Knoxville Utilities Board

Revised Composite Correction Plan

CDM

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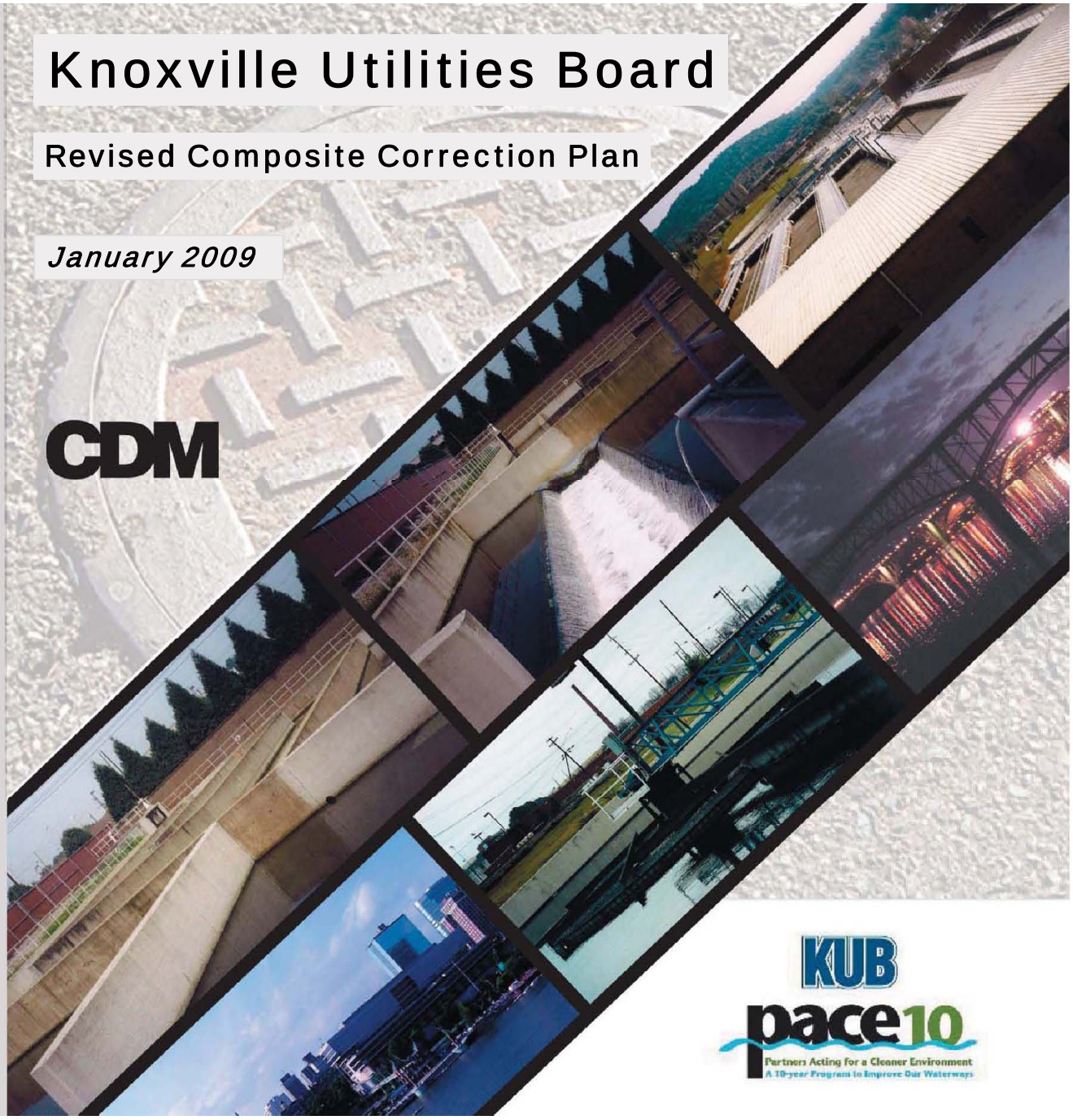
## Revised Composite Correction Plan

*January 2009*

CDM



KUB pace10 Partners Acting for a Cleaner Environment
A 10-year Program to Improve Our Waterways

# Knoxville Utilities Board

## *Composite Correction Plan*

**Submitted to EPA on January 5, 2009**

KUB

pace10

Partners Acting for a Cleaner Environment
A 10-year Program to Improve Our Waterways

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*I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering such information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.*

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# Section 1
# Introduction

## 1.1 Overview

Section VII.D.1.(a)(v) of the Consent Decree (CD) requires KUB to complete a Composite Correction Plan (CCP) for the Kuwahee Wastewater Treatment Plant (KWWTP), Fourth Creek Wastewater Treatment Plant (FCWWTP) and the Loves Creek Wastewater Treatment Plant (LCWWTP). Pertinent CD language describing the CCP is provided below:

> *"The purpose of the CCP is to identify rehabilitation and/or upgrades to the Kuwahee, Fourth Creek and Loves Creek WWTPs to address the problems identified in the CPE. To the extent applicable, the CCP shall be consistent with the EPA publications Improving POTW Performance Using the Composite Correction Approach, EPA CERI, October 1984, and Retrofitting POTWs, EPA CERI, July 1989; and the Tennessee Design Criteria in accordance with Tenn. Comp. R. & Reg., ch. 1200-4-.03. The CCP shall: (A) address all factors which limit or which could limit a WWTP's operating efficiency and/or the ability to achieve NPDES Permit compliance; (B) address the peak flow handling procedures and peak flow capacity of the WWTP; and (C) identify specific actions and schedules to correct each limiting factor, including capital improvements to the existing WWTP where appropriate. The CCP shall evaluate all appropriate alternatives and provide schedules for achieving compliance. KUB has represented that the Eastbridge WWTP is not designed for Diversions. KUB shall not cause any Diversions to occur at the Eastbridge WWTP. In the event that there are changes in the law or any NPDES Permit that require modifications to the CCP prior to or during implementation of the CCP, KUB shall submit such CCP modifications as a Deliverable subject to Review Level 1 within a reasonable time to be determined by KUB and EPA, after consultation with the TDEC. After approval, KUB shall implement the modified CCP."*

As described above, the CCP is the performance improvement plan that results from the Comprehensive Performance Evaluation (CPE), which was previously approved by EPA.

## 1.2 Related Consent Decree Programs

This CCP is consistent with other programs that have been developed and approved by EPA to comply with the CD, specifically the Comprehensive Performance Evaluation (CPE), the Process Control Program (PCP) and the Capacity Assurance Program (CAP). These programs are described below:

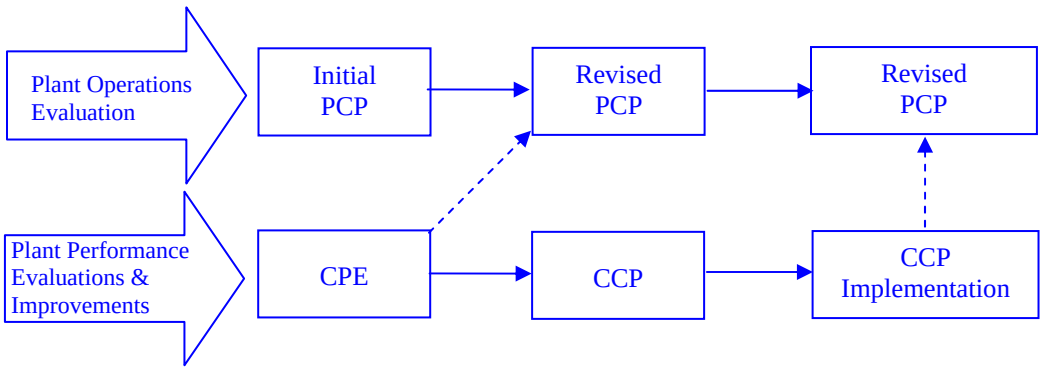
*Comprehensive Performance Evaluation (CPE)* - The CPE required an in-depth diagnostic evaluation of the capacity and operation of each of the identified WWTPs and their ability to meet all terms of the NPDES Permits. The CPE established a schedule and procedures that KUB will use to prepare a Composite Correction Plan (CCP) based on

the results of the CPE. The CPE employs flow modeling and other appropriate techniques to evaluate WWTP capacity and operation, taking into account the net (cumulative) increase or decrease to the existing volume of wastewater introduced to the WWTP as a result of KUB's actual and anticipated increases in flow from the authorization of new sewer service connections and/or from existing sewer service connections, and the reduction of I/I into the WCTS. The CPE identifies the flow at which each of the identified WWTPs is designed to operate without experiencing a SSO or a Diversion prohibited under the NPDES Permits.

*Process Controls Program (PCP)* – The Consent Decree (CD) requires development of a PCP for the Kuwahee, Fourth Creek, and Loves Creek wastewater treatment plants (WWTPs). The PCP consists of standard procedures for wet weather flow operating conditions, along with supporting documentation to optimize treatment of wastewater with existing facilities in order to achieve NPDES Permits compliance. The standard procedures consist of checklists and flow charts and have been developed to base operational decision-making on parameters including plant flow, mixed liquor suspended solids (MLSS), clarifier sludge blanket levels, and other operational conditions including, but not limited to, status of on-site storage basins. Specifically, the procedures address when to initiate and conclude Diversions in accordance with the requirements of the currently applicable NPDES Permits. [Ref. CD Section VII.D.2.(b)]

*Capacity Assurance Program (CAP)* – The CPE considers anticipated future changes in flows which are authorized under the CAP. This program requires KUB to certify that there is sufficient capacity (collection system, transmission system and treatment capacity) for all new building connections or increases in flow from existing connections, within the constraints defined in the CD. In the event capacity for additional flow cannot be certified, the additional flow can only be approved if KUB documents that a multiple of the new flow has been removed from the system. The CAP was developed concurrently with the CPE. The CPE established the treatment capacities and current flow and loading conditions to be included in the CAP. Current and future flow conditions were established by the Corrective Action Plan/Engineering Report (CAP/ER).

The CPE, the PCP, and the CAP have been approved by EPA. The graphic below illustrates the relationship between the CPE, PCP and CCP components of the CD.



The initial PCP will be revised as appropriate to reflect the capacities of all unit processes, and action levels will be confirmed or revised.

# 1.3 CPE Summary and Conclusions

## 1.3.1 CPE Summary

The EPA-approved CPE includes physical facilities evaluations, process performance evaluations, NPDES Permits compliance summaries, mass balances, flow analyses, hydraulic analyses, process modeling results, and an evaluation of KUB's administration, operations and maintenance practice. To summarize:

- the facilities are adequately operated and maintained by capable staff that are supported appropriately by KUB administration;
- the facilities are capable of consistent compliance with currently applicable NPDES Permits during dry weather conditions;
- implementation of the PCP will improve compliance by existing facilities with currently applicable NPDES Permits during wet weather conditions;
- additional hydraulic capacity and treatment capacity (or nearby storage) are required at KWWTP and FCWWTP for peak wet weather flows to avoid SSOs under a design storm condition and to eliminate Diversions prohibited under the NPDES Permits;
- the LCWWTP has adequate capacity to consistently meet all provisions of the currently applicable permits and therefore is not included in the CCP evaluation; and
- several process control and operational improvement opportunities have been identified and upon implementation will enhance process performance, reliability and permit compliance.

The CCP approach for each plant is determined by the CPE rating (Type 1, 2 or 3). The CPE ratings and CCP approach are summarized below:

KWWTP – Type 3: Several unit processes do not have adequate capacity for existing peak flows and capital improvements are needed, pending comprehensive evaluation of alternatives under the CCP. Potential performance limiting factors related to administration, operations, and maintenance will be addressed through implementation of and revisions to the PCP.

FCWWTP – Type 3: Several unit processes do not have adequate capacity for existing peak flows and capital improvements are needed, pending comprehensive evaluation of alternatives under the CCP. Potential performance limiting factors related to administration, operations, and maintenance will be addressed through implementation of and revisions to the PCP.

LCWWTP – Type 1: All unit processes have adequate capacity for current and planning term flows including peak wet weather flows, and are operated to comply with the currently applicable permit. Potential performance limiting factors related to administration, operations, and maintenance will be addressed through implementation of and revisions to the PCP. A CCP is not required for the LCWWTP as approved by the USEPA.

Primary performance limiting factors identified for the KWWTP and the FCWWTP relate to their ability to process peak wet weather flows, and to meet currently applicable NPDES Permits requirements under these conditions. These deficiencies will require significant capital improvements and will be the focus of the CCP. Other performance limiting factors associated with these plants will be addressed as ancillary improvements associated with major, minor and/or routine capital improvements, or as ongoing improvements in administration, operations, and maintenance, including continued refinement of the PCP.

### 1.3.2 CPE Conclusions

Conventional flow rating for WWTPs is based on average daily flow, which is the basis for monthly and weekly effluent limits (concentrations, mass loadings). The determination of this potential design flow capacity is dependent on BOD/CBOD and TSS loadings, and process performance characteristics (primary clarifier removal efficiency, SVI, sludge yield, etc.). However, process control issues can limit the ability of a plant to operate efficiently, especially at high flows. NPDES Permits have provisions that address SSOs; Diversions; and daily limits for BOD/CBOD, TSS, and SS including during peak flow conditions.

The determination of a single specific peak flow capacity for the KUB plants is difficult for several reasons:

1. The plants were originally designed and approved for Diversion of peak wet weather flows that exceed the capacity of biological treatment.

2. The capacity of biological treatment facilities is dependent on flows and loads, RAS rate, aeration basin operation, clarifier performance, and other related factors.

3. The KWWTP features 6.5 mg of in-plant storage that enables flows that exceed biological capacity to be stored and processed when peak flows decline.

4. Different peak flows can be accommodated for different durations; the higher the peak, the shorter the duration.

5. Out-of-service process units can result in reduced peak flow capacity.

Based on the analyses presented in the CPE, the following conclusions related to plant capacity and NPDES Permits compliance were identified:

## KWWTP Capacity

- Based on current wastewater characteristics and plant performance, the annual average daily biological treatment capacity is estimated to be 50 mgd. Firm aeration capacity may not be sufficient for peak oxygen demands, however there is no indication this has been a problem.

- The firm hydraulic capacity is 113 mgd based on influent pumping (3 of 4 pumps operating at current low wetwell level). However, flows that exceed 113 mgd are occasionally pumped by operating at a higher wetwell level, and/or use of all four pumps. The firm capacity can be increased to 120 mgd by raising the wetwell operating level.

- The firm capacity of the intermediate pump station (4 of 5 pumps operating at low wetwell level that pumps flow to biological treatment) is 76 mgd. However, flows that exceed 76 mgd are occasionally pumped by operating at a higher wetwell level, and/or use of all five pumps.

- Flows through primary treatment are typically limited to 70 to 72 mgd because of hydraulic constraints. Additional flows to the primary clarifiers can be achieved when the Diversion gate is open; however there is no current benefit to this because diverted primary effluent can result in exceedances of TSS effluent limits.

- Based on recent operating experience and process modeling, peak flows of 80 to 90 mgd can be treated by the biological system for short durations (up to 3 to 4 hours).

- Process control problems related to distribution of flow to and removal of sludge from the final clarifiers impacts biological process performance during high flow conditions.

- There are several process control problems (flooded Parshall flumes) when influent pumping rate exceeds approximately 100 mgd.

- SSOs can be expected to occur occasionally based on a maximum influent pumping capacity of 120 mgd based on existing conditions; however they should not occur during a design storm event.

- Diversions occur occasionally with full implementation of the PCP based on current conditions. All Diversions have been in full compliance with the PCP.

Specific KWWTP performance issues identified in the CPE are summarized in **Table 1-1**.

