damage, Combined Single Limit	\$1,000,000
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  - c. Automobile Liability:
 

Bodily Injury and Property Damage, Combined Single Limit	\$1,000,000
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  - d. Professional Liability:
 

Errors and Omissions	\$1,000,000
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**CONTRACT PERFORMANCE**

**COMPLETION DATES**

The duration of major work tasks (calendar days) are as indicated on the Project Schedule shown in **Exhibit B** and are summarized below.

Engineering Services	Timeframe per Task
▪ Task 1 – Lift Station Flow Analysis	7 weeks
▪ Task 2 – Preliminary Design Criteria Evaluation	4 weeks
▪ Task 3 – Construction Cost Opinion	1 week
▪ Task 4 – Report Preparation	7 weeks *
DRAFT Report	3 weeks
District Review	2 weeks
FINAL Report	2 weeks
▪ Task 5 – Quality Assurance / Quality Control	On-going

**Total Project Duration: 19 weeks**

\* The schedule is based upon conducting a review meeting within 14 calendar days after District receives the DRAFT PER. All review comments shall be provided to MC within 14 calendar days after District receives the submittal. An adjustment to the overall schedule will be required in case the review meeting takes longer to be conducted and/or obtaining comments takes longer to receive.

**SUMMARY OF PROPOSED FEES**

Proposed labor costs and associated expenses for engineering services are tabulated below and detailed in **Exhibit C**.

<u>ENGINEERING SERVICES</u>	<u>ENGINEERING FEE</u>
Task 1 – Lift Station Flow Analysis	\$7,612.00
Task 2 – Preliminary Design Criteria Evaluation	\$7,098.00
Task 3 – Construction Cost Opinion	\$1,696.00
Task 4 – Report Preparation	\$14,232.00
Task 5 – Quality Assurance / Quality Control	\$1,320.00
Sub-Consultant Fees	\$21,078.20
Reimbursables	<u>\$750.00</u>
<b>TOTAL ENGINEERING SERVICES</b>	<b>\$53,786.20 (LUMP SUM)</b>

**DELIVERABLES**

TASKS	DELIVERABLES	QUANTITY
2.0 Preliminary Engineering Report	DRAFT PER	4 - Hard Copies
	FINAL PER	5 – Hard Copies
		1 – CD in pdf format



IN WITNESS WHEREOF, the parties have made and executed this agreement as of the date written below.

LOXAHATCHEE RIVER ENVIRONMENTAL  
CONTROL DISTRICT

Witnesses:

\_\_\_\_\_

\_\_\_\_\_

Date

Date

Executed: \_\_\_\_\_

By: \_\_\_\_\_  
D. Albrey Arrington, Ph D, Executive Director

MATHEWS CONSULTING, INC.

Witnesses:

\_\_\_\_\_

\_\_\_\_\_

Date

Executed: \_\_\_\_\_

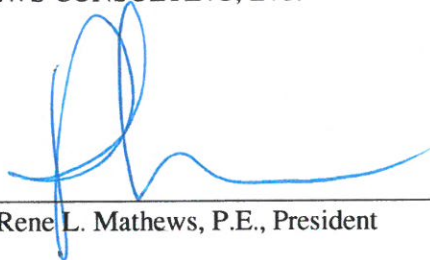
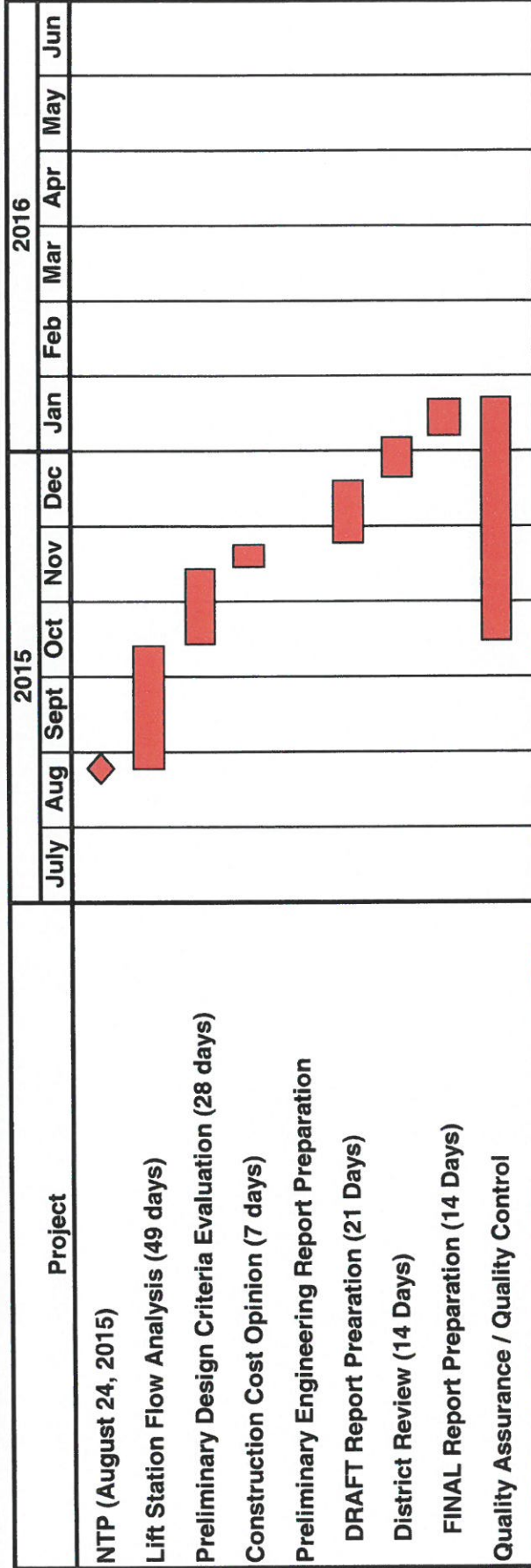
By:   
Rene L. Mathews, P.E., President Date

EXHIBIT B

Master Lift Station No. 1 Rehabilitation- Project Schedule



Notes:

(1) The design schedule is based upon conducting a review meeting within 14 calendar days after District receives the submittal. All review comments shall be provided to MC within 14 calendar days after District receives the submittal. An adjustment to the overall schedule will be required in case the review meeting takes longer to be conducted and/or obtaining comments takes longer to receive.

