# Monterey Wastewater Treatment Facility Improvements Project

# Project Definition

**PREPARED FOR:** JEA

**PREPARED BY:** CONSTANTINE ENGINEERING, INC

**DATE:** THURSDAY, AUGUST 15, 2019

# Introduction & Background

JEA currently provides wastewater collection and treatment service for Duval County and portions of Nassau and St Johns Counties. Most of the wastewater generated east and south of the St Johns River and north of Beach Boulevard is currently served by the Monterey and the Arlington East service areas. JEA does not anticipate significant growth within the Monterrey service area; however, significant growth within the other service areas has been observed. Since growth is projected to continue within the other East Grid service areas, the Monterey Wastewater Treatment Facility (WWTF) is required to treat wastewater within the Monterey wastewater service area. In addition, Monterey WWTF provides flexibility to the operation of the Arlington East WWTF since a portion of the influent wastewater to the Arlington WWTF can be diverted temporarily to the Monterey WWTF. The future JEA wastewater service areas are shown on the JEA wastewater service area map shown on Figure 1.

The Monterey wastewater service area is shown on Figure 1 along with other service areas. Significant growth is not anticipated in the Monterey service area since the area is largely built out. JEA operations staff does have the flexibility to divert flow from the Arlington East service area to the Monterey service area for treatment and discharge. This flexibility has proven valuable when conditions have required a reduction in flow at the Arlington East WWTF.

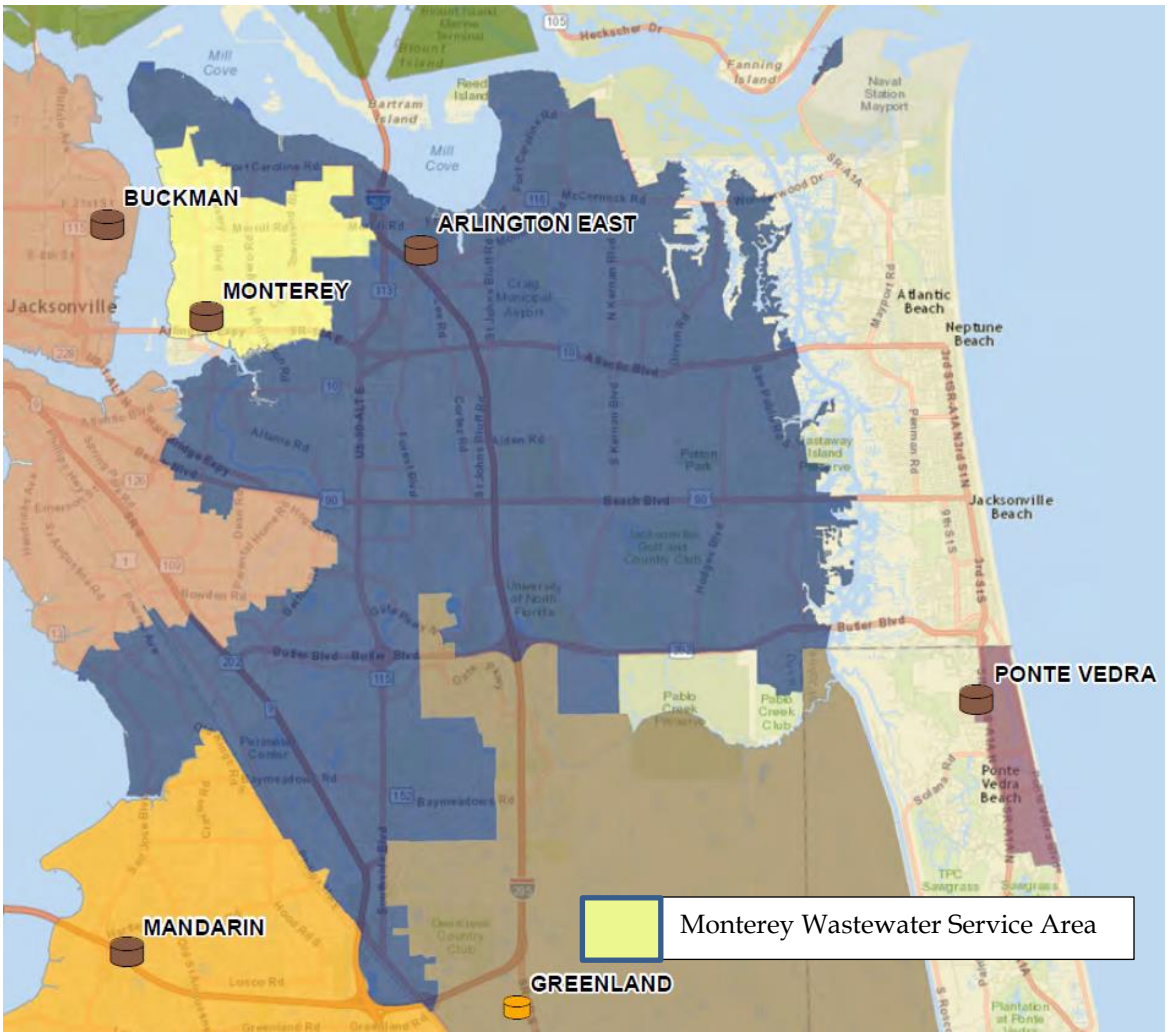



**Figure 1 – Monterey WWTF Service Area (from JEA Planning Dept., April 19, 2017)**

Figure 2 presents the Monterey WWTF flow projections. Increased flow above the projected base line flow rate of 1.5 mgd is not anticipated. The treatment facility is rated at 3.6 mgd along with the outfall to the St Johns River. The Monterey WWTF was expanded in 1997 and has been in constant operation since construction was completed without major modifications. Since most of the process equipment, electrical components and structures are over 20 years old, renovation, rehabilitation and identified process improvements are justified to provide reliable and sustainable service through the Year 2040.

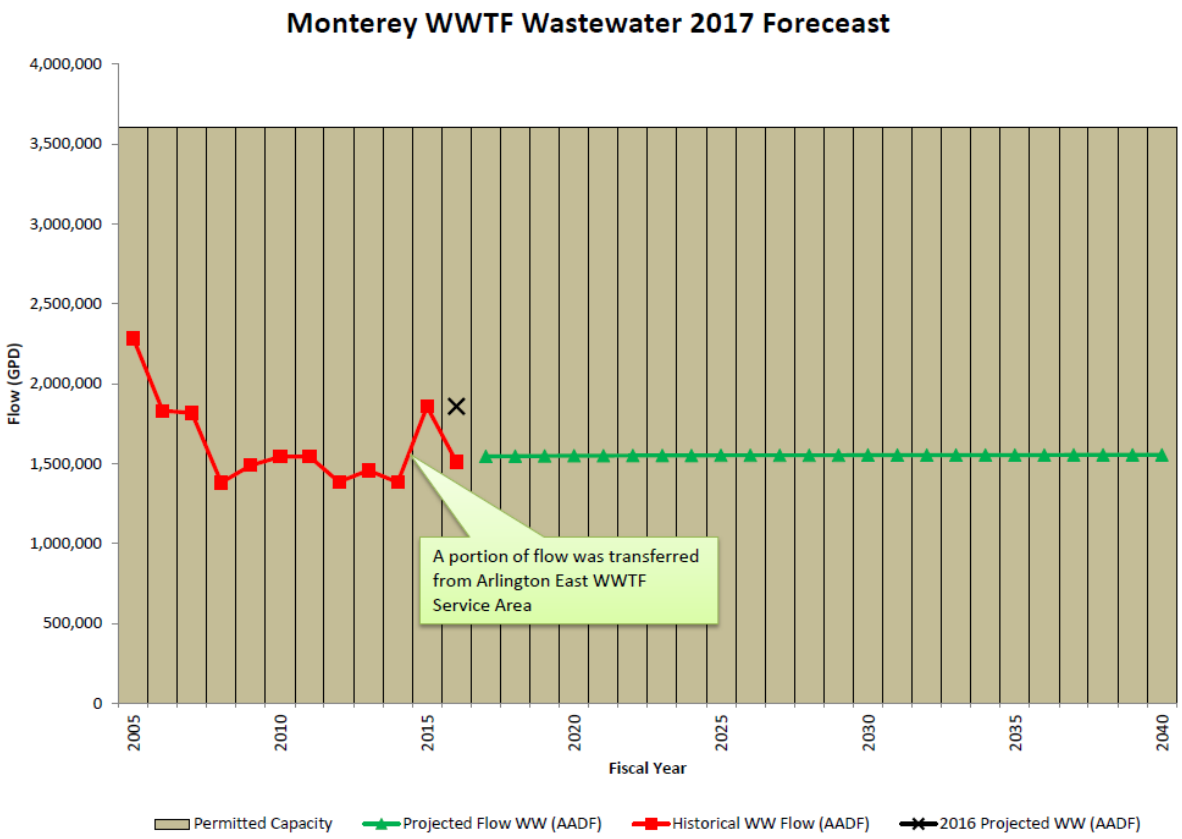



**Figure 2 – Monterey WWTF Capacity Projections (from JEA Planning Dept., April 19, 2017)**

# Project Justification

Expansion and process improvements were completed in November 1997 for the Monterey WWTF, and the treatment facility has provided continuous treatment service since completion. JEA has considered options for the Monterey WWTF including the continuation of current operations, elimination of the treatment facility, and expansion of the facility. Due to the age of the facility, the development of a Project Definition was initiated to address the following:

- Identify replacement, renovation and rehabilitation of the Monterey WWTF due to the age of the plant
- Perform a treatment process overview and equipment assessment for the overall process to verify that the facility will provide sustainable wastewater treatment to meet the anticipated flow and effluent quality requirements and to identify process improvements
- Perform an evaluation and assessment of the electrical system
- Perform an evaluation and assessment of the structural components of the facility

Due to the growth in other service areas and the need to continue to provide flexibility to allow the Arlington WWTF to shed flows to the Monterey WWTF, retiring the Monterey WWTF and provide treatment at Arlington WWTF was not considered.

# Process Evaluation, Equipment Assessment and Recommended Improvements

The Monterey WWTF was converted from an extended aeration "package" type plant to a Sequencing Batch Reactor (SBR) plant in 1997. The facility was designed for an ultimate four SBR basins; however, one of the four SBR basins was configured for use as an aerobic digester until the time that the additional process capacity was required. There is no immediate need for the aerobic digester to be converted to a fourth SBR based on current flow projections. Therefore, a process evaluation was justified to verify that the three SBR basins would satisfactorily treat wastewater for the anticipated future flow projections. The facility is required to maintain adequate service during critical conditions such as power failures and significant storm events, so an evaluation of the electrical distribution system was also performed.

## Process Evaluation

The overall process treatment criteria for the Monterey WWTF has been based on the design criteria that was used for the facility expansion completed in 1997 (CH2M Hill record drawings dated October 1997). The permitted treatment capacity and effluent requirements is presented in Table 1.

**Table 1 – Permitted Treatment Parameters**

| Treatment Parameter | Value |
|---|---|
| Annual Average Daily Flow | 3.6 mgd |
| Effluent $BOD_5$ | 20 mg/l |
| Effluent TSS | 20 mg/l |
| Effluent Total Nitrogen | Aggregate TMDL |
| Effluent Total Phosphorus | Aggregate TMDL |

Nitrogen and phosphorus levels in the effluent are regulated based on the overall total maximum daily load (TMDL) that is reported monthly and the aggregate cap that JEA has in place with the State of Florida. Since there are no firm treatment requirements for nitrogen and phosphorus, the facility will be evaluated based on the original design criteria for nitrogen removal, which was to achieve less than 5.0 mg/l of total nitrogen. Sufficient phosphorus is removed to meet the aggregate TMDL limit for total phosphorus through the phosphorus contained in the waste activated sludge cell mass that is removed from the facility as a separate waste stream.

The existing WWTF consists of the following unit processes:

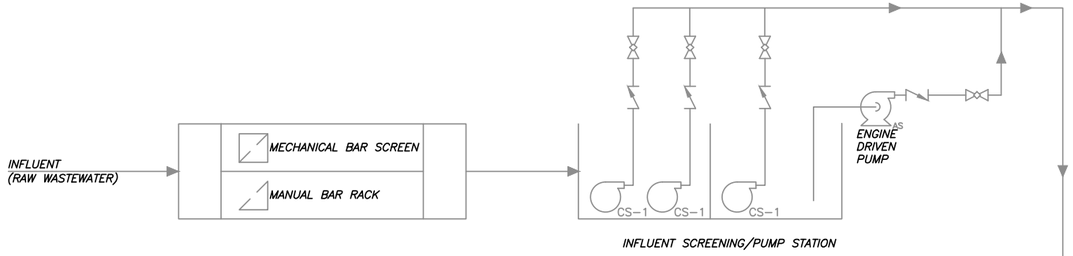
- Influent Screening
- Influent Pumping System
- Three (3) Sequencing Batch Reactors (SBRs)
- UV (ultraviolet) Disinfection
- Effluent Pumping System
- Effluent Equalization System
- One (1) SBR/Aerobic Digester
- Sludge Storage and Dewatering

Figure 3 shows the process flow diagram for the existing facility.

A process evaluation of the treatment facility was performed to confirm that the existing process would be capable of achieving current and future treatment requirements. In addition, areas of improvement were identified based on facility observation visits and interviews with JEA staff responsible for the operation and maintenance of this facility.

The process evaluation that was performed consisted of the development of a BioWin® activated sludge model. The technical memorandum that was generated to present the model results has been included as **Appendix A**. In summary, the evaluation found that the treatment process based on SBR technology and the current basin configurations and volumes would provide a sustainable treatment process at wastewater flows up to 3.6 mgd for the planning period through 2040. The process modeling effort was unable to replicate the current treatment performance as it relates to nitrogen removal and adjustments were made to the process model by adding supplemental carbon to achieve total nitrogen levels below 5.0 mg/l. Based on the model results, our recommendation is to maintain the current SBR configuration and to only add a supplemental carbon storage and feed system as operational experience dictates. The process evaluation has also confirmed that only three (3) SBRs would be required to achieve the required process performance at the planned future capacity of the facility.

The technical memorandum summarizing the process evaluation is provided in **Appendix A**.



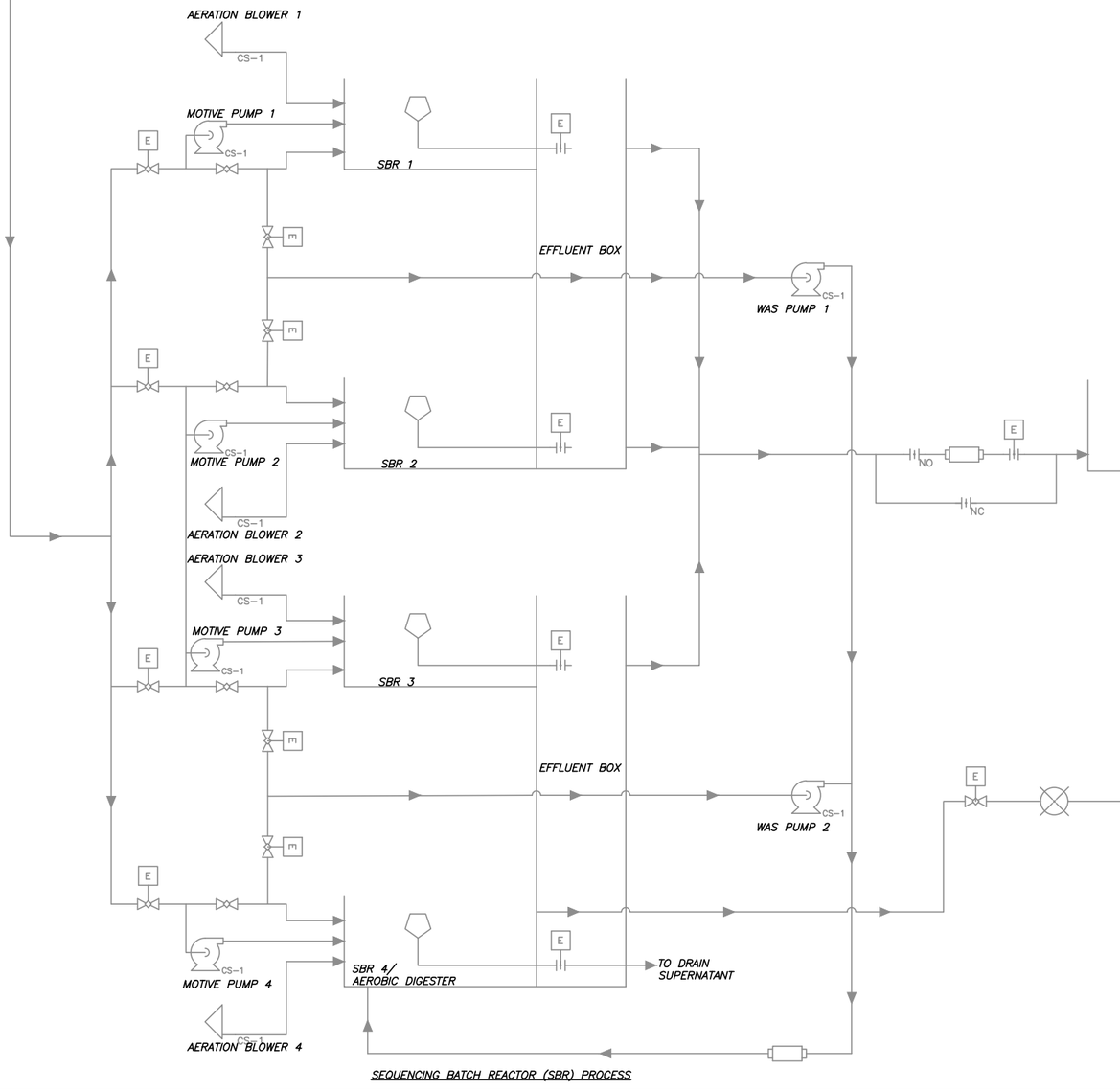

INFLUENT SCREENING/PUMP STATION

LEGEND

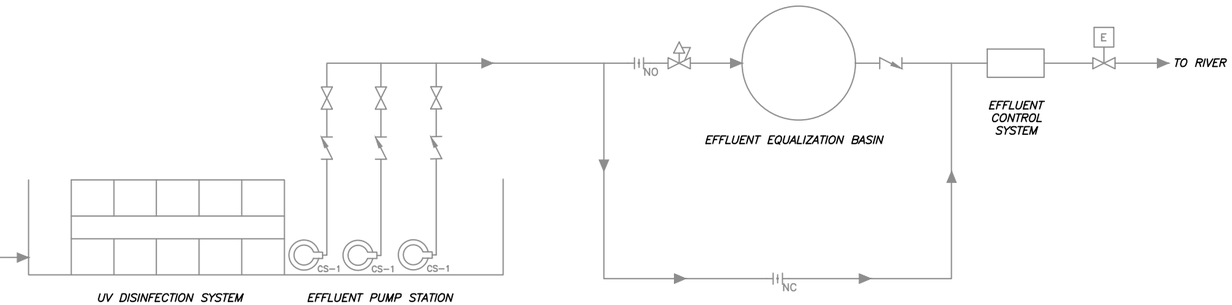
- PLUG VALVE
- BUTTERFLY VALVE
- GATE VALVE
- SWING CHECK VALVE
- REGULATED SIDE PRESSURE CONTROL
- ELECTROMAGNETIC FLOWMETER
- ELECTRIC ACTUATOR
- PROGRESSIVE CAVITY PUMP
- CENTRIFUGAL PUMP (WET PIT) OR TURBINE PUMP
- CENTRIFUGAL PUMP (DRY PIT)
- SUBMERSIBLE SUMP PUMP
- EXISTING
- PROPOSED
- DECANTER
- GRINDER
- CENTRIFUGE
- BLOWER

NOTE:
XX: AS = ADJUSTABLE SPEED
CS-1 = CONSTANT SPEED (SINGLE SPEED)
CS-2 = CONSTANT SPEED (TWO SPEED)

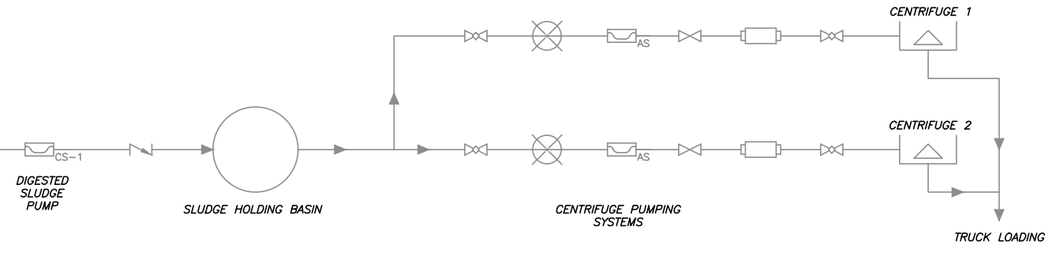
NO = NORMALLY OPEN
NC = NORMALLY CLOSED




SEQUENCING BATCH REACTOR (SBR) PROCESS




EFFLUENT MANAGEMENT SYSTEM




BIOSOLIDS MANAGEMENT SYSTEM

FIGURE 3
EXISTING PROCESS FLOW DIAGRAM
MONTEREY WWTF PD
JEA

Constantine Engineering

## Process Equipment Assessment

Constantine staff visited the Monterey WWTF on various days in April 2019 to assess the condition of the facility. The focus of the assessment was on the three major facility components: process and mechanical equipment, electrical equipment, and the facility structures.

Each major process was examined to evaluate the condition of the process and mechanical equipment. The assessments were performed to provide a ranking of the condition of each piece of equipment based on the following criteria:

1. Condition of the equipment is very good and there are no apparent problems. The equipment is new or nearly new, appears to be operated as intended by design, appears to fit the application to which it is applied, and does not need repair or replacement.
2. This condition ranking applies when the unit fails one or more of the criteria outlined in "1" above and is 5 to 10 years in age.
3. This condition ranking applies when the unit is 10 to 20 years in age and does not leak, is capable of remaining in service, and shows some signs of corrosion.
4. This condition ranking applies when the unit is near the end of its useful life, is over 20 years in age, requires excessive maintenance, and if recommended for replacement in 1 to 3 years.
5. This condition ranking applies when the unit should be replaced within 1 year, presents worker safety issues, and is not capable of performing in its intended function.

A detailed discussion of the condition rankings is provided in **Appendix B**.

The condition rankings, as well as observations and discussions are summarized in **Table 2**. This table summarizes the major equipment utilized to process wastewater and biosolids at the Monterey WWTF.

It should be noted that the observations and rankings provided herein are made on external inspections and on the age of the equipment. More rigorous condition testing, internal inspections or stress testing may result in different rankings than the ones shown in Table 1. Constantine Engineering staff estimated the typical life expectancy for each piece of equipment based on Constantine Engineering staff's experience with similar equipment and consideration of the operating environment. In addition, it is assumed that JEA performs preventive maintenance and parts replacement as recommended by the manufacturer of that equipment.