**Table 1-1**
**CCP Summary of WWTP Performance Issues - KWWTP**

| Process | Current Performance Issue | Potential Impact(s) | CPE Rating[(1)] | CCP Elements |
|---|---|---|---|---|
| Influent Pumping | Peak wet weather flow exceeds firm capacity. | Unpermitted Discharge. | B | Evaluate alternatives to increase capacity. |
| Screening | Peak wet weather flow may exceed firm capacity. | Unpermitted Discharge. | C | Evaluate alternatives to increase capacity if needed. |
| Grit Removal | Peak wet weather flow may exceed firm capacity. | Unpermitted Discharge. | C | Evaluate alternatives to increase capacity if needed. |
| Primary Clarifiers | Hydraulics limit peak wet weather flow to less than peak process capacity. | High CBOD/TSS loads to secondary treatment. | B | Evaluate alternatives to increase capacity. |
| | Poor effluent quality during wet weather flows. | Effluent limit violations during Diversion. | B | Evaluate alternatives to improve performance. |
| Biological Treatment | Capacity limited to 50 mgd (ADF) and 80 to 90 mgd peak flow (3 to 4 hours). | Washout; Diversion; effluent violations. | C | Evaluate alternatives to increase capacity. |
| | Flow distribution to final clarifiers results in variable sludge blanket levels. | Effluent violations. | B | Evaluate alternatives to improve flow distribution if necessary. |
| | RAS rate difficult to control. | Washout; effluent limit violations. | B | Evaluate alternatives to improve rate control. |
| Disinfection | Insufficient contact time at flows above 120 mgd. | Effluent violations (Fecal Coliforms). | C | Evaluate alternatives to increase capacity. |
| Outfall | Insufficient diffuser hydraulic capacity at peak flows. | Excess flow discharged through overflow pipe. | C | Evaluate alternatives to increase capacity. |

*(1) A = Major effect - long-term repetitive basis. B - Mimum effect - routine basis, or major effect - periodic basis. C = Minimum effect.*

**Table 1-1**
**CCP Summary of WWTP Performance Issues - KWWTP**

| Process | Current Performance Issue | Potential Impact(s) | CPE Rating[(1)] | CCP Elements |
|---|---|---|---|---|
| Solids Processing | Gravity thickener capacity is marginal for current operation; capacity is insufficient if chemical addition to primary clarifiers is implemented. | Reintroduction of solids to liquid wastestream. | B | Evaluate alternatives to increase capacity. |
| Misc. Process Monitoring & Control | Influent sampling location is downstream from several recycle streams. | Error in calculating percent removal efficiencies. | C | Evaluate alternatives to redirect recycle streams or relocate influent sampler. |
| | Diversion Parshall flume submerges under high flows. | Inaccurate flow measurement. | C | Evaluate alternatives to correct if necessary. |
| | Flow measurement to biological system is by effluent Parshall flume | Unknown flow to biological system due to detention time between pumping and flow measurement. | C | Evaluate benefits of installing flow meter. |
| | Discrepancy in solids balances. | Inadequate information for process control. | C | NA |
| | Some SOPs need revisions (i.e., wet weather operations) | Permit violation relative to Diversions. | C | Additional SOP revisions as appropriate. |
| | Influent /effluent flow measurement discrepancy. | Potential mass balance errors. | C | Evaluate alternate flow measurement. |
| | Flow, load and performance trending not used. | Changes in process efficiency. | C | NA |

*(1) A = Major effect - long-term repetitive basis. B - Mimum effect - routine basis, or major effect - periodic basis. C = Minimum effect.*

### FCWWTP Capacity

- Based on current wastewater characteristics and plant performance, the annual average daily biological treatment capacity is estimated to be 15 mgd. There is insufficient aeration capacity for recent maximum day and maximum week oxygen demands.
- The firm hydraulic capacity is 27 mgd based on influent pumping (3 of 4 pumps operating at low wetwell level). However, flows that exceed 27 mgd are occasionally pumped by operating at a higher wetwell level, and/or use of all four pumps.
- The firm capacity of the effluent pump station is only 21 mgd. However, flows that exceed 21 mgd are occasionally pumped by operating at a higher wetwell level, and/or use of all pumps.
- Based on recent operating experience and process modeling, peak flows of up to 18 mgd can be treated by the biological system for short durations (up to 3 to 4 hours).
- Process control problems are experienced when influent pumping rate exceeds approximately 15 mgd. The influent Parshall flume is submerged at flows above about 18 mgd.
- SSOs can be expected to occur occasionally based on a maximum influent pumping capacity of 30 mgd (not achievable with one pump out of service), based on existing conditions.
- Diversions occur occasionally with full implementation of the PCP based on current conditions. All Diversions have been in full compliance with the PCP.

Specific FCWWTP performance issues identified in the CPE are summarized in **Table 1-2**.

## 1.4 CCP Approach

KUB's approach to implementing the CCP for the KWWTP and the FCWWTP will be to assume that future NPDES Permits will continue to allow Diversion of peak wet weather flows if there are no feasible alternatives. Further, if no feasible alternative exists for one or both plants, it will be assumed that future permit(s) will be consistent with the recently released "Guidance on Peak Wet Weather Flow Diversions (October 27, 2005)" proposed by NACWA and NRDC, that is currently being considered by the White House Office of Management & Budget (OMB). Therefore, the CCP provides the framework for the "No Feasible Alternatives Analysis Process" through a utility analysis that will:

**Table 1-2**
**CCP Summary of WWTP Performance Issues - FCWWTP**

| Process | Current Performance Issue | Potential Impact(s) | CPE Rating[(1)] | CCP Elements |
|---|---|---|---|---|
| Influent Pumping | Peak wet weather flow exceeds firm capacity. | Unpermitted Discharge. | B | Evaluate alternatives to increase capacity. |
| Screening | Peak wet weather flow exceeds firm capacity. | Unpermitted Discharge. | C | Evaluate alternatives to increase capacity. |
| Grit Removal | Peak wet weather flow exceeds firm capacity. | Unpermitted Discharge. | C | Evaluate alternatives to increase capacity. |
| Primary Clarifiers | Effluent weirs submerged at high flows. | Possible performance impact. | C | Evaluate hydraulic improvement alternatives. |
| Biological Treatment | Capacity limited to 15 mgd (ADF) and 18 mgd peak flow (3 to 4 hours). | Washout, Diversion, effluent violations. | C | Evaluate alternatives to increase capacity. |
| | RAS rate difficult to control. | Washout; effluent limit violations. | B | Evaluate alternatives to improve rate control. |
| | Insufficient aeration capacity. | Effluent violations, process upsets. | B | Evaluate alternatives to increase capacity. |
| | Clarifier distribution box overflows at peak flows. | Unpermitted Discharge. | B | NA |
| | Flow split to all aeration basins is not equal. | Decreased process performance efficiency. | B | Evaluate hydraulic improvement alternatives. |
| Disinfection | Hydraulic constraint between contact basins at high flows. | Error in effluent flow measured at high flows. | C | Evaluate alternatives to increase capacity. |
| | Insufficient contact time at flows above 24 mgd. | Effluent violations (Fecal Coliforms) | C | Evaluate alternatives to increase capacity. |

*(1) A = Major effect - long-term repetitive basis. B - Mimum effect - routine basis, or major effect - periodic basis. C = Minimum effect.*

**Table 1-2**
**CCP Summary of WWTP Performance Issues - FCWWTP**

| Process | Current Performance Issue | Potential Impact(s) | CPE Rating[(1)] | CCP Elements |
|---|---|---|---|---|
| Effluent Pumping | Peak wet weather flow exceeds capacity. | Unpermitted Discharge. | C | NA |
| Solids Processing | Gravity thickener capacity is marginal for current operation; capacity is insufficient if chemical addition to primary clarifiers is implemented. | Reintroduction of solids to liquid wastestream. | C | Evaluate alternatives to increase capacity. |
| Misc. Process Monitoring & Control | Influent Parshall flume floods at high flows. | Error in influent flow measured at high flows. | C | Evaluate alternatives to correct hydraulics. |
| | Some SOPs need revisions (i.e., wet weather operations) | Permit violation relative to Diversions. | C | Additional SOP revisions as appropriate. |
| | Discrepancy in measured and predicted flow (may be cause of "other" problem below). | Excess I/I; adverse process performance. | B | NA |
| | Flow, load and performance trending not used. | Changes in process efficiency. | C | NA |
| | Discrepancy in solids balances. | Inadequate information for process control. | C | NA |
| Other | Dilute influent TSS and BOD concentrations | Violation of minimum removal efficiencies | B | NA |

*(1) A = Major effect - long-term repetitive basis. B - Mimum effect - routine basis, or major effect - periodic basis. C = Minimum effect.*

a. Document current treatment plant design capacity for all treatment units, the maximum flow that can be processed through those units, and the feasibility of increasing such treatment capacity and related costs (essentially complete upon approval of CPE);

b. Estimate the frequency, duration, and volume of current wet weather Diversions, and evaluate alternatives to reduce the frequency, duration, and volume of such occurrences and related costs;

c. Estimate the potential for future peak wet weather Diversions based on information such as predicted weather patterns, population growth, and projected treatment plant and collection system changes (e.g., upgrades, extensions, deterioration) and evaluate options for reducing Diversions based on these variables;

d. Assess existing storage within the collection system or on-site and options for enhanced utilization or expansion (taking into account physical and technological considerations) of that storage to reduce the frequency, duration, and volume of peak wet weather Diversions, and the related costs;

e. Assess other ways to reduce peak wet weather flow volumes, such as limiting collection system extensions or slug loadings from indirect dischargers;

f. Evaluate technologies – such as physical chemical treatment, ballasted flocculation, deep bed filtration, membrane technology, or supplemental biological treatment – that are or could be used to provide additional treatment to peak wet weather flows or peak wet weather Diversions and the costs of implementing those technologies;

g. Evaluate the extent to which KUB is maximizing its ability to reduce I/I throughout the entire collection system (i.e., both operated by the utility and satellite), including the use of existing legal authorities, potential improvements in the timing or quality of such efforts, and options for obtaining or expanding legal authorities to reduce I/I from satellite collection systems;

h. Evaluate peak flow reductions obtainable through implementation of existing Capacity, Management, Operations, and Maintenance (CMOM) programs and potential improvements in the timing or enhancement of those programs and the related costs;

i. Propose a protocol for monitoring the recombined flow (if a non-biological process is proposed) at least once daily during Diversions for all parameters for which the WWTP has daily effluent limitations or other requirements (e.g., monitoring only requirements), the total Diversion volume, and the duration of the peak wet weather Diversion event; and

j. Project the effluent improvements and other improvements in system performance that could be expected should the technologies, practices, and/or other measures discussed in the utility analysis be implemented.

All of these tasks are consistent with or actually included in current CD-mandated activities. Alternatives to be evaluated will include continued removal of rainfall dependent infiltration/inflow (RDI/I) and optimization of existing biological treatment facilities, in combination with one or more of the following:

- Storage facilities
- Physical/chemical peak flow treatment facilities
- Expansion of or modifications to biological treatment facilities

The CCP provides a proposed schedule for implementing the recommended alternative for each facility.

# Section 2
# RDI/I and Slug Flow Reduction Efforts

## 2.1 Introduction

The approved CCP approach includes an assessment of potential ways to reduce peak wet weather flow volumes and slug flow loadings from indirect dischargers that adversely impact WWTP operations and/or performance. These opportunities could include:

- reducing rainfall derived infiltration – inflow (RDI/I) throughout the system, including satellite systems
- limiting collection system extensions
- limiting or eliminating slug flow loadings from indirect dischargers during dry and/or wet weather conditions

## 2.2 KUB's Integrated Approach to Capacity Enhancement and RDI/I Reduction

KUB has initiated implementation of several complementary programs, including the Phase I CAP/ER, to comply with the requirements of the CD, specifically to "address the conditions causing SSOs with the goal of eliminating the SSO locations on the Long-Term List." KUB's holistic or total basin solution for each sewershed is to:

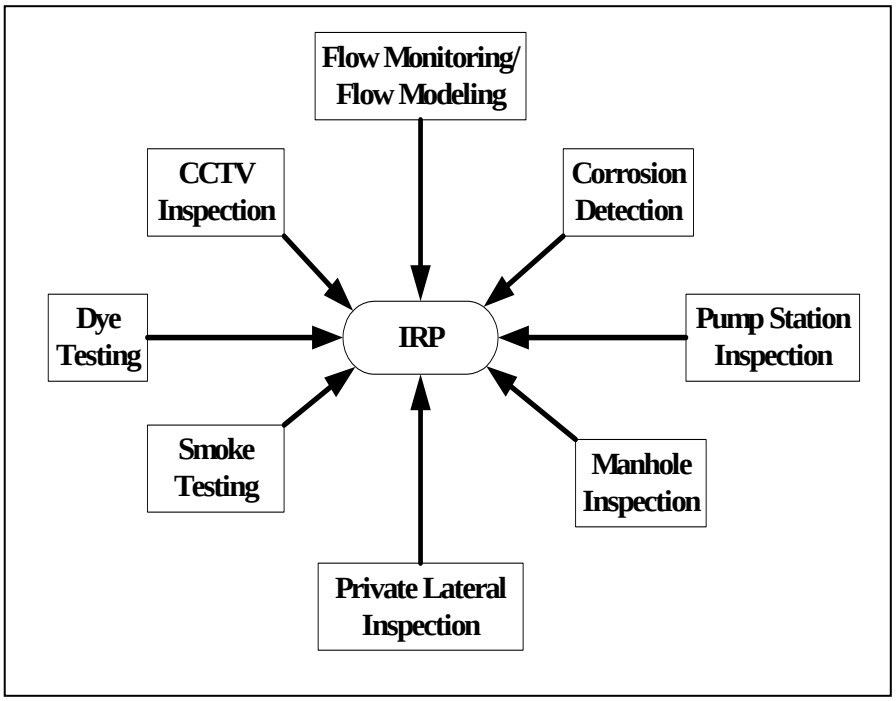
1. Implement capacity enhancement projects consistent with the CAP/ER requirements including storage facilities, relief sewers, pump station upgrades, and comprehensive rehabilitation in targeted areas with documented rainfall dependent infiltration and inflow (RDI/I) problems, and

2. Achieve capacity recovery through RDI/I removal with other complementary maintenance programs that are part of the Infrastructure Rehabilitation Program (IRP).

KUB is in the process of implementing the EPA-approved Phase I CAP/ER program of capital projects. In many cases, projects are being designed with capacities that exceed the minimum criteria established in the CAP/ER (as summarized in Section 2.2.3).

### 2.2.1 Other Complementary Programs Related to CAP/ER

KUB's other complementary programs that combine to comprise the Infrastructure Rehabilitation Program (IRP) are supported by the Continuing Sewer System Assessment Program (CSSAP), both of which have been previously approved by EPA. These programs address performance enhancement (removal of roots, debris, grease), asset management (condition assessment, repair and replacement) and RDI/I removal (removal of inflow, repair of defective pipes and manholes that are the source of




*CSSAP Components Supporting the IRP*

infiltration). Specifically, the smoke testing program addresses inflow elimination, and the lateral replacement program and sewer rehabilitation programs address infiltration reduction. It is important to note that the RDI/I reduction benefits of these programs in restoring system capacity have not been considered in developing the conceptual capacity of CAP/ER solutions. This provides an added factor of safety because the CAP/ER project facilities will be able to store and/or convey flows from increasingly larger storm events as RDI/I is removed through KUB's comprehensive IRP, which has been approved and is being aggressively implemented. KUB is in the process of analyzing permanent and temporary flow monitoring data to quantify the effectiveness of these programs.

These integrated programs will not only address system SSOs, but will also impact WWTP flows.

## 2.2.2 Background and Purpose of CAP/ER

Providing a wastewater collection system that meets the needs of KUB customers while protecting the environment is the top priority of KUB's facility planning efforts. Since 1987, KUB has performed several studies and made many improvements in a majority of the service area basins. However, there are still areas requiring capital improvements, particularly in older areas of the system where RDI/I is problematic.

RDI/I entering the sanitary sewer system during wet-weather is a major consideration in this report. All combined sanitary and storm sewers have been eliminated from the wastewater service area. However, because of sewer system defects, unintentional or illegal cross connections with the storm sewer system, or other sources, extraneous storm water flows enter the sanitary sewer system during rainfall events as RDI/I. These RDI/I flows can overload the capacity of the sanitary sewer system and result in periodic SSOs from manholes and/or building back-ups.

The objective of the Phase I CAP/ER is to identify facility improvements required to address reported SSOs in accordance with the CD. These SSOs include building back-

ups. Some of these SSOs were caused by capacity issues and some were caused by non-capacity issues such as a pipe blockage caused by debris, grease, or roots.

Most capacity related SSOs were evaluated using a hydraulic modeling analysis. In keeping with KUB's goals, this hydraulic analysis consisted of first analyzing each basin using a hydraulic model and developing a total basin solution that would convey projected future flows and projected RDI/I from a representative planning storm event. The total basin solution for each basin takes into account the whole system including the effects of transporting this flow to the wastewater treatment plants. The total basin solution addresses future projected SSOs and surcharge conditions in addition to the SSOs listed in the Long-Term List.

### 2.2.3 CAP/ER Project Performance Criteria

The criteria used in evaluating wet-weather performance of the existing system and alternative capacity enhancement projects to address capacity related locations identified in the SSO Engineering Report (SSOER) are summarized below:

1. Future base flows projected to occur at or near build-out conditions (20 years for highly developed sewersheds and 40 years for developing sewersheds) were used to represent dry-weather flows, including diurnal variations.

2. Winter/spring R values (percentage of rainfall that enters the sewers as RDI/I) were developed on the basis of extensive temporary flow monitoring program data and used to develop RDI/I influent hydrographs. The data indicate that winter/spring R values typically exceed other seasonal R values by up to 100 percent.

3. Projects selected for inclusion in the CAP/ER result in surcharging of less than 2.0 feet above top of pipe and/or no surcharging to within 3.0 feet of the manhole rim at SSOER locations during base wet-weather conditions (described below).

4. Projects selected for inclusion in the CAP/ER include sufficient downstream improvements and/or upstream comprehensive rehabilitation so that they do not result in moving overflows to downstream locations during base wet-weather conditions (described below).

5. Base wet-weather conditions consist of a synthetic rainfall event derived from a representative 24 hour event of 2.96 inches. Additional information on the synthetic rainfall event is provided in a subsequent portion of this document.

The total basin solution consists of a number of individual projects including various sewer replacement projects, storage projects, and rehabilitation projects. For this Phase I CAP/ER, each of the individual projects in the total basin solution for each basin was analyzed to determine which are required to address the SSO locations on the Long-Term List. This included projects directly affecting the SSO location as well

as projects required to address predicted overflows downstream, which are predicted to occur as a result of upstream improvements. Projects that were not required to address these SSOs are not included in this report.

Some SSOs reported on the Long-Term List occurred on small collector pipes that were not included in the hydraulic model evaluation. These are also addressed by this Phase I CAP/ER by either collector sewer replacement projects or sewer rehabilitation projects. In addition, some SSOs reported on the Long-Term List were caused by non-capacity issues such as a pipe blockage caused by debris, grease, or roots. These SSOs have been addressed or are being addressed by KUB's CSSAP.