Based on this evaluation, the following equipment was identified for replacement:

- Influent mechanical bar screen (condition rank 3)
- Influent pump station slide and weir gates (condition rank 4)

- SBR process equipment (condition rank 4 except for the motive pumps which are relatively new)
- UV disinfection system (condition rank 4)
- Effluent pumps (condition rank 5)
- Effluent flow control valve and meter (condition rank 5)
- Sludge transfer flow meter (condition rank 4)
- Sludge recirculation pump (condition rank 5)
- Polymer feed system for sludge dewatering system (condition rank 5)
- Process valves (condition rank 4 and 5)

**Table 2: Major Equipment Condition Assessment Summary**

| No. | EQUIPMENT | LOCATION | CONDITION RANKING | SITE VISIT COMMENTS |
|---|---|---|---|---|
| P-2-1-1 | Influent Pump No. 1 | Master Pump Station | | Submersible pump; will need to rely on JEA personnel for condition assessment |
| P-2-1-2 | Influent Pump No. 2 | Master Pump Station | | Submersible pump; will need to rely on JEA personnel for condition assessment |
| P-2-1-3 | Influent Pump No. 3 | Master Pump Station | | Submersible pump; will need to rely on JEA personnel assessment |
| P-2-1-4 | Emergency Backup Influent Pump | Master Pump Station | 2 | Pump is in good condition; enclosure has moderate to severe corrosion; access latch broken due to corrosion |
| M-2-1-1 | Mechanical Bar Screen | Master Pump Station | 3 | Screen shows signs of deterioration due to age and corrosive environment |
| G-1-1-1 | Influent Slide Gates | Master Pump Station | 4 | Difficult to inspect frame inside wetwell; age of unit warrants replacement |
| M-8-2-1 | Odor Control | Master Pump Station | 5 | Non-functional and obsolete; recommend that mulch bed and associated equipment be demolished |
| FP-4-1-2 | SBR Control Panel | Sequencing Batch Reactors | 4 | HMI appears to be non-functional; DO probes not operational |
| P-4-1-1 | SBR Motive Pump No. 1 | Sequencing Batch Reactors | 1 | Pump is in good condition. The pump was recently replaced. |
| P-4-1-2 | SBR Motive Pump No. 2 | Sequencing Batch Reactors | 1 | Pump is in good condition. The pump was recently replaced. |
| P-4-1-4 | SBR Motive Pump No. 3 | Sequencing Batch Reactors | 1 | Pump is in good condition. The pump was recently replaced. |
| P-4-1-4 | SBR Motive Pump No. 4 | Sequencing Batch Reactors | 1 | Pump was down for maintenance and repairs but should be in good condition since it was recently replaced. |
| M-4-12-1 | SBR Blower No.1 | Sequencing Batch Reactors | 4 | Age of unit warrants replacement; ratchet straps used on intake shroud |
| M-4-12-2 | SBR Blower No.2 | Sequencing Batch Reactors | 4 | Age warrants replacement; leaking |
| M-4-12-3 | SBR Blower No. 3 | Sequencing Batch Reactors | 4 | Age of unit warrants replacement; leaking oil |
| M-4-12-4 | SBR Blower No. 4 | Sequencing Batch Reactors | 4 | Age of unit warrants replacement |
| FV-4-5-1 | SBR No. 1 Fill Valve | Sequencing Batch Reactors | 4 | Seals appears to be leaking; Age of unit warrants replacement |
| FV-4-5-2 | SBR No. 2 Fill Valve | Sequencing Batch Reactors | 4 | Seals appears to be leaking; Age of unit warrants replacement |
| FV-4-5-3 | SBR No. 3 Fill Valve | Sequencing Batch Reactors | 4 | Age of unit warrants replacement |
| FV-4-3-4 | SBR No. 4 Fill Valve | Sequencing Batch Reactors | 5 | Actuator has been removed. Fill valve is not needed if SBR 4 will continue to be used as a digester. |
| FV-4-9-1 | SBR No. 1 Decant Valve | Sequencing Batch Reactors | 4 | Age of unit warrants replacement |
| FV-4-9-2 | SBR No. 2 Decant Valve | Sequencing Batch Reactors | 4 | Age of unit warrants replacement |
| FV-4-9-3 | SBR No. 3 Decant Valve | Sequencing Batch Reactors | 4 | Age of unit warrants replacement |
| FV-4-9-4 | SBR No. 4 Decant Valve | Sequencing Batch Reactors | 4 | Age of unit warrants replacement |
| | Dissolved Oxygen Indicating Transmitter | Sequencing Batch Reactors | 4 | Needs calibration/ doesn't seem to operate accurately |
| | Decanter No. 1 | Sequencing Batch Reactors | 5 | Age of decanter unit warrants replacement |
| | Decanter No. 2 | Sequencing Batch Reactors | 5 | Age of unit warrants replacement |
| | Decanter No. 3 | Sequencing Batch Reactors | 5 | Age of unit warrants replacement |
| P-4-2-1 | SBR WAS Pump No. 1 | Digester | 4 | Serves SBR 1 & 2; consider limit switch on check valve to protect pump |
| P-4-2-2 | SBR WAS Pump No. 2 | Digester | | not in use |
| | UV System | UV Disinfection System | 4 | Age of system warrants replacement |
| M-5-2-2 | UV Scour Blower | UV Disinfection System | 4 | Age of unit warrants replacement |
| M-5-2-1 | UV Monorail Hoist | UV Disinfection System | 4 | Possibly replaced; sandblast, paint and rehabilitate at a minimum |

| No. | EQUIPMENT | LOCATION | CONDITION RANKING | SITE VISIT COMMENTS |
|---|---|---|---|---|
| P-6-1-1 | Effluent Pump No. 1 | Effluent Pump Station | 1 | motor is in good condition |
| | | | 5 | Piping & valves; age warrants replacement |
| P-6-1-2 | Effluent Pump No. 2 | Effluent Pump Station | 1 | Motor TBD |
| | | | 5 | Piping & valves; age warrants replacement |
| P-6-1-3 | Effluent Pump No. 3 | Effluent Pump Station | 1 | Motor getting rebuilt |
| | | | 5 | Piping & valves; age warrants replacement |
| FV-6-12 | Flow Control Valve | Effluent Equalization System | 5 | Valve old; magnetic flow meter not operational |
| | | | 1 | Motor operated actuator appears new |
| | Check Valve | Effluent Equalization System | 2 | Standing water |
| M-8-2-1 | Sludge Holding Tank Odor Control Fan | Sludge Dewatering System | 5 | Not operational |
| P-11-2-1 | Sludge Transfer Pump | Sludge Dewatering System | 1 | Newly replaced |
| M-11-1-1 | Sludge Transfer Grinder | Sludge Dewatering System | 1 | Newly replaced |
| FE-11-4-2 | Sludge Transfer Flow Meter | Sludge Dewatering System | 4 | Age of unit warrants replacement |
| T-11-1 | Sludge Holding Tank | Sludge Dewatering System | 5 | |
| P-8-1-1 | Recirculation Pump | Sludge Dewatering System | 1 | Motor TBD |
| | | | 5 | Piping & valves; age warrants replacement |
| M-13-11-1 | Polymer System | Sludge Dewatering System | 5 | Age of unit warrants replacement |
| M-11-5-1 | Centrifuge Feed Pump & Grinder | Sludge Dewatering System | 1 | Newly replaced |
| FE-11-8-1 | Centrifuge Feed Flow Meter | Sludge Dewatering System | 5 | Scheduled for replacement |
| M-11-11-1 | Centrifuge | Sludge Dewatering System | 5 | JEA in the process of providing second unit and rebuilding original as separate project |

## Recommended Process Improvements

Based on meetings and interviews with JEA staff responsible for the operation and maintenance of the Monterey WWTF, the following improvements have been identified:

- Provide a second parallel influent mechanical screen to improve performance when one screen is out of service
- Install larger influent pumps to provide a firm peak hourly flow pumping rate of 11.5 mgd with two pumps running (third pump is a standby unit)
- Provide a second influent pump station wet well to accommodate additional emergency pumping capacity and for bypass pumping during construction
- Provide a standby blower for the three SBRs and the sludge digestion system
- Provide a second centrifuge and associated feed pumping system to improve system redundancy
- Convert the SBR 4/Aerobic Digester to a dedicated sludge digester
- Provide a new sludge storage tank due to the age of the existing tank or as an alternate approach, consider a sludge thickening system prior to aerobic digestion to eliminate the need for the storage tank
- Provide a new UV disinfection system since the current system relies on obsolete technology that is no longer supported

In addition to the process improvements identified to ensure process performance, additional facilities may be necessary to allow uninterruptable process performance during construction. A second influent screening structure and wet well is proposed to accommodate construction requirements such as bypass pumping. This wet well would then be available to provide a location for additional permanent emergency pumping capacity Once the second screening and wet well is in place and connections have been made, then the existing screening structure and wet well can be taken out of service for renovations.

Figure 4 presents a proposed process flow diagram that shows the recommended improvements for the treatment process.

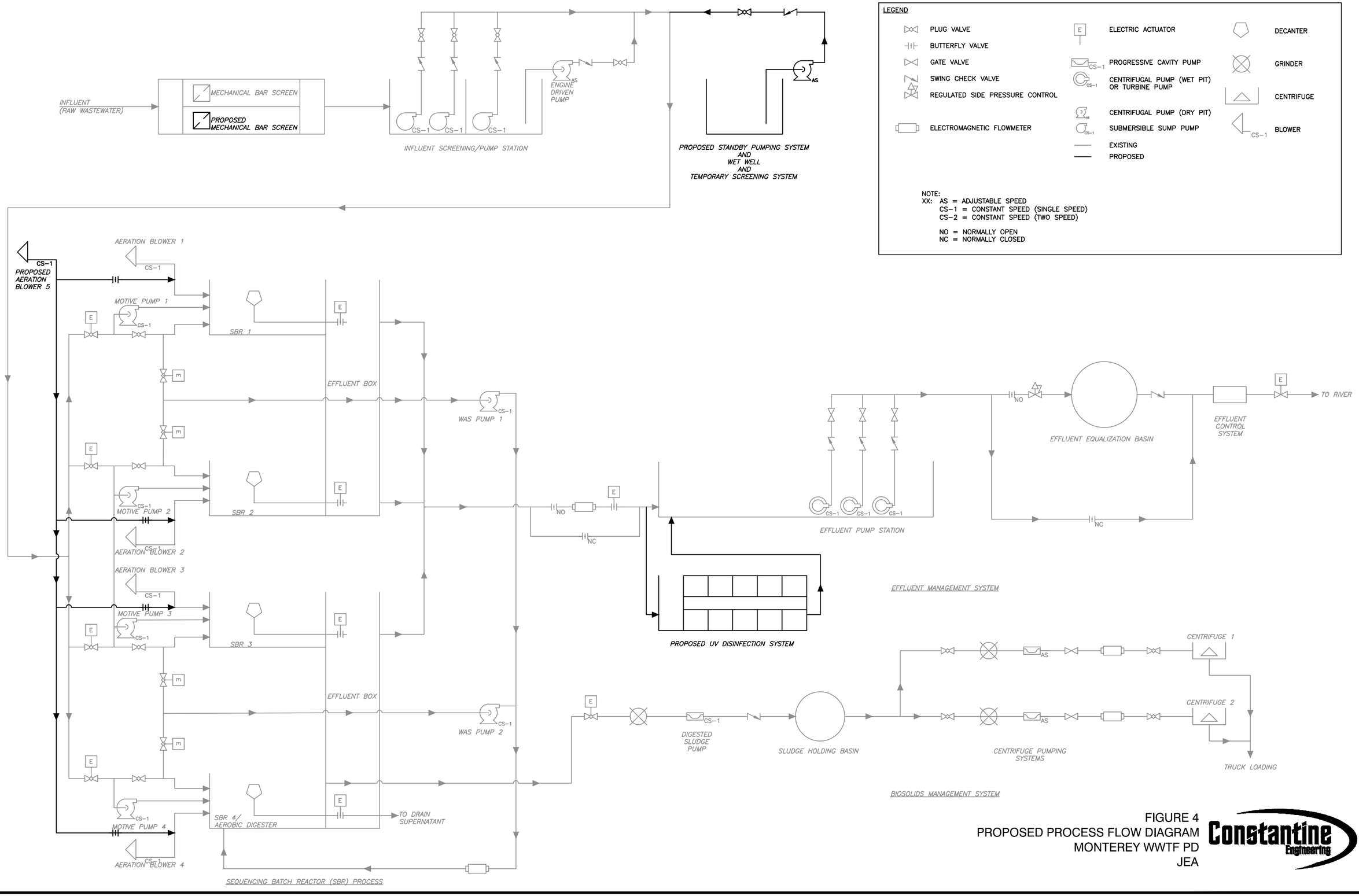



FIGURE 4
PROPOSED PROCESS FLOW DIAGRAM
MONTEREY WWTF PD
JEA

Constantine Engineering

# Electrical System Evaluation and Assessment

The facility's electrical distribution system underwent major reliability and process modifications in August 1997. A new 480-volt switchgear was installed as well as an emergency backup generator. Three new motor control centers (MCC) were installed and fed from the 480-volt switchgear bus. An existing MCC, from before the modifications, was repowered from the new 480-volt switchgear.

## Previous Engineering Report

Jacobs Engineering Group, Inc. (Jacobs) provided an assessment of the electrical and instrumentation control systems in February 2019. The full report identified several proposed solutions and recommendations for JEA to follow. This report does not intend to replicate the details discussed in the Jacobs' report. For reference, the table (ES-1) addressing the assessments presented in the Jacobs' report is provided in Table 3:

# Table 3: Proposed Solutions for the Monterey WWTP

**Table ES-1. Proposed Solutions for the Monterey WWTP**

*Activity 1: Assessment – Evaluate Electrical and I&C Systems at the Monterey WWTP*

| No. | Description | Proposed Solutions/Recommendations | Implementation |
|---|---|---|---|
| **Electrical** | | | |
| 1 | Single Phasing Event Goes Undetected During the Storm | Install Schweitzer SEL-751 relay programmed to sense single phasing event and trip main utility breaker in 480-V switchgear (SWGR) and generate alarm. | Based on the review of this TM, JEA will approve and issue a task order for detail design and implementation. |
| 2 | Phase Unbalance and Under Voltage Condition went Undetected | Install Basler Model #ES-47N/27 relays at motor control center (MCC) buses and major motor feeders to detect the phase unbalance and/or under voltage conditions, and generate alarms/trip starters. | Based on the review of this TM JEA will approve and issue a task order for detail design and implementation. |

**Table ES-1. Proposed Solutions for the Monterey WWTP**

*Activity 1: Assessment – Evaluate Electrical and I&C Systems at the Monterey WWTP*

| No. | Description | Proposed Solutions/Recommendations | Implementation |
|---|---|---|---|
| 3 | Failure to Open the Utility Breaker at 480-V SWGR, preventing standby Generator Breaker Closure to Provide Standby Power to SWGR | Replace the utility and generator side main breakers at the SWGR. | This solution has been implemented. |
| 4 | Electrically Operated Influent Valves "Fail Closed" on UPS-backed Control Power Failure during Storm causing an SSO Event | Replace the faulty UPS providing control power to the SBR Control Panel and modify the SBR Control Panel control logic. | The faulty UPS has been replaced.<br>Based on the review of this TM JEA will approve and issue a task order for detail design and implementation of the SBR Control Panel logic modifications. |
| 5 | Reliability of Existing Obsolete MCC is Questionable | Remove existing MCC. | Based on the review of this TM, JEA will approve and issue a task order for detail design and implementation. |
| 6 | Not All Power System Related Signals are Connected to the Plant PLC System | Wire all power related signals to the PLC system at the Monterey WWTP and transmit to the Ridenour WTP Control Center SCADA.<br>Prepare an I/O list of all power system related signals to wire to RIO-3.<br>Transmit these signals to the Ridenour WTP Control Center SCADA. Include data links to SCADA from the existing power meters and new SEL-751 relay. | Based on the review of this TM, JEA will approve and issue a task order for detail design and implementation. |
| 7 | Path of Incoming JEA 26-kV Overhead Line Appears to be too Close to Tree Limbs or Trees | Request JEA Transmission & Distribution (T&D) Group to inspect the line route for proximity of trees, tree limbs, or shrubs. If required, prune the tree limbs to create the required line clearance. | JEA T&D Group will implement this recommendation. |
| 8 | Quality and Reliability of the Incoming Power Supplied by the JEA Overhead Line | PQ data were received and analyzed. Pursue anomalies in the PQ data with JEA Systems Group. | Continue dialog with JEA Systems Group on the PQ data anomalies. |
| 9 | Lightning Protection is Not Consistently Installed throughout the Plant Process Areas | Install lightning protection in WWTP areas currently lacking lightning protection. | JEA will implement this solution using a certified lightning protection installer. |
| 10 | Lack of Arc Flash Hazard Warning Labels on Electrical Equipment | CE Power Company will perform short circuit, breaker coordination, and arc flash studies for all facilities under their contract. | Coordinate with Freddy Gonzalez Vargas, JEA Electrical System Engineer. |
| 11 | Elevations of Electrical and I&C Equipment in Various Process Areas | Determine any modifications required to raise or relocate the panel/equipment elevations to avoid submergence. | Significant input will be required from JEA staff regarding existing equipment and panel modifications. |
| **Instrumentation and Controls** | | | |
| 1 | SBR Influent Valve Wiring | Add a new PLC output and relay for the SBR Influent Valve Close Command. Reprogram PLC to maintain OPEN and CLOSE commands separately. Reconfigure control panel wiring and control valve actuator wiring for separate OPEN/CLOSE commands, yielding a stop position on loss. | Based on the review of this TM, JEA will approve and issue a task order for detail design and implementation of the SBR Control Panel logic modifications. |

**Table ES-1. Proposed Solutions for the Monterey WWTP**

*Activity 1: Assessment – Evaluate Electrical and I&C Systems at the Monterey WWTP*

| No. | Description | Proposed Solutions/Recommendations | Implementation |
|---|---|---|---|
| 2 | Integrate Facility Power Statuses with SCADA System Network | Wire all status signals from the plant generator, UPS, and recommended phase monitoring devices to the Siemens PLCs. Display status values on new recommended plant SCADA graphics. Configure SCADA network so that all Monterey WWTP screens are visible at the Ridenour WTP Control Center. | Based on the review of this TM, JEA will approve and issue a task order for detail design and implementation of the power system monitoring and SCADA system improvements. |
| 3 | Flood Risks for Site Electrical and I&C Equipment | Evaluate current elevations of Electrical and I&C equipment against potential flood conditions or SSO events and determine if equipment can be relocated or protected from flooding. | Flood elevation assessment is required before further action is taken. When data are received, implementation can be recommended for each major equipment. |
| 4 | Influent Pony Pump Monitoring | Wire new input/output (I/O) between the plant SCADA system and the pony pump engine control panel. Include run status, fault status, and fuel indication. | Include as part of the task order recommended in I&C Reliability Issue No. 2. |

**Table 3 (continued): Jacobs' Electrical Assessment Table**

The following approach was recommended:

- Electrical Items #1, 2, 4, 5, 6 – Issues to be designed by Jacobs and implemented
- Electrical Items #7, 8, 9, 10 – Issues to be resolved by JEA directly.
- Instrumentation Items #1, #2 – Issues to be designed by Jacobs and implemented
- Electrical Item #11 and Instrumentation Item #3 – To Be Evaluated by JEA and Implemented during Monterey WWTF Project.
- Electrical Item #4 will be included in Project Definition with a larger diesel emergency standby pump.

## Existing Electrical System Review

The electrical distribution system for the Monterey WWTF was designed to be a single utility primary source with emergency generator backup. A JEA 26kV overhead line serves a 26kV – 480-volt grounded wye step down transformer. The 480-volt transformer feeds the 480-volt switchgear for primary utility power. A 700kW standby generator provides backup power to the 480-volt switchgear. The 480-volt switchgear distributes power to three motor control centers in the same room: MCC-1, MCC-2, and MCC-3. A legacy "Existing MCC" is a motor control center located in the same building, which has been refed.

The criteria utilized for evaluating the electrical equipment are as follows:

- Age of the equipment
- Availability of spare or replacement parts
- physical state of the equipment

In general, most electrical equipment has a service life of 25 to 30 years in a wastewater treatment plant. Older equipment is usually more maintenance intensive and often harder

to keep operational due to the lack of available spare parts. Assessments will be determined by the following methodology:

- Good – Equipment in working condition, with no clear physical defects. Intended to operate an additional 15+ years with proper maintenance.
- Fair – Equipment that requires more maintenance for replaceable operation. It demonstrates physical defects or corrosion, and maintenance staff indicates issues for service
- Poor – Equipment that needs to be replaced. It is beyond its reliable service life, with clear defects and corrosion. Spare or replacement parts are difficult to find.

Much of the existing distribution equipment is in good operating condition. Most of the instrumentation equipment and control panels have been upgraded in the past. Instrumentation equipment well past its design life should be replaced. The reliability of this equipment is questionable and higher maintenance costs are expected.

### Utility and Generator Systems

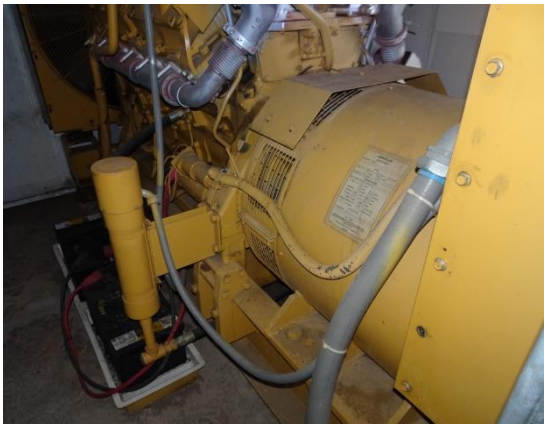
Utility power is provided from a 26kV overhead feeder to a step down 480-volt transformer. Maintenance staff and the existing Jacobs report detailed a single phasing event, as well as over/under voltage events which previously occurred from the primary. The recommended relays which are to be implemented by JEA or Jacobs will help protect equipment in the event this occurs in the future. The utility transformer itself was level, with no noticeable signs of corrosion.

*Utility Transformer*

Located in an outdoor weatherproof enclosure, the Caterpillar 3412 700kW standby generator was installed in 1996. The generator provides power to the automatic transfer switch during utility power outages. Although there are large rust spots and signs of deterioration on the exterior of the enclosure, maintenance staff states the generator operates

well. Due to the age of the generator, it is recommended that the generator be exercised regularly. Repainting the enclosure is recommended.

The generator is 23 years old and considered to be in "Fair" condition. Existing generators can be repaired instead of being replaced. However, the 3412-model generator is no longer in production so renovation may not be possible. Due to the age of the generator and the difficulties presented due to the unit being obsolete, replacement with a similar generator is recommended.



*Generator*

## Main Electrical Building

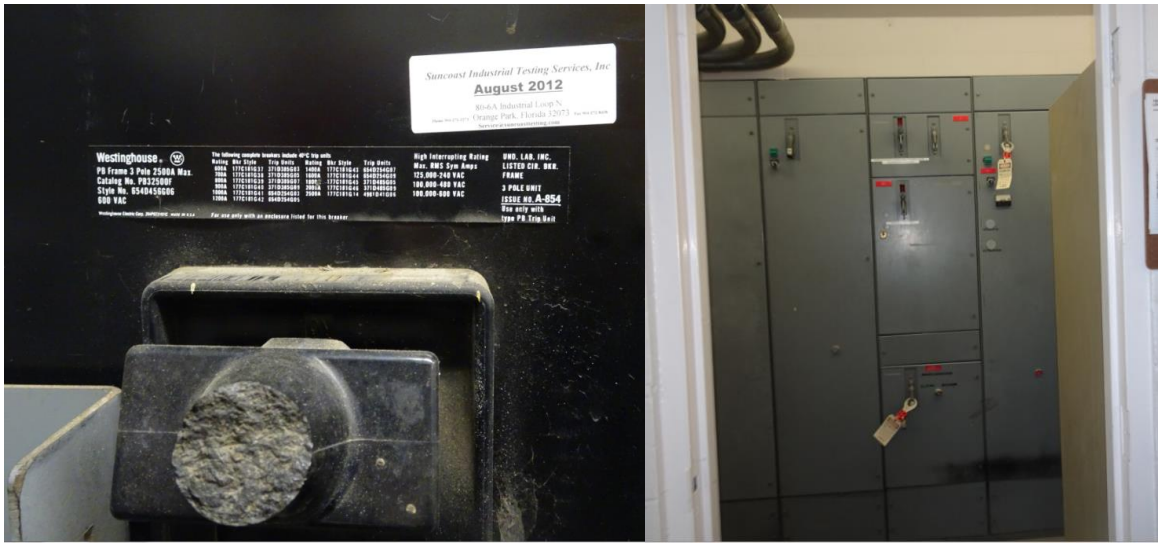
The 480V Switchgear, MCC-1, MCC-2, MCC-3, and the automatic transfer switch were installed in 1996 and are in good working condition. The panelboards and associated transformers in this room are of the same age and in good working condition. MCC-3 has adequate capacity for planned plant upgrades including an additional centrifuge and ancillary equipment. The air conditioning in the room seems adequate for the heat generated by the electrical equipment and variable frequency drives (VFD) in the room.

The 480V Switchgear 3000A main circuit breaker was serviced and replaced approximately 6 months ago per the existing Jacobs' report recommendation. The generator circuit breaker is scheduled to be serviced soon, and so are the 1200A and 800-amp feeder circuit breakers. However, there are no spare circuit breakers for the switchgear. Constantine Engineering highly recommends purchasing spare circuit breakers in the event of a critical failure of the other circuit breakers.

*Left to Right: MCC-2, MCC-1, Automatic Transfer Switch*

*Left to Right: 480-volt Switchgear and MCC-3*

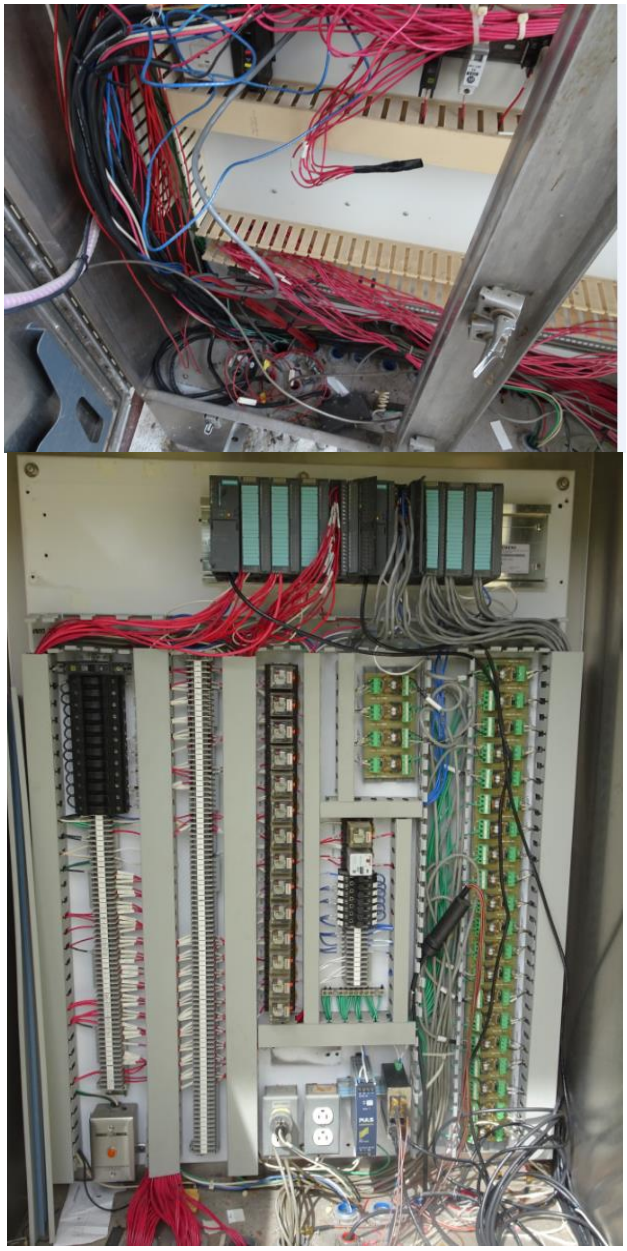
The motor control center known as the "Existing MCC" in this building is in poor condition and should be replaced. The motor control center main circuit breaker handle is broken off and cannot properly be operated, which is a violation of the National Electrical Code (NEC). The handful of active loads in this MCC can be transitioned to MCC-1, MCC-2, and MCC-3 in order to decommission the existing motor control center. In addition, there is a storage cabinet across from "Existing MCC" with only 29" of clearance. This is in violation of NEC Working Clearance, which requires a minimum of 42" for this instance.




*Existing MCC*

## Centrifuge Control Panels

There are two main control panels associated with the Centrifuge: FP-11-1 and FP-11-2. Control panel FP-11-1 was an Allen Bradley control panel at one time, but now acts as a pull box to FP-11-2. Control panel FP-11-2 serves as the new Siemens PLC control panel for the process. FP-11-2 is in "good" condition. It is recommended that the existing wires in FP-11-1 are traced, labelled, and any corroded or abandoned wires are removed. Existing wires should be bundled and tied within the control panel to improve the working conditions.



*FP-11-1 and FP-11-2*

## Process Control Panels and PLCs

The control panels and PLCs were upgraded during a previous SCADA upgrade in the past year. Therefore, the control panels are in "good" condition with no noticeable signs of deterioration. There were some exceptions as follows:

- US Filter Jet-Tech Panel – Rust on the feet and front of the panel
- Effluent Pump Station Panel – Missing screws in pull box below panel

- Existing Odor Control Panel – Removed and serves as a pull box. Removal is recommended since the odor control system will be demolished.
- Influent Pump Station Panel FP-2-1 – Conduit seal offs are corroded. Panel enclosure has significant rust and only serves as a pull box. Removal and replacement with a suitable pull box is recommended.
- Grinder Pump Station Control Panel – Panel is completely corroded and should be replaced. The grinder was previously been replaced.
- Headworks Panels FP-8-1 – Panel has deteriorated and serves as a pull box. The conduit seal offs are corroded. Removal and replacement of the panel is recommended.
- Flow Meter FIT-2-3 – The display does not appear to work, and it is unknown if the flow meter is functioning. Replacement is recommended after confirmation of functionality.

## Grounding and Underground Systems

Manholes were spot checked to verify the integrity of the underground system. The manholes that were opened were dry, therefore they were able to be viewed for inspection.

All manholes were mostly clean with adequate racks for most of the conductors. Constantine recommends all conductors be placed on racks and grounded to the common ground rod.