The primary function of the CSSAP is to provide decision-support information for implementation of the Infrastructure Rehabilitation Program (IRP), along with KUB's other capital improvements to restore and maintain system hydraulic capacity, restore and maintain structural integrity of system components and reduce corrective maintenance costs. The primary objectives of the IRP are to address RDI/I and other conditions causing SSOs through:

- Capacity restoration – this objective is aimed at keeping assets functioning at their full, original capacity. Examples include removing sediment or debris from a pipeline system, reducing infiltration and inflow (I/I) in a wastewater collection system, and/or repairing system defects that would limit flow capacity through a system. In some cases, it is cost effective and/or necessary due to growth to provide increased capacity or storage to attain desired system hydraulic capacity.

- Damage repair – this objective is aimed at repairing structural damage and failures in the system that are the result of wear, corrosion, age, and/or construction-related damage to extend the useful life of the component. This function reduces the risk of system failure which could cause interruption in service, could result in impacts to the community, and would increase costs as compared to scheduled maintenance and repairs.

- Maintenance reduction – this objective is aimed at repairing portions of the system that are subject to known, repeated maintenance problems that increase maintenance costs and keep crews from conducting more productive preventive maintenance. Examples in a wastewater collection system are the repair of conditions such as root intrusion, offset joints, pipe sags, improper service connections, and other system deficiencies that typically lead to recurring problems for system operators.

The Phase I CAP/ER was developed using CSSAP elements (e. g., flow monitoring, hydraulic model) and will be implemented using other CSSAP elements (e.g., dye testing/dyed water flooding, CCTV inspection, smoke testing). Therefore, for program administration purposes, KUB considers the CAP/ER and its implementation to be part of its IRP.

### 2.2.4 Evaluation of Alternatives

Improvement alternatives were developed that would convey projected future flows and projected RDI/I from the design storm event. These alternatives take into account the whole system including the effects of transporting this flow to the wastewater treatment plant. Typically, at least four alternatives were developed with cost estimates consisting of the following options:

1) Upsize pipes and pump stations as required to meet criteria and convey flows to the WWTP.

2) Add storage units upstream to eliminate downstream pipe improvements and decrease peak flows to the WWTP.

3) Perform sewer rehabilitation in subbasins that showed high RDI/I to eliminate downstream pipe improvements and decrease peak flows to the WWTP.

4) Various combinations of 1, 2, and 3.

### 2.2.5 Implementation Plan

The approved implementation plan summarizes the facility improvements required to address SSOs in accordance with the CD. The program is scheduled for completion in 2013. A Phase II CAP/ER program to address additional system improvements is anticipated to be completed by June 30, 2016.

## 2.3 Slug Flows and Loadings

Slug flows and loadings from indirect discharges to the WWTPs can potentially cause an adverse impact on wet weather treatment performance. The identified sources of these flows and/or loadings to the KWWTP and FCWWTP are described in the following paragraphs.

#### KWWTP Discharges

Following is a description of indirect slug flow loadings to the KWWTP. There are no satellite systems that discharge to the KWWTP system.

***Hauled Wastes*** – Hauled wastes are discharged at a receiving facility at the west end of the KWWTP site. The wastes flow into the Neyland Drive trunk sewer and enter the headworks co-mingled with other wastewater flows. Hauled wastes include landfill leachate, grease, septage and other special wastes.

***Industrial Discharges*** – Approximately 24 significant industrial discharges are served by the KWWTP. These discharges are rigorously monitored through KUB's industrial discharge program. Recent data indicate these flows average approximately 1.6 mgd.

***Water Treatment Plant Residuals*** – Residuals including sedimentation basin underflow and filter backwash water are continuously discharged to the KWWTP. These flows average approximately 1.0 mgd.

***Loves Creek WWTP Residuals*** – Residuals from the LCWWTP are discharged to the KWWTP. These flow average approximately 0.02 mgd.

***Eastbridge WWTP Residuals*** – Residuals from this WWTP are trucked to the hauled waste receiving facilities.

***Fourth Creek WWTP Residuals*** – Residuals from the FCWWTP are discharged continuously to the KWWTP. These flow average approximately 0.5 mgd.

With the exception of grease loadings from the hauled waste facility, none of these slug flow loadings has been identified as a problem during wet weather flow conditions. Recently, KUB has implemented a ban on receipt of hauled grease wastes from establishments outside of Knox County. It is anticipated that a total ban on hauled grease wastes will be implemented within the next two years.

## FCWWTP Discharges

Following is a description of slug flow loadings and satellite system loadings to the FCWWTP.

***Industrial Dischargers*** – Approximately 4 significant industrial dischargers are served by the FCWWTP. These dischargers are rigorously monitored through KUB's industrial pretreatment program. Recent data indicate that flows average approximately 142,000 gpd.

***Satellite Systems*** – Satellite systems include the West Knox Utility District and First Utility District. Recent flow monitoring indicates the following flow conditions:

| Utility District | Minibasin | Existing Utility District Flows | | | Projected |
|---|---|---|---|---|---|
| | | ADWF (mgd) | Peak 1-Hour (mgd) | Peak 3-Hour (mgd) | ADWF (mgd) |
| West Knox Utility District | WKUD1 | 0.227 | 0.776 | 0.706 | 0.361 |
| West Knox Utility District | WKUD2 | 0.053 | 0.123 | 0.118 | 0.069 |
| West Knox Utility District | WKUD3* | NA | 0.680 | 0.455 | NA |
| First Utility District | FUD2 | 0.358 | 2.763 | 2.662 | 0.504 |

* KUB is in the process of eliminating this flow.

Recent site inspections in FUD2 identified several inflow sources that have been eliminated.

## 2.4 Summary

KUB's Phase I CAP/ER and the anticipated Phase II CAP/ER are expected to achieve wet weather collection and transmission system performance criteria which have been approved by EPA. Further wet weather flow reductions are expected to be achieved through implementation of KUB's EPA-approved CSSAP, IRP and other CMOM programs.

The impacts of further RDI/I reductions on peak wet weather flows requiring treatment at the WWTPs are further evaluated in Section 3 of this CCP. However, at this time, it is not possible to confirm the effectiveness of these additional RDI/I removal efforts comprising KUB's CSSAP, IRP and other CMOM programs. Flow monitoring is currently being used to assess the success of Phase I CAP/ER RDI/I removal efforts, which have not yet been quantified. Once the most significant sources of RDI/I have been eliminated upon completion of the Phase I CAP/ER, it will become more and more difficult to locate and remove significant RDI/I sources.

With the exception of hauled grease wastes, other slug flow loadings from indirect dischargers have not been determined to cause operational problems or NPDES Permits compliance problems during wet weather flow conditions at the WWTPs. KUB has taken steps to significantly reduce grease waste loadings and the impact of other slug flow loadings on wet weather WWTP performance will continue to be monitored.

# Section 3
# Capacity Exceedance and Diversion Frequency Analyses

This section presents the results of the wet weather conveyance capacity and Diversion analyses that are part of the Composite Correction Plan for the Kuwahee and Fourth Creek wastewater treatment plants in the KUB system. The purpose of this analysis is to estimate the frequency, duration, and volumes of excess flows immediately upstream of each WWTP resulting from insufficient WWTP capacity, and to evaluate alternative capacity enhancement projects that will enable the entire conveyance system up to each WWTP to be in compliance with the Capacity Assurance Program (CAP) surcharge criteria. In addition, the frequencies and volumes of wet weather Diversions are evaluated. The capacity of the biological treatment facilities at each WWTP is less than the influent pumping capacity. Therefore, a Diversion could occur within the plant, whether or not a CAP surcharge exceedance occurs upstream.

In addition to analyzing frequencies of CAP surcharge exceedances and Diversions, the provision of additional storage and/or the provision of increased collection system rehabilitation for greater RDI/I reduction are addressed as alternatives to increasing WWTP capacity to meet CAP and CAP/ER-established performance criteria. While there is sufficient space at the FCWWTP for a storage facility, there is limited space at the KWWTP for additional storage. Therefore, KWWTP options requiring additional storage will only be feasible if suitable nearby sites can be acquired or if space currently being utilized at the KWWTP can be converted to allow construction of additional on-site storage tankage.

## 3.1 Conveyance Capacity/Diversion Analysis Conditions

### 3.1.1 Base Condition Analyses

As a part of these analyses, three base conditions were considered with regard to the treatment facilities:

- Condition 1 – examines the existing system. No improvements currently in the planning stages pertaining to system rehabilitation or storage have been included in this condition. Storage units recently finished or under construction in 2006 have been included in this condition. Current wet weather flows projected using existing dry weather base flows and RDI/I predictions based on the analysis of flow monitoring data collected between 2003 and 2006 are used in this condition.

- Condition 2 – examines the system after all CAP/ER Phase I improvements and in-system storage facilities have been put into operation. This condition assumes all system rehabilitation included in the CAP/ER Phase I report has been successful in achieving predicted RDI/I reductions down to an R of 2% for the rehabilitated sewersheds. Future wet weather flows projected using buildout dry weather base

flows and the I/I over the 52-year historical rainfall record as predicted using the calibrated R values, or R values reduced by rehabilitation, are used in this condition.

- Condition 3 – examines the system after all long-term system improvements, assumed to be included in Phase II CAP/ER, are completed and put into operation. This includes all CAP/ER Phase I projects and in-system storage and rehabilitation not directly related to CAP/ER Phase I activities. Future wet weather flows projected using buildout dry weather base flows and the RDI/I over the 52-year historical rainfall record as predicted using the calibrated R values, or R values reduced by rehabilitation, are used in this condition. This condition assumes all system rehabilitation has been successful in achieving predicted RDI/I reductions down to an R of 2% in the rehabilitated sewersheds. Condition 3 only applies to Kuwahee because Fourth Creek will have all of its rehabilitation and storage completed under Condition 2.

A summary of Conditions 1, 2, and 3 is presented in **Table 3-1. Figure 3-1** provides an illustration of the minibasins rehabilitated under Conditions 2 and 3.

**Table 3-1**
**Summary of Conditions 1 through 3 – Base Conditions**

| | Baseflow | Trunk Sewer Projects | Collection Sewer Rehabilitation | Storage |
|---|---|---|---|---|
| Condition 1 (Existing Conditions) | Current | Existing System | Minibasins completed by end of 2006. R values reduced to 2%. | Completed / Construction 2006<br>• Walker Springs - 3.25 MG<br>• Upper First Creek - 9 MG<br>• Lower First Creek - 5 MG |
| Condition 2 (Phase I CAP/ER) | Future Projected | KWWTP – Replace 61,280 LF<br>FWWTP – Replace 11,646 LF | KWWTP – 0.6 million LF of pipe<br>FWWTP – 0 LF of Pipe<br>R reduced to 2% | CAP/ER Phase I<br>• Walker Springs - 3.25 MG<br>• Upper First Creek - 9 MG<br>• Lower First Creek - 5 MG<br>• Third Creek - 4 MG |
| Condition 3 (Phase II CAP/ER) | Future Projected | KWWTP – Replace 111,497 LF<br>FWWTP – Replace 47,632 LF | KWWTP – 0.6 million LF of pipe<br>FWWTP – 44,000 LF of Pipe<br>R reduced to 2% | Potential Future Improvements<br>• Walker Springs - 3.25 MG<br>• Upper First Creek - 9 MG<br>• Lower First Creek - 5 MG<br>• Third Creek - 4 MG<br>• Williams Creek – 1.7 MG |

N
W E
S
3000 0 3000 Feet

First Creek
Second Creek
Third Creek
Williams Creek
Fourth Creek
South Knoxville
Knob Creek

03B2
03B1a
03B1
04B1a
08A1a
08A1
05A4
05A3
05A2a
09A4
05C1
09A2
09D1
09A1
15D2
14C1
15E1
23E1
23C1a
19A2
32A4
40F1
41A6
41A7
41A4
41B1
41C2
41C1
41A2

75
40
4075

CAP/ER Phase I Minibasins
Preferred Alternative Minibasin Rehabilitation
CAP/ER Phase I Storage
Trunk Sewers
Force Main
Major Roadways

Note: At the time of this memorandum, the Second Creek Technical Memorandum had not been finalized. As a conservative assumption, the Preferred Alternative and CAP/ER Phase I plans are assumed the same.

CDM

Figure 3-1 Minibasin Rehabilitation Map Kuwahee and Fourth Creek WWTP Service Areas

### 3.1.2 Additional RDI/I Reduction Analyses

The impacts of additional RDI/I reductions beyond Conditions 2 and 3 were evaluated to determine impacts on plant capacity-related excessive surcharge conditions and Diversions and to determine if increased RDI/I reduction (above the Phase II CAP/ER level) is feasible in lieu of additional WWTP wet weather treatment. Below are the criteria for these further analyses:

- Condition 4 – examines all minibasins that exceeded 40 gallons/linear foot in RDI/I based on final model calibrated R values. Minibasins that exceeded this threshold were examined with their R values reduced to 2%.

- Condition 5 – examines all minibasins that exceeded 40 gallons/linear foot in RDI/I based on final model calibrated R values. Condition 5 differs from 4 in that the rehabilitation efforts reduce R values by 51%. This reduction value is the median reduction documented during the 2006 Post-Rehabilitation Flow Monitoring Study.

- Condition 6 – examines how rehabilitation also affects baseflows. Condition 6 uses the terms of Condition 5 and further adds a 42% reduction in baseflow due to groundwater infiltration (GWI) reductions in previously studied rehabilitated minibasins. This 42% reduction is a result taken from the 2006 Post-Rehabilitation Flow Analysis Study. The median reduction of 42% in total baseflow due to groundwater infiltration was achieved in the minibasins examined under the study.

**Table 3-2** summarizes Conditions 4 through 6. Storage facilities for Conditions 4, 5, and 6 consists of the CAP/ER Phase I facilities.

**Table 3-2**
**Summary of Conditions – Additional RDI/I Reduction Scenarios**

| | Baseflow | Rehabilitation | Storage |
|---|---|---|---|
| Condition 4 | Future Projected | KWWTP – 1.7 million LF of pipe R=2%<br>FWWTP – 0.1 million LF of pipe R=2% | • Walker Springs - 3.25 MG<br>• Upper First Creek - 9 MG<br>• Lower First Creek - 5 MG<br>• Third Creek - 4 MG |
| Condition 5 | Future Projected | KWWTP – 1.7 million LF of pipe, R reduced by 51%<br>FWWTP – 0.1 million LF of pipe, R reduced by 51% | • Walker Springs - 3.25 MG<br>• Upper First Creek - 9 MG<br>• Lower First Creek - 5 MG<br>• Third Creek - 4 MG |
| Condition 6 | Rehabilitated Minibasin Baseflow GWI reduced 42% | KWWTP – 1.7 million LF of pipe, R reduced by 51%<br>FWWTP – 0.1 million LF of pipe, R reduced by 51% | • Walker Springs - 3.25 MG<br>• Upper First Creek - 9 MG<br>• Lower First Creek - 5 MG<br>• Third Creek - 4 MG |

### 3.1.3 Summary of Hydraulic Model Conveyed Flows

As a part of the storage and Diversion analyses process, the hydraulic models for the Kuwahee service area (First Creek, Second Creek, Third Creek, South Knoxville/Knob Creek, and Williams Creek) and the Fourth Creek service area were reviewed. Flows conveyed to each treatment facility through the individual models are summarized in **Table 3-3**.

**Table 3-3**
**Summary of Modeled Flows to Kuwahee WWTP and Fourth Creek WWTP**

| | System Flows (mgd) | | | | | |
|---|---|---|---|---|---|---|
| | Condition 1 | | Condition 2 (1) | | Condition 3 (2) | |
| Sewershed | Peak 1-hour | Peak 3-hour | Peak 1-hour | Peak 3-hour | Peak 1-hour | Peak 3-hour |
| First Creek | 33.77 | 33.01 | 33.49 | 32.37 | 33.49 | 32.37 |
| Second Creek | 29.64 | 27.63 | 27.76 | 23.98 | 27.76 | 23.98 |
| Third Creek | 47.35 | 45.60 | 56.70 | 50.33 | 53.27 | 49.03 |
| South Knoxville | 20.26 | 19.17 | 27.25 | 26.28 | 27.25 | 26.28 |
| Williams Creek | 8.22 | 7.91 | 13.90 | 12.55 | 7.87 | 7.63 |
| Total KWWTP | 139.22 | 133.32 | 159.10 | 145.51 | 149.63 | 139.28 |
| | | | | | | |
| Fourth Creek WWTP | 23.96 | 23.01 | 30.4 | 28.3 | 32.78 | 29.93 |

(1) Based on Phase I CAP/ER improvements.

(2) Based on anticipated Phase II CAP/ER improvements.

The peak 1-hour and peak 3-hour flows as recorded from the base of each basin model are presented in the table for the existing system condition, CAP/ER Phase I condition, and the anticipated CAP/ER Phase II condition. The increase in flow from the existing system condition to the CAP/ER Phase I condition is a result of increased pipe upsizing projects in the CAP/ER Phase I condition which helps to recapture flow lost in the existing conditions models. The increase in flow is tempered by storage in First Creek (9 MG and 5 MG), Third Creek (4 MG), and Fourth Creek (3.25 MG). In the Condition 3 models, additional pipe projects are undertaken and storage is added in Williams Creek (1.7 MG). Note that the main difference in flows between the CAP/ER Phase I system and the Condition 3 system for Third Creek is in the location of the tank itself.

These flows along with predicted peak instantaneous flows were used to establish influent pumping rates at the WWTPs for evaluation of CAP surcharge criteria, for use in continuous simulations described in the following sections and for selection of CCP WWTP wet weather treatment alternatives discussed in Section 4. The following influent pumping conditions were selected:

| WWTP | Maximum Influent Pump Capacity, mgd | Comment |
|---|---|---|
| KWWTP | 120 | Existing Capacity |
| | 160 | Peak hourly flow – Condition 2 |
| FCWWTP | 28 | Existing Capacity |
| | 33 | Peak hourly flow – Condition 3 |
| | 34 | Peak instantaneous flow |

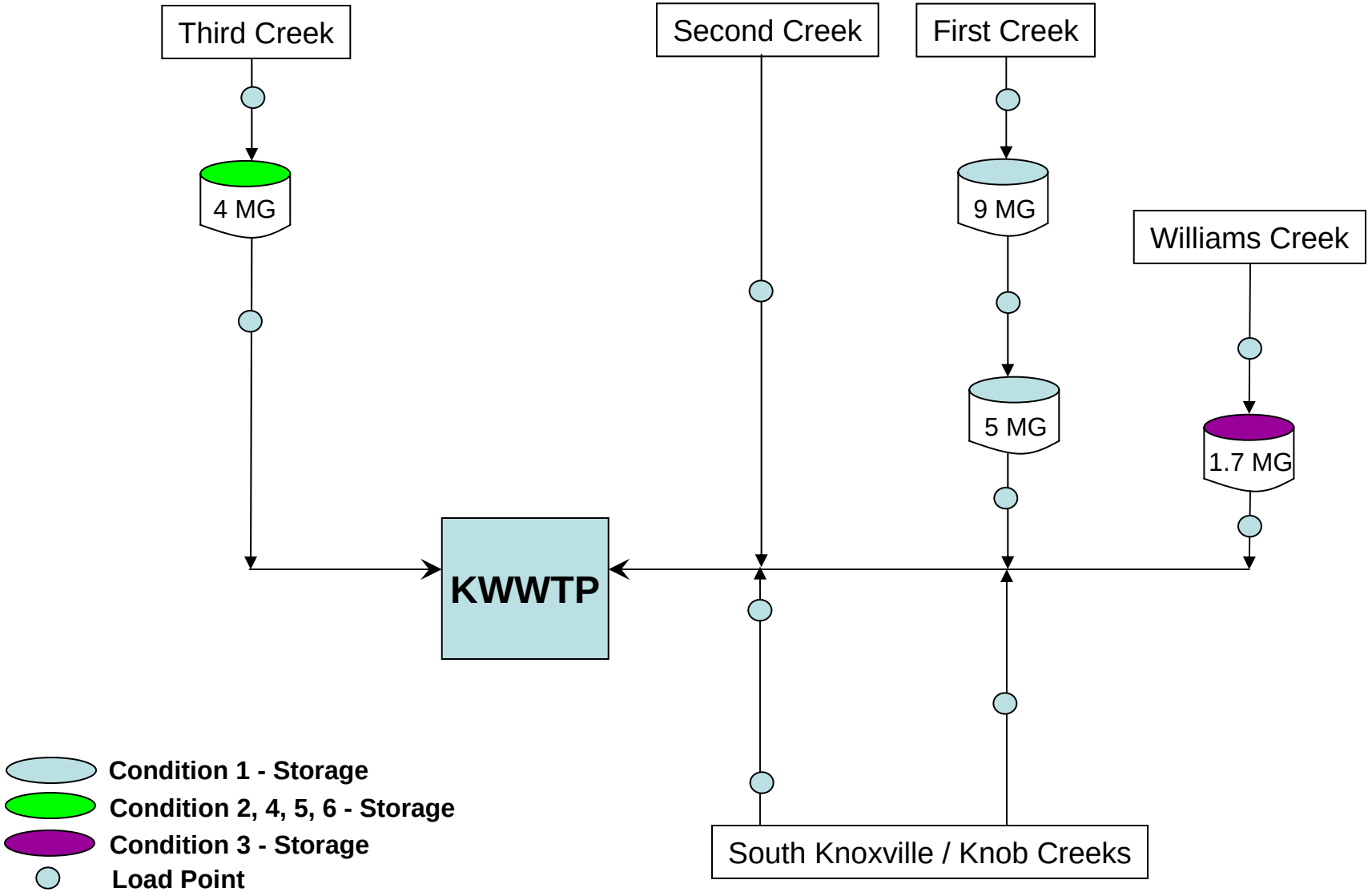
A peak instantaneous flow was not evaluated for the KWWTP because the Neyland Drive sewers provide some peak dampening, and the peak instantaneous flows from each sewershed do not occur at the same time. Based on these influent pumping capacity evaluations, the CCP WWTP improvement alternatives presented in Section 4 will be based on a peak treatment capacity without additional CCP storage of 160 mgd at KWWTP and 34 mgd at FCWWTP. WWTP improvement alternatives will also be analyzed based on a combined improvement approach of CCP storage and treatment improvements for a peak treatment capacity of 120 mgd at KWWTP and 27 mgd for FCWWTP. (The 27 mgd peak capacity was determined to be the maximum treatment capacity from process evaluations and is 1 mgd lower than the 28 mgd pumping capacity used for the hydraulic statistical analysis).

## 3.2 Analysis Methodology and Results

Excessive surcharge and Diversion analyses results are presented as a series of curves developed using wet weather modeling analyses. The curves represent potential annual system excessive surcharge and Diversion frequencies and volumes with regard to variable system storage and treatment capacities. The curves were prepared based on the results of the NetSTORM program, a storage, treatment, overflow, and runoff model, which was also used to evaluate the Phase I CAP/ER storage facilities. Prior flow monitoring and hydraulic model analyses in the KUB system provided the information necessary to characterize sewer basin wet weather responses. These characterizations are represented by unit hydrograph parameters of R, T, and K from individual portions of the KUB system (this hydrograph analysis procedure is fully explained in the Phase I CAP/ER).

The smaller sewershed areas previously used for EXTRAN analyses were compiled into larger service areas in the NetSTORM models to simplify model operations and allow for modeling over a 52-year period (1951-2003) of precipitation record. **Figures 3-2 and 3-3** are schematics representing the larger combined areas in the NetSTORM models. Each round node represents a point at the base of each combined area where wet and dry weather flows from that area are loaded into the model. Each storage unit on the figures is color coded to indicate to which modeling condition the storage unit belongs. Each storage condition assumes the lower numbered condition storage is also included. An example of this would be Condition 2 containing both the storage units indicated by Condition 2 and by Condition 1. Walker Springs storage in Fourth Creek is assumed to be in place for all FCWWTP modeling conditions.

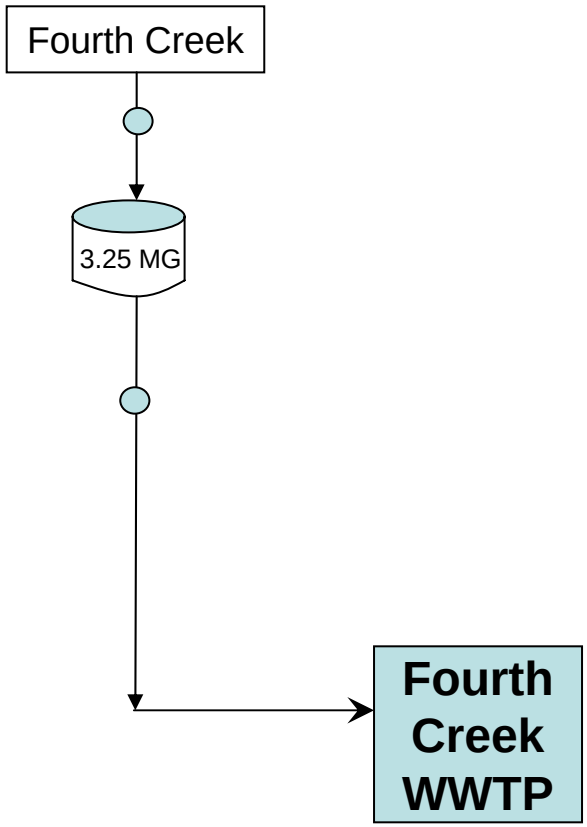
# Kuwahee WWTP Service Area – Model Schematic




***Continuous Model with 52-years worth of Precipitation Data**

**Figure 3-2**

# Fourth Creek
# Service Area – Model Schematic




**Load Point**

***Continuous Model with 52-years worth of Precipitation Data**

**Figure 3-3**

The R value reduction assumptions to an R of 2% or by 51% in these analyses may be subject to change once additional post-flow monitoring studies are conducted and rehabilitation effectiveness is further evaluated. These analyses are also dependent on current and potential treatment rates for the individual treatment facilities.

All NetSTORM combined areas convey flow to the treatment facilities at a maximum flow rate such that CAP surcharge exceedance occurs no more than once every 2 years. This analysis is based on the 52-year historical precipitation record from the Knoxville airport rain gage applied to each area and is consistent with the approved Phase I CAP/ER.

## 3.2.1 Conveyance Capacity Analysis Results

### Kuwahee WWTP

As discussed above, the existing and projected in-system storage was modeled as part of Conditions 1 through 6. Any storage indicated on the curves for the capacity analysis would be in addition to the in-system storage shown on Figures 3-2 and 3-3 and as described in the condition descriptions in Tables 3-1 and 3-2.

The conveyance capacity analysis results for KWWTP performing at 120 mgd are summarized on **Figure 3-4**. The existing system would require 70 million gallons (MG) of additional in-system storage to reduce surcharge exceedances at the plant to zero. Approximately 27 MG of additional storage would be required to reduce the surcharge criteria exceedance frequency to once every 2 years, or an average of 0.5 events per year. Upon completion of the Condition 2 assumptions, the storage volume would be cut in half to 35 MG for no surcharge exceedances and approximately 12 MG for 0.5 predicted surcharge exceedances per year. Condition 3 further reduces the storage need to approximately 30 MG for no predicted surcharge exceedances and 11.5 MG for 0.5 predicted surcharge exceedances per year.

Condition 4 would require less than 10 MG of additional storage at or near the plant to result in no predicted surcharge exceedances at the plant. Approximately 2.8 MG of additional storage would be required to reduce the predicted surcharge exceedance frequency to 0.5 per year. Under the Condition 5 assumptions, the storage volume would increase to 18 MG for no predicted surcharge exceedances and approximately 5 MG for 0.5 predicted surcharge exceedances per year. Condition 6 yields approximately 16 MG of storage for no predicted surcharge exceedances and 5 MG for 0.5 predicted surcharge exceedances per year. For comparative purposes, Figure 3-4 contains the results utilizing the 120 mgd treatment rate for all the conditions.

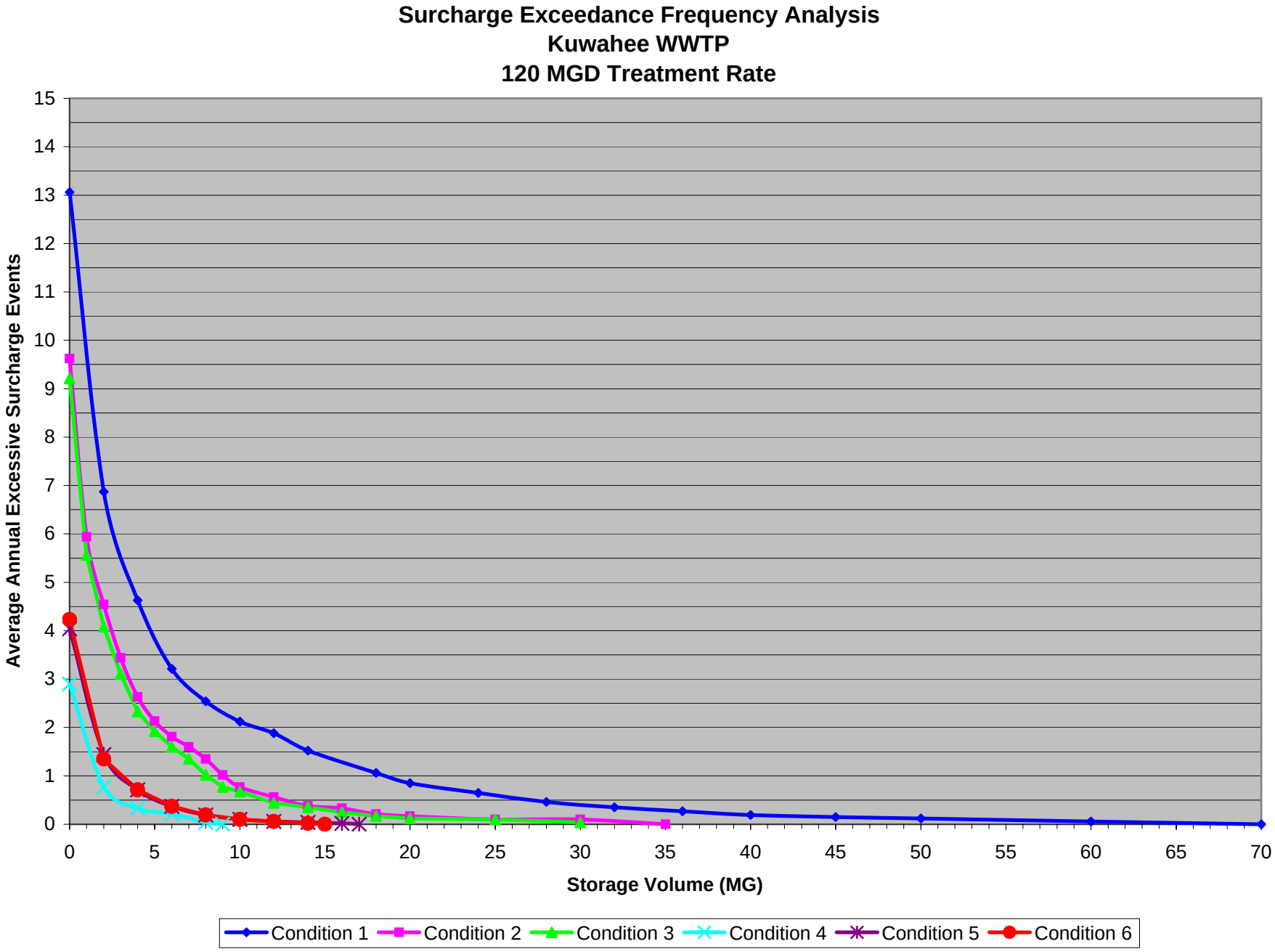

Surcharge Exceedance Frequency Analysis
Kuwahee WWTP
120 MGD Treatment Rate
Average Annual Excessive Surcharge Events
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
Storage Volume (MG)
Condition 1
Condition 2
Condition 3
Condition 4
Condition 5
Condition 6

**Figure 3-4**

**Table 3-4** provides a brief summary of each condition storage requirement for zero and 0.5 predicted surcharge exceedances per year (equivalent to 1 surcharge exceedance every two years) at the KWWTP.

**Table 3-4**
**KWWTP Trunk Sewer Surcharge Criteria Exceedance Analysis Summary**

| Modeling Condition | Treatment Rate (mgd) | Avg. Annual Excess Flow Events | Additional Storage Volume (MG) |
|---|---|---|---|
| Condition 1 | 120 | 0 | 70.0 |
| | | 0.5 | 27.2 |
| Condition 2 | 120 | 0 | 35.0 |
| | | 0.5 | 12.7 |
| Condition 3 | 120 | 0 | 30 |
| | | 0.5 | 11.5 |
| Condition 4 | 120 | 0 | 9.0 |
| | | 0.5 | 3.0 |
| Condition 5 | 120 | 0 | 17.0 |
| | | 0.5 | 5.0 |
| Condition 6 | 120 | 0 | 15.0 |
| | | 0.5 | 5.0 |

Figure 3-4 shows a decrease in storage from Condition 1 to Conditions 2 and 3 for two reasons: 1) decreases in RDI/I flow from collection system rehabilitation is offsetting the increase in future base flows and 2) the Condition 1 and 2 assumptions do not include all pipe capacity improvements needed to convey all wet weather flows to the storage tanks and plant. These results can also be attributed to how NetSTORM routes system flows. Because it is a simplified model of the conveyance system, it does not account for individual pipe projects. The primary difference between Conditions 2 and 3 is due to pipe capacity improvements. Condition 4 continues the decrease in storage volume required due to an extension of rehabilitation in the KWWTP service area. Condition 4 represents the lowest storage volumes required in all the condition analyses. Like Condition 4, Conditions 5 and 6 assume the same service areas are being rehabilitated. However, unlike Condition 4, Conditions 5 and 6 assume that rehabilitation efforts do not fully reach an R of 2%, but rather reduce existing R values by 51%. As a result, an increase in storage volumes is required to avert predicted surcharge exceedances at the plant occurs. Reductions in groundwater infiltration are not enough to cause significant differences in the curves for Conditions 5 and 6. This illustrates that wet weather peaks are the main drivers for additional storage requirements in the KWWTP system to mitigate treatment capacity related surcharge exceedances.