The sumps appeared full and should be kept free of debris. The ground rod connections had signs of oxidation and/or corrosion on the spot-checked manholes. It is recommended that a full 3-point fall of potential method grounding test be performed on the grounding systems. In addition, any ground with corrosion should be repaired with a recommended exothermic weld.

*Manholes*

## Lighting Systems

The entire site is composed of high-pressure sodium lighting, with exception to the top of the Centrifuge platform which contains LED lighting. While high pressure sodium is fairly efficient, removal and replacement with full-cutoff LED lighting throughout the site is recommended to save cost.

*Existing Lighting*

## Lightning Protection System

There does not appear to be a comprehensive lightning protection system for the entire facility. Only lightning rods were noticed on the two buildings. A full lighting protection system should be scheduled for installation in accordance with NFPA 820, UL 96, and UL 96A. The lightning protection system should include complete requirements for UL Master Label as well for compliance. Lightning protection systems should be inspected every 5 years due to potential plant modifications, as well as accidental damage due to routine maintenance throughout the facility.


*Sample UL Master Label*

In summary, the following electrical system improvements are recommended:

- Replace emergency electrical generator
- Purchase and store onsite spare switchgear circuit breakers
- Replace existing MCC
- Replace process control panels
- Replace site lighting system
- Install comprehensive lightning protection system

# Structural Evaluation

An evaluation of the structural components of the treatment facility was performed as part of the field evaluation work. A summary report of the structural condition assessment is provided in **Appendix C**. A summary of the identified required corrective actions or improvements is as follows:

- Significant corrosion in the influent screening and pump station has damaged the interior concrete and reinforcing steel requiring repair and restoration.
- Replacement of the aluminum awnings at the centrifuge facility will be required to meet current building codes.
- Minor repairs to the centrifuge facility will be required.
- Repair of the sludge storage tank will be required based on the observed conditions.
- The canopies at the SBR basins will require repair and repainting along with concrete restoration within the basins after further inspection of clean and dry tanks.
- Corroded anchor bolts at the UV system and effluent pumps will require replacement.
- Painting of the effluent equalization tank is recommended to increase the life expectancy of the tank; the interior of the tank was not inspected, and repairs may be required after inspection.
- Building renovation to increase the life expectancy and the weatherproofing of the buildings are recommended.

Additional considerations are included in the structural report

# Site Improvements

The existing facility site is shown on Figure 5. Site improvements have been previously identified in a report developed by Jacobs. Improvements included the following:

- Increase stormwater retention volume to also provide additional storage in case of tank or pump station overflows
- Provide containment area around sludge cake loading area to contain stormwater runoff in the area

In addition to identified site improvements, Figure 6 presents the proposed site plan showing proposed site and process improvements.


FIGURE 5
PROPOSED SITE PLAN - DEMOLITION
MONTEREY WWTF IMPROVEMENTS PROJECT
JEA

Constantine Engineering

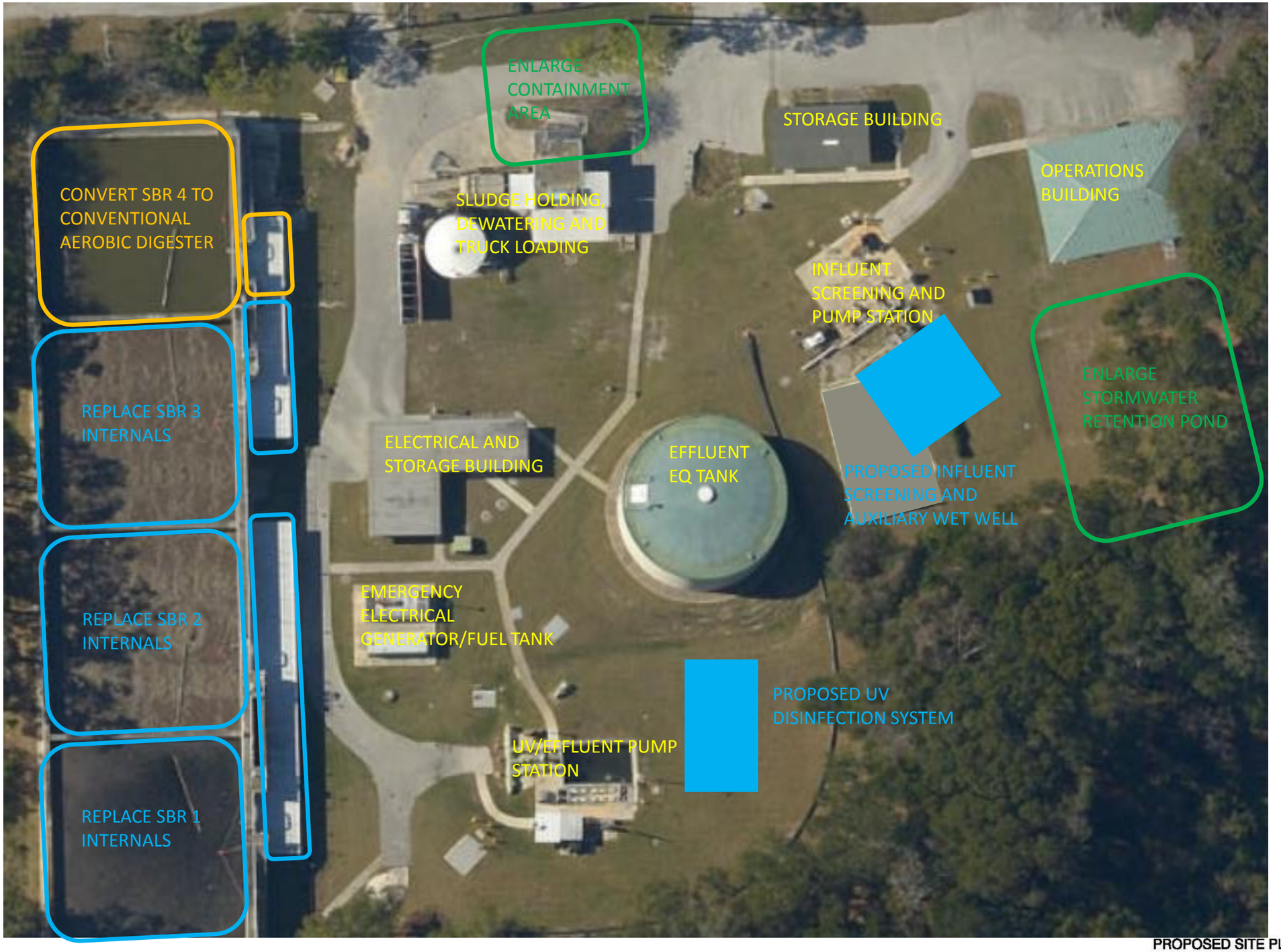



FIGURE 6
PROPOSED SITE PLAN - IMPROVEMENTS
MONTEREY WWTF IMPROVEMENTS PROJECT
JEA

Constantine Engineering

# Implementation Schedule

The overall schedule that follows has been developed based on a traditional design/bid/build delivery model.

## Implementation Schedule (Traditional Design/Bid/Build)

| **Project Name** | **2019** | **2020** | | | | **2021** | | |
|---|---|---|---|---|---|---|---|---|
| | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 |
| Procurement of Engineer<br>Duration = 150 Days | | | | | | | | |
| Engineering – Design<br>Duration = 210 Calendar Days | | | | | | | | |
| Procurement – Bid<br>Duration = 210 Calendar Days | | | | | | | | |
| Construction<br>Duration = 720 Calendar Days | | | | | | | | |

| **Project Name** | **2021** | **2022** | | | | **2023** | | |
|---|---|---|---|---|---|---|---|---|
| | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 |
| Procurement of Engineer<br>Duration = 150 Days | | | | | | | | |
| Engineering – Design<br>Duration = 210 Calendar Days | | | | | | | | |
| Procurement – Bid<br>Duration = 210 Calendar Days | | | | | | | | |
| Construction<br>Duration = 720 Calendar Days | | | | | | | | |

## Project Management & Delivery

| Stage | Project Definition | 10% Schematic Design | 30% Conceptual Design | 90% Detail Design | 100% Final Design | Bid | Construction |
|---|---|---|---|---|---|---|---|
| To Project Delivery | W&WW | PEC | PEC | PEC | PEC | PEC | PEC |

OPB Established | Trend | Trend | Trend

## Cost Estimate and Expenditure Forecast (Current $)

The overall opinion of probable cost is presented below. The cost of improvements and/or replacement of the UV disinfection system have not been included since there is a possibility that these improvements may be performed as a separate project. Also, the cost of a replacement centrifuge and a second centrifuge is not included since this work will be performed separately. The costs associated with improvements without improvements to the UV system is presented as Alternative 1 below.

The detailed Project Definition level opinion of probable cost for Alternative 1 without UV system improvements is provided in **Appendix D**. The cost estimate should be used to set the overall capital improvement budget, and the estimate is within the accuracy range required by JEA (+50%/-30%). It should be noted that property acquisition is not included in these costs.

**Alternative 1: Cost Estimate and Expenditure Forecast (Current $)**

| ACTIVITY/ DESCRIPTION | SUB-TOTAL | TOTAL |
|---|---|---|
| Contractor Direct Cost | $ 5,180,466 | $ 5,180,466 |
| Contractor Indirect Cost | | $ 1,346,921 |
| Overhead and Profit | $ 673,461 | |
| Miscellaneous-General/Special Conditions | $ 518,047 | |
| Supplemental Work Allowance (3% max) | $ 155,414 | |
| JEA Cost and Engineering | | $ 1,599,210 |
| Engineering and Post Design Services (15%) | $ 979,108 | |
| Project Management (3%) | $ 195,822 | |
| Services During Construction - JEA Inspector (5%) | $ 326,369 | |
| Project Support (1.5%) | $ 97,911 | |
| Total Project Cost* | | $ 8,126,597 |

***A 30% CONTINGENCY IS RECOMMENDED FOR APPLICATION TO THE TOTAL PROJECT COST**

| LEGEND | | |
|---|---|---|
| A | Influent Pump Station and Screenings System | $1,183,533.33 |
| B | Parallel Wetwell, Temporary Screenings and New Pony Pump | $549,386.42 |
| C | SBR Rehabilitation | $1,307,675.80 |
| D | Standby Aeration System for Redundancy | $131,345.19 |
| E | New UV Disinfection System | $0.00 |
| F | Conversion of SBR 4 to Aerobic Digestion System | $368,272.59 |
| G | Sludge Storage Tank Replacement | $110,000.00 |
| H | Sludge Dewatering Building Improvements | $166,971.11 |
| I | Replacement of Valves, Piping and Appurtenances | $452,986.80 |
| J | Structural Rehabilitation Allowance | $150,000.00 |
| K | Electrical System Improvements | $546,300.00 |
| L | Demolition of Odor Control System | $24,481.48 |
| M | Site Improvements | $23,333.33 |
| | **Other** | **$166,179.72** |
| | | |
| | Sales Tax 7% | $166,179.72 |
| | **Subtotal** | **$5,180,465.78** |
| | Overhead and Profit (12%) | $673,460.55 |
| | Miscellaneous-General/Special Conditions (10%) | $518,046.58 |
| | Bonds and Insurance (3%) | $155,413.97 |
| | **Construction & Closeout Subtotal** | **$6,527,386.88** |
| | Engineering and Post Design Services (15%) | $979,108.03 |
| | Project Management (3%) | $195,821.61 |
| | Services During Construction - JEA Inspector (5%) | $326,369.34 |
| | Project Support (1.5%) | $97,910.80 |
| | Supplemental Work Authorization (3%) | $195,821.61 |
| | **Total Project Cost*** | **$8,126,596.67** |

***A 30% CONTINGENCY IS RECOMMENDED FOR APPLICATION TO THE TOTAL PROJECT COST**

The anticipated quarterly expenditure is provided below for planning purposes.

**Alternative 1: Expenditure Forecast (Traditional Design/Bid/Build)**

| **PROJECTED EXPENDITURE FORECAST BY FISCAL YEAR** | **2020** | | | **2021** | | | | **2022** | |
|---|---|---|---|---|---|---|---|---|---|
| **QUARTER** | **Q2** | **Q3** | **Q4** | **Q1** | **Q2** | **Q3** | **Q4** | **Q1** | **Q2** |
| JEA Cost & Engineering 10% | $97,911 | | | | | | | | |
| JEA Cost & Engineering 30% | | $195,822 | | | | | | | |
| JEA Cost & Engineering Final | | | $342,688 | $342,688 | | | | | |
| Construction, Engineering Services | | | | | $68,900 | $68,900 | $68,900 | $68,900 | $68,900 |
| Construction Cost | | | | | | $326,369 | $326,369 | $652,739 | $1,305,477 |
| Project Closeout | | | | | | | | | |
| **TOTAL** | **$97,911** | **$195,822** | **$342,688** | **$342,688** | **$68,900** | **$395,270** | **$395,270** | **$721,639** | **$1,374,378** |

| **PROJECTED EXPENDITURE FORECAST BY FISCAL YEAR** | **2022** | | **2023** | | | | **2024** | | **Total** |
|---|---|---|---|---|---|---|---|---|---|
| **QUARTER** | **Q3** | **Q4** | **Q1** | **Q2** | **Q3** | **Q4** | **Q1** | **Q2** | |
| JEA Cost & Engineering 10% | | | | | | | | | $97,911 |
| JEA Cost & Engineering 30% | | | | | | | | | $195,822 |
| JEA Cost & Engineering Final | | | | | | | | | $685,376 |
| Construction, Engineering Services | $68,900 | $68,900 | $68,900 | $68,900 | | | | | $620,102 |
| Construction Cost | $979,108 | $979,108 | $652,739 | $652,739 | | | | | $5,874,648 |
| Project Closeout | | | | | $652,739 | | | | $652,739 |
| **TOTAL** | **$1,048,008** | **$1,048,008** | **$721,639** | **$721,639** | **$652,739** | **$0** | **$0** | **$0** | **$8,126,597** |

In the event that the UV disinfection system is included in this project, the opinion of probable cost for the UV disinfection improvements subtotal (before Contractor overhead and profit and JEA administrative and engineering costs) is $1,098,500, and the revised opinion of probable capital costs and quarterly expenditure is provided below as Alternative 2. The detailed cost estimate information for Alternative 2 is provided in Appendix E.

**Alternative 2: Cost Estimate and Expenditure Forecast (Current $)**

| ACTIVITY/ DESCRIPTION | SUB-TOTAL | TOTAL |
|---|---|---|
| Contractor Direct Cost | $ 6,314,736 | $ 6,314,736 |
| Contractor Indirect Cost | | $ 1,641,831 |
| Overhead and Profit | $ 820,916 | |
| Miscellaneous-General/Special Conditions | $ 631,474 | |
| Supplemental Work Allowance (3% max) | $ 189,442 | |
| JEA Cost and Engineering | | $ 1,949,359 |
| Engineering and Post Design Services (15%) | $ 1,193,485 | |
| Project Management (3%) | $ 238,697 | |
| Services During Construction - JEA Inspector (5%) | $ 397,828 | |
| Project Support (1.5%) | $ 119,349 | |
| Total Project Cost* | | $ 9,905,926 |

***A 30% CONTINGENCY IS RECOMMENDED FOR APPLICATION TO THE TOTAL PROJECT COST**

| LEGEND | | |
|---|---|---|
| A | Influent Pump Station and Screenings System | $1,183,533.33 |
| B | Parallel Wetwell, Temporary Screenings and New Pony Pump | $549,386.42 |
| C | SBR Rehabilitation | $1,307,675.80 |
| D | Standby Aeration System for Redundancy | $131,345.19 |
| E | New UV Disinfection System | $1,098,500.00 |
| F | Conversion of SBR 4 to Aerobic Digestion System | $368,272.59 |
| G | Sludge Storage Tank Replacement | $110,000.00 |
| H | Sludge Dewatering Building Improvements | $166,971.11 |
| I | Replacement of Valves, Piping and Appurtenances | $452,986.80 |
| J | Structural Rehabilitation Allowance | $150,000.00 |
| K | Electrical System Improvements | $546,300.00 |
| L | Demolition of Odor Control System | $24,481.48 |
| M | Site Improvements | $23,333.33 |
| | **Other** | **$201,949.72** |
| | | |
| | Sales Tax 7% | $201,949.72 |
| | **Subtotal** | **$6,314,735.78** |
| | Overhead and Profit (12%) | $820,915.65 |
| | Miscellaneous-General/Special Conditions (10%) | $631,473.58 |
| | Bonds and Insurance (3%) | $189,442.07 |
| | **Construction & Closeout Subtotal** | **$7,956,567.08** |
| | Engineering and Post Design Services (15%) | $1,193,485.06 |
| | Project Management (3%) | $238,697.01 |
| | Services During Construction - JEA Inspector (5%) | $397,828.35 |
| | Project Support (1.5%) | $119,348.51 |
| | Supplemental Work Authorization (3%) | $238,697.01 |
| | **Total Project Cost*** | **$9,905,926.02** |

***A 30% CONTINGENCY IS RECOMMENDED FOR APPLICATION TO THE TOTAL PROJECT COST**

The anticipated quarterly expenditure is provided below for planning purposes.

**Alternative 2: Expenditure Forecast (Traditional Design/Bid/Build)**

| **PROJECTED EXPENDITURE FORECAST BY FISCAL YEAR** | **2020** | | | **2021** | | | | **2022** | |
|---|---|---|---|---|---|---|---|---|---|
| **QUARTER** | **Q2** | **Q3** | **Q4** | **Q1** | **Q2** | **Q3** | **Q4** | **Q1** | **Q2** |
| JEA Cost & Engineering 10% | $119,348.51 | | | | | | | | |
| JEA Cost & Engineering 30% | | $238,697.01 | | | | | | | |
| JEA Cost & Engineering Final | | | $417,719.77 | $417,719.77 | | | | | |
| Construction, Engineering Services | | | | | $83,986 | $83,986 | $83,986 | $83,986 | $83,986 |
| Construction Cost | | | | | | $397,828 | $397,828 | $795,657 | $1,591,313 |
| Project Closeout | | | | | | | | | |
| **TOTAL** | **$ 119,349** | **$ 238,697** | **$ 417,720** | **$ 417,720** | **$83,986** | **$481,814** | **$481,814** | **$879,643** | **$ 1,675,299** |

| **PROJECTED EXPENDITURE FORECAST BY FISCAL YEAR** | **2022** | | **2023** | | | | **2024** | | **Total** |
|---|---|---|---|---|---|---|---|---|---|
| **QUARTER** | **Q3** | **Q4** | **Q1** | **Q2** | **Q3** | **Q4** | **Q1** | **Q2** | |
| JEA Cost & Engineering 10% | | | | | | | | | $119,348.51 |
| JEA Cost & Engineering 30% | | | | | | | | | $238,697.01 |
| JEA Cost & Engineering Final | | | | | | | | | $835,439.54 |
| Construction, Engineering Services | $83,986 | $83,986 | $83,986 | $83,986 | | | | | $755,873.87 |
| Construction Cost | $1,193,485 | $1,193,485 | $795,657 | $795,657 | | | | | $7,160,910.37 |
| Project Closeout | | | | | $795,657 | | | | $795,656.71 |
| **TOTAL** | **$1,277,471** | **$1,277,471** | **$879,643** | **$879,643** | **$795,657** | **$0** | **$0** | **$0** | **$9,905,926** |

## Risks

**Permit Compliance:** As process equipment, electrical components and structures age, the risk of component failure increases. Much of the process equipment has reached or exceeded industry accepted standards for longevity. Full renovation, rehabilitation and any necessary process improvements will ensure that the facility treats wastewater and produces an effluent that can be safely and sustainably discharged to the St. Johns River in full compliance with the existing operating permit.

**Revision History**

| Name | Date | Version | Revision Notes |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

**APPENDICES**

Appendix A: Technical Memorandum: Monterey Wastewater Treatment Facility Capacity Evaluation

Appendix B: Description of Condition Assessment Ranking

Appendix C: Structural Condition Assessment

Appendix D: Opinion of Probably Cost for Alternative 1 (without UV System Improvements)

Appendix E: Opinion of Probably Cost for Alternative 2 (with UV System Improvements)

# APPENDIX A

## Technical Memorandum: Monterey Wastewater Treatment Facility Capacity Evaluation

TECHNICAL MEMORANDUM

# Monterey Wastewater Treatment Facility Capacity Evaluation

| | |
|---|---|
| **PREPARED FOR:** | JEA, Inc |
| **PREPARED BY:** | Constantine Engineering, Inc. |
| **DISTRIBUTION:** | Ted Hortenstine/TCG<br>Jim Kizer/TCG<br>Christina Leach/TCG |
| **PROJECT NUMBER:** | 100436.15 |
| **DATE:** | August 27, 2019 |

## Background

Constantine Engineering was contracted by JEA to proceed with services for the evaluation and development of a Project Definition document for renovating of and improving the unit processes and equipment at the Monterey Wastewater Treatment Facility (WWTF) to continue to receive, treat, and dispose of effluent wastewater in accordance with the facility's effluent permit. This Technical Memorandum (TM) presents a summary of the results of an evaluation of the capacity of the WWTF to operate in accordance with its permit limits based on a design average daily flow (ADF) of 3.6 mgd. This TM is not intended to be an exhaustive presentation of the details of this evaluation, but rather to present a concise summary of the conclusions.

## Basis of Evaluation

Constantine evaluated the capacity of the WWTF using the EnviroSim BioWin Computerized Wastewater Simulation Software. Several model iterations were performed under varying flow and influent characteristic conditions. The final model runs were made with the assumption that all three sequencing batch reactor (SBR) basins were online, the influent ADF was 3.6 mgd, and the influent wastewater characteristics were as listed in Table 1, below.

The influent characteristics were based on the actual influent characteristics received at the WWTP during recent sampling periods and are representative of the current waste loading to the facility. The models were run using a mixed liquor suspended solids concentration of 5,000 mg/L and a wasting rate of 0.8 mgd.

Table 2 presents the cycle times for the operation of the SBRs.

## Summary of Results

Table 3 presents a summary of the effluent characteristics for the final model run. As shown in Table 3, the effluent parameters for carbonaceous biochemical oxygen demand (CBOD), total suspended solids (TSS), and total phosphorus (TP) were well below the limits of 5-, 5-, and 1-mg/L, respectively. The total nitrogen (TN) concentration was 11.47-mg/L which

*Table 1. Influent Parameters*

| | Run 1 | |
|---|---|---|
| Flow Rate | 3.600 | mgd |
| Total COD | 450 | mg/L |
| CBOD5 | 161 | mg/L |
| VSS | 138 | mg/L |
| TSS | 176 | mg/L |
| TKN | 41.3 | mg/L |
| Total P | 4.5 | mg/L |
| Ammonia | 31 | mg/L |
| Alkalinity | 7.00 | mmol/L |
| Alkalinity | 350 | mg/L |
| Temp | 20 | Celsius |
| Ca | 50 | mg/L |
| Mg | 30.0 | mg/L |
| pH | 7.5 | s.u. |

*Table 2. Effluent Parameters*

| Cycle | Time (mins) |
|---|---|
| Anoxic Fill (min) | 20.0 |
| Aerated Fill (min) | 100.0 |
| Anoxic Reactor (min) | 15.0 |
| Aeration Reactor (min) | 45.0 |
| Settle Time (min) | 120.0 |
| Waste Time (min) | 10.0 |
| Decant Time (min) | 50.0 |

exceeds the limit of 3-mg/L and the majority of the nitrogen was nitrate-nitrogen and the ammonia concentration was less than 0.35 mg/L. This data shows that the biological processes to reduce the CBOD and to nitrify the ammonia-nitrogen to nitrate are sufficient at the ADF of 3.6 mgd. However, the denitrification process to convert the nitrate-nitrogen to nitrogen gas is inhibited, thus resulting in the high effluent nitrate-nitrogen concentration. Based on a review of the details of the model run, the denitrification process is limited by the amount of readily available carbon or soluble BOD. Therefore, to further reduce the nitrate-nitrogen concentration and the TN in the effluent, the SBR process may need to be modified to include a second anoxic cycle following the aeration cycle and a supplemental carbon source added to provide the denitrifying bacteria the carbon substrate needed to convert the nitrate-nitrogen to nitrogen gas.

# Recommendations

As presented above, the existing SBR process has the capacity to treat the current influent wastewater and produce an effluent that meets the permit limits at the design ADF of 3.6 mgd with a slight modification of the SBR process and the addition of supplemental carbon. Table 4 presents a preliminary recommendation for modifying the SBR process.

*Table 3. Effluent Parameters*

| | | |
|---|---|---|
| Decant Flow | 8.62 | mgd |
| VSS | 2.88 | mg/L |
| TSS | 3.81 | mg/L |
| Total COD | 19.82 | mg/L |
| Soluble PO4-P | 2.17 | mg/L |
| Total P | 2.27 | mg/L |
| TKN | 1.8 | mg/L |
| Total CBOD | 1.22 | mg/L |
| Nitrite + Nitrate | 9.67 | mg/L |
| Total N | 11.47 | mg/L |
| Alkalinity | 4.15 | mmol/L |
| Alkalinity | 207.5 | mg/l |
| pH | 6.9 | s.u. |
| Ammonia | 0.35 | mg/L |
| Nitrate | 9.6 | mg/L |
| Nitrite | 0.07 | mg/L |

*Table 4. Proposed Cycle Times*

| Cycle | Time (mins) |
|---|---|
| Anoxic Fill (min) | 20.0 |
| Aerated Fill (min) | 100.0 |
| 1st Anoxic Reactor (min) | 15.0 |
| Aeration Reactor (min) | 45.0 |
| 2nd Anoxic Reactor (min) | 15.0 |
| Settle Time (min) | 105.0 |
| Waste Time (min) | 10.0 |
| Decant Time (min) | 50.0 |

# APPENDIX B

## Description of Condition Assessment Rankings

**Description of Condition Assessment Ratings**

These condition evaluations are used in the Risk-Based Assessments. Condition evaluation are rated on a five point scale, (1, 2, 3, 4, and 5), with "1" as the highest or best condition and "5" as the lowest or worst condition. Below are descriptions of the responses associated with each response 1-5.

1 This conditional response is appropriate when no apparent problems exist. When assigning this value to a unit of inspection, consider the following to be a "rule-of-thumb:"

a. Mechanically and structural appears to be new or nearly new;
b. Appears to operate as intended by design,
c. Appears to fit the application to which it is applied; and,
d. Does not need repair of replacement.

2 This conditional response is appropriate when the unit of inspection fails one or more of the criteria outlined in the "1" conditional response. While a piece of equipment may be working properly, it may show signs of wear. A "2" conditional response should be assigned to a unit of inspection when that unit is characterized by the following:

a. Does not meet all "1" conditional response criteria; and,
b. Is greater than 5 years old but less than 10 years old.
(Not applicable for structural)

3 This conditional response is appropriate when the unit of inspection is greater than 10 years old but less than 20 years old (not applicable for Structural) and meets the following criteria:

a. Does not leak, drip, spill or discharge lubricants or process fluids excessively, except as designed, and
b. Is capable of remaining in useful service, without requiring repair or replacement, for at lease five years.
c. Shows signs of corrosion (structural).