### Fourth Creek WWTP

Dry weather flows have a greater impact on results for the FCWWTP than in the KWWTP service area. For the FCWWTP operating at an influent pumping rate of 28 mgd, the Condition 1 system would require approximately 1.6 MG of storage to eliminate predicted surcharge exceedances at the plant and an estimated 0.25 MG for 0.5 predicted surcharge exceedances per year. This same treatment rate would require approximately 2.5 MG of storage for the Condition 2 system with no predicted surcharge exceedances and approximately 0.6 MG to achieve 0.5 predicted surcharge exceedances per year (**Figure 3-5**). For a 30 mgd treatment rate, the Condition 1 storage sizes decrease to an estimated 1.5 MG and 0.1 MG respectively. At 30 mgd, the Condition 2 estimated storage sizes would be 1.8 MG and 0.25 MG respectively (**Figure 3-6**). For the 34 mgd treatment rate, Condition 1 storage sizes further decreases to an estimated 1.1 MG and 0 MG respectively. At 34 mgd, the Condition 2 estimated storage sizes would be 1.6 MG and 0.02 MG respectively (**Figure 3-7**).

Figures 3-5, 3-6, and 3-7 show an increase in storage required for the Condition 2 modeling run. Unlike the Kuwahee system, all the proposed in-system storage is currently in place and operating in the Fourth Creek system. The increase in base flows from Condition 1 to 2 for Fourth Creek drives the Condition 2 curve beyond the Condition 1 curve. For Condition 3, even though it does contain some comprehensive rehabilitation, the location of the rehabilitation is upstream of the Walker Springs storage facility. As a result, the impact on peak wet weather flow has already been alleviated by the storage facility. Also, because NetSTORM is a simplified model of the conveyance system, it does not account for individual pipe projects. The primary difference between Conditions 2 and 3 is due to pipe capacity improvements. Because of this and the storage in both conditions, results for Condition 3 mimic those of Condition 2. The need for additional storage to prevent surcharge exceedances at FCWWTP becomes further reduced when Minibasins 42, 36A4, and 36A5 are added to rehabilitation efforts as they are in Conditions 4 through 6. R value reduction assumptions made under these conditions remove additional I/I from the Fourth Creek system further reducing predicted surcharge exceedances at the plant. **Table 3-5** provides a summary of key predicted surcharge exceedance frequency and storage volume points for each of the conditions for the FCWWTP.

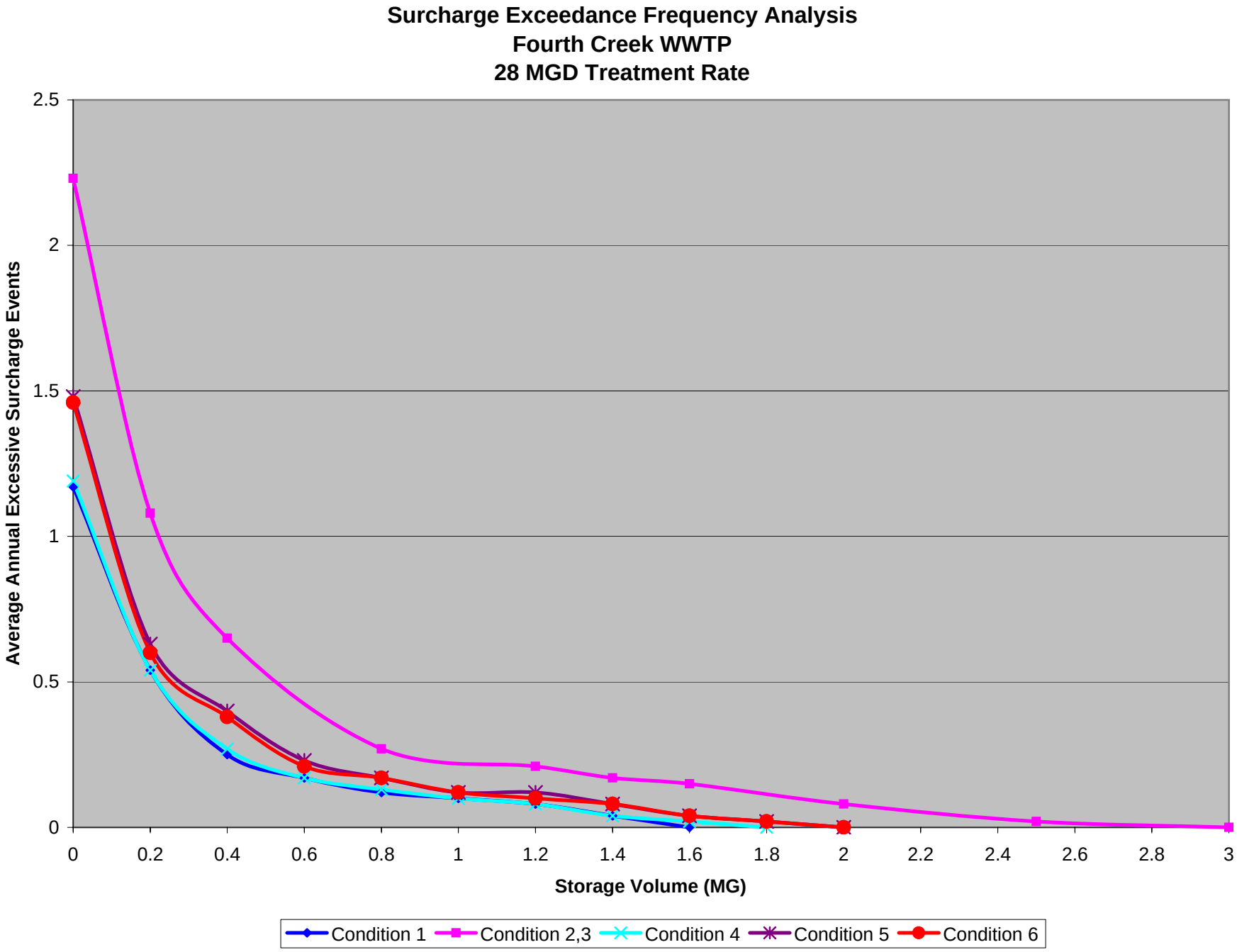

Surcharge Exceedance Frequency Analysis
Fourth Creek WWTP
28 MGD Treatment Rate
Average Annual Excessive Surcharge Events
2.5
2
1.5
1
0.5
0
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3
Storage Volume (MG)
Condition 1
Condition 2,3
Condition 4
Condition 5
Condition 6

**Figure 3-5**

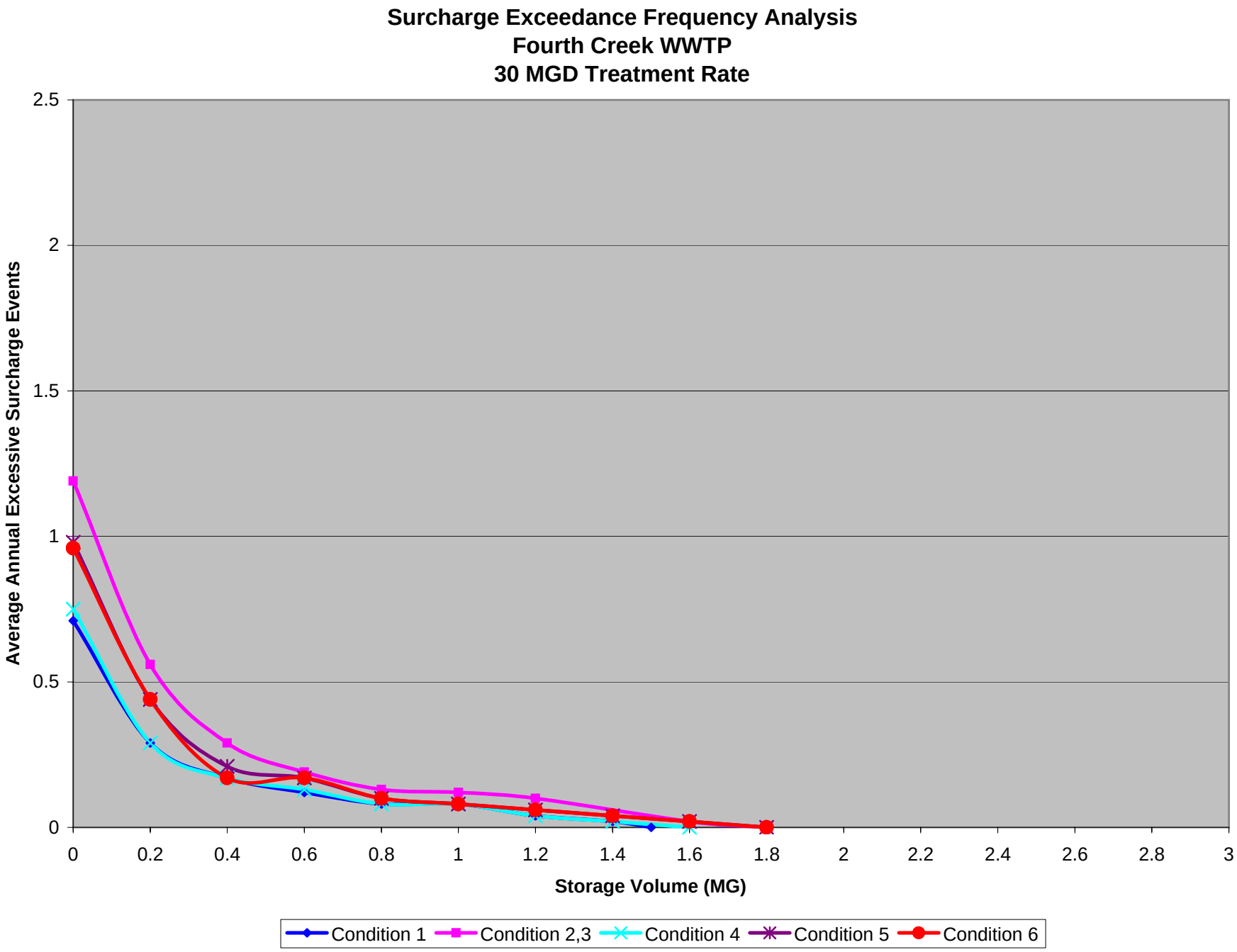

Surcharge Exceedance Frequency Analysis
Fourth Creek WWTP
30 MGD Treatment Rate
Average Annual Excessive Surcharge Events
2.5
2
1.5
1
0.5
0
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3
Storage Volume (MG)
Condition 1
Condition 2,3
Condition 4
Condition 5
Condition 6

**Figure 3-6**

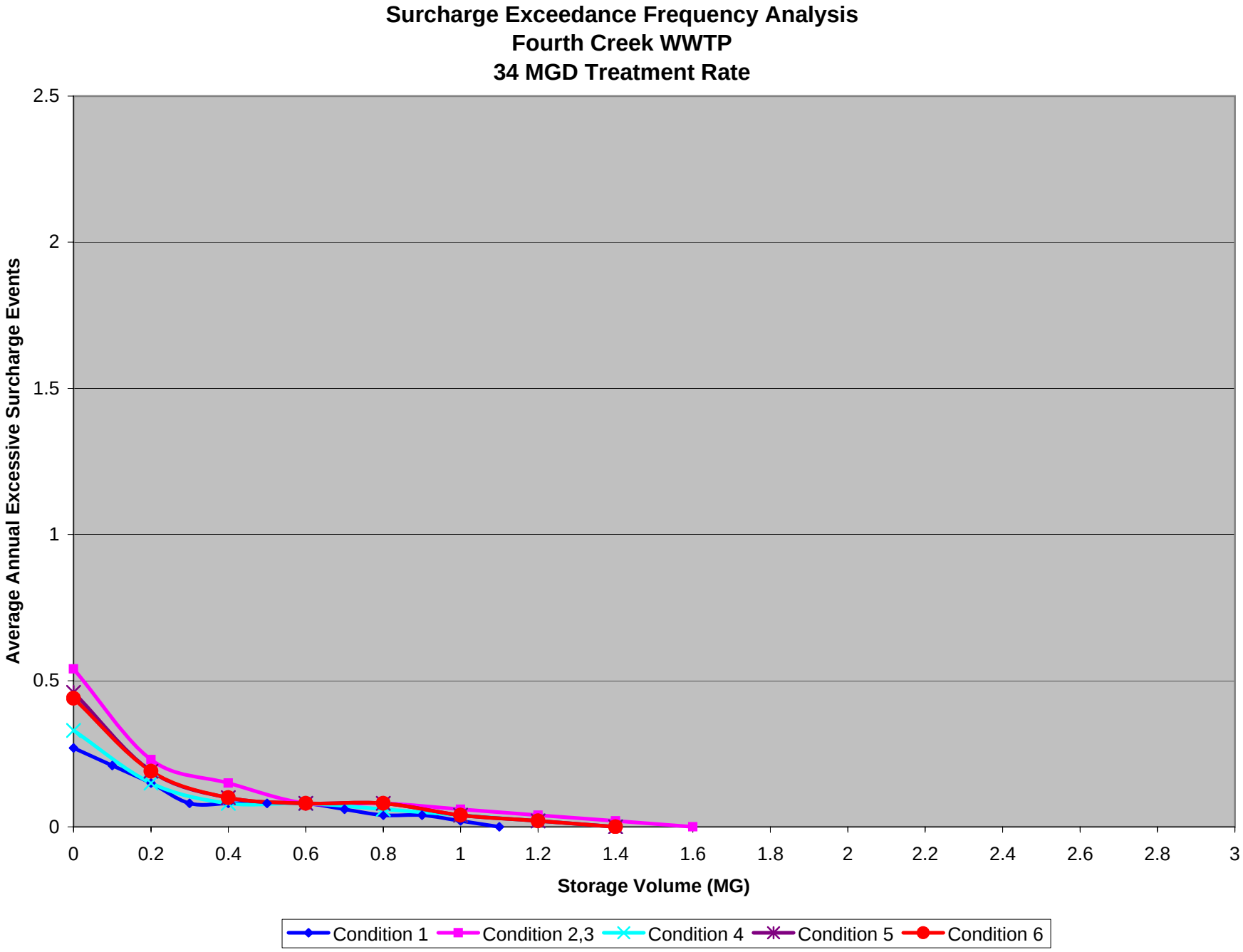

Surcharge Exceedance Frequency Analysis
Fourth Creek WWTP
34 MGD Treatment Rate
Average Annual Excessive Surcharge Events
2.5
2
1.5
1
0.5
0
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3
Storage Volume (MG)
Condition 1
Condition 2,3
Condition 4
Condition 5
Condition 6

**Figure 3-7**

**Table 3-5**
**FCWWTP Trunk Sewer Surcharge Criteria Exceedance Analysis Summary**

| Modeling Condition | Treatment Rate (mgd) | Avg. Annual Excess Flow Events | Storage Volume (MG) |
|---|---|---|---|
| Condition 1 | 28 | 0 | 1.6 |
| | | 0.5 | 0.25 |
| Conditions 2, 3 | 28 | 0 | 2.5 |
| | | 0.5 | 0.6 |
| Condition 4 | 28 | 0 | 1.8 |
| | | 0.5 | 0.2 |
| Condition 5 | 28 | 0 | 2.0 |
| | | 0.5 | 0.3 |
| Condition 6 | 28 | 0 | 2.0 |
| | | 0.5 | 0.3 |
| Condition 1 | 30 | 0 | 1.5 |
| | | 0.5 | 0.1 |
| Conditions 2, 3 | 30 | 0 | 1.8 |
| | | 0.5 | 0.25 |
| Condition 4 | 30 | 0 | 1.6 |
| | | 0.5 | 0.1 |
| Condition 5 | 30 | 0 | 1.8 |
| | | 0.5 | 0.2 |
| Condition 6 | 30 | 0 | 1.8 |
| | | 0.5 | 0.2 |
| Condition 1 | 34 | 0 | 1.1 |
| | | 0.5 | 0 |
| Conditions 2, 3 | 34 | 0 | 1.6 |
| | | 0.5 | 0.02 |
| Condition 4 | 34 | 0 | 1.4 |
| | | 0.5 | 0 |
| Condition 5 | 34 | 0 | 1.4 |
| | | 0.5 | 0 |
| Condition 6 | 34 | 0 | 1.4 |
| | | 0.5 | 0 |

## 3.2.2 Diversion Analysis Results

The surcharge criteria exceedance analysis evaluated storage volumes required at or upstream of the influent pump stations to prevent surcharge criteria exceedance events immediately upstream of each WWTP. As a further NetSTORM analysis, a study was done to determine the effects of flow routing and treatment rates at the

KWWTP and FCWWTP and the resulting Diversions that could occur after the influent pumping stations. **Figures 3-8 and 3-9** show simplified schematics of the KWWTP and FCWWTP operations respectively that are the basis of the analyses.

Currently 70 mgd of flow can be treated via primary and secondary treatment respectively at KWWTP. Flow exceeding the 70 mgd of primary treatment has the potential of being contained in storage of up to 6.5 MG (in existing unused process tanks) at KWWTP. Once storage capacity is met and flow exceeds the 70 mgd secondary treatment capacity, the excess flow (which receives primary treatment) is diverted and blended with secondary effluent prior to disinfection and eventual discharge. Analyses were performed to look at the KWWTP with and without the 6.5 MG of initial storage at the plant site using the maximum influent pumping rate of 120 mgd. Conditions 1 through 3 examine how the use of this storage affects overall predicted Diversions at the KWWTP. One additional analysis was performed to assess the impacts on treatment plant Diversions if the influent pumping rate is increased to 160 mgd (the peak hourly flow to the plant under Condition 2).

FCWWTP currently has an 18 mgd secondary treatment capacity. There is currently no additional plant storage available at FCWWTP and once the 18 mgd treatment rate is exceeded, excess primary effluent flow is diverted to disinfection where it is blended with secondary effluent. Analyses were performed at the FCWWTP with the plant's influent pump station operating at a maximum capacity of 28 mgd. An additional analysis was performed to evaluate Diversion impacts if the influent pumping rate is increased in capacity to 34 mgd (the peak instantaneous flow under Condition 3) and no surcharge exceedance abatement storage is provided.

### Kuwahee WWTP

For KWWTP, this analysis develops estimated annual Diversion frequencies and volumes based on secondary treatment rates of 80 mgd, 70 mgd, and 60 mgd and based on a 120 mgd influent pumping rate. An additional analysis was performed with an influent pumping rate of 160 mgd (the peak hourly flow under Condition 2) and 70 mgd secondary treatment rate to assess the impacts of increasing influent pumping capacity. These analyses also consider the previous Condition 1 and Condition 2 criteria of existing system conditions and post-CAP/ER Phase I conditions respectively. Condition 3 criteria mimics the same results as Condition 2 for KWWTP for this secondary treatment rate operating range. The 1.7 MG of potential additional storage in Williams Creek is the only net difference between Condition 2 and Condition 3. The impact of this storage is felt mainly on the surcharge exceedance analysis and has negligible effects on Diversion frequencies or volumes. Note the additional 160 mgd influent pumping rate analysis was run only for Conditions 2 and 3.

**Figures 3-10 through 3-18** present Diversion frequencies and volumes based on all Condition criterion for KWWTP. Figures 3-10 through 3-12 reflect an assumed 6.5 MG storage at the plant. Figures 3-13 through 3-15 reflect an initial condition of no storage

# KWWTP Diversion Analysis

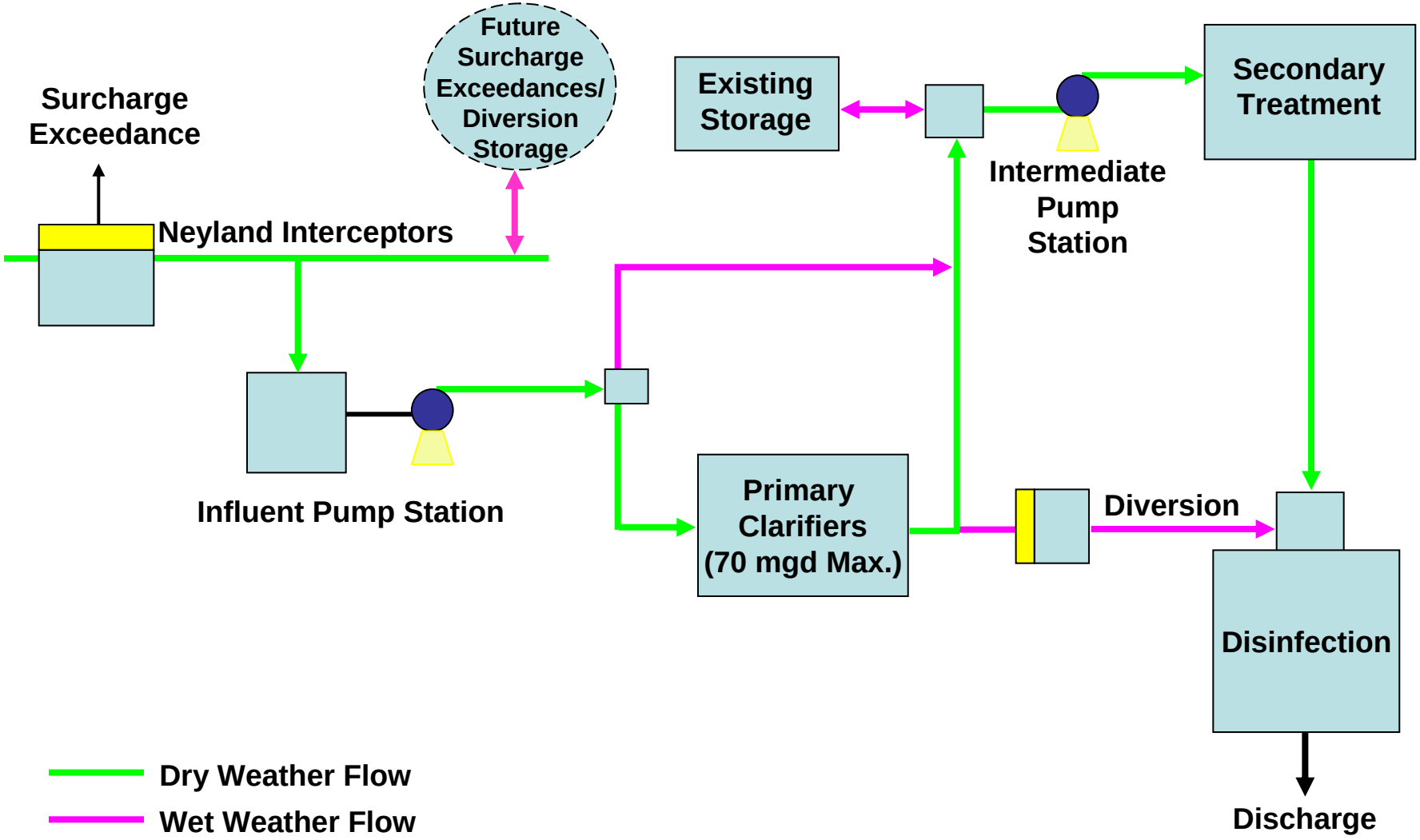



Figure 3-8

# FCWWTP Diversion Analysis

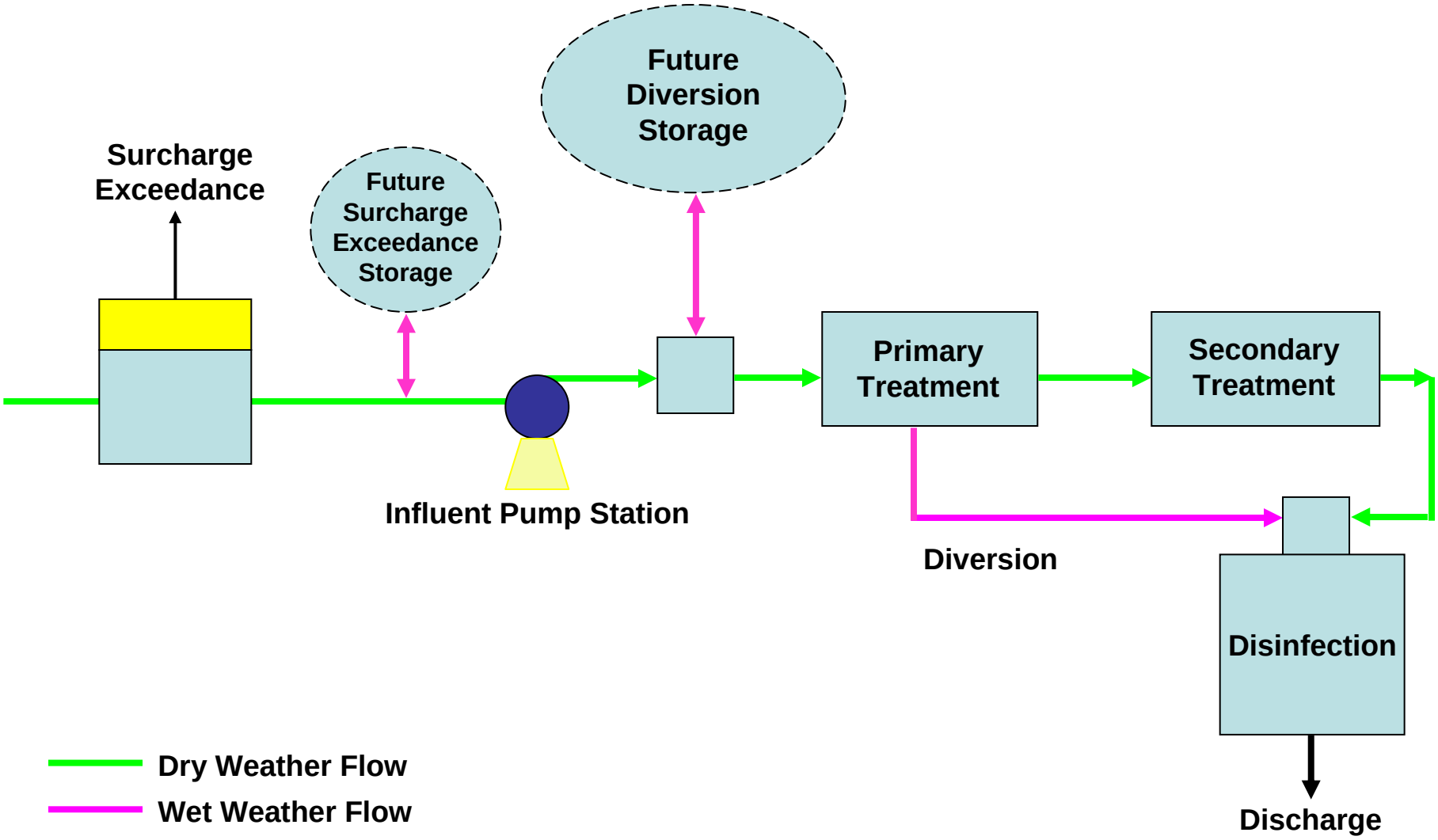



Figure 3-9

**Kuwahee WWTP**
**Diversion Analysis Preliminary Results - 80 mgd Secondary Treatment**
**6.5 MG Plant Storage**

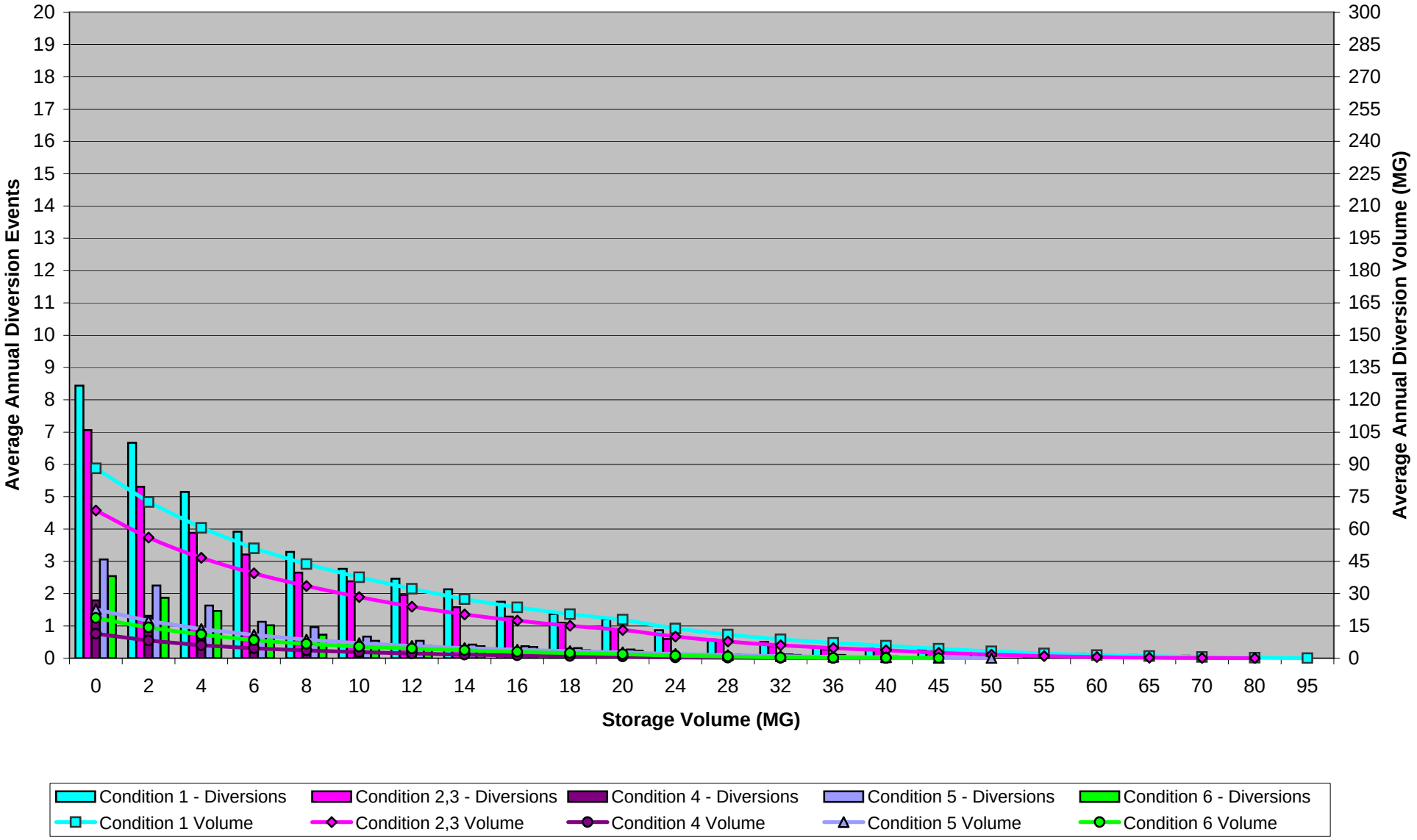