4 The unit of inspection appears to be near the end of its useful life cycle as indicated by the following:

a. The unit of inspection is greater than 20 years old (not applicable for Structural);
b. The unit of inspection requires excessive maintenance or repair to remain in service; and,
c. It is recommended that the unit of inspection be repaired and/or replaced in not less than one year but not more than 3 years.

5 This conditional response indicates that the unit of inspection is not capable or remaining in service for more than one year and/or is currently out of service. If the unit of inspection meets one of the following criteria, it should be considered a "5" on the conditional response scale.

a. Needs immediate replacement (immediate=1 year or less.);
b. Presents a worker safety issue;
c. Is improperly applied for its current function; and,
d. Is not capable of performing its intended function.

| | | |
|---|---|---|
| General | Other | |
| | burning smell | |
| | exceeds expected life cycle | |
| | excessive heat | |
| | incompatible | |
| | installed improperly | |
| | misalignment | |
| | not closing | |
| | obsolete | |
| | Out of service | |
| Structural, Tanks | Other | |
| | concrete damage | |
| | concrete damage, H2S | |
| | Cracks in tank | |
| | floor damaged | |
| | plumbing leaks | |
| | roof leaking | |
| | rotten wood | |
| | stairs worn/damaged | |
| | structural crack | |
| | structural crack/leak | |
| | window(s) broken | |
| Electrical | Other | |
| | Arcing, signs of | |
| | burned smell | |
| | burning smell | |
| | electrical problems | |
| | HVAC not working | |
| | HVAC condensate not draining | |
| | insulation damaged | |
| | Lamps, Indicators | Other |
| | | lamps burned out |
| | | lamps not clean |
| | | lamps not working |
| | | lamp wiper not working |
| | loose termination | |
| Leaks, Leakage | Other | |
| | broken pipe | |
| | chlorine leak | |
| | dry chemical leak | |
| | excessive leakage | |
| | excessive packing leak | |
| | excessive pipe joint leak | |
| | fuel leak | |
| | leakage | |
| | oil leak | |
| | packing/seal leak | |
| | piping leaks | |
| | piping broken | |
| | plumbing leak | |
| | Reagent leak | |
| | roof leaking | |
| | Seals leaking | |
| | Tank wall Leak | |
| Oil, Lubrication | Other | |
| | fittings not greased | |
| | oil dirty | |
| | oil leak | |
| | oil level low | |
| Noise, Vibration | Other | |
| | bearing noise | |
| | excessive noise | |
| | excessive vibration | |

| | | |
|---|---|---|
| Paint, Coating, Rust | Other | |
| | coating peeling | |
| | corrosion | |
| | paint peeling | |
| | rust | |
| Belts, Chains, Bearings | Other | |
| | bearing noise | |
| | belt damaged | |
| | belt loose | |
| | belt sheave wear | |
| | chain loose | |
| | chain/sprockets worn | |
| | fittings not greased | |
| | V-belts damaged | |
| | V-belts loose | |
| | V-belts misaligned | |
| Calibration | Other | |
| | looses calibration | |
| | out of calibration | |
| Filters, Grit Traps | Other | |
| | dust filter clogged | |
| | filter cloth damaged | |
| | fouled media | |
| | mud balls | |
| | solids build-up | M (in grit Trap) |
| Doors,Seals,Gates | Other | |
| | door doesn't close | |
| | door seal damaged | |
| | gates not working/sealing | |
| | not closing | |
| Mech Misc | Other | |
| | build-up in rotameter | M (in Chlorinator) |
| | condensate not draining | M (in HVAC) |
| | discharge air warm | M (in HVAC) |
| | rake alignment | M |
| | loose fasteners | M |
| | vibrator not working | M (in silo) |

# APPENDIX C

## Structural Condition Assessment

April 23, 2019

# Structural Condition Assessment

## Influent Screening/Pump Station

### Background

The structure is a cast-in-place concrete structure which includes two screening channels along with an influent collection box and two independent wet wells.

### Observations

The following is a summary of observations obtained during the site visit:

1. Several areas of the wall below or at the normal waterline showed signs of concrete degradation along with exposed reinforcement which was visibly corroded. (See Photographs #1 & #2). The coating system in these areas was not intact and had been deteriorated.
2. The coating system throughout the structure was in poor condition and was either missing as indicated above or was delaminated.
3. Spalled concrete was visible at the beams and channel walls on either side of the screening channels (See Photographs #3 & #4).
4. Severe concrete degradation and spalling appeared to be located at the walls in the vicinity of the gate frames partitioning the wet wells (See Photograph #5).
5. The various miscellaneous metal components (grating, access hatches, etc.) appeared to be in good condition with no major signs of corrosion or inoperability.

### Discussion and Recommendations

Given these observations, the following are conclusions and recommendations:

1. Provide new coating system. Repairs are anticipated to be performed at several locations throughout. After proper surface preparation these repairs include the replacement of reinforcement and the building back of the wall/slab surfaces to the original lines and thicknesses. It is recommended that the entire interior of the structure be coated except the base slab.

## Centrifuge Facility

### Background

The structure consists of a masonry building and an elevated cast-in-place concrete platform allowing truck drive-thru access and loading of solids material. The masonry building has painted steel beam roof framing and a galvanized steel roof deck.

### Observations

The following is a summary of observations obtained during the site visit:

1. The aluminum awnings attached to the elevated platform should be removed. These items did not appear to be adequately designed to accommodate the design wind loads for this type of structure (See Photograph #6).

2. The exterior paint on the masonry building and elevated platform is chalky and stained.
3. Corrosion is visible at several areas of the metal roof deck and the screws attaching the deck to the roof framing. The roof framing itself appears to be in good condition although some minor corrosion is visible (See Photograph #7).
4. Staining of underside of the elevated platform was visible from below at several penetrations through the slab (See Photograph #8).
5. Minor cracking was visible on the top of the elevated platform slab. These cracks emanated from the various penetrations.

### Discussion and Recommendations

Given these observations, the following are conclusions and recommendations:

1. The aluminum awning should be removed. It does not appear that modifications would be plausible, and replacement is deemed to be most advantageous if it is desired to have a covering in these areas.
2. The interior and exterior of the building and platform should be painted.
3. The metal roof deck should be removed and replaced. It is possible that some portions can be reused by removing them and painting. The various anchors of the deck to the roof framing should be replaced. The roof framing should be repainted.

## Sludge Storage Tank

### Background

The structure is a painted steel tank with bolted wall panels placed on a ring beam foundation.

### Observations

The following is a summary of observations obtained during the site visit:

1. Some corrosion and staining are visible at the various bolted connections (See Photograph #9).
2. The sealant at the bolted wall panel seams was cracked and failing in several places (See Photograph #10).

### Discussion and Recommendations

Given these observations, the following are conclusions and recommendations:

1. The sealant at each joint should be removed and replaced where excessive wear has been experienced.
2. The bolts should be replaced where the gaskets have been compromised and the bolt is corroding. The bolted are considered to be the primary source of the staining and visible corrosion.
3. The tank manufacturer should be contacted for any repair recommendations not listed above.

## SBR Basins

### Background

The structure is a cast-in-place concrete structure with an open-sided canopy on the north side. The canopy covers piping and pumps and is constructed of galvanized steel framing and painted steel roof decking.

### Observations

The following is a summary of observations obtained during the site visit:

1. Corrosion is visible at several areas of the metal roof deck and the screws attaching the deck to the roof framing. The roof framing itself appears to be in good condition although some minor corrosion is visible (See Photograph #12 & #13).
2. A roof beam has been damaged at the east side of the structure (See Photograph #14).
3. The exterior of the basins have some cracking with signs of active seepage (See Photograph #15 & #16).
4. Several joints (both construction and expansion) have experienced movement causing spalling of the concrete (See Photograph #17). Some vertical reinforcement is exposed, and corrosion of this reinforcement may have exasperated the spalling.
5. The walkway sealant was cracked and failing (See Photograph #18).
6. The various miscellaneous metal components (grating, access hatches, etc.) appeared to be in good condition with no major signs of corrosion or inoperability.
7. No coating system was visible on the interior of the structure. The exterior paint system was in fair condition with some chalkiness present.

### Discussion and Recommendations

Given these observations, the following are conclusions and recommendations:

1. The metal roof deck should be repaired. Given the large quantity of the decking and the relatively minor corrosion it has experienced, it is recommended that the panels be removed, the surfaces prepared, and repainted. The anchors to the canopy framing should be replaced at this time.
2. The canopy roof framing should be repainted with a zinc galvanizing spray at the areas where some corrosion is visible.
3. The damaged roof beam should be replaced.
4. Crack injections should be performed at the actively seeping cracks on the basin walls.
5. Spalls at the vertical wall joints should be repaired. This repair will entail the removal of any loose concrete, the cleaning and coating of any exposed reinforcement, and finally the application of a structural repair mortar to build the surface back to the original lines.
6. Walkway sealant should be replaced.

## UV Structure

### Background

The structure is a cast-in-place concrete structure with several channels connecting to a basin which contains effluent pumps on the south side.

### Observations

The following is a summary of observations obtained during the site visit:

1. Some guardrail anchor bolts are corroded (See Photograph #19).
2. The pump base plate anchorage assembly was in poor condition. One pump was missing grout below the base plate and the anchors appeared to be too close the edge of the opening which has produced several cracks (See Photograph #20).
3. Multiple concrete pipe supports are cracked at the strap anchor locations (See Photograph #21).
4. The davit crane had visible corrosion at several areas. The hoist and trolley were in poor condition (See Photograph #22).

### Discussion and Recommendations

Given these observations, the following are conclusions and recommendations:

1. All corroded anchor bolts should be replaced with stainless steel anchors. This may require slightly adjusting the location of the guardrail base plates to avoid conflict with the existing anchor locations.
2. The pump base plates should be repaired by removing and replacing the existing grout and replacing anchors as needed to ensure the proper anchor bolt edge distance. A new transfer plate welded or bolted to the pump base plate may be necessary to accommodate the minimum edge distances.
3. The cracked pipe supports should be repaired. This repair will entail the removal of any loose concrete, the cleaning and coating of any exposed reinforcement, and finally the application of a structural repair mortar to build the surface back to the original lines.
4. The davit crane should be repainted. The hoist and trolley may need to be replaced but the operability of these items could not be confirmed in the field.

## Ground Storage Tank

### Background

The structure is a prestressed concrete tank (See Photograph #23).

### Observations

The following is a summary of observations obtained during the site visit:

1. The exterior paint system was chalky and had staining throughout.
2. The access ladder and other steel components were in good condition with no visible corrosion.

### Discussion and Recommendations

Given these observations, the following are conclusions and recommendations:

1. The exterior of the tank should be painted in the near future (less than 5 years). It does not appear that any major paint system failures were present such as delamination.
2. The interior of the structure was not accessed during the site visit and thus this area of the structure could not be observed.

## Electrical Building

### Background

The structure appears to be two independent buildings located adjacent to each other. The electrical equipment room is a single-story masonry building with a prestressed concrete hollowcore roof system. The adjacent building is used as a general storage room and appears to be constructed of wood stud walls with steel columns and beams that support the prestressed concrete hollowcore roof panels.

### Observations

The following is a summary of observations obtained during the site visit:

1. The exterior paint system was chalky and in poor condition on the walls, exterior doors and the exposed steel framing which supports the hollowcore roof system on the north side of the structure (See Photograph #25 & #26).
2. The interior of the electrical equipment room and storage room were in good condition (See Photograph #27).
3. The roof system when viewed from above at the SBR Basins appears to be a single-ply membrane roof and is in good condition.

### Discussion and Recommendations

Given these observations, the following are conclusions and recommendations:

1. The exterior of the structure should be painted including the steel support framing.
2. The doors and door hardware should be replaced.

## Miscellaneous Storage Building

### Background

The structure is a single-story masonry structure with wood trusses and a shingle roof system.

### Observations

The following is a summary of observations obtained during the site visit:

1. The exterior paint system was chalky and in poor condition on the walls, exterior doors and the fascia (See Photograph #29 & #30).
2. The roof system appeared to be in fair condition although the drip edge was corroded and not properly fastened in some areas.
3. The overhead door was in poor condition.

### Discussion and Recommendations

Given these observations, the following are conclusions and recommendations:

1. The exterior of the structure should be painted.
2. All doors and door hardware should be replaced.
3. The fascia should be removed and replaced.
4. The shingle roof system should eb further evaluated for possible replacement. The drip edge should be replaced at a minimum which may warrant a new roof system given the relatively small size of the roof area.

## Operations Building

### Background

The structure is a single-story masonry structure with wood trusses and a standing seam roof system.

### Observations

The following is a summary of observations obtained during the site visit:

1. The structure was generally in very good condition (See Photograph #31).
2. The standing seam roof panels appeared to be in poor condition with signs of corrosion and paint loss.
3. The door and window sealant were cracked and losing adhesion in several areas.

### Discussion and Recommendations

Given these observations, the following are conclusions and recommendations:

1. The standing seam metal roof panels should be replaced with new prefinished panels. Connections to the roof trusses shall be replaced as required.
2. The door and window sealant should be replaced.
3. The exterior face of the split-face CMU should be coated with a water-repellent sealer to prevent moisture intrusion into the structure.

# Appendix A - Photographs

**Photograph #1: View within pump station wet well. Note: Visible wall reinforcement and missing/failed coating system.**

**Photograph #2: View within pump station wet well.**

**Photograph #3: View within screening channel. Note: Spalled concrete and failing coating system on channel wall.**

**Photograph #4: View within screening channel. Note: Spalled and deteriorated concrete at concrete beam above channel.**

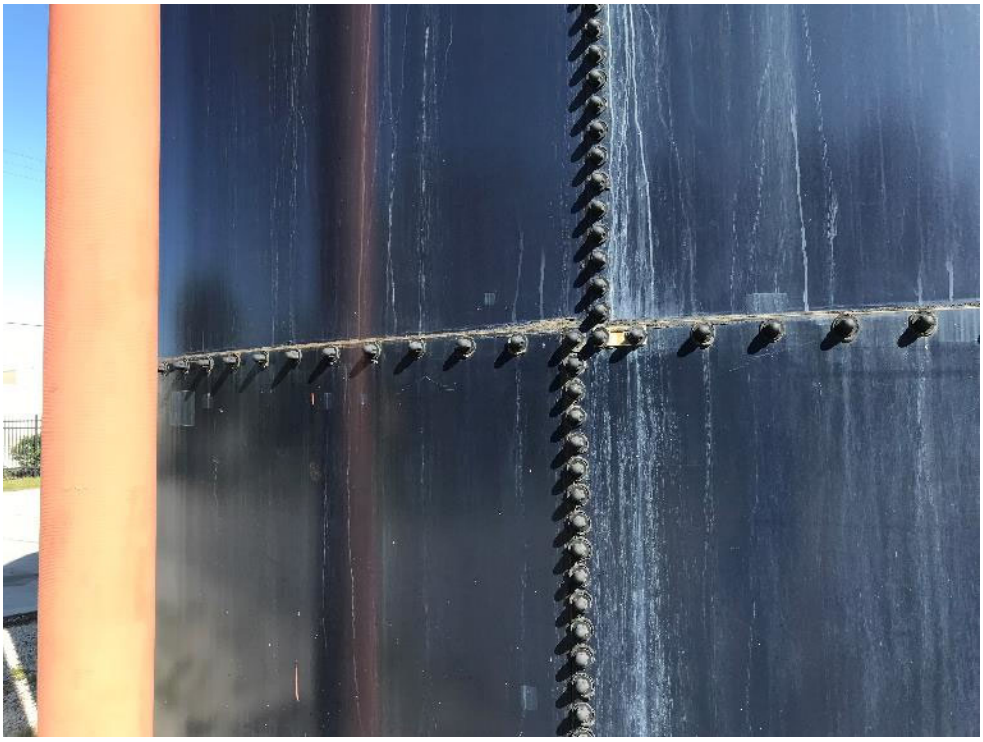
**Photograph #5: View within pump station wet well. Note: Spalled and deteriorated concrete in vicinity of gate frames.**

**Photograph #6: Exterior view of Centrifuge Facility.**

**Photograph #7: View of roof framing and roof deck at Centrifuge Facility. Note: Corrosion visible on roof deck.**

**Photograph #8: View of elevated platform at Centrifuge Facility.**

**Photograph #9: View of exterior of Sludge Storage Tank.**



**Photograph #10: View of exterior of Sludge Storage Tank.**

**Photograph #11: View of exterior of SBR Basins showing canopy.**


**Photograph #12: View of canopy at SBR Basin. Note: Corrosion on underside of roof deck.**

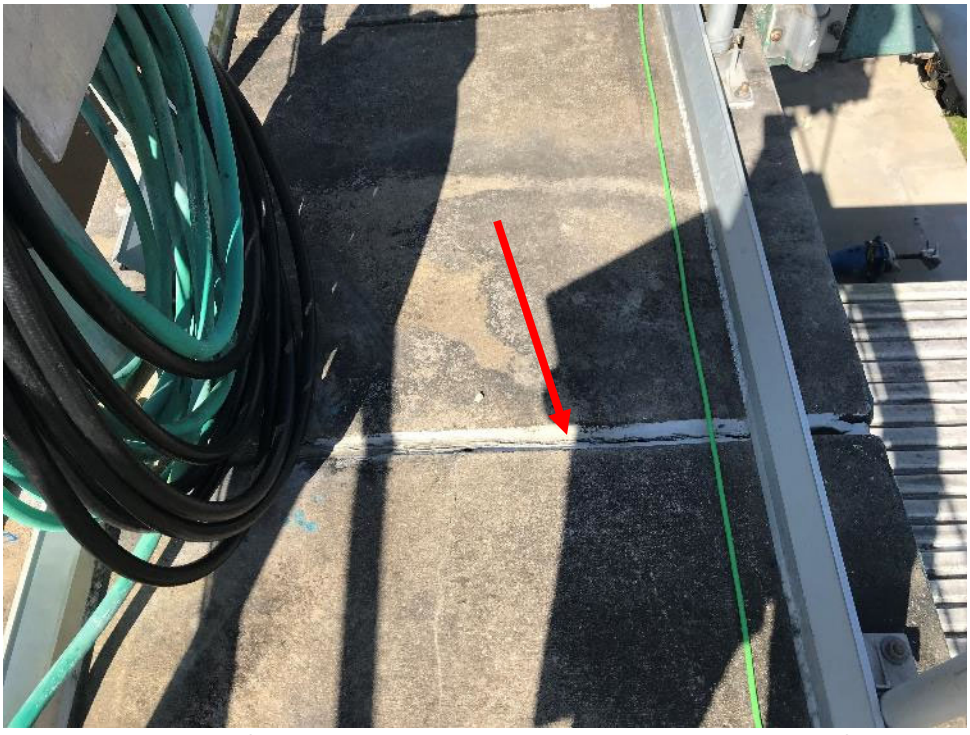
**Photograph #13: View of canopy at SBR Basin. Note: Corrosion on underside of roof deck.**

**Photograph #14: View of canopy at SBR Basin. Note: Corrosion on underside of roof deck.**

**Photograph #15: View of typical cracking on walls at SBR Basin.**

**Photograph #16: View of typical cracking on walls at SBR Basin.**

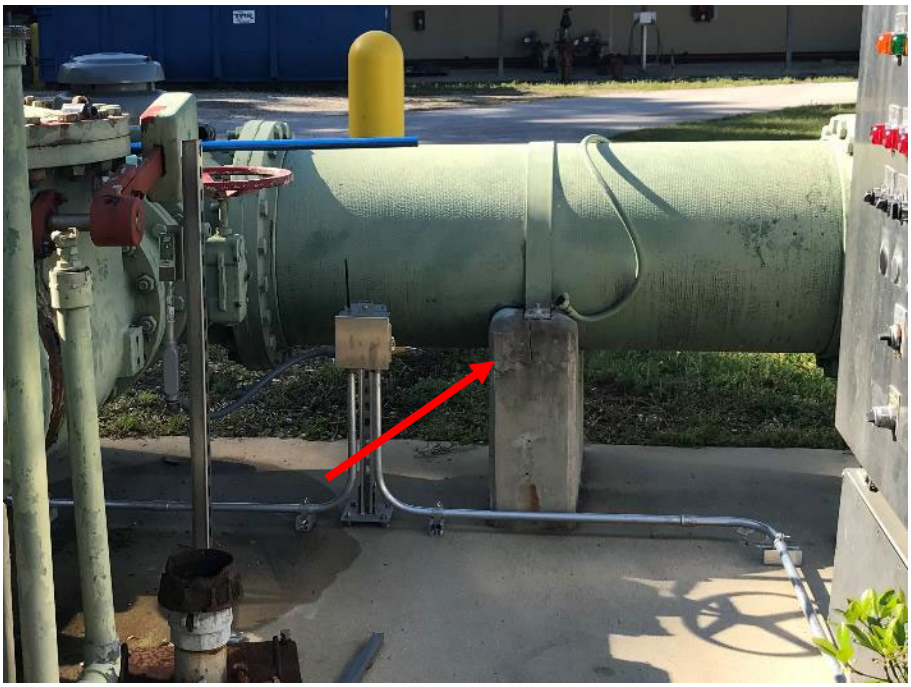
**Photograph #17: View of spalling on walls at SBR Basin vertical joints.**



**Photograph #18: View of walkway joint at SBR Basin. Note: Cracked and failing sealant.**

**Photograph #19: View of gates and grating at UV Structure. Note: Corroded guardrail anchor bolts.**

**Photograph #20: View of effluent pumps at the UV Structure. Note: Missing grout under base plate, cracked and stained grout.**



**Photograph #21: View of effluent pipes at the UV Structure. Note: Cracked concrete pipe support.**

**Photograph #22: View of davit crane at the UV Structure.**

**Photograph #23: View of Ground Storage Tank.**

**Photograph #24: View of Electrical Building.**

**Photograph #25: View of Electrical Building. Note: Paint system failure at all doors and exterior columns and beams supporting the roof system.**

**Photograph #26: View of Electrical Building. Note: Paint system failure at all doors and exterior columns and beams supporting the roof system.**

**Photograph #27: View of interior of Electrical Building.**

**Photograph #28: View of interior of Electrical Building at the storage room.**

**Photograph #29: View of exterior of Miscellaneous Storage Building.**

**Photograph #30: View of exterior of Miscellaneous Storage Building.**

**Photograph #31: View of exterior of Operations Building.**

# Appendix D

## Opinion of Probably Cost for Alternative 2 (without UV System Improvements)

## Cost Estimate and Expenditure Forecast (Current $)

| ACTIVITY/ DESCRIPTION | SUB-TOTAL | TOTAL |
|---|---|---|
| Contractor Direct Cost | $ 5,180,466 | $ 5,180,466 |
| Contractor Indirect Cost | | $ 1,346,921 |
| Overhead and Profit | $ 673,461 | |
| Miscellaneous-General/Special Conditions | $ 518,047 | |
| Supplemental Work Allowance (3% max) | $ 155,414 | |
| JEA Cost and Engineering | | $ 1,599,210 |
| Engineering and Post Design Services (15%) | $ 979,108 | |
| Project Management (3%) | $ 195,822 | |
| Services During Construction - JEA Inspector (5%) | $ 326,369 | |
| Project Support (1.5%) | $ 97,911 | |
| Total Project Cost* | | $ 8,126,597 |

***A 30% CONTINGENCY IS RECOMMENDED FOR APPLICATION TO THE TOTAL PROJECT COST**

| | LEGEND | |
|---|---|---|
| A | Influent Pump Station and Screenings System | $ 1,183,533 |
| B | Parallel Wetwell, Temporary Screenings and New Pony Pump | $ 549,386 |
| C | SBR Rehabilitation | $ 1,307,676 |
| D | Standby Aeration System for Redundancy | $ 131,345 |
| E | New UV Disinfection System | $ - |
| F | Conversion of SBR 4 to Aerobic Digestion System | $ 368,273 |
| G | Sludge Storage Tank Replacement | $ 110,000 |
| H | Sludge Dewatering Building Improvements | $ 166,971 |
| I | Replacement of Valves, Piping and Appurtenances | $ 452,987 |
| J | Structural Rehabilitation Allowance | $ 150,000 |
| K | Electrical System Improvements | $ 546,300 |
| L | Demolition of Odor Control System | $ 24,481 |
| M | Site Improvements | $ 23,333 |
| | **Other** | **$ 166,180** |
| | Sales Tax 7% | $ 166,180 |
| | **Subtotal** | **$ 5,180,466** |
| | Overhead and Profit (12%) | $ 673,461 |
| | Miscellaneous-General/Special Conditions (10%) | $ 518,047 |
| | Bonds and Insurance (3%) | $ 155,414 |
| | **Construction & Closeout Subtotal** | **$ 6,527,387** |
| | Engineering and Post Design Services (15%) | $ 979,108 |
| | Project Management (3%) | $ 195,822 |
| | Services During Construction - JEA Inspector (5%) | $ 326,369 |
| | Project Support (1.5%) | $ 97,911 |
| | Supplemental Work Authorization (3%) | $ 195,822 |
| | **Total Project Cost*** | **$ 8,126,597** |

***A 30% CONTINGENCY IS RECOMMENDED FOR APPLICATION TO THE TOTAL PROJECT COST**

# Expenditure Forecast (Traditional Design/Bid/Build)

| PROJECTED EXPENDITURE FORECAST BY FISCAL YEAR | 2020 | | | 2021 | | | | 2022 | |
|---|---|---|---|---|---|---|---|---|---|
| QUARTER | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 |
| JEA Cost & Engineering 10% | $97,910.80 | | | | | | | | |
| JEA Cost & Engineering 30% | | $195,821.61 | | | | | | | |
| JEA Cost & Engineering Final | | | $342,687.81 | $342,687.81 | | | | | |
| Construction, Engineering Services | | | | | $68,900 | $68,900 | $68,900 | $68,900 | $68,900 |
| Construction Cost | | | | | | $326,369 | $326,369 | $652,739 | $1,305,477 |
| Project Closeout | | | | | | | | | |
| **TOTAL** | **$ 97,911** | **$ 195,822** | **$ 342,688** | **$ 342,688** | **$ 68,900** | **$ 395,270** | **$ 395,270** | **$ 721,639** | **$ 1,374,378** |

| PROJECTED EXPENDITURE FORECAST BY FISCAL YEAR | 2022 | | 2023 | | | | 2024 | | Total |
|---|---|---|---|---|---|---|---|---|---|
| QUARTER | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | |
| JEA Cost & Engineering 10% | | | | | | | | | $97,910.80 |
| JEA Cost & Engineering 30% | | | | | | | | | $195,821.61 |
| JEA Cost & Engineering Final | | | | | | | | | $685,375.62 |
| Construction, Engineering Services | $68,900 | $68,900 | $68,900 | $68,900 | | | | | $620,101.75 |
| Construction Cost | $979,108 | $979,108 | $652,739 | $652,739 | | | | | $5,874,648.19 |
| Project Closeout | | | | | $652,739 | | | | $652,738.69 |
| **TOTAL** | **$1,048,008** | **$1,048,008** | **$721,639** | **$721,639** | **$652,739** | **$0** | **$0** | **$0** | **$8,126,597** |

# Expenditure Forecast (Traditional Design/Bid/Build)

| PROJECTED EXPENDITURE FORECAST BY FISCAL YEAR | 2020 | | | 2021 | | | | 2022 | |
|---|---|---|---|---|---|---|---|---|---|
| QUARTER | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 |
| JEA Cost & Engineering 10% | 10% | | | | | | | | |
| JEA Cost & Engineering 30% | | 20% | | | | | | | |
| JEA Cost & Engineering Final | | | 35% | 35% | | | | | |
| Construction, Engineering Services | | | | | 11% | 11% | 11% | 11% | 11% |
| Construction Cost | | | | | | 5% | 5% | 10% | 20% |
| Project Closeout | | | | | | | | | |
| **TOTAL** | **1%** | **2%** | **4%** | **4%** | **1%** | **5%** | **5%** | **9%** | **17%** |

| PROJECTED EXPENDITURE FORECAST BY FISCAL YEAR | 2022 | | 2023 | | | | 2024 | | Total |
|---|---|---|---|---|---|---|---|---|---|
| QUARTER | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | |
| JEA Cost & Engineering 10% | | | | | | | | | 10% |
| JEA Cost & Engineering 30% | | | | | | | | | 20% |
| JEA Cost & Engineering Final | | | | | | | | | 70% |
| Construction, Engineering Services | 11% | 11% | 11% | 11% | | | | | 100% |
| Construction Cost | 15% | 15% | 10% | 10% | | | | | 90% |
| Project Closeout | | | | | 10% | | | | 10% |
| **TOTAL** | **13%** | **13%** | **9%** | **9%** | **8%** | **0%** | **0%** | **0%** | **300%** |

# Implementation Schedule (Traditional Design/Bid/Build)

| **Project Name** | **2019** | **2020** | | | | **2021** | | |
|---|---|---|---|---|---|---|---|---|
| | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 |
| Procurement of Engineer<br>Duration = 150 Days | | | | | | | | |
| Engineering – Design<br>Duration = 210 Calendar Days | | | | | | | | |
| Procurement – Bid<br>Duration = 210 Calendar Days | | | | | | | | |
| Construction<br>Duration = 720 Calendar Days | | | | | | | | |

| **Project Name** | **2021** | **2022** | | | | **2023** | | |
|---|---|---|---|---|---|---|---|---|
| | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 |
| Procurement of Engineer<br>Duration = 150 Days | | | | | | | | |
| Engineering – Design<br>Duration = 210 Calendar Days | | | | | | | | |
| Procurement – Bid<br>Duration = 210 Calendar Days | | | | | | | | |
| Construction<br>Duration = 720 Calendar Days | | | | | | | | |

# Opinion of Probable Cost of Construction

| | | | |
|---|---|---|---|
| A | Influent Pump Station and Screenings System | $ | 1,183,533 |
| B | Parallel Wetwell, Temporary Screenings and New Pony Pump | $ | 549,386 |
| C | SBR Rehabilitation | $ | 1,307,676 |
| D | Standby Aeration System for Redundancy | $ | 131,345 |
| E | New UV Disinfection System | $ | - |
| F | Conversion of SBR 4 to Aerobic Digestion System | $ | 368,273 |
| G | Sludge Storage Tank Replacement | $ | 110,000 |
| H | Sludge Dewatering Building Improvements | $ | 166,971 |
| I | Replacement of Valves, Piping and Appurtenances | $ | 452,987 |
| J | Structural Rehabilitation Allowance | $ | 150,000 |
| K | Electrical System Improvements | $ | 546,300 |
| L | Demolition of Odor Control System | $ | 24,481 |
| M | Site Improvements | $ | 23,333 |
| | **Subtotal** | **$** | **5,014,286** |
| | General Conditions (10%) | $ | 501,429 |
| | Bond and Ins (3%) | $ | 150,429 |
| | Overhead & Profit (12%) | $ | 601,714 |
| | JEA SWA (3%) | $ | 150,429 |
| | Construction & Closeout Subtotal | $ | 6,418,286 |

| Area | Project Description | CSI Division | Description | Extended Subtotal | Sub Totals | Reference |
|---|---|---|---|---|---|---|
| **A** | **Influent Pump Station and Screenings System** | | | | $ 1,183,533 | |
| | | 1 | General Requirements | $ 55,000 | | |
| | | 2 | Site Construction | $ 11,533 | | |
| | | 3 | Concrete | $ 81,000 | | |
| | | 4 | Masonry | $ - | | |
| | | 5 | Metals | $ - | | |
| | | 9 | Finishes | $ - | | |
| | | 11 | Equipment | $ 842,000 | | |
| | | 13 | Special Construction | $ 50,000 | | |
| | | 14 | Conveying Systems | $ - | | |
| | | 15 | Mechanical | $ - | | |
| | | 16 | Electrical | $ 144,000 | | |
| **B** | **Parallel Wetwell, Temporary Screenings and New Pony Pump** | | | | $ 549,386 | |
| | | 1 | General Requirements | $ 20,000 | | |
| | | 2 | Site Construction | $ 1,148 | | |
| | | 3 | Concrete | $ 183,726 | | |
| | | 4 | Masonry | $ - | | |
| | | 5 | Metals | $ 2,400 | | |
| | | 9 | Finishes | $ 56,113 | | |
| | | 11 | Equipment | $ 286,000 | | |
| | | 13 | Special Construction | $ - | | |
| | | 14 | Conveying Systems | $ - | | |
| | | 15 | Mechanical | $ - | | |
| | | 16 | Electrical | $ - | | |
| **C** | **SBR Rehabilitation** | | | | $ 1,307,676 | |
| | | 1 | General Requirements | $ 58,000 | | |
| | | 2 | Site Construction | $ - | | |
| | | 3 | Concrete | $ 33,750 | | |
| | | 4 | Masonry | $ - | | |
| | | 5 | Metals | $ 198,326 | | |
| | | 9 | Finishes | $ 57,600 | | |
| | | 11 | Equipment | $ 910,000 | | |
| | | 13 | Special Construction | $ 50,000 | | |
| | | 14 | Conveying Systems | $ - | | |
| | | 15 | Mechanical | $ - | | |
| | | 16 | Electrical | $ - | | |

| Area | Project Description | CSI Division | Description | Extended Subtotal | Sub Totals | Reference |
|---|---|---|---|---|---|---|
| **D** | **Standby Aeration System for Redundancy** | | | | $ 131,345 | |
| | | 1 | General Requirements | $ - | | |
| | | 2 | Site Construction | $ - | | |
| | | 3 | Concrete | $ 1,185 | | |
| | | 4 | Masonry | $ - | | |
| | | 5 | Metals | $ - | | |
| | | 9 | Finishes | $ - | | |
| | | 11 | Equipment | $ 65,000 | | |
| | | 13 | Special Construction | $ - | | |
| | | 14 | Conveying Systems | $ - | | |
| | | 15 | Mechanical | $ 50,160 | | |
| | | 16 | Electrical | $ 15,000 | | |
| **E** | **New UV Disinfection System** | | | | $ - | |
| | | 1 | General Requirements | $ - | | |
| | | 2 | Site Construction | $ - | | |
| | | 3 | Concrete | $ - | | |
| | | 4 | Masonry | $ - | | |
| | | 5 | Metals | $ - | | |
| | | 9 | Finishes | $ - | | |
| | | 11 | Equipment | $ - | | |
| | | 13 | Special Construction | $ - | | |
| | | 14 | Conveying Systems | $ - | | |
| | | 15 | Mechanical | $ - | | |
| | | 16 | Electrical | $ - | | |
| **F** | **Conversion of SBR 4 to Aerobic Digestion System** | | | | $ 368,273 | |
| | | 1 | General Requirements | $ 25,000 | | |
| | | 2 | Site Construction | $ - | | |
| | | 3 | Concrete | $ 173,993 | | |
| | | 4 | Masonry | $ - | | |
| | | 5 | Metals | $ - | | |
| | | 9 | Finishes | $ 14,280 | | |
| | | 11 | Equipment | $ 140,000 | | |
| | | 13 | Special Construction | $ - | | |
| | | 14 | Conveying Systems | $ - | | |
| | | 15 | Mechanical | $ - | | |
| | | 16 | Electrical | $ 15,000 | | |

| Area | Project Description | CSI Division | Description | Extended Subtotal | Sub Totals | Reference |
|---|---|---|---|---|---|---|
| **G** | **Sludge Storage Tank Replacement** | | | | $ 110,000 | |
| | | 1 | General Requirements | $ 20,000 | | |
| | | 2 | Site Construction | $ - | | |
| | | 3 | Concrete | $ - | | |
| | | 4 | Masonry | $ - | | |
| | | 5 | Metals | $ - | | |
| | | 9 | Finishes | $ - | | |
| | | 11 | Equipment | $ - | | |
| | | 13 | Special Construction | $ 60,000 | | |
| | | 14 | Conveying Systems | $ - | | |
| | | 15 | Mechanical | $ 30,000 | | |
| | | 16 | Electrical | $ - | | |
| **H** | **Sludge Dewatering Building Improvements** | | | | $ 166,971 | |
| | | 1 | General Requirements | $ 5,000 | | |
| | | 2 | Site Construction | $ 1,067 | | |
| | | 3 | Concrete | $ 4,444 | | |
| | | 4 | Masonry | $ 18,000 | | |
| | | 5 | Metals | $ - | | |
| | | 9 | Finishes | $ 3,960 | | |
| | | 11 | Equipment | $ 65,000 | | |
| | | 13 | Special Construction | $ 39,000 | | |
| | | 14 | Conveying Systems | $ - | | |
| | | 15 | Mechanical | $ 10,000 | | |
| | | 16 | Electrical | $ 20,500 | | |
| **I** | **Replacement of Valves, Piping and Appurtenances** | | | | $ 452,987 | |
| | | 1 | General Requirements | $ 35,000 | | |
| | | 2 | Site Construction | $ - | | |
| | | 3 | Concrete | $ - | | |
| | | 4 | Masonry | $ - | | |
| | | 5 | Metals | $ 22,500 | | |
| | | 9 | Finishes | $ 20,000 | | |
| | | 11 | Equipment | $ - | | |
| | | 13 | Special Construction | $ - | | |
| | | 14 | Conveying Systems | $ - | | |
| | | 15 | Mechanical | $ 375,487 | | |
| | | 16 | Electrical | $ - | | |

| Area | Project Description | CSI Division | Description | Extended Subtotal | Sub Totals | Reference |
|---|---|---|---|---|---|---|
| **J** | **Structural Rehabilitation Allowance** | | | | $ 150,000 | |
| | | 1 | General Requirements | $ - | | |
| | | 2 | Site Construction | $ - | | |
| | | 3 | Concrete | $ 150,000 | | |
| | | 4 | Masonry | $ - | | |
| | | 5 | Metals | $ - | | |
| | | 9 | Finishes | $ - | | |
| | | 11 | Equipment | $ - | | |
| | | 13 | Special Construction | $ - | | |
| | | 14 | Conveying Systems | $ - | | |
| | | 15 | Mechanical | $ - | | |
| | | 16 | Electrical | $ - | | |
| **K** | **Electrical System Improvements** | | | | $ 546,300 | |
| | | 1 | General Requirements | $ 45,000 | | |
| | | 2 | Site Construction | $ 800 | | |
| | | 3 | Concrete | $ 6,000 | | |
| | | 4 | Masonry | $ - | | |
| | | 5 | Metals | $ - | | |
| | | 9 | Finishes | $ - | | |
| | | 11 | Equipment | $ - | | |
| | | 13 | Special Construction | $ - | | |
| | | 14 | Conveying Systems | $ - | | |
| | | 15 | Mechanical | $ - | | |
| | | 16 | Electrical | $ 494,500 | | |
| **L** | **Demolition of Odor Control System** | | | | $ 24,481 | |
| | | 1 | General Requirements | $ 15,000 | | |
| | | 2 | Site Construction | $ 9,481 | | |
| | | 3 | Concrete | $ - | | |
| | | 4 | Masonry | $ - | | |
| | | 5 | Metals | $ - | | |
| | | 9 | Finishes | $ - | | |
| | | 11 | Equipment | $ - | | |
| | | 13 | Special Construction | $ - | | |
| | | 14 | Conveying Systems | $ - | | |
| | | 15 | Mechanical | $ - | | |
| | | 16 | Electrical | $ - | | |

| Area | Project Description | CSI Division | Description | Extended Subtotal | Sub Totals | Reference |
|---|---|---|---|---|---|---|
| **M** | **Site Improvements** | | | | $ 23,333 | |
| | | 1 | General Requirements | $ - | | |
| | | 2 | Site Construction | $ 20,333 | | |
| | | 3 | Concrete | $ 3,000 | | |
| | | 4 | Masonry | $ - | | |
| | | 5 | Metals | $ - | | |
| | | 9 | Finishes | $ - | | |
| | | 11 | Equipment | $ - | | |
| | | 13 | Special Construction | $ - | | |
| | | 14 | Conveying Systems | $ - | | |
| | | 15 | Mechanical | $ - | | |
| | | 16 | Electrical | $ - | | |

**A** **Influent Pump Station and Screenings System**

Div 1 General

| General | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Dewatering of Wet Well | | | 1 | LS | $10,000 | $10,000 |
| Debris Removal | | | 1 | LS | $5,000 | $5,000 |
| Demolition and Equipment Removal | | | 1 | LS | $40,000 | $40,000 |
| | | | | SUBTOTAL | | $55,000 |

Div 2 Sitework

| Sitework | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Excavation for Piping | | | 213.33 | CY | $40 | $8,533 |
| Shoring for Piping | | | 60 | LF | $50 | $3,000 |
| | | | | SUBTOTAL | | $11,533 |

Div 3 Concrete

| Concrete | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Repair of Existing Concrete | | | 360 | SF | $225 | $81,000 |
| | | | | SUBTOTAL | | $81,000 |

Assume 3'-0" wide patch around the entire inside perimeter will require full concrete restoration.

Coating Area is as follows:

| | Length feet | Width or Height feet | No. | Area | Total Area |
|---|---|---|---|---|---|
| Bottom Slab | 25.5 | 35 | 1 | 893 | 893 |
| Wet Well Walls | 19 | 16 | 2 | 304 | 608 |
| Exterior Walls | 18.5 | 16 | 2 | 296 | 592 |
| Top Slab | 19 | 21.5 | 1 | 409 | 409 |
| Slab on Grade | 19 | 8 | 1 | | |

Div 4 Masonry

| Masonry | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Block Building | | | 0 | CY | $0 | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | SUBTOTAL | | $0 |

Div 5 Metals

| Metals | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 9 Finishes

| Finishes | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Spectrashield | | | 0 | SF | $25 | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 11 Equipment

| Equipment | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Flygt Pumps | | | 3 | EA | $ 50,000 | $150,000 |
| Slide Gates | | | 7 | EA | $ 10,000 | $70,000 |
| Mechanical Screens | | | 2 | EA | $ 165,000 | $330,000 |
| Installation | | | 1 | % | 40% | $292,000 |
| | | | | | | $0 |
| | | | | SUBTOTAL | | $842,000 |

Div 13 Special Construction

| Special Construction | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Control Panel | | | 1 | EA | $50,000 | $50,000 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $50,000 |

Div 14 Conveying Systems

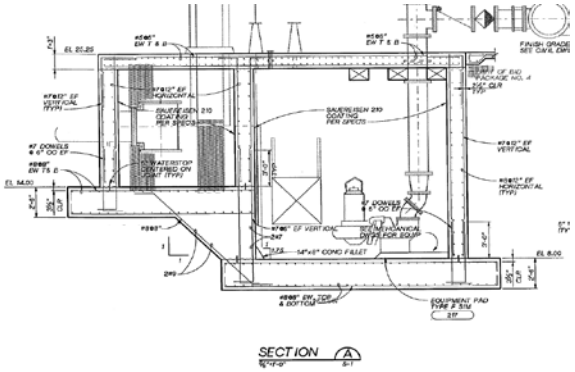
| Conveying Systems | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 15 Mechanical

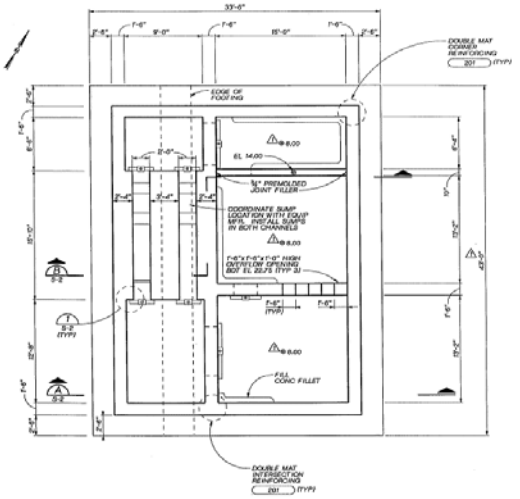
| Mechanical | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 16 Electrical

| Electrical | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Electrical | | | 1 | % | 30% | $144,000 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $144,000 |




SECTION A




PLAN AT ELEVATION 23.00

**RECORD I**

**B** **Parallel Wetwell, Temporary Screenings and New Pony Pump**

Div 1 General

| General | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Allowance to Install Screens Temporarily | | | 1 | LS | $20,000 | $20,000 |
| | | | 0 | CY | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $20,000 |

Div 2 Sitework

| Sitework | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Clearing and Grubbing | | | 0.06 | LS | $20,000 | $1,148 |
| | | | | | | |
| | | | | SUBTOTAL | | $1,148 |

Div 3 Concrete

| Concrete | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Elevated Concrete Slab | | | 19 | CY | $1,500 | $28,368 |
| Slab on Grade | | | 5 | CY | $1,000 | $4,691 |
| Slab below Grade | | | 59 | LS | $1,200 | $70,667 |
| Walls | | | 67 | CY | $1,200 | $80,000 |
| Stairway and Landing | | | | LS | $25,000 | $0 |
| Additional Handrail and Accessories | | | | LS | $25,000 | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $183,726 |

Div 4 Masonry

| Masonry | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Block Building | | | 0 | CY | $0 | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 5 Metals

| Metals | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Checkerplate Covers for Temp Screen Installation | | | 120 | SF | $20 | $2,400 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $2,400 |

Div 9 Finishes

| Finishes | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Spectrashield | | | 2245 | SF | $25 | $56,113 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $56,113 |

Div 11 Equipment

| Equipment | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Godwin CD225M Pump | | | 1 | EA | $ 220,000 | $220,000 |
| Installation Allowance | | | 30% | % | $ 220,000 | $66,000 |
| | | | | EA | | $0 |
| | | | | LF | | $0 |
| | | | | | | $0 |
| | | | | SUBTOTAL | | $286,000 |

Div 13 Special Construction

| Special Construction | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 14 Conveying Systems

| Conveying Systems | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 15 Mechanical

| Mechanical | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 16 Electrical

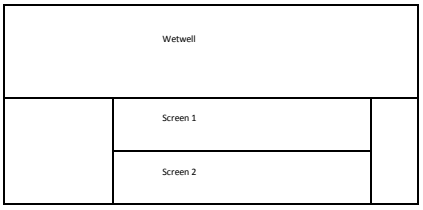
| Electrical | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Calculations:

| | |
|---|---|
| Wetwell Design Criteria | |
| Peak Hourly Flow Rate | 8000 gpm |
| Worst Case | Inflow equals half of pumping rate |
| Design Pumping Rate with One Pump | 4000 gpm |
| Design Pumping Rate with Two Pumps | 8000 gpm |
| Maximum Starts per Hour | 30 starts per hour |
| Minimum Wetwell Volume | 2000 gallons |
| Useable Depth | 4 feet |
| Length | 16 feet |
| Width | 4.177528 feet |
| Set Width | 8 feet |

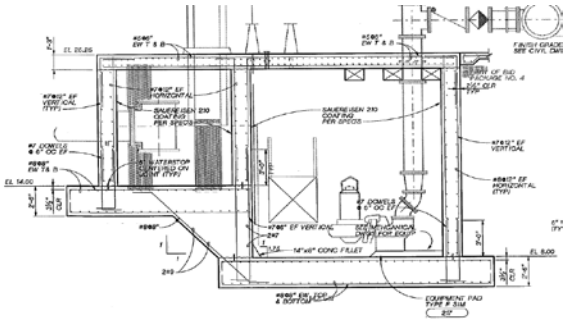
Use existing section for Developing OPP for depth and slab thickness

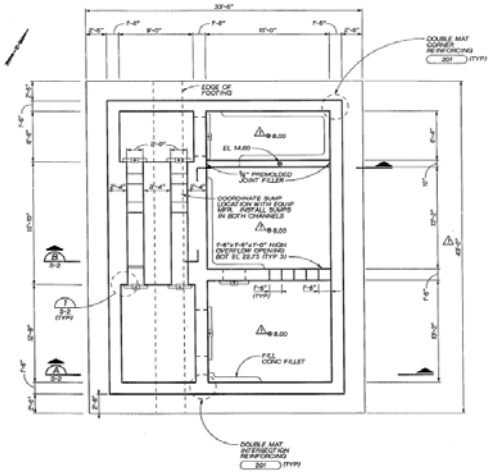
16 feet




8 feet

| | Length feet | Width or Height feet | Thickness feet | Volume cf | Volume cy | No. | Total Volur cy | Area | Total Area |
|---|---|---|---|---|---|---|---|---|---|
| Bottom Slab | 24 | 26.5 | 2.5 | 1590 | 58.9 | 1 | 58.9 | 636 | 636 |
| Exterior Walls | 19 | 16 | 1.5 | 456 | 16.9 | 2 | 33.8 | 304 | 608 |
| Exterior Walls | 18.5 | 16 | 1.5 | 444 | 16.4 | 2 | 32.9 | 296 | 592 |
| Top Slab | 19 | 21.5 | 1.25 | 511 | 18.9 | 1 | 18.9 | 409 | 409 |
| Slab on Grade | 19 | 8 | 0.83 | 127 | 4.7 | 1 | 4.7 | | |




**RECORD**

**C** **SBR Rehabilitation**

Div 1 General

| General | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Dewatering of SBRs | | | 4 | LS | $2,000 | $8,000 |
| Debris Removal | | | 1 | LS | $10,000 | $10,000 |
| Demolition and Equipment Removal | | | 4 | Days | $10,000 | $40,000 |
| | | | | SUBTOTAL | | $58,000 |

Div 2 Sitework

| Sitework | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | CY | | $0 |
| | | | | LF | | $0 |
| | | | | SUBTOTAL | | $0 |

Div 3 Concrete

| Concrete | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Repair of Existing Concrete (Allowance) | | | 150 | SF | $225 | $33,750 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | SUBTOTAL | | $33,750 |

Div 4 Masonry

| Masonry | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | CY | $0 | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 5 Metals

| Metals | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Canopy for SBR 1/2 | | | 2,590 | SF | $45 | $116,560 |
| Canopy for SBR 3/4 | | | 1,817 | SF | $45 | $81,766 |
| | | | | | | |
| | | | | SUBTOTAL | | $198,326 |

Div 9 Finishes

| Finishes | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Surface Preparation | | | 3840 | SF | $5 | $19,200 |
| High Solids Epoxy Coating | | | 3840 | SF | $10 | $38,400 |
| | | | | | | |
| | | | | SUBTOTAL | | $57,600 |

Div 11 Equipment

| Equipment | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| SBR Package (3 SBR Basins) | | | 1 | LS | ######## | $650,000 |
| Installation | | | 1 | % | 40% | $260,000 |
| | | | | EA | | $0 |
| | | | | LF | | $0 |
| | | | | | | $0 |
| | | | | SUBTOTAL | | $910,000 |

Div 13 Special Construction

| Special Construction | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Process Integration Allowance | | | 1 | LS | $50,000 | $50,000 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $50,000 |

Div 14 Conveying Systems

| Conveying Systems | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 15 Mechanical

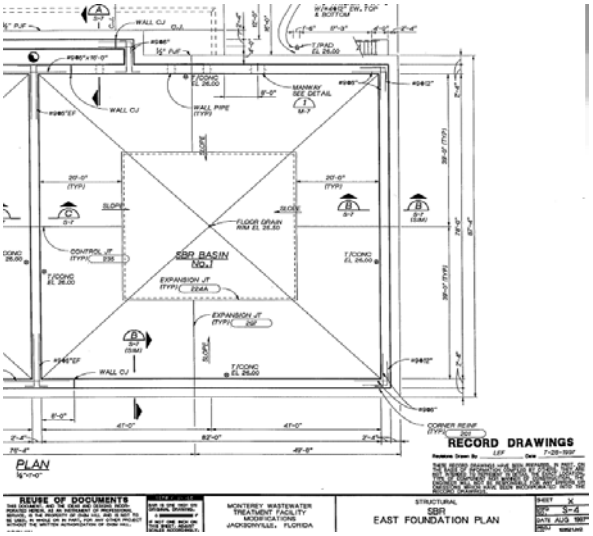
| Mechanical | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 16 Electrical

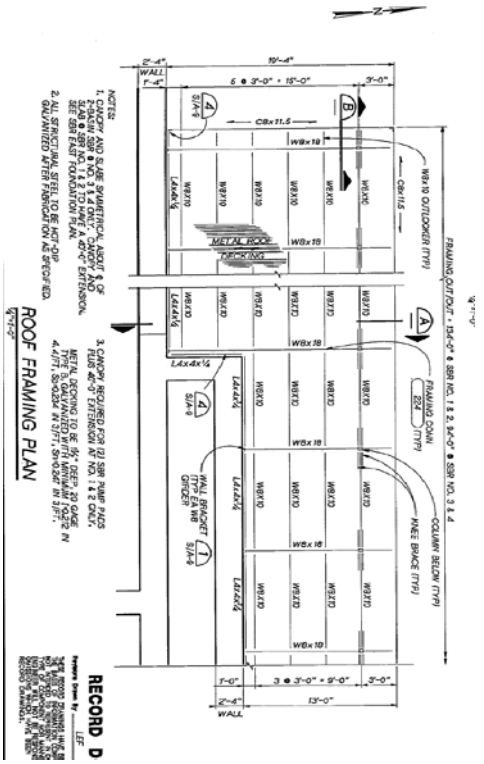
| Electrical | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Coating of Top 3 feet of Four SBRs (all same size as below)

| | Length feet | Width or Height feet | No. | Area | Total Area |
|---|---|---|---|---|---|
| Inside Wall Perimeter | 320 | 3 | 4 | 960 | 3840 |
| | | | | 0 | 0 |
| | | | | 0 | 0 |
| | | | | 0 | 0 |




| Canopy Information | Length | Width | Area |
|---|---|---|---|
| SBR 1/2 | 134 | 19.33 | 2590.22 |
| SBR 3/4 | 94 | 19.33 | 1817.02 |



**D** **Standby Aeration System for Redundancy**

Div 1 General

| General | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | 1 | LS | | $0 |
| | | | 1 | LS | | $0 |
| | | | 1 | LS | | $0 |
| | | | | **SUBTOTAL** | | **$0** |

Div 2 Sitework

| Sitework | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | CY | | $0 |
| | | | | LF | | $0 |
| | | | | **SUBTOTAL** | | **$0** |

Div 3 Concrete

| Concrete | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Housekeeping Pads | | | 1.2 | SF | $1,000 | $1,185 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | **SUBTOTAL** | | **$1,185** |

Assume 3'-0" wide patch around the entire inside perimeter will require full concrete restoration.