**Figure 3-10**

**Kuwahee WWTP**
**Diversion Analysis Preliminary Results - 70 mgd Secondary Treatment**
**6.5 MG Plant Storage**

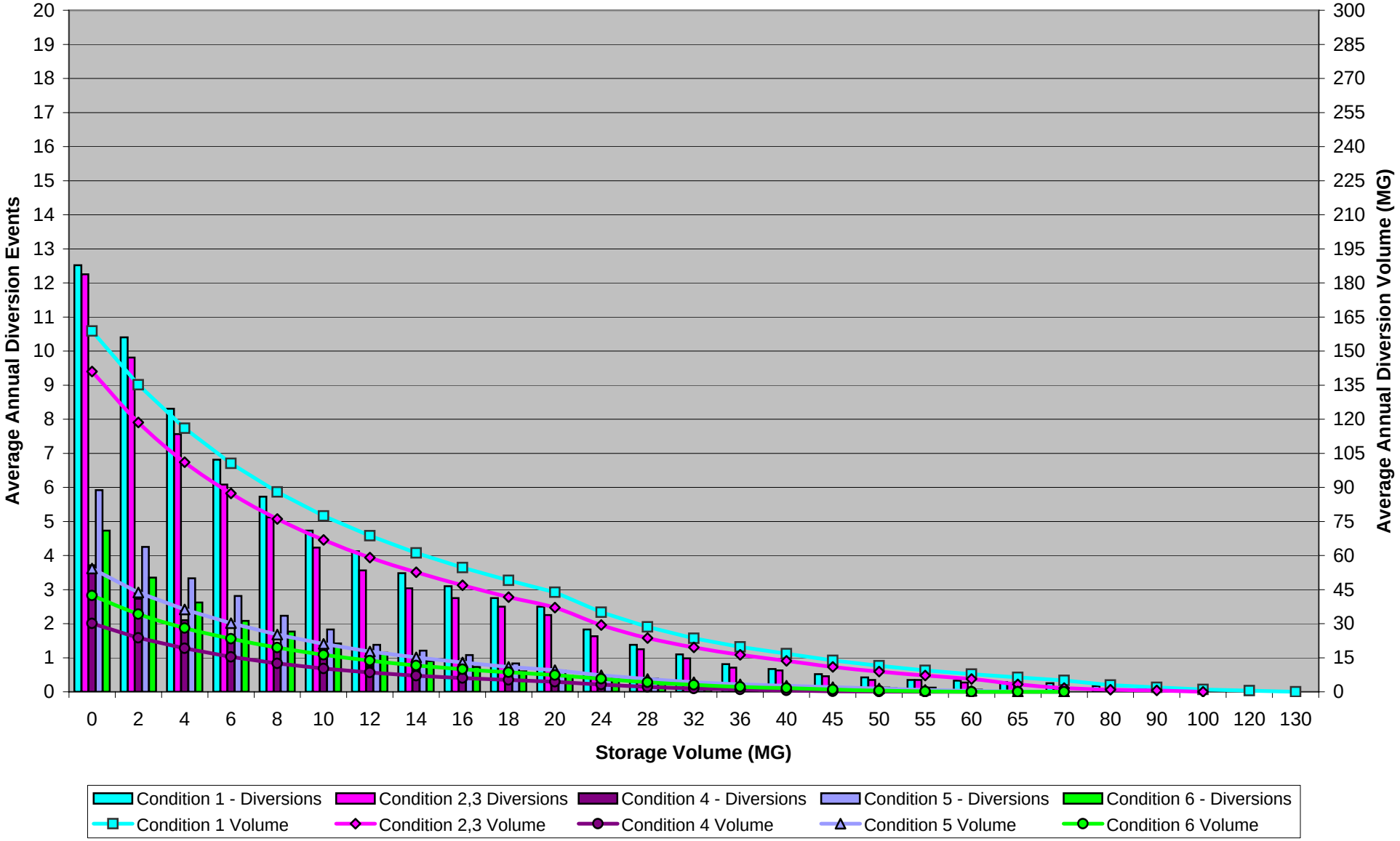



**Figure 3-11**

**Kuwahee WWTP**
**Diversion Analysis Preliminary Results - 60 mgd Secondary Treatment**
**6.5 MG Plant Storage**

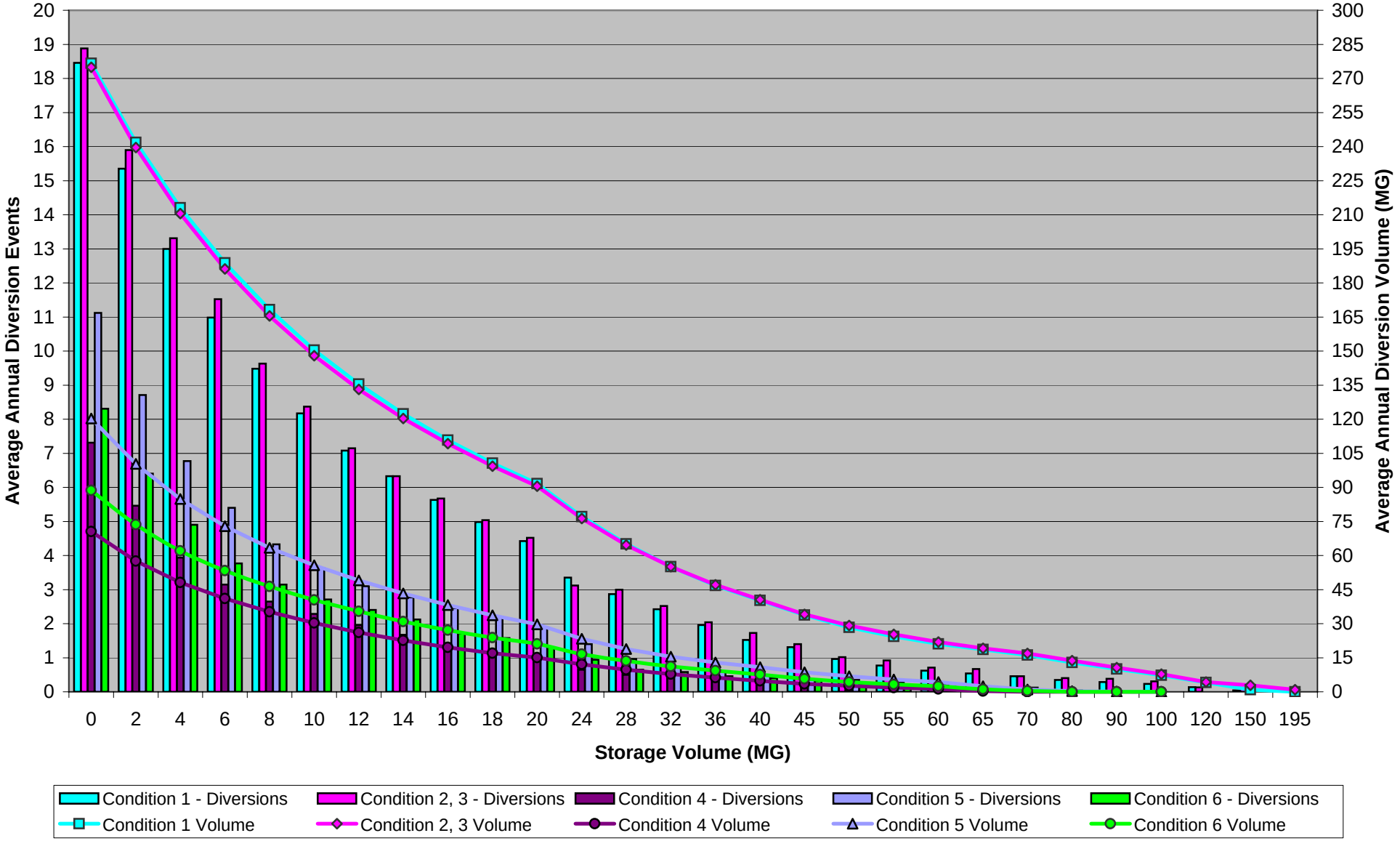



**Figure 3-12**

**Kuwahee WWTP**
**Diversion Analysis Preliminary Results - 80 mgd Secondary Treatment**
**NO Existing Storage at Plant**

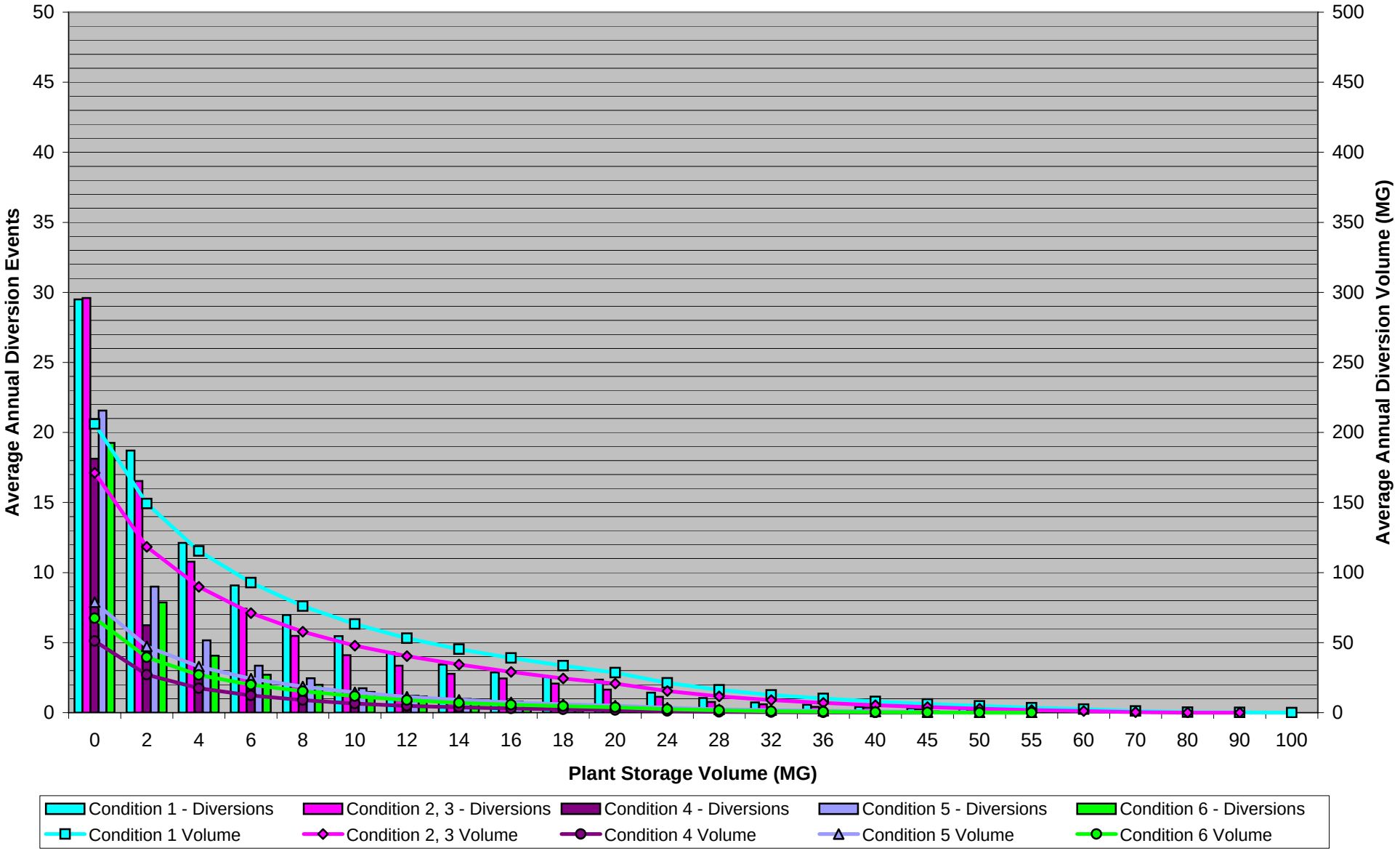
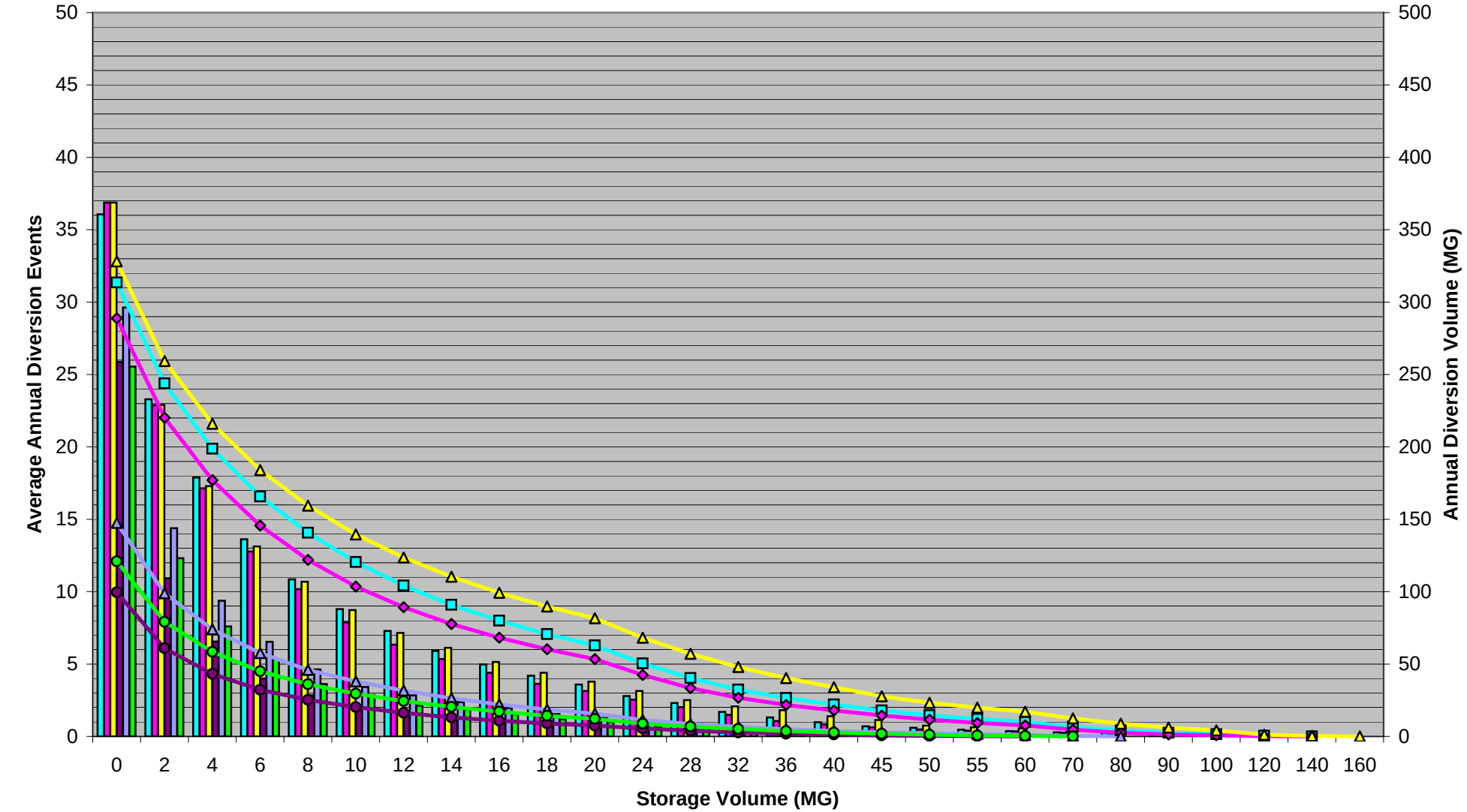



**Figure 3-13**

**Kuwahee WWTP**
**Diversion Analysis Preliminary Results - 70 mgd Secondary Treatment**
**NO Existing Storage at Plant**




*Note: These results reflect a change in the influent pumping rate from 120 mgd up to 160 mgd at KWWTP.

**Figure 3-14**

**Kuwahee WWTP**
**Diversion Analysis Preliminary Results - 60 mgd Secondary Treatment**
**NO Existing Storage at Plant**

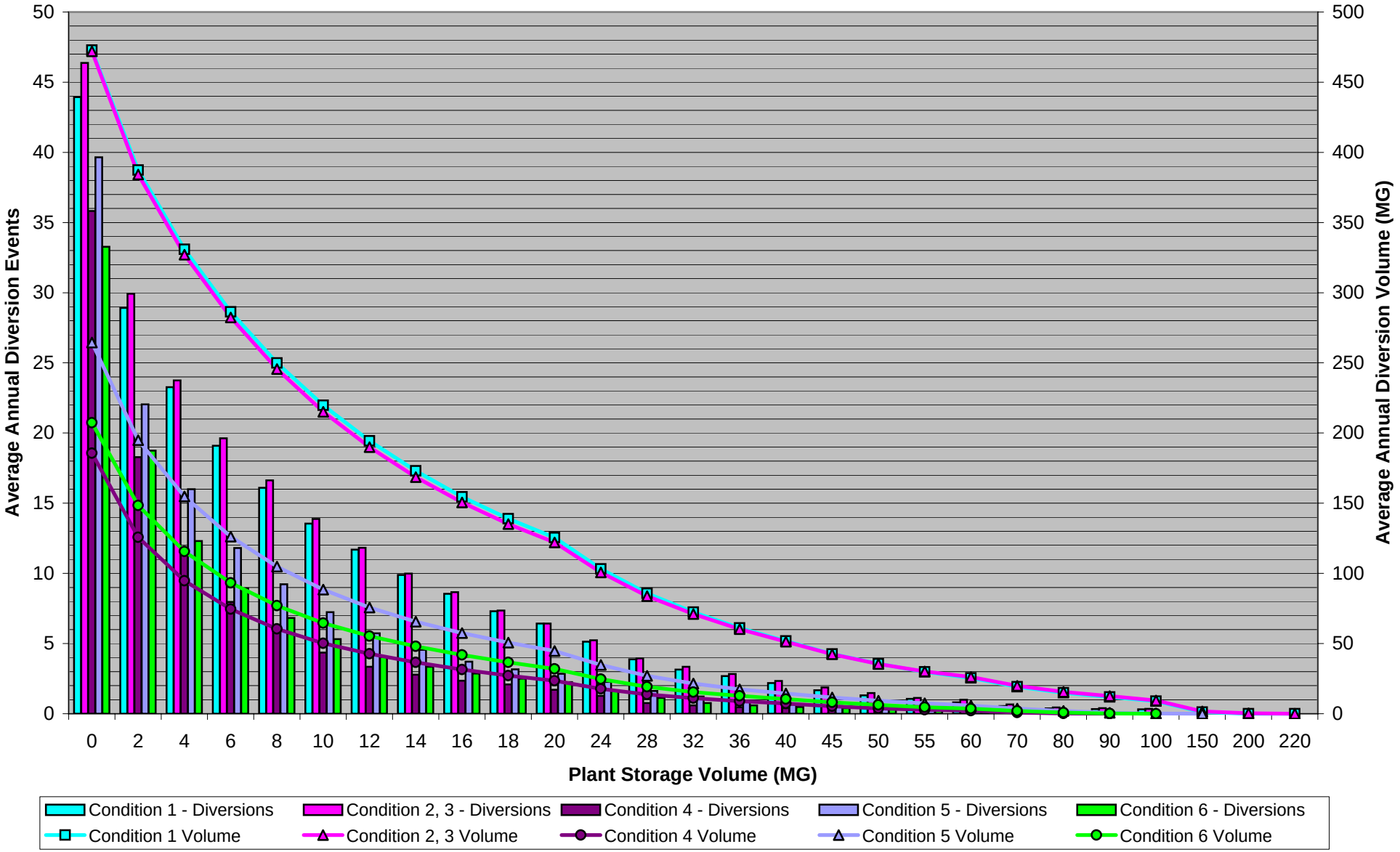



**Figure 3-15**

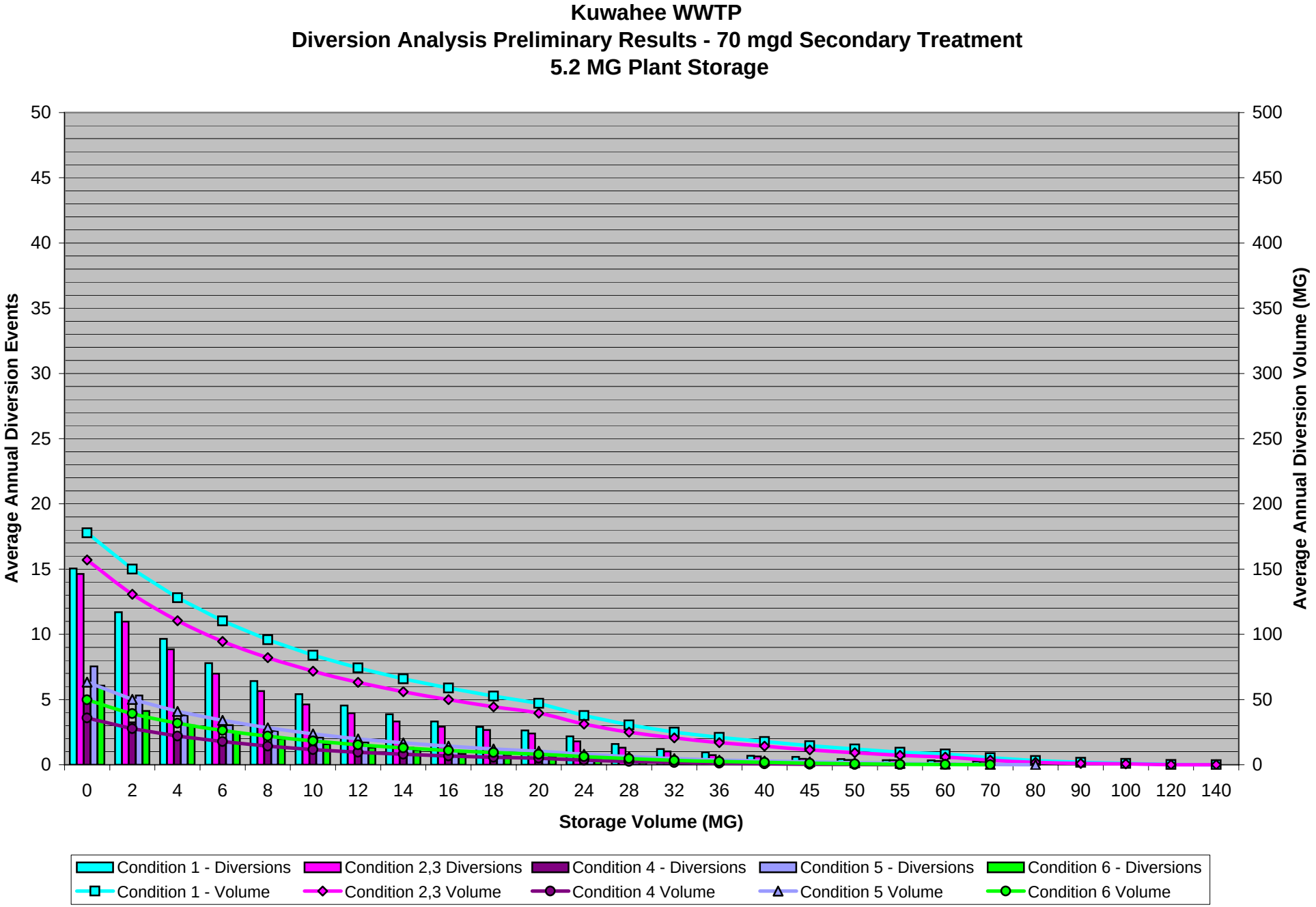

Kuwahee WWTP
Diversion Analysis Preliminary Results - 70 mgd Secondary Treatment
5.2 MG Plant Storage
Average Annual Diversion Events
Average Annual Diversion Volume (MG)
Storage Volume (MG)
0
2
4
6
8
10
12
14
16
18
20
24
28
32
36
40
45
50
55
60
70
80
90
100
120
140
0
5
10
15
20
25
30
35
40
45
50
0
50
100
150
200
250
300
350
400
450
500
Condition 1 - Diversions
Condition 2,3 Diversions
Condition 4 - Diversions
Condition 5 - Diversions
Condition 6 - Diversions
Condition 1 - Volume
Condition 2,3 Volume
Condition 4 Volume
Condition 5 Volume
Condition 6 Volume