Coating Area is as follows:

| | Length feet | Width or Height feet | No. | Area | Total Area | |
|---|---|---|---|---|---|---|
| Bottom Slab | 25.5 | | 35 | 1 | 893 | 893 |
| Wet Well Walls | 19 | | 16 | 2 | 304 | 608 |
| Exterior Walls | 18.5 | | 16 | 2 | 296 | 592 |
| Top Slab | 19 | | 21.5 | 1 | 409 | 409 |
| Slab on Grade | 19 | | 8 | 1 | | |

Div 4 Masonry

| Masonry | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | CY | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | **SUBTOTAL** | | **$0** |

Div 5 Metals

| Metals | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | **SUBTOTAL** | | **$0** |

Div 9 Finishes

| Finishes | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | **SUBTOTAL** | | **$0** |

Div 11 Equipment

| Equipment | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Blower | | | 1 | EA | $ 50,000 | $50,000 |
| Blower Installation | | | 1 | EA | 30% | $15,000 |
| | | | | EA | | $0 |
| | | | | LF | | $0 |
| | | | | | | $0 |
| | | | | **SUBTOTAL** | | **$65,000** |

Div 13 Special Construction

| Special Construction | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | **SUBTOTAL** | | **$0** |

Div 14 Conveying Systems

| Conveying Systems | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | **SUBTOTAL** | | **$0** |

Div 15 Mechanical

| Mechanical | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| 12" SS Air Piping | | | 328 | LF | $120 | $39,360 |
| 12"x10" SS Tees | | | 4 | EA | $1,200 | $4,800 |
| 10" BF Valves | | | 4 | EA | $1,500 | $6,000 |
| | | | | **SUBTOTAL** | | **$50,160** |

Div 16 Electrical

| Electrical | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Electrical | | | 1 | % | 30% | $15,000 |
| | | | | | | $0 |
| | | | | | | |
| | | | | **SUBTOTAL** | | **$15,000** |

**E** **New UV Disinfection System**

Div 1 General

| General | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Bypass Pumping | | | | LS | $10,000 | $0 |
| Debris Removal | | | | LS | $1,000 | $0 |
| Demolition and Equipment Removal | | | | LS | $20,000 | $0 |
| | | | | SUBTOTAL | | $0 |

Div 2 Sitework

| Sitework | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Excavation for Piping | | | | CY | $40 | $0 |
| Shoring for Piping | | | | LF | $50 | $0 |
| | | | | SUBTOTAL | | $0 |

Div 3 Concrete

| Concrete | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Concrete Walls | | | | CY | $1,200 | $0 |
| Concrete Slab | | | | CY | $1,200 | $0 |
| Access Stairway and Landing | | | | LS | $35,000 | $0 |
| Housekeeping Slab for UV Modules | | | | CY | $1,000 | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Concrete Calculation

| | | |
|---|---|---|
| Number of | 2 | |
| Width | 3 | feet |
| Depth | 8 | feet |
| Freeboard | 2 | feet |
| Length | 34 | feet |
| Width of W | 12 | inches |
| Width of W | 1.00 | feet |
| Length of E | 90.00 | feet |
| Length of I | 20.00 | feet |
| Volume of | 40.74 | cy |
| Slab Thickr | 1.50 | feet |
| Slab Overh | 2.00 | feet |
| Slab Area | 949.00 | sf |
| Slab Volur | 52.72 | cy |
| Solid Grati | 42.00 | sf |
| Housekeep | 34.00 | feet |
| Housekeep | 12.00 | feet |
| Housekeep | 1.00 | feet |

Total length of outside walls (34' L x 9' W)

Div 4 Masonry

| Masonry | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | 0 | CY | $0 | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 5 Metals

| Metals | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Pre-Engineered Canopy | | | | SF | $45 | $0 |
| Solid Grating | | | | SF | $ 50 | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Canopy Calculation

Area

| | |
|---|---|
| Length | 36 |
| Width | 30 |
| Area | 1080 |

Div 9 Finishes

| Finishes | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 11 Equipment

| Equipment | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| UV Equipment | | | | LS | $435,000 | $0 |
| Isolation Slide Gates | | | | EA | $7,500 | $0 |
| Installation | | | | % | 40% | $0 |
| | | | | LF | | $0 |
| | | | | | | $0 |
| | | | | SUBTOTAL | | $0 |

Div 13 Special Construction

| Special Construction | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Hoist for UV Modules | | | | EA | $ 25,000 | $0 |
| Core Drill Existing UV Basin | | | | EA | $4,000 | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 14 Conveying Systems

| Conveying Systems | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 15 Mechanical

| Mechanical | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| 24" Piping | | | | LF | $180 | $0 |
| 24" 90 Bends | | | | EA | $1,500 | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 16 Electrical

| Electrical | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Electrical (Equipment) | | | 1 | % | 30% | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

**F** **Conversion of SBR 4 to Aerobic Digestion System**

Div 1 General

| General | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Dewatering | | | 1 | LS | $5,000 | $5,000 |
| Debris Removal | | | 1 | LS | $10,000 | $10,000 |
| Demolition and Equipment Removal | | | 1 | LS | $10,000 | $10,000 |
| | | | | SUBTOTAL | | $25,000 |

Div 2 Sitework

| Sitework | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | CY | | $0 |
| | | | | LF | | $0 |
| | | | | SUBTOTAL | | $0 |

Div 3 Concrete

| Concrete | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Repair of Existing Concrete | | | 120 | SF | $225 | $27,000 |
| Baffle Wall | | | 122 | CY | $1,200 | $146,993 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $173,993 |

Div 4 Masonry

| Masonry | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Block Building | | | 0 | CY | $0 | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 5 Metals

| Metals | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 9 Finishes

| Finishes | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| High Solids Epoxy (top 3' of interior walls | | | 1428 | SF | $10 | $14,280 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $14,280 |

Div 11 Equipment

| Equipment | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Decanter | | | 1 | EA | $ 50,000 | $50,000 |
| Blower | | | 1 | LS | $ 50,000 | $50,000 |
| Installation | | | 1 | % | 40% | $40,000 |
| | | | | LF | | $0 |
| | | | | | | $0 |
| | | | | SUBTOTAL | | $140,000 |

Div 13 Special Construction

| Special Construction | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 14 Conveying Systems

| Conveying Systems | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 15 Mechanical

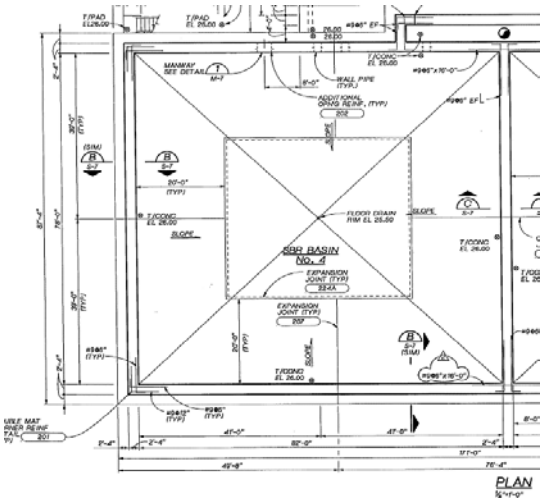
| Mechanical | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

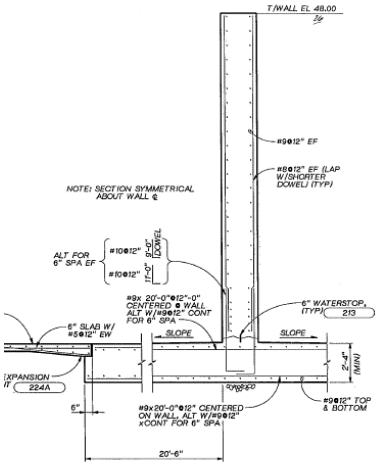
Div 16 Electrical

| Electrical | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Electrical associated with blower | | | 1 | % | $0 | $15,000 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $15,000 |

Baffle Wall Calc

| | | |
|---|---|---|
| Length | 82 | feet |
| Height | 22 | feet |
| Thickness | 1.83 | feet |
| Volume | 122.4938272 | cy |




ORD DRAWINGS

**G** **Sludge Storage Tank Replacement**

Div 1 General

| General | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Dewatering of Tank | | | 1 | LS | $10,000 | $10,000 |
| Tank Demolition | | | 1 | LS | $10,000 | $10,000 |
| | | | | | | $0 |
| | | | | **SUBTOTAL** | | **$20,000** |

Div 2 Sitework

| Sitework | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | **SUBTOTAL** | | **$0** |

Div 3 Concrete

| Concrete | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | **SUBTOTAL** | | **$0** |

Assume 3'-0" wide patch around the entire inside perimeter will require full concrete restoration.

Coating Area is as follows:

| | Length feet | Width or Height feet | No. | Area | Total Area | |
|---|---|---|---|---|---|---|
| Bottom Slab | 25.5 | | 35 | 1 | 893 | 893 |
| Wet Well Walls | 19 | | 16 | 2 | 304 | 608 |
| Exterior Walls | 18.5 | | 16 | 2 | 296 | 592 |
| Top Slab | 19 | | 21.5 | 1 | 409 | 409 |
| Slab on Grade | 19 | | 8 | 1 | | |

Div 4 Masonry

| Masonry | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | 0 | CY | $0 | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | **SUBTOTAL** | | **$0** |

Div 5 Metals

| Metals | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | **SUBTOTAL** | | **$0** |

Div 9 Finishes

| Finishes | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | **SUBTOTAL** | | **$0** |

Div 11 Equipment

| Equipment | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | EA | | $0 |
| | | | | LF | | $0 |
| | | | | | | $0 |
| | | | | **SUBTOTAL** | | **$0** |

Div 13 Special Construction

| Special Construction | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Tank | | | 60,000 | gallons | $1 | $60,000 |
| | | | | | | $0 |
| | | | | | | |
| | | | | **SUBTOTAL** | | **$60,000** |

Div 14 Conveying Systems

| Conveying Systems | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | **SUBTOTAL** | | **$0** |

Div 15 Mechanical

| Mechanical | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Piping (allowance) | | | 1 | LS | $20,000 | $20,000 |
| Valves (allowance) | | | 1 | LS | $10,000 | $10,000 |
| | | | | | | |
| | | | | **SUBTOTAL** | | **$30,000** |

Div 16 Electrical

| Electrical | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | **SUBTOTAL** | | **$0** |

**H** **Sludge Dewatering Building Improvements**

Div 1 General

| General | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| Demolition and Removal of Canopies | | | 1 | LS | $5,000 | $5,000 |
| | | | | SUBTOTAL | | $5,000 |

Div 2 Sitework

| Sitework | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Excavation for Piping | | | 26.67 | CY | $40 | $1,067 |
| | | | | | | $0 |
| | | | | SUBTOTAL | | $1,067 |

Div 3 Concrete

| Concrete | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Concrete Slab | | | 4.4 | CY | $1,000 | $4,444 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $4,444 |

Assume 3'-0" wide patch around the entire inside perimeter will require full concrete restoration.

Coating Area is as follows:

| | Length feet | Width or Height feet | No. | Area | Total Area | |
|---|---|---|---|---|---|---|
| Bottom Slab | 25.5 | | 35 | 1 | 893 | 893 |
| Wet Well Walls | 19 | | 16 | 2 | 304 | 608 |
| Exterior Walls | 18.5 | | 16 | 2 | 296 | 592 |
| Top Slab | 19 | | 21.5 | 1 | 409 | 409 |
| Slab on Grade | 19 | | 8 | 1 | | |

Div 4 Masonry

| Masonry | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Block Building | | | 120 | SF | $150 | $18,000 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $18,000 |

Div 5 Metals

| Metals | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 9 Finishes

| Finishes | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Paint Building | | | 396 | SF | $10 | $3,960 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $3,960 |

Div 11 Equipment

| Equipment | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Polymer Feed System | | | 1 | EA | $ 35,000 | $35,000 |
| Polymer Aging Tank | | | 1 | EA | $ 15,000 | $15,000 |
| Installation | | | 1 | % | 30% | $15,000 |
| | | | | LF | | $0 |
| | | | | | | $0 |
| | | | | SUBTOTAL | | $65,000 |

Div 13 Special Construction

| Special Construction | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Canopy Replacement | | | 600 | SF | $65 | $39,000 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $39,000 |

Div 14 Conveying Systems

| Conveying Systems | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 15 Mechanical

| Mechanical | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Polymer Piping Allowance | | | 1 | LS | $10,000 | $10,000 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $10,000 |

Div 16 Electrical

| Electrical | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Electrical for Polymer System | | | 1 | % | $0 | $10,500 |
| Lighting | | | 1 | LS | $10,000 | $10,000 |
| | | | | | | |
| | | | | SUBTOTAL | | $20,500 |

**I** **Replacement of Valves, Piping and Appurtenances**

Div 1 General

| General | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Pipe Dewatering Allowance | | | 1 | LS | $10,000 | $10,000 |
| Debris Removal | | | 1 | LS | $5,000 | $5,000 |
| Demolition and Equipment Removal | | | 1 | LS | $20,000 | $20,000 |
| | | | | **SUBTOTAL** | | **$35,000** |

Div 2 Sitework

| Sitework | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | **SUBTOTAL** | | **$0** |

Div 3 Concrete

| Concrete | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | **SUBTOTAL** | | **$0** |

Div 4 Masonry

| Masonry | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | **SUBTOTAL** | | **$0** |

Div 5 Metals

| Metals | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Pipe Support Replacement | | | 30 | EA | $750 | $22,500 |
| | | | | | | $0 |
| | | | | | | |
| | | | | **SUBTOTAL** | | **$22,500** |

Div 9 Finishes

| Finishes | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Painting | | | 1 | LS | $20,000 | $20,000 |
| | | | | | | $0 |
| | | | | | | |
| | | | | **SUBTOTAL** | | **$20,000** |

Div 11 Equipment

| Equipment | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | EA | | $0 |
| | | | | LF | | $0 |
| | | | | | | $0 |
| | | | | **SUBTOTAL** | | **$0** |

Div 13 Special Construction

| Special Construction | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | **SUBTOTAL** | | **$0** |

Div 14 Conveying Systems

| Conveying Systems | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | **SUBTOTAL** | | **$0** |

Div 15 Mechanical

| Mechanical | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Pipe and Valve Takeoff (See Separate Spreadsheet Takeoff) | | | 1 | LS | $288,836 | $288,836 |
| Installation | | | 1 | % | 30% | $86,651 |
| | | | | | | |
| | | | | **SUBTOTAL** | | **$375,487** |

Div 16 Electrical

| Electrical | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | **SUBTOTAL** | | **$0** |

**J** **Structural Rehabilitation Allowance**

Div 1 General

| General | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | SUBTOTAL | | $0 |

Div 2 Sitework

| Sitework | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | SUBTOTAL | | $0 |

Div 3 Concrete

| Concrete | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Structural Repair Allowance | | | 1 | LS | $150,000 | $150,000 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $150,000 |

Assume 3'-0" wide patch around the entire inside perimeter will require full concrete restoration.

Coating Area is as follows:

| | Length feet | Width or Height feet | No. | Area | Total Area | |
|---|---|---|---|---|---|---|
| Bottom Slab | 25.5 | | 35 | 1 | 893 | 893 |
| Wet Well Walls | 19 | | 16 | 2 | 304 | 608 |
| Exterior Walls | 18.5 | | 16 | 2 | 296 | 592 |
| Top Slab | 19 | | 21.5 | 1 | 409 | 409 |
| Slab on Grade | 19 | | 8 | 1 | | |

Div 4 Masonry

| Masonry | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 5 Metals

| Metals | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 9 Finishes

| Finishes | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 11 Equipment

| Equipment | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | EA | | $0 |
| | | | | LF | | $0 |
| | | | | | | $0 |
| | | | | SUBTOTAL | | $0 |

Div 13 Special Construction

| Special Construction | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 14 Conveying Systems

| Conveying Systems | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 15 Mechanical

| Mechanical | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 16 Electrical

| Electrical | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

**K** **Electrical System Improvements**

Div 1 General

| General | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | LS | | $0 |
| Debris Removal from electrical manholes | | | 1 | LS | $5,000 | $5,000 |
| Demolition and Equipment Removal | | | 1 | LS | $10,000 | $10,000 |
| Temporary Power During Generator Install | | | 1 | LS | $30,000 | $30,000 |
| | | | | **SUBTOTAL** | | **$45,000** |

Div 2 Sitework

| Sitework | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Excavation for Piping | | | 20.00 | CY | $40 | $800 |
| | | | | LF | | $0 |
| | | | | **SUBTOTAL** | | **$800** |

Div 3 Concrete

| Concrete | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Repair of Existing Gen Slab | | | 1200 | SF | $5 | $6,000 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | **SUBTOTAL** | | **$6,000** |

Assume 3'-0" wide patch around the entire inside perimeter will require full concrete restoration.

Coating Area is as follows:

| | Length feet | Width or Height feet | No. | Area | Total Area | |
|---|---|---|---|---|---|---|
| Bottom Slab | 25.5 | | 35 | 1 | 893 | 893 |
| Wet Well Walls | 19 | | 16 | 2 | 304 | 608 |
| Exterior Walls | 18.5 | | 16 | 2 | 296 | 592 |
| Top Slab | 19 | | 21.5 | 1 | 409 | 409 |
| Slab on Grade | 19 | | 8 | 1 | | |

Div 4 Masonry

| Masonry | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | 0 | CY | $0 | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | **SUBTOTAL** | | **$0** |

Div 5 Metals

| Metals | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | **SUBTOTAL** | | **$0** |

Div 9 Finishes

| Finishes | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | SF | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | **SUBTOTAL** | | **$0** |

Div 11 Equipment

| Equipment | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | EA | | $0 |
| | | | | EA | | $0 |
| | | | | EA | | $0 |
| | | | | LF | | $0 |
| | | | | | | $0 |
| | | | | **SUBTOTAL** | | **$0** |

Div 13 Special Construction

| Special Construction | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | **SUBTOTAL** | | **$0** |

Div 14 Conveying Systems

| Conveying Systems | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | **SUBTOTAL** | | **$0** |

Div 15 Mechanical

| Mechanical | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | **SUBTOTAL** | | **$0** |

Div 16 Electrical

| Electrical | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| 750 kW Generator with Tank | | | 1 | EA | $275,000 | $275,000 |
| Generator Installation and Markup | | | 1 | LS | $80,000 | $80,000 |
| Spare Circuit Breakers | | | 3 | EA | $10,000 | $30,000 |
| Replace Existing MCC | | | 1 | EA | $32,000 | $32,000 |
| Replace and/or Refurbish Control Panels (Allowance) | | | 1 | LS | $30,000 | $30,000 |
| Replace Site Lighting | | | 30 | EA | $750 | $22,500 |
| Lightning Protection System | | | 1 | LS | $25,000 | $25,000 |
| | | | | **SUBTOTAL** | | **$494,500** |

**L** **Demolition of Odor Control System**

Div 1 General

| General | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| Demolition and Equipment Removal | | | 1 | LS | $15,000 | $15,000 |
| | | | | SUBTOTAL | | $15,000 |

Div 2 Sitework

| Sitework | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Excavation and Soil Replacement | | | 237.04 | CY | $40 | $9,481 |
| | | | | | | $0 |
| | | | | SUBTOTAL | | $9,481 |

Div 3 Concrete

| Concrete | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 4 Masonry

| Masonry | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 5 Metals

| Metals | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 9 Finishes

| Finishes | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 11 Equipment

| Equipment | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | EA | | $0 |
| | | | | LF | | $0 |
| | | | | | | $0 |
| | | | | SUBTOTAL | | $0 |

Div 13 Special Construction

| Special Construction | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 14 Conveying Systems

| Conveying Systems | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 15 Mechanical

| Mechanical | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 16 Electrical

| Electrical | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Assume 3'-0" wide patch around the entire inside perimeter will require full concrete restoration.

Coating Area is as follows:

| | Length feet | Width or Height feet | No. | Area | Total Area | |
|---|---|---|---|---|---|---|
| Bottom Slab | 25.5 | | 35 | 1 | 893 | 893 |
| Wet Well Walls | 19 | | 16 | 2 | 304 | 608 |
| Exterior Walls | 18.5 | | 16 | 2 | 296 | 592 |
| Top Slab | 19 | | 21.5 | 1 | 409 | 409 |
| Slab on Grade | 19 | | 8 | 1 | | |

**M** **Site Improvements**

Div 1 General

| General | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | SUBTOTAL | | $0 |

Div 2 Sitework

| Sitework | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Pond Excavation | | | 133.33 | CY | $40 | $5,333 |
| Improvements at Sludge Handling (Allowance) | | | 1 | LS | $15,000 | $15,000 |
| | | | | SUBTOTAL | | $20,333 |

Div 3 Concrete

| Concrete | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| Diversion Curbing | | | 100 | LS | $30 | $3,000 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $3,000 |

Assume 3'-0" wide patch around the entire inside perimeter will require full concrete restoration.

Coating Area is as follows:

| | Length feet | Width or Height feet | No. | Area | Total Area | |
|---|---|---|---|---|---|---|
| Bottom Slab | 25.5 | | 35 | 1 | 893 | 893 |
| Wet Well Walls | 19 | | 16 | 2 | 304 | 608 |
| Exterior Walls | 18.5 | | 16 | 2 | 296 | 592 |
| Top Slab | 19 | | 21.5 | 1 | 409 | 409 |
| Slab on Grade | 19 | | 8 | 1 | | |

Div 4 Masonry

| Masonry | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | 0 | CY | $0 | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 5 Metals

| Metals | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 9 Finishes

| Finishes | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 11 Equipment

| Equipment | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | EA | | $0 |
| | | | | LF | | $0 |
| | | | | | | $0 |
| | | | | SUBTOTAL | | $0 |

Div 13 Special Construction

| Special Construction | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 14 Conveying Systems

| Conveying Systems | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 15 Mechanical

| Mechanical | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Div 16 Electrical

| Electrical | | | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | |
| | | | | SUBTOTAL | | $0 |

Sales Tax for Equipment and Materials

| Cost Area | Cost | Sales Tax R | Sales Tax |
|---|---|---|---|
| A | $600,000 | 7% | $42,000 |
| B | $220,000 | 7% | $15,400 |
| C | $650,000 | 7% | $45,500 |
| D | $100,160 | 7% | $7,011 |
| E | $0 | 7% | $0 |
| F | $100,000 | 7% | $7,000 |
| G | $ 60,000 | 7% | $4,200 |
| H | $ 50,000 | 7% | $3,500 |
| I | $ 288,836 | 7% | $20,219 |
| J | | 7% | $0 |
| K | $ 305,000 | 7% | $21,350 |
| L | | 7% | $0 |
| M | | 7% | $0 |
| | | | |
| Total Sales Tax | | | $166,180 |

Assumptions

| | | |
|---|---|---|
| Tank Aeration Requirement | 30 | scfm/1000 cf of tank volume |
| D24 Diffusers | 20 | scfm/diffuser |

| Wall Length to Hei | Wall Thickness | |
|---|---|---|
| >3 to 1 | 1 | inch per foot of wall heigth |
| 2 to 1 | 0.8 | inch per foot of wall heigth |
| <1 to 1 | 0.5 | inch per foot of wall heigth |

Slab Thickness must equal wall thickness as a minimum

Concrete costs

| | | |
|---|---|---|
| Elevated concrete slabs | $ | 1,500.00 |
| Walls | $ | 1,200.00 |
| Slab below Grade | $ | 1,200.00 |
| Slab on Grade | $ | 1,000.00 |
| Footers | $ | 600.00 |

Concrete Rehab

| | | | |
|---|---|---|---|
| Trowel Concrete | $ | 225 | sf |
| Liner/Coating | $ | 25 | sf |
| Epoxy Coating | $ | 10 | sf |

| | | | |
|---|---|---|---|
| Clear and Grub | $ | 20,000.00 | per acre |

Equipment Installation

| | | |
|---|---|---|
| Adder | 30% | for minor |
| | 40% | for complex |
| Electrical | 30% | of equipment |
| | 15% | overall |

| | | | |
|---|---|---|---|
| Canopy at Sludge Holding | $ | 65.00 | sf |
| Replacement Canopies and UV Canopy | $ | 45.00 | sf |
| Solid Grating | $ | 50.00 | sf |
| Concrete Block Building | $ | 150.00 | sf |

# Appendix E

## Opinion of Probably Cost for Alternative 2 (with UV System Improvements)

# Cost Estimate and Expenditure Forecast (Current $)

| ACTIVITY/ DESCRIPTION | SUB-TOTAL | TOTAL |
|---|---|---|
| Contractor Direct Cost | $ 6,314,736 | $ 6,314,736 |
| Contractor Indirect Cost | | $ 1,641,831 |
| Overhead and Profit | $ 820,916 | |
| Miscellaneous-General/Special Conditions | $ 631,474 | |
| Supplemental Work Allowance (3% max) | $ 189,442 | |
| JEA Cost and Engineering | | $ 1,949,359 |
| Engineering and Post Design Services (15%) | $ 1,193,485 | |
| Project Management (3%) | $ 238,697 | |
| Services During Construction - JEA Inspector (5%) | $ 397,828 | |
| Project Support (1.5%) | $ 119,349 | |
| Total Project Cost* | | $ 9,905,926 |

***A 30% CONTINGENCY IS RECOMMENDED FOR APPLICATION TO THE TOTAL PROJECT COST**

| | LEGEND | |
|---|---|---|
| A | Influent Pump Station and Screenings System | $ 1,183,533 |
| B | Parallel Wetwell, Temporary Screenings and New Pony Pump | $ 549,386 |
| C | SBR Rehabilitation | $ 1,307,676 |
| D | Standby Aeration System for Redundancy | $ 131,345 |
| E | New UV Disinfection System | $ 1,098,500 |
| F | Conversion of SBR 4 to Aerobic Digestion System | $ 368,273 |
| G | Sludge Storage Tank Replacement | $ 110,000 |
| H | Sludge Dewatering Building Improvements | $ 166,971 |
| I | Replacement of Valves, Piping and Appurtenances | $ 452,987 |
| J | Structural Rehabilitation Allowance | $ 150,000 |
| K | Electrical System Improvements | $ 546,300 |
| L | Demolition of Odor Control System | $ 24,481 |
| M | Site Improvements | $ 23,333 |
| | **Other** | **$ 201,950** |
| | Sales Tax 7% | $ 201,950 |
| | **Subtotal** | **$ 6,314,736** |
| | Overhead and Profit (12%) | $ 820,916 |
| | Miscellaneous-General/Special Conditions (10%) | $ 631,474 |
| | Bonds and Insurance (3%) | $ 189,442 |
| | **Construction & Closeout Subtotal** | **$ 7,956,567** |
| | Engineering and Post Design Services (15%) | $ 1,193,485 |
| | Project Management (3%) | $ 238,697 |
| | Services During Construction - JEA Inspector (5%) | $ 397,828 |
| | Project Support (1.5%) | $ 119,349 |
| | Supplemental Work Authorization (3%) | $ 238,697 |
| | **Total Project Cost*** | **$ 9,905,926** |

***A 30% CONTINGENCY IS RECOMMENDED FOR APPLICATION TO THE TOTAL PROJECT COST**

# Expenditure Forecast (Traditional Design/Bid/Build)

| PROJECTED EXPENDITURE FORECAST BY FISCAL YEAR | 2020 | | | 2021 | | | | 2022 | |
|---|---|---|---|---|---|---|---|---|---|
| QUARTER | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 |
| JEA Cost & Engineering 10% | $119,348.51 | | | | | | | | |
| JEA Cost & Engineering 30% | | $238,697.01 | | | | | | | |
| JEA Cost & Engineering Final | | | $417,719.77 | $417,719.77 | | | | | |
| Construction, Engineering Services | | | | | $83,986 | $83,986 | $83,986 | $83,986 | $83,986 |
| Construction Cost | | | | | | $397,828 | $397,828 | $795,657 | $1,591,313 |
| Project Closeout | | | | | | | | | |
| **TOTAL** | **$ 119,349** | **$ 238,697** | **$ 417,720** | **$ 417,720** | **$ 83,986** | **$ 481,814** | **$ 481,814** | **$ 879,643** | **$ 1,675,299** |

| PROJECTED EXPENDITURE FORECAST BY FISCAL YEAR | 2022 | | 2023 | | | | 2024 | | Total |
|---|---|---|---|---|---|---|---|---|---|
| QUARTER | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | |
| JEA Cost & Engineering 10% | | | | | | | | | $119,348.51 |
| JEA Cost & Engineering 30% | | | | | | | | | $238,697.01 |
| JEA Cost & Engineering Final | | | | | | | | | $835,439.54 |
| Construction, Engineering Services | $83,986 | $83,986 | $83,986 | $83,986 | | | | | $755,873.87 |
| Construction Cost | $1,193,485 | $1,193,485 | $795,657 | $795,657 | | | | | $7,160,910.37 |
| Project Closeout | | | | | $795,657 | | | | $795,656.71 |
| **TOTAL** | **$1,277,471** | **$1,277,471** | **$879,643** | **$879,643** | **$795,657** | **$0** | **$0** | **$0** | **$9,905,926** |

| PROJECTED EXPENDITURE FORECAST BY FISCAL YEAR | 2020 | | | 2021 | | | | 2022 | |
|---|---|---|---|---|---|---|---|---|---|
| QUARTER | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 |
| JEA Cost & Engineering 10% | 10% | | | | | | | | |
| JEA Cost & Engineering 30% | | 20% | | | | | | | |
| JEA Cost & Engineering Final | | | 35% | 35% | | | | | |
| Construction, Engineering Services | | | | | 11% | 11% | 11% | 11% | 11% |
| Construction Cost | | | | | | 5% | 5% | 10% | 20% |
| Project Closeout | | | | | | | | | |
| **TOTAL** | **1%** | **2%** | **4%** | **4%** | **1%** | **5%** | **5%** | **9%** | **17%** |

| PROJECTED EXPENDITURE FORECAST BY FISCAL YEAR | 2022 | | 2023 | | | | 2024 | | Total |
|---|---|---|---|---|---|---|---|---|---|
| QUARTER | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | |
| JEA Cost & Engineering 10% | | | | | | | | | 10% |
| JEA Cost & Engineering 30% | | | | | | | | | 20% |
| JEA Cost & Engineering Final | | | | | | | | | 70% |
| Construction, Engineering Services | 11% | 11% | 11% | 11% | | | | | 100% |
| Construction Cost | 15% | 15% | 10% | 10% | | | | | 90% |
| Project Closeout | | | | | 10% | | | | 10% |
| **TOTAL** | **13%** | **13%** | **9%** | **9%** | **8%** | **0%** | **0%** | **0%** | **300%** |

# Implementation Schedule (Traditional Design/Bid/Build)

| **Project Name** | **2019** | **2020** | | | | **2021** | | |
|---|---|---|---|---|---|---|---|---|
| | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 |
| Procurement of Engineer<br>Duration = 150 Days | | | | | | | | |
| Engineering – Design<br>Duration = 210 Calendar Days | | | | | | | | |
| Procurement – Bid<br>Duration = 210 Calendar Days | | | | | | | | |
| Construction<br>Duration = 720 Calendar Days | | | | | | | | |

| **Project Name** | **2021** | **2022** | | | | **2023** | | |
|---|---|---|---|---|---|---|---|---|
| | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 |
| Procurement of Engineer<br>Duration = 150 Days | | | | | | | | |
| Engineering – Design<br>Duration = 210 Calendar Days | | | | | | | | |
| Procurement – Bid<br>Duration = 210 Calendar Days | | | | | | | | |
| Construction<br>Duration = 720 Calendar Days | | | | | | | | |

# Opinion of Probable Cost of Construction

| | | | |
|---|---|---|---|
| A | Influent Pump Station and Screenings System | $ | 1,183,533 |
| B | Parallel Wetwell, Temporary Screenings and New Pony Pump | $ | 549,386 |
| C | SBR Rehabilitation | $ | 1,307,676 |
| D | Standby Aeration System for Redundancy | $ | 131,345 |
| E | New UV Disinfection System | $ | 1,098,500 |
| F | Conversion of SBR 4 to Aerobic Digestion System | $ | 368,273 |
| G | Sludge Storage Tank Replacement | $ | 110,000 |
| H | Sludge Dewatering Building Improvements | $ | 166,971 |
| I | Replacement of Valves, Piping and Appurtenances | $ | 452,987 |
| J | Structural Rehabilitation Allowance | $ | 150,000 |
| K | Electrical System Improvements | $ | 546,300 |
| L | Demolition of Odor Control System | $ | 24,481 |
| M | Site Improvements | $ | 23,333 |
| | **Subtotal** | **$** | **6,112,786** |
| | General Conditions (10%) | $ | 611,279 |
| | Bond and Ins (3%) | $ | 183,384 |
| | Overhead & Profit (12%) | $ | 733,534 |
| | JEA SWA (3%) | $ | 183,384 |
| | Construction & Closeout Subtotal | $ | 7,824,366 |

| Area | Project Description | CSI Division | Description | Extended Subtotal | Sub Totals | Reference |
|---|---|---|---|---|---|---|
| **A** | **Influent Pump Station and Screenings System** | | | | $ 1,183,533 | |
| | | 1 | General Requirements | $ 55,000 | | |
| | | 2 | Site Construction | $ 11,533 | | |
| | | 3 | Concrete | $ 81,000 | | |
| | | 4 | Masonry | $ - | | |
| | | 5 | Metals | $ - | | |
| | | 9 | Finishes | $ - | | |
| | | 11 | Equipment | $ 842,000 | | |
| | | 13 | Special Construction | $ 50,000 | | |
| | | 14 | Conveying Systems | $ - | | |
| | | 15 | Mechanical | $ - | | |
| | | 16 | Electrical | $ 144,000 | | |
| **B** | **Parallel Wetwell, Temporary Screenings and New Pony Pump** | | | | $ 549,386 | |
| | | 1 | General Requirements | $ 20,000 | | |
| | | 2 | Site Construction | $ 1,148 | | |
| | | 3 | Concrete | $ 183,726 | | |
| | | 4 | Masonry | $ - | | |
| | | 5 | Metals | $ 2,400 | | |
| | | 9 | Finishes | $ 56,113 | | |
| | | 11 | Equipment | $ 286,000 | | |
| | | 13 | Special Construction | $ - | | |
| | | 14 | Conveying Systems | $ - | | |
| | | 15 | Mechanical | $ - | | |
| | | 16 | Electrical | $ - | | |
| **C** | **SBR Rehabilitation** | | | | $ 1,307,676 | |
| | | 1 | General Requirements | $ 58,000 | | |
| | | 2 | Site Construction | $ - | | |
| | | 3 | Concrete | $ 33,750 | | |
| | | 4 | Masonry | $ - | | |
| | | 5 | Metals | $ 198,326 | | |
| | | 9 | Finishes | $ 57,600 | | |
| | | 11 | Equipment | $ 910,000 | | |
| | | 13 | Special Construction | $ 50,000 | | |
| | | 14 | Conveying Systems | $ - | | |
| | | 15 | Mechanical | $ - | | |
| | | 16 | Electrical | $ - | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **D** | **Standby Aeration System for Redundancy** | | | | $ 131,345 | |
| | | 1 | General Requirements | $ - | | |
| | | 2 | Site Construction | $ - | | |
| | | 3 | Concrete | $ 1,185 | | |
| | | 4 | Masonry | $ - | | |
| | | 5 | Metals | $ - | | |
| | | 9 | Finishes | $ - | | |
| | | 11 | Equipment | $ 65,000 | | |
| | | 13 | Special Construction | $ - | | |
| | | 14 | Conveying Systems | $ - | | |
| | | 15 | Mechanical | $ 50,160 | | |
| | | 16 | Electrical | $ 15,000 | | |
| **E** | **New UV Disinfection System** | | | | $ 1,098,500 | |
| | | 1 | General Requirements | $ 31,000 | | |
| | | 2 | Site Construction | $ 11,533 | | |
| | | 3 | Concrete | $ 162,267 | | |
| | | 4 | Masonry | $ - | | |
| | | 5 | Metals | $ 50,700 | | |
| | | 9 | Finishes | $ - | | |
| | | 11 | Equipment | $ 651,000 | | |
| | | 13 | Special Construction | $ 33,000 | | |
| | | 14 | Conveying Systems | $ - | | |
| | | 15 | Mechanical | $ 21,000 | | |
| | | 16 | Electrical | $ 138,000 | | |
| **F** | **Conversion of SBR 4 to Aerobic Digestion System** | | | | $ 368,273 | |
| | | 1 | General Requirements | $ 25,000 | | |
| | | 2 | Site Construction | $ - | | |
| | | 3 | Concrete | $ 173,993 | | |
| | | 4 | Masonry | $ - | | |
| | | 5 | Metals | $ - | | |
| | | 9 | Finishes | $ 14,280 | | |
| | | 11 | Equipment | $ 140,000 | | |
| | | 13 | Special Construction | $ - | | |
| | | 14 | Conveying Systems | $ - | | |
| | | 15 | Mechanical | $ - | | |
| | | 16 | Electrical | $ 15,000 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **G** | **Sludge Storage Tank Replacement** | | | | $ 110,000 | |
| | | 1 | General Requirements | $ 20,000 | | |
| | | 2 | Site Construction | $ - | | |
| | | 3 | Concrete | $ - | | |
| | | 4 | Masonry | $ - | | |
| | | 5 | Metals | $ - | | |
| | | 9 | Finishes | $ - | | |
| | | 11 | Equipment | $ - | | |
| | | 13 | Special Construction | $ 60,000 | | |
| | | 14 | Conveying Systems | $ - | | |
| | | 15 | Mechanical | $ 30,000 | | |
| | | 16 | Electrical | $ - | | |
| **H** | **Sludge Dewatering Building Improvements** | | | | $ 166,971 | |
| | | 1 | General Requirements | $ 5,000 | | |
| | | 2 | Site Construction | $ 1,067 | | |
| | | 3 | Concrete | $ 4,444 | | |
| | | 4 | Masonry | $ 18,000 | | |
| | | 5 | Metals | $ - | | |
| | | 9 | Finishes | $ 3,960 | | |
| | | 11 | Equipment | $ 65,000 | | |
| | | 13 | Special Construction | $ 39,000 | | |
| | | 14 | Conveying Systems | $ - | | |
| | | 15 | Mechanical | $ 10,000 | | |
| | | 16 | Electrical | $ 20,500 | | |
| **I** | **Replacement of Valves, Piping and Appurtenances** | | | | $ 452,987 | |
| | | 1 | General Requirements | $ 35,000 | | |
| | | 2 | Site Construction | $ - | | |
| | | 3 | Concrete | $ - | | |
| | | 4 | Masonry | $ - | | |
| | | 5 | Metals | $ 22,500 | | |
| | | 9 | Finishes | $ 20,000 | | |
| | | 11 | Equipment | $ - | | |
| | | 13 | Special Construction | $ - | | |
| | | 14 | Conveying Systems | $ - | | |
| | | 15 | Mechanical | $ 375,487 | | |
| | | 16 | Electrical | $ - | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **J** | **Structural Rehabilitation Allowance** | | | | $ 150,000 | |
| | | 1 | General Requirements | $ - | | |
| | | 2 | Site Construction | $ - | | |
| | | 3 | Concrete | $ 150,000 | | |
| | | 4 | Masonry | $ - | | |
| | | 5 | Metals | $ - | | |
| | | 9 | Finishes | $ - | | |
| | | 11 | Equipment | $ - | | |
| | | 13 | Special Construction | $ - | | |
| | | 14 | Conveying Systems | $ - | | |
| | | 15 | Mechanical | $ - | | |
| | | 16 | Electrical | $ - | | |
| **K** | **Electrical System Improvements** | | | | $ 546,300 | |
| | | 1 | General Requirements | $ 45,000 | | |
| | | 2 | Site Construction | $ 800 | | |
| | | 3 | Concrete | $ 6,000 | | |
| | | 4 | Masonry | $ - | | |
| | | 5 | Metals | $ - | | |
| | | 9 | Finishes | $ - | | |
| | | 11 | Equipment | $ - | | |
| | | 13 | Special Construction | $ - | | |
| | | 14 | Conveying Systems | $ - | | |
| | | 15 | Mechanical | $ - | | |
| | | 16 | Electrical | $ 494,500 | | |
| **L** | **Demolition of Odor Control System** | | | | $ 24,481 | |
| | | 1 | General Requirements | $ 15,000 | | |
| | | 2 | Site Construction | $ 9,481 | | |
| | | 3 | Concrete | $ - | | |
| | | 4 | Masonry | $ - | | |
| | | 5 | Metals | $ - | | |
| | | 9 | Finishes | $ - | | |
| | | 11 | Equipment | $ - | | |
| | | 13 | Special Construction | $ - | | |
| | | 14 | Conveying Systems | $ - | | |
| | | 15 | Mechanical | $ - | | |
| | | 16 | Electrical | $ - | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **M** | **Site Improvements** | | | | $ 23,333 | |
| | | 1 | General Requirements | $ - | | |
| | | 2 | Site Construction | $ 20,333 | | |
| | | 3 | Concrete | $ 3,000 | | |
| | | 4 | Masonry | $ - | | |
| | | 5 | Metals | $ - | | |
| | | 9 | Finishes | $ - | | |
| | | 11 | Equipment | $ - | | |
| | | 13 | Special Construction | $ - | | |
| | | 14 | Conveying Systems | $ - | | |
| | | 15 | Mechanical | $ - | | |
| | | 16 | Electrical | $ - | | |

**A** **Influent Pump Station and Screenings System**

Div 1 General

| General | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Dewatering of Wet Well | 1 | LS | $10,000 | $10,000 |
| Debris Removal | 1 | LS | $5,000 | $5,000 |
| Demolition and Equipment Removal | 1 | LS | $40,000 | $40,000 |
| | | **SUBTOTAL** | | **$55,000** |

Div 2 Sitework

| Sitework | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Excavation for Piping | 213.33 | CY | $40 | $8,533 |
| Shoring for Piping | 60 | LF | $50 | $3,000 |
| | | **SUBTOTAL** | | **$11,533** |

Div 3 Concrete

| Concrete | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Repair of Existing Concrete | 360 | SF | $225 | $81,000 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | **SUBTOTAL** | | **$81,000** |

Div 4 Masonry

| Masonry | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Block Building | 0 | CY | $0 | $0 |
| | | | | $0 |
| | | | | $0 |
| | | **SUBTOTAL** | | **$0** |

Div 5 Metals

| Metals | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | **SUBTOTAL** | | **$0** |

Div 9 Finishes

| Finishes | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Spectrashield | 0 | SF | $25 | $0 |
| | | | | $0 |
| | | **SUBTOTAL** | | **$0** |

Div 11 Equipment

| Equipment | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Flygt Pumps | 3 | EA | $ 50,000 | $150,000 |
| Slide Gates | 7 | EA | $ 10,000 | $70,000 |
| Mechanical Screens | 2 | EA | $ 165,000 | $330,000 |
| Installation | 1 | % | 40% | $292,000 |
| | | | | $0 |
| | | **SUBTOTAL** | | **$842,000** |

Div 13 Special Construction

| Special Construction | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Control Panel | 1 | EA | $50,000 | $50,000 |
| | | | | $0 |
| | | **SUBTOTAL** | | **$50,000** |

Div 14 Conveying Systems

| Conveying Systems | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | **SUBTOTAL** | | **$0** |

Div 15 Mechanical

| Mechanical | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | **SUBTOTAL** | | **$0** |

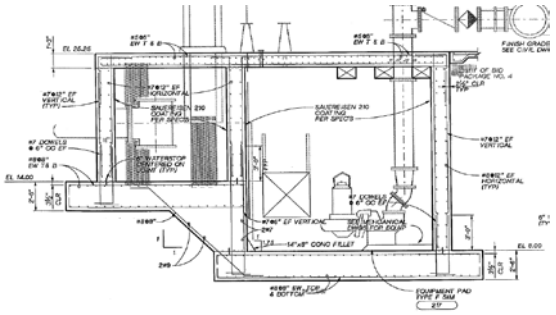
Div 16 Electrical

| Electrical | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Electrical | 1 | % | 30% | $144,000 |
| | | | | $0 |
| | | **SUBTOTAL** | | **$144,000** |

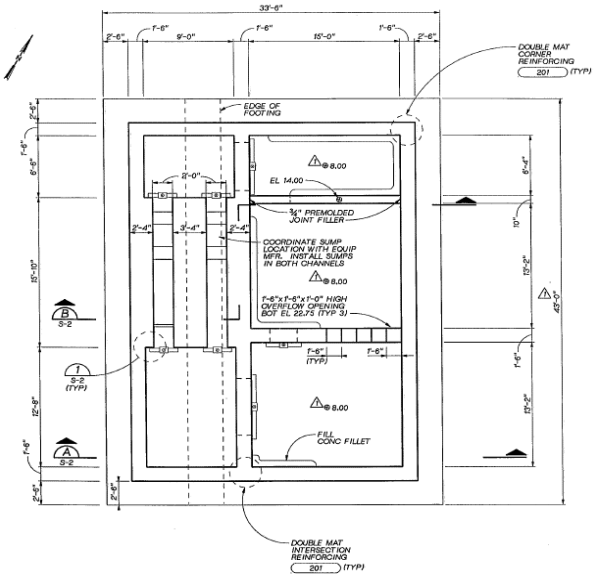
Assume 3'-0" wide patch around the entire inside perimeter will require full concrete restoration.

Coating Area is as follows:

| | Length feet | Width or Height feet | No. | Area | Total Area |
|---|---|---|---|---|---|
| Bottom Slab | 25.5 | 35 | 1 | 893 | 893 |
| Wet Well Walls | 19 | 16 | 2 | 304 | 608 |
| Exterior Walls | 18.5 | 16 | 2 | 296 | 592 |
| Top Slab | 19 | 21.5 | 1 | 409 | 409 |
| Slab on Grade | 19 | 8 | 1 | | |




SECTION A




PLAN AT ELEVATION 23.00

**RECORD I**

**B** **Parallel Wetwell, Temporary Screenings and New Pony Pump**

Div 1 General

| General | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Allowance to Install Screens Temporarily | 1 | LS | $20,000 | $20,000 |
| | 0 | CY | | $0 |
| | | | | |
| | | SUBTOTAL | | **$20,000** |

Div 2 Sitework

| Sitework | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Clearing and Grubbing | 0.06 | LS | $20,000 | $1,148 |
| | | | | |
| | | SUBTOTAL | | **$1,148** |

Div 3 Concrete

| Concrete | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Elevated Concrete Slab | 19 | CY | $1,500 | $28,368 |
| Slab on Grade | 5 | CY | $1,000 | $4,691 |
| Slab below Grade | 59 | LS | $1,200 | $70,667 |
| Walls | 67 | CY | $1,200 | $80,000 |
| Stairway and Landing | | LS | $25,000 | $0 |
| Additional Handrail and Accessories | | LS | $25,000 | $0 |
| | | | | |
| | | SUBTOTAL | | **$183,726** |

Div 4 Masonry

| Masonry | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Block Building | 0 | CY | $0 | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | **$0** |

Div 5 Metals

| Metals | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Checkerplate Covers for Temp Screen Installation | 120 | SF | $20 | $2,400 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | **$2,400** |

Div 9 Finishes

| Finishes | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Spectrashield | 2245 | SF | $25 | $56,113 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | **$56,113** |

Div 11 Equipment

| Equipment | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Godwin CD225M Pump | 1 | EA | $ 220,000 | $220,000 |
| Installation Allowance | 30% | % | $ 220,000 | $66,000 |
| | | EA | | $0 |
| | | LF | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | **$286,000** |

Div 13 Special Construction

| Special Construction | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | **$0** |

Div 14 Conveying Systems

| Conveying Systems | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | **$0** |

Div 15 Mechanical

| Mechanical | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | **$0** |

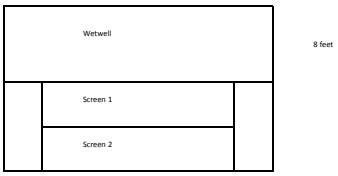
Div 16 Electrical

| Electrical | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | **$0** |

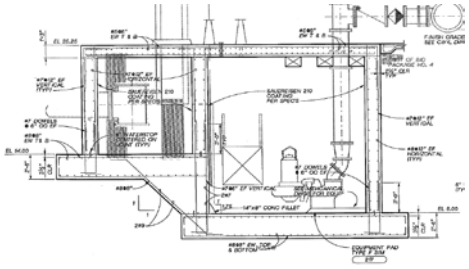
Calculations:

Wetwell Design Criteria

| | | |
|---|---|---|
| Peak Hourly Flow Rate | 8000 | gpm |
| Worst Case | Inflow equals half of pumping rate | |
| Design Pumping Rate with One Pump | 4000 | gpm |
| Design Pumping Rate with Two Pumps | 8000 | gpm |
| Maximum Starts per Hour | 30 | starts per hour |
| Minimum Wetwell Volume | 2000 | gallons |
| Useable Depth | 4 | feet |
| Length | 16 | feet |
| Width | 4.177528 | feet |
| Set Width | 8 | feet |




Use existing section for Developing OPP for depth and slab thickness



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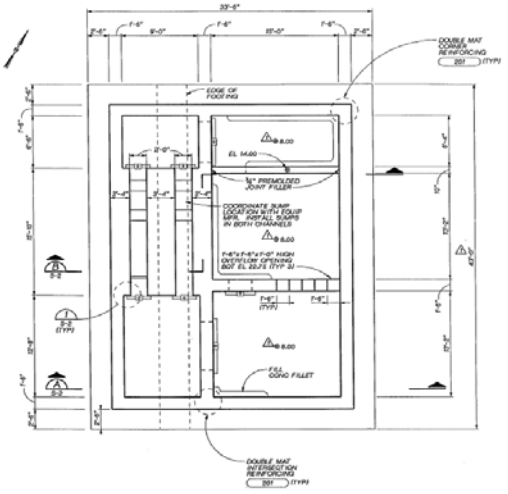



PLAN AT ELEVATION 23.00

**RECORD**

| | Length feet | Width or Height feet | Thickness feet | Volume cf | Volume cy | No. | Total Volu cy | Area | Total Area |
|---|---|---|---|---|---|---|---|---|---|
| Bottom Slab | 24 | 26.5 | 2.5 | 1590 | 58.9 | 1 | 58.9 | 636 | 636 |
| Exterior Walls | 19 | 16 | 1.5 | 456 | 16.9 | 2 | 33.8 | 304 | 608 |
| Exterior Walls | 18.5 | 16 | 1.5 | 444 | 16.4 | 2 | 32.9 | 296 | 592 |
| Top Slab | 19 | 21.5 | 1.25 | 511 | 18.9 | 1 | 18.9 | 409 | 409 |
| Slab on Grade | 19 | 8 | 0.83 | 127 | 4.7 | 1 | 4.7 | | |

**c** **SBR Rehabilitation**

Div 1 General

| General | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Dewatering of SBRs | 4 | LS | $2,000 | $8,000 |
| Debris Removal | 1 | LS | $10,000 | $10,000 |
| Demolition and Equipment Removal | 4 | Days | $10,000 | $40,000 |
| | | SUBTOTAL | | $58,000 |

Div 2 Sitework

| Sitework | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | CY | | $0 |
| | | LF | | $0 |
| | | SUBTOTAL | | $0 |

Div 3 Concrete

| Concrete | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Repair of Existing Concrete (Allowance) | 150 | SF | $225 | $33,750 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $33,750 |

Div 4 Masonry

| Masonry | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | CY | $0 | $0 |
| | | | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $0 |

Div 5 Metals

| Metals | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Canopy for SBR 1/2 | 2,590 | SF | $45 | $116,560 |
| Canopy for SBR 3/4 | 1,817 | SF | $45 | $81,766 |
| | | SUBTOTAL | | $198,326 |

Div 9 Finishes

| Finishes | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Surface Preparation | 3840 | SF | $5 | $19,200 |
| High Solids Epoxy Coating | 3840 | SF | $10 | $38,400 |
| | | SUBTOTAL | | $57,600 |

Div 11 Equipment

| Equipment | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| SBR Package (3 SBR Basins) | 1 | LS | ######## | $650,000 |
| Installation | 1 | % | 40% | $260,000 |
| | | EA | | $0 |
| | | LF | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $910,000 |

Div 13 Special Construction

| Special Construction | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Process Integration Allowance | 1 | LS | $50,000 | $50,000 |
| | | | | $0 |
| | | SUBTOTAL | | $50,000 |

Div 14 Conveying Systems

| Conveying Systems | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $0 |

Div 15 Mechanical

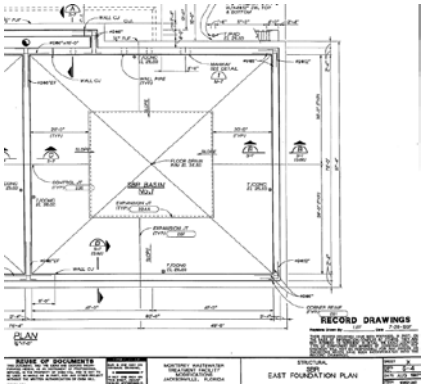
| Mechanical | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $0 |

Div 16 Electrical

| Electrical | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $0 |

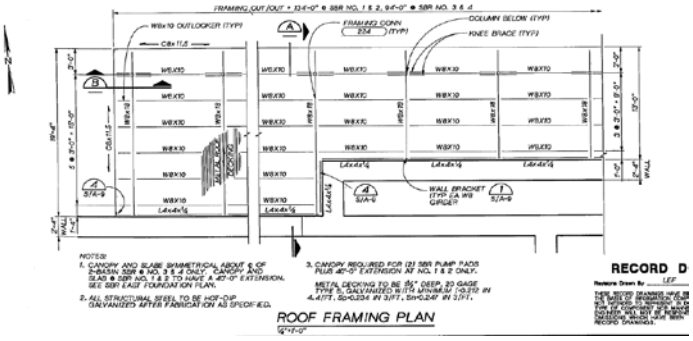
Coating of Top 3 feet of Four SBRs (all same size as below)

| | Length feet | Width or Height feet | No. | Area | Total Area |
|---|---|---|---|---|---|
| Inside Wall Perimeter | 320 | 3 | 4 | 960 | 3840 |
| | | | | 0 | 0 |
| | | | | 0 | 0 |
| | | | | 0 | 0 |




Canopy Information

| | Length | Width | Area |
|---|---|---|---|
| SBR 1/2 | 134 | 19.33 | 2590.22 |
| SBR 3/4 | 94 | 19.33 | 1817.02 |



**D** **Standby Aeration System for Redundancy**

Div 1 General

| General | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | 1 | LS | | $0 |
| | 1 | LS | | $0 |
| | 1 | LS | | $0 |
| | | SUBTOTAL | | $0 |

Div 2 Sitework

| Sitework | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | CY | | $0 |
| | | LF | | $0 |
| | | SUBTOTAL | | $0 |

Div 3 Concrete

| Concrete | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Housekeeping Pads | 1.2 | SF | $1,000 | $1,185 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $1,185 |

Div 4 Masonry

| Masonry | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | CY | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $0 |

Div 5 Metals

| Metals | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $0 |

Div 9 Finishes

| Finishes | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $0 |

Div 11 Equipment

| Equipment | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Blower | 1 | EA | $ 50,000 | $50,000 |
| Blower Installation | 1 | EA | 30% | $15,000 |
| | | EA | | $0 |
| | | LF | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $65,000 |

Div 13 Special Construction

| Special Construction | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $0 |

Div 14 Conveying Systems

| Conveying Systems | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $0 |

Div 15 Mechanical

| Mechanical | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| 12" SS Air Piping | 328 | LF | $120 | $39,360 |
| 12"x10" SS Tees | 4 | EA | $1,200 | $4,800 |
| 10" BF Valves | 4 | EA | $1,500 | $6,000 |
| | | SUBTOTAL | | $50,160 |

Div 16 Electrical

| Electrical | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Electrical | 1 | % | 30% | $15,000 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $15,000 |

Assume 3'-0" wide patch around the entire inside perimeter will require full concrete restoration.