**Figure 3-16**

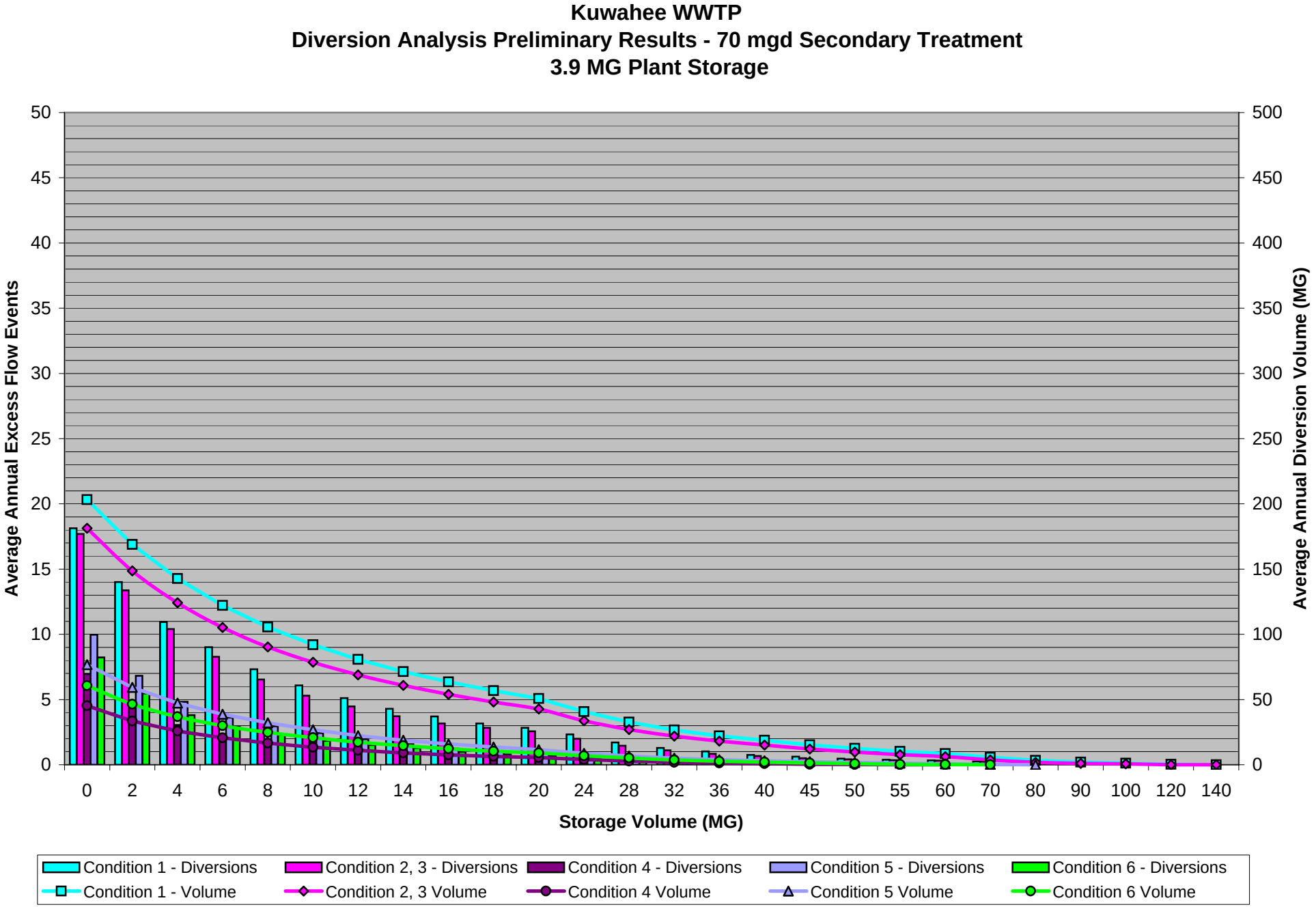

Kuwahee WWTP
Diversion Analysis Preliminary Results - 70 mgd Secondary Treatment
3.9 MG Plant Storage
Average Annual Excess Flow Events
Average Annual Diversion Volume (MG)
Storage Volume (MG)
0
2
4
6
8
10
12
14
16
18
20
24
28
32
36
40
45
50
55
60
70
80
90
100
120
140
0
5
10
15
20
25
30
35
40
45
50
0
50
100
150
200
250
300
350
400
450
500
Condition 1 - Diversions
Condition 2, 3 - Diversions
Condition 4 - Diversions
Condition 5 - Diversions
Condition 6 - Diversions
Condition 1 - Volume
Condition 2, 3 Volume
Condition 4 Volume
Condition 5 Volume
Condition 6 Volume

**Figure 3-17**

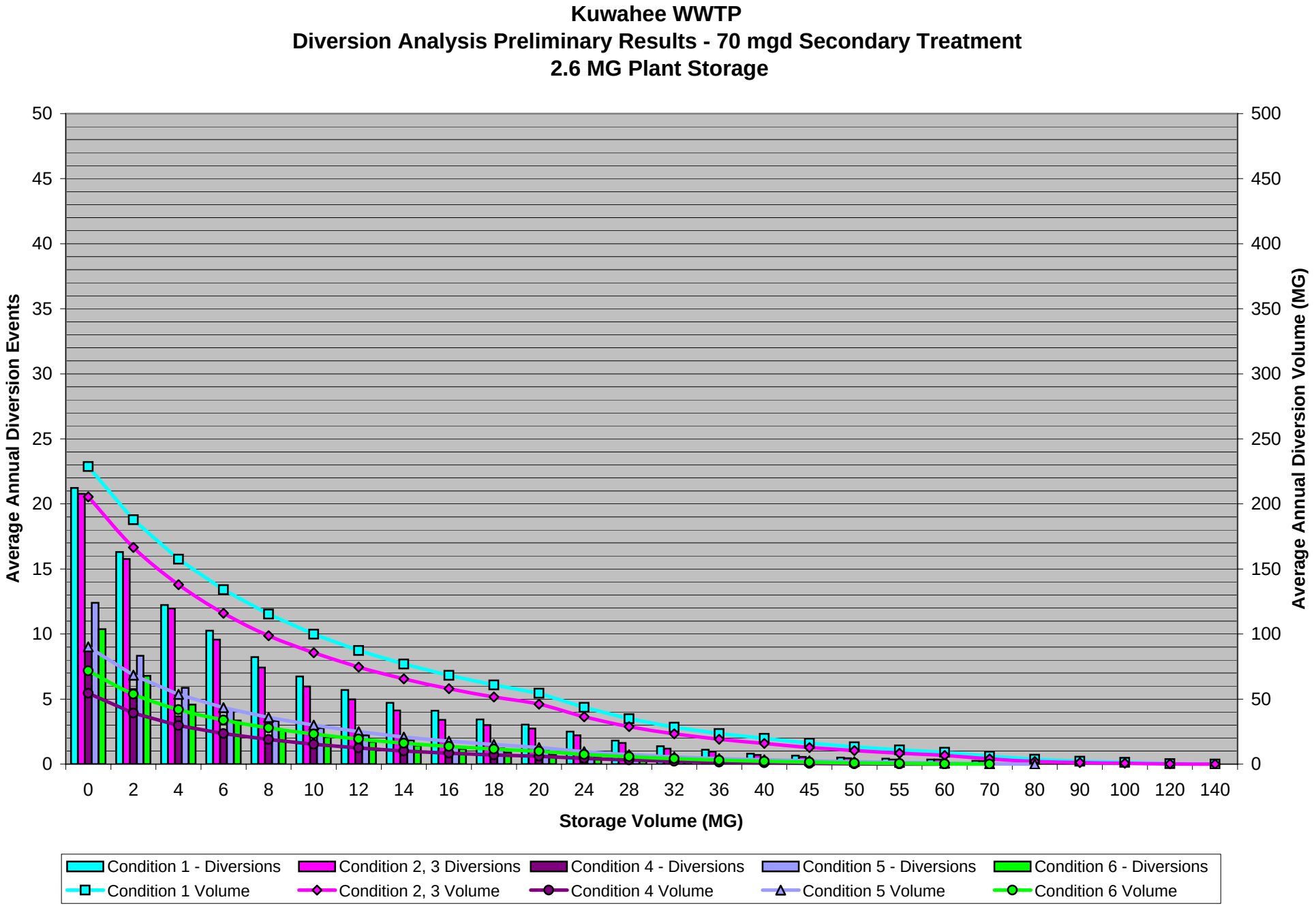

Kuwahee WWTP
Diversion Analysis Preliminary Results - 70 mgd Secondary Treatment
2.6 MG Plant Storage
Average Annual Diversion Events
Average Annual Diversion Volume (MG)
Storage Volume (MG)
0
5
10
15
20
25
30
35
40
45
50
0
50
100
150
200
250
300
350
400
450
500
0
2
4
6
8
10
12
14
16
18
20
24
28
32
36
40
45
50
55
60
70
80
90
100
120
140
Condition 1 - Diversions
Condition 2, 3 Diversions
Condition 4 - Diversions
Condition 5 - Diversions
Condition 6 - Diversions
Condition 1 Volume
Condition 2, 3 Volume
Condition 4 Volume
Condition 5 Volume
Condition 6 Volume

**Figure 3-18**

at KWWTP. Additionally, analyses were performed on several storage volumes utilizing portions of the in-plant 6.5 MG of storage. These analyses were performed with primary and secondary treatment rates set at 70 mgd. The results are illustrated in Figures 3-16 through 3-18.

**Table 3-6** presents a summary for the Diversion analysis results for Conditions 1 and 2 for KWWTP with 120 mgd influent capacity. For comparison purposes only, the nearby plant storage values of 0 MG and 12 MG were chosen. The 12 MG reflects the amount of storage needed for surcharge exceedance abatement down to 0.5 predicted surcharge exceedances per year under the surcharge exceedance analysis. Variable on-site storage volumes were evaluated to correspond with various WWTP improvements discussed in Section 4 that utilize existing on-site storage tankage for wet weather treatment facilities. Use of the 12 MG surcharge exceedance abatement storage to minimize Diversions may impact surcharge exceedance frequency. For example, if KWWTP flow exceeds 70 mgd after the on-site storage is full and flow in excess of 70 mgd is diverted to one or both of the surcharge exceedance abatement tanks, storage volume may not be sufficient to avoid a surcharge exceedance if flow continues to rise and exceeds the 120 mgd influent pumping capacity. Therefore, it will be critical to establish appropriate standard operating procedures for use of this storage as part of the updated PCP for wet weather treatment plant operation.

**Table 3-6**
**KWWTP Diversion Analysis Summary – Base Conditions**

| Modeling Condition | Treatment Rate (mgd) | Nearby Plant Storage (MG) | Average Annual Statistics | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 6.5 MG Storage at Plant | | 5.2 MG Storage at Plant | | 3.9 MG Storage at Plant | | 2.6 MG Storage at Plant | | 0 MG Storage at Plant | |
| | | | Diversion Frequency (per year) | Volume (MG) | Diversion Frequency (per year) | Volume (MG) | Diversion Frequency (per year) | Volume (MG) | Diversion Frequency (per year) | Volume (MG) | Diversion Frequency (per year) | Volume (MG) |
| Condition 1 | 80 | 0 | 8.4 | 88.2 | | | | | | | 29.5 | 205.9 |
| | | 12 | 2.5 | 32.3 | | | | | | | 4.3 | 53.1 |
| Condition 2 | 80 | 0 | 7.1 | 68.6 | | | | | | | 29.6 | 171.1 |
| | | 12 | 2.0 | 23.9 | | | | | | | 3.4 | 40.4 |
| Condition 1 | 70 | 0 | 12.5 | 158.9 | 15.0 | 177.8 | 18.1 | 203.3 | 21.2 | 228.8 | 36.1 | 313.5 |
| | | 12 | 4.1 | 68.7 | 4.5 | 74.2 | 5.1 | 80.8 | 5.7 | 87.4 | 7.3 | 104.2 |
| Condition 2 | 70 | 0 | 12.3 | 141.0 | 14.6 | 157.1 | 17.7 | 181.3 | 20.8 | 205.5 | 36.9 | 288.9 |
| | | 12 | 3.6 | 59.1 | 4.0 | 63.2 | 4.5 | 68.9 | 5.0 | 74.6 | 6.3 | 89.3 |
| Condition 1 | 60 | 0 | 18.5 | 276.6 | | | | | | | 43.9 | 472.8 |
| | | 12 | 7.1 | 135.4 | | | | | | | 11.7 | 194.5 |
| Condition 2 | 60 | 0 | 18.9 | 274.9 | | | | | | | 46.4 | 472.0 |
| | | 12 | 7.2 | 133.1 | | | | | | | 11.8 | 190.0 |

For both Conditions 1 and 2 at the KWWTP, there is an increasing trend in both Diversion frequency and volume as treatment capacity is decreased from 80 mgd to 60 mgd. Condition 2 Diversion volumes are notably less than Condition 1 volumes for the 80 and 70 mgd treatment rates. Diversion volumes for the 60 mgd treatment rate show less notable differences between the flow conditions. As the treatment rate is reduced for secondary treatment, dry weather peak flow begins to have a larger effect on Diversion frequencies and volumes. Condition 2 has an average of approximately 5 mgd more dry weather flow than Condition 1 because of projected growth within the system. This growth in baseflow has more of an effect on Diversion rates as the secondary treatment rate is reduced. Under the increased WWTP influent pumping rate analysis (Conditions 2, 3* on Figure 3-14), an increase in the pumping rate to 160 mgd caused a shift in flows from potential surcharge exceedances in front of the plant to Diversions within the plant. Diversion frequency shows minor increases; however, the volumes diverted increase noticeably over Condition 2, 3 under the 120 mgd influent pumping rate.

Conditions 1 through 6 were also used to examine the impacts of 6.5 MG of unused plant process tanks currently available for storage. Reductions achieved in predicted Diversion volume and storage because of the application of the in-plant storage are almost equivalent to the predicted difference in storage volumes for 0.5 predicted Diversions per year for all the conditions. This means that no additional benefit of the 6.5 MG in-plant storage is gained on peak flows other than reducing the overall need for additional storage to avert Diversions by approximately 6.5 MG. An example of this is Condition 1 at 80 mgd. The difference in storage volumes for the analysis with 6.5 MG and without it is approximately 5.7 MG. Using this same example point and condition, the analysis for 0 MG storage at the plant produces a higher predicted Diversion volume of 9.2 MG. The analysis with 6.5 MG produces a predicted Diversion volume of 8.7 MG. If this 0.5 MG predicted Diversion volume difference is also taken in combination with the 5.7 MG predicted storage requirement, this equivocates to the 6.5 MG in-plant storage.

Figures 3-10 through 3-15 also present predicted Diversion frequencies and volumes based on Conditions 4, 5, and 6 criterion. Note for Conditions 4 through 6 there is an increasing trend in both Diversion frequency and volume as treatment capacity is decreased from 80 mgd to 70 mgd and downward to 60 mgd. Diversion frequencies and volumes are cut almost in half each time the treatment rate is raised 10 mgd. Condition 4 has the lowest Diversion