Coating Area is as follows:

| | Length feet | Width or Height feet | No. | Area | Total Area |
|---|---|---|---|---|---|
| Bottom Slab | 25.5 | | 35 | 1 | 893 | 893 |
| Wet Well Walls | 19 | | 16 | 2 | 304 | 608 |
| Exterior Walls | 18.5 | | 16 | 2 | 296 | 592 |
| Top Slab | 19 | | 21.5 | 1 | 409 | 409 |
| Slab on Grade | 19 | | 8 | 1 | | |

**E** **New UV Disinfection System**

Div 1 General

| General | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Bypass Pumping | 1 | LS | $10,000 | $10,000 |
| Debris Removal | 1 | LS | $1,000 | $1,000 |
| Demolition and Equipment Removal | 1 | LS | $20,000 | $20,000 |
| | | SUBTOTAL | | $31,000 |

Div 2 Sitework

| Sitework | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Excavation for Piping | 213.33 | CY | $40 | $8,533 |
| Shoring for Piping | 60 | LF | $50 | $3,000 |
| | | SUBTOTAL | | $11,533 |

Div 3 Concrete

| Concrete | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Concrete Walls | 40.74 | CY | $1,200 | $48,889 |
| Concrete Slab | 53 | CY | $1,200 | $63,267 |
| Access Stairway and Landing | 1 | LS | $35,000 | $35,000 |
| Housekeeping Slab for UV Modules | 15 | CY | $1,000 | $15,111 |
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $162,267 |

Concrete Calculation

| | | | |
|---|---|---|---|
| Number of UV Channels | 2 | | |
| Width | 3 | feet | |
| Depth | 8 | feet | |
| Freeboard | 2 | feet | |
| Length | 34 | feet | |
| | | | |
| Width of Walls | 12 | inches | |
| Width of Walls | 1.00 | feet | |
| Length of Exterior Perimeter Wall | 90.00 | feet | Total length of outside walls (34' L x 9' W) |
| Length of Interior Hydrostatic Wall | 20.00 | feet | |
| Volume of Walls | 40.74 | cy | |
| Slab Thickness | 1.50 | feet | |
| Slab Overhang | 2.00 | feet | |
| Slab Area | 949.00 | sf | |
| Slab Volume | 52.72 | cy | |
| Solid Grating Area | 42.00 | sf | |
| | | | |
| Housekeeping Slab Length | 34.00 | feet | |
| Housekeeping Slab Width | 12.00 | feet | |
| Housekeeping Slab Thickness | 1.00 | feet | |

Div 4 Masonry

| Masonry | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | 0 | CY | $0 | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $0 |

Div 5 Metals

| Metals | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Pre-Engineered Canopy | 1,080 | SF | $45 | $48,600 |
| Solid Grating | 42 | SF | $ 50 | $2,100 |
| | | | | |
| | | SUBTOTAL | | $50,700 |

Canopy Calculation

Area

| | | |
|---|---|---|
| Length | 36 | |
| Width | 30 | |
| Area | 1080 | |

Div 9 Finishes

| Finishes | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $0 |

Div 11 Equipment

| Equipment | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| UV Equipment | 1 | LS | $435,000 | $435,000 |
| Isolation Slide Gates | 4 | EA | $7,500 | $30,000 |
| Installation | 1 | % | 40% | $186,000 |
| | | LF | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $651,000 |

Div 13 Special Construction

| Special Construction | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Hoist for UV Modules | 1 | EA | $ 25,000 | $25,000 |
| Core Drill Existing UV Basin | 2 | EA | $4,000 | $8,000 |
| | | | | |
| | | SUBTOTAL | | $33,000 |

Div 14 Conveying Systems

| Conveying Systems | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $0 |

Div 15 Mechanical

| Mechanical | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| 24" Piping | 100 | LF | $180 | $18,000 |
| 24" 90 Bends | 2 | EA | $1,500 | $3,000 |
| | | | | |
| | | SUBTOTAL | | $21,000 |

Div 16 Electrical

| Electrical | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Electrical (Equipment) | 1 | % | 30% | $138,000 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $138,000 |

**F** **Conversion of SBR 4 to Aerobic Digestion System**

Div 1 General

| General | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Dewatering | 1 | LS | $5,000 | $5,000 |
| Debris Removal | 1 | LS | $10,000 | $10,000 |
| Demolition and Equipment Removal | 1 | LS | $10,000 | $10,000 |
| | | SUBTOTAL | | $25,000 |

Div 2 Sitework

| Sitework | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | CY | | $0 |
| | | LF | | $0 |
| | | SUBTOTAL | | $0 |

Div 3 Concrete

| Concrete | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Repair of Existing Concrete | 120 | SF | $225 | $27,000 |
| Baffle Wall | 122 | CY | $1,200 | $146,993 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $173,993 |

Div 4 Masonry

| Masonry | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Block Building | 0 | CY | $0 | $0 |
| | | | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $0 |

Div 5 Metals

| Metals | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $0 |

Div 9 Finishes

| Finishes | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| High Solids Epoxy (top 3' of interior walls | 1428 | SF | $10 | $14,280 |
| | | | | $0 |
| | | SUBTOTAL | | $14,280 |

Div 11 Equipment

| Equipment | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Decanter | 1 | EA | $ 50,000 | $50,000 |
| Blower | 1 | LS | $ 50,000 | $50,000 |
| Installation | 1 | % | 40% | $40,000 |
| | | LF | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $140,000 |

Div 13 Special Construction

| Special Construction | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $0 |

Div 14 Conveying Systems

| Conveying Systems | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $0 |

Div 15 Mechanical

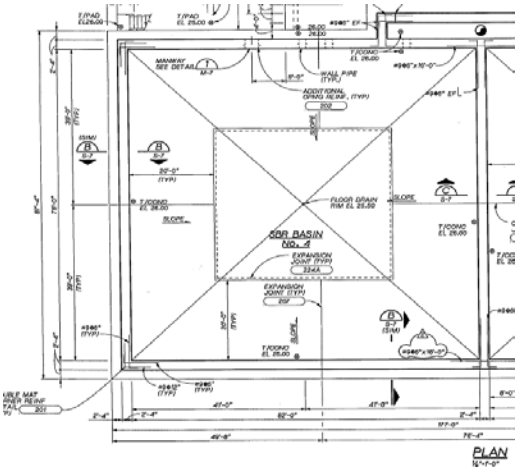
| Mechanical | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $0 |

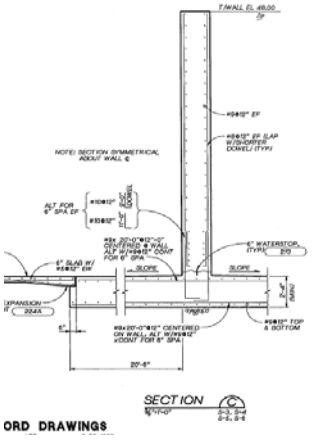
Div 16 Electrical

| Electrical | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Electrical associated with blower | 1 | % | $0 | $15,000 |
| | | | | $0 |
| | | SUBTOTAL | | $15,000 |

Baffle Wall Calc

| | | |
|---|---|---|
| Length | 82 | feet |
| Height | 22 | feet |
| Thickness | 1.83 | feet |
| Volume | 122.4938272 | cy |




ORD DRAWINGS

**G** **Sludge Storage Tank Replacement**

Div 1 General

| General | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Dewatering of Tank | 1 | LS | $10,000 | $10,000 |
| Tank Demolition | 1 | LS | $10,000 | $10,000 |
| | | | | $0 |
| | | **SUBTOTAL** | | **$20,000** |

Div 2 Sitework

| Sitework | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | **SUBTOTAL** | | **$0** |

Div 3 Concrete

| Concrete | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | **SUBTOTAL** | | **$0** |

Div 4 Masonry

| Masonry | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | 0 | CY | $0 | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | **SUBTOTAL** | | **$0** |

Div 5 Metals

| Metals | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | **SUBTOTAL** | | **$0** |

Div 9 Finishes

| Finishes | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | **SUBTOTAL** | | **$0** |

Div 11 Equipment

| Equipment | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | EA | | $0 |
| | | LF | | $0 |
| | | | | $0 |
| | | **SUBTOTAL** | | **$0** |

Div 13 Special Construction

| Special Construction | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Tank | 60,000 | gallons | $1 | $60,000 |
| | | | | $0 |
| | | | | |
| | | **SUBTOTAL** | | **$60,000** |

Div 14 Conveying Systems

| Conveying Systems | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | **SUBTOTAL** | | **$0** |

Div 15 Mechanical

| Mechanical | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Piping (allowance) | 1 | LS | $20,000 | $20,000 |
| Valves (allowance) | 1 | LS | $10,000 | $10,000 |
| | | | | |
| | | **SUBTOTAL** | | **$30,000** |

Div 16 Electrical

| Electrical | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | **SUBTOTAL** | | **$0** |

Assume 3'-0" wide patch around the entire inside perimeter will require full concrete restoration.

Coating Area is as follows:

| | Length feet | Width or Height feet | No. | Area | Total Area |
|---|---|---|---|---|---|
| Bottom Slab | 25.5 | 35 | 1 | 893 | 893 |
| Wet Well Walls | 19 | 16 | 2 | 304 | 608 |
| Exterior Walls | 18.5 | 16 | 2 | 296 | 592 |
| Top Slab | 19 | 21.5 | 1 | 409 | 409 |
| Slab on Grade | 19 | 8 | 1 | | |

**H** **Sludge Dewatering Building Improvements**

Div 1 General

| General | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| Demolition and Removal of Canopies | 1 | LS | $5,000 | $5,000 |
| | | SUBTOTAL | | $5,000 |

Div 2 Sitework

| Sitework | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Excavation for Piping | 26.67 | CY | $40 | $1,067 |
| | | | | $0 |
| | | SUBTOTAL | | $1,067 |

Div 3 Concrete

| Concrete | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Concrete Slab | 4.4 | CY | $1,000 | $4,444 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $4,444 |

Assume 3'-0" wide patch around the entire inside perimeter will require full concrete restoration.

Coating Area is as follows:

| | Length feet | Width or Height feet | No. | Area | Total Area |
|---|---|---|---|---|---|
| Bottom Slab | 25.5 | 35 | 1 | 893 | 893 |
| Wet Well Walls | 19 | 16 | 2 | 304 | 608 |
| Exterior Walls | 18.5 | 16 | 2 | 296 | 592 |
| Top Slab | 19 | 21.5 | 1 | 409 | 409 |
| Slab on Grade | 19 | 8 | 1 | | |

Div 4 Masonry

| Masonry | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Block Building | 120 | SF | $150 | $18,000 |
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $18,000 |

Div 5 Metals

| Metals | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $0 |

Div 9 Finishes

| Finishes | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Paint Building | 396 | SF | $10 | $3,960 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $3,960 |

Div 11 Equipment

| Equipment | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Polymer Feed System | 1 | EA | $ 35,000 | $35,000 |
| Polymer Aging Tank | 1 | EA | $ 15,000 | $15,000 |
| Installation | 1 | % | 30% | $15,000 |
| | | LF | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $65,000 |

Div 13 Special Construction

| Special Construction | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Canopy Replacement | 600 | SF | $65 | $39,000 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $39,000 |

Div 14 Conveying Systems

| Conveying Systems | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $0 |

Div 15 Mechanical

| Mechanical | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Polymer Piping Allowance | 1 | LS | $10,000 | $10,000 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $10,000 |

Div 16 Electrical

| Electrical | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Electrical for Polymer System | 1 | % | $0 | $10,500 |
| Lighting | 1 | LS | $10,000 | $10,000 |
| | | | | |
| | | SUBTOTAL | | $20,500 |

**I** **Replacement of Valves, Piping and Appurtenances**

Div 1 General

| General | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Pipe Dewatering Allowance | 1 | LS | $10,000 | $10,000 |
| Debris Removal | 1 | LS | $5,000 | $5,000 |
| Demolition and Equipment Removal | 1 | LS | $20,000 | $20,000 |
| | | SUBTOTAL | | $35,000 |

Div 2 Sitework

| Sitework | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $0 |

Div 3 Concrete

| Concrete | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $0 |

Div 4 Masonry

| Masonry | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $0 |

Div 5 Metals

| Metals | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Pipe Support Replacement | 30 | EA | $750 | $22,500 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $22,500 |

Div 9 Finishes

| Finishes | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Painting | 1 | LS | $20,000 | $20,000 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $20,000 |

Div 11 Equipment

| Equipment | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | EA | | $0 |
| | | LF | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $0 |

Div 13 Special Construction

| Special Construction | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $0 |

Div 14 Conveying Systems

| Conveying Systems | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $0 |

Div 15 Mechanical

| Mechanical | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Pipe and Valve Takeoff (See Separate Spreadsheet Takeoff) | 1 | LS | $288,836 | $288,836 |
| Installation | 1 | % | 30% | $86,651 |
| | | | | |
| | | SUBTOTAL | | $375,487 |

Div 16 Electrical

| Electrical | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $0 |

**J** **Structural Rehabilitation Allowance**

Div 1 General

| General | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $0 |

Div 2 Sitework

| Sitework | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $0 |

Div 3 Concrete

| Concrete | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Structural Repair Allowance | 1 | LS | $150,000 | $150,000 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $150,000 |

Assume 3'-0" wide patch around the entire inside perimeter will require full concrete restoration.

Coating Area is as follows:

| | Length feet | Width or Height feet | No. | Area | Total Area |
|---|---|---|---|---|---|
| Bottom Slab | 25.5 | | 35 | 1 | 893 | 893 |
| Wet Well Walls | 19 | | 16 | 2 | 304 | 608 |
| Exterior Walls | 18.5 | | 16 | 2 | 296 | 592 |
| Top Slab | 19 | | 21.5 | 1 | 409 | 409 |
| Slab on Grade | 19 | | 8 | 1 | | |

Div 4 Masonry

| Masonry | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $0 |

Div 5 Metals

| Metals | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $0 |

Div 9 Finishes

| Finishes | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $0 |

Div 11 Equipment

| Equipment | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | EA | | $0 |
| | | LF | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $0 |

Div 13 Special Construction

| Special Construction | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $0 |

Div 14 Conveying Systems

| Conveying Systems | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $0 |

Div 15 Mechanical

| Mechanical | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $0 |

Div 16 Electrical

| Electrical | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $0 |

**K** **Electrical System Improvements**

Div 1 General

| General | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | LS | | $0 |
| Debris Removal from electrical manholes | 1 | LS | $5,000 | $5,000 |
| Demolition and Equipment Removal | 1 | LS | $10,000 | $10,000 |
| Temporary Power During Generator Install | 1 | LS | $30,000 | $30,000 |
| | | **SUBTOTAL** | | **$45,000** |

Div 2 Sitework

| Sitework | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Excavation for Piping | 20.00 | CY | $40 | $800 |
| | | LF | | $0 |
| | | **SUBTOTAL** | | **$800** |

Div 3 Concrete

| Concrete | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Repair of Existing Gen Slab | 1200 | SF | $5 | $6,000 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | **SUBTOTAL** | | **$6,000** |

Assume 3'-0" wide patch around the entire inside perimeter will require full concrete restoration.

Coating Area is as follows:

| | Length feet | Width or Height feet | No. | Area | Total Area |
|---|---|---|---|---|---|
| Bottom Slab | 25.5 | 35 | 1 | 893 | 893 |
| Wet Well Walls | 19 | 16 | 2 | 304 | 608 |
| Exterior Walls | 18.5 | 16 | 2 | 296 | 592 |
| Top Slab | 19 | 21.5 | 1 | 409 | 409 |
| Slab on Grade | 19 | 8 | 1 | | |

Div 4 Masonry

| Masonry | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | 0 | CY | $0 | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | **SUBTOTAL** | | **$0** |

Div 5 Metals

| Metals | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | **SUBTOTAL** | | **$0** |

Div 9 Finishes

| Finishes | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | SF | | $0 |
| | | | | $0 |
| | | | | |
| | | **SUBTOTAL** | | **$0** |

Div 11 Equipment

| Equipment | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | EA | | $0 |
| | | EA | | $0 |
| | | EA | | $0 |
| | | LF | | $0 |
| | | | | $0 |
| | | **SUBTOTAL** | | **$0** |

Div 13 Special Construction

| Special Construction | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | **SUBTOTAL** | | **$0** |

Div 14 Conveying Systems

| Conveying Systems | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | **SUBTOTAL** | | **$0** |

Div 15 Mechanical

| Mechanical | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | **SUBTOTAL** | | **$0** |

Div 16 Electrical

| Electrical | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| 750 kW Generator with Tank | 1 | EA | $275,000 | $275,000 |
| Generator Installation and Markup | 1 | LS | $80,000 | $80,000 |
| Spare Circuit Breakers | 3 | EA | $10,000 | $30,000 |
| Replace Existing MCC | 1 | EA | $32,000 | $32,000 |
| Replace and/or Refurbish Control Panels (Allowance) | 1 | LS | $30,000 | $30,000 |
| Replace Site Lighting | 30 | EA | $750 | $22,500 |
| Lightning Protection System | 1 | LS | $25,000 | $25,000 |
| | | **SUBTOTAL** | | **$494,500** |

**L** **Demolition of Odor Control System**

Div 1 General

| General | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| Demolition and Equipment Removal | 1 | LS | $15,000 | $15,000 |
| | | **SUBTOTAL** | | **$15,000** |

Div 2 Sitework

| Sitework | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Excavation and Soil Replacement | 237.04 | CY | $40 | $9,481 |
| | | | | $0 |
| | | **SUBTOTAL** | | **$9,481** |

Div 3 Concrete

| Concrete | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | **SUBTOTAL** | | **$0** |

Assume 3'-0" wide patch around the entire inside perimeter will require full concrete restoration.

Coating Area is as follows:

| | Length feet | Width or Height feet | No. | Area | Total Area |
|---|---|---|---|---|---|
| Bottom Slab | 25.5 | 35 | 1 | 893 | 893 |
| Wet Well Walls | 19 | 16 | 2 | 304 | 608 |
| Exterior Walls | 18.5 | 16 | 2 | 296 | 592 |
| Top Slab | 19 | 21.5 | 1 | 409 | 409 |
| Slab on Grade | 19 | 8 | 1 | | |

Div 4 Masonry

| Masonry | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | **SUBTOTAL** | | **$0** |

Div 5 Metals

| Metals | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | **SUBTOTAL** | | **$0** |

Div 9 Finishes

| Finishes | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | **SUBTOTAL** | | **$0** |

Div 11 Equipment

| Equipment | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | EA | | $0 |
| | | LF | | $0 |
| | | | | $0 |
| | | **SUBTOTAL** | | **$0** |

Div 13 Special Construction

| Special Construction | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | **SUBTOTAL** | | **$0** |

Div 14 Conveying Systems

| Conveying Systems | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | **SUBTOTAL** | | **$0** |

Div 15 Mechanical

| Mechanical | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | **SUBTOTAL** | | **$0** |

Div 16 Electrical

| Electrical | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | **SUBTOTAL** | | **$0** |

**M** **Site Improvements**

Div 1 General

| General | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $0 |

Div 2 Sitework

| Sitework | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Pond Excavation | 133.33 | CY | $40 | $5,333 |
| Improvements at Sludge Handling (Allowance) | 1 | LS | $15,000 | $15,000 |
| | | SUBTOTAL | | $20,333 |

Div 3 Concrete

| Concrete | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| Diversion Curbing | 100 | LS | $30 | $3,000 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $3,000 |

Assume 3'-0" wide patch around the entire inside perimeter will require full concrete restoration.

Coating Area is as follows:

| | Length feet | Width or Height feet | No. | Area | Total Area |
|---|---|---|---|---|---|
| Bottom Slab | 25.5 | 35 | 1 | 893 | 893 |
| Wet Well Walls | 19 | 16 | 2 | 304 | 608 |
| Exterior Walls | 18.5 | 16 | 2 | 296 | 592 |
| Top Slab | 19 | 21.5 | 1 | 409 | 409 |
| Slab on Grade | 19 | 8 | 1 | | |

Div 4 Masonry

| Masonry | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | 0 | CY | $0 | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $0 |

Div 5 Metals

| Metals | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $0 |

Div 9 Finishes

| Finishes | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $0 |

Div 11 Equipment

| Equipment | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | EA | | $0 |
| | | LF | | $0 |
| | | | | $0 |
| | | SUBTOTAL | | $0 |

Div 13 Special Construction

| Special Construction | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $0 |

Div 14 Conveying Systems

| Conveying Systems | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $0 |

Div 15 Mechanical

| Mechanical | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $0 |

Div 16 Electrical

| Electrical | QUANTITY | UNIT | UNIT $ | $ |
|---|---|---|---|---|
| | | | | $0 |
| | | | | $0 |
| | | | | |
| | | SUBTOTAL | | $0 |

Sales Tax for Equipment and Materials

| Cost Area | Cost | Sales Tax R | Sales Tax |
|---|---|---|---|
| A | $600,000 | 7% | $42,000 |
| B | $220,000 | 7% | $15,400 |
| C | $650,000 | 7% | $45,500 |
| D | $100,160 | 7% | $7,011 |
| E | $511,000 | 7% | $35,770 |
| F | $100,000 | 7% | $7,000 |
| G | $ 60,000 | 7% | $4,200 |
| H | $ 50,000 | 7% | $3,500 |
| I | $ 288,836 | 7% | $20,219 |
| J | | 7% | $0 |
| K | $ 305,000 | 7% | $21,350 |
| L | | 7% | $0 |
| M | | 7% | $0 |
| | | | |
| Total Sales Tax | | | $201,950 |

Assumptions

| | | |
|---|---|---|
| Tank Aeration Requirement | 30 | scfm/1000 cf of tank volume |
| D24 Diffusers | 20 | scfm/diffuser |

| Wall Length to Hei | Wall Thickness | |
|---|---|---|
| >3 to 1 | 1 | inch per foot of wall heigth |
| 2 to 1 | 0.8 | inch per foot of wall heigth |
| <1 to 1 | 0.5 | inch per foot of wall heigth |

Slab Thickness must equal wall thickness as a minimum

Concrete costs

| | | |
|---|---|---|
| Elevated concrete slabs | $ | 1,500.00 |
| Walls | $ | 1,200.00 |
| Slab below Grade | $ | 1,200.00 |
| Slab on Grade | $ | 1,000.00 |
| Footers | $ | 600.00 |

Concrete Rehab

| | | | |
|---|---|---|---|
| Trowel Concrete | $ | 225 | sf |
| Liner/Coating | $ | 25 | sf |
| Epoxy Coating | $ | 10 | sf |

| | | | |
|---|---|---|---|
| Clear and Grub | $ | 20,000.00 | per acre |

Equipment Installation

| | | |
|---|---|---|
| Adder | 30% | for minor |
| | 40% | for complex |
| Electrical | 30% | of equipment |
| | 15% | overall |

| | | | |
|---|---|---|---|
| Canopy at Sludge Holding | $ | 65.00 | sf |
| Replacement Canopies and UV Canopy | $ | 45.00 | sf |
| Solid Grating | $ | 50.00 | sf |
| Concrete Block Building | $ | 150.00 | sf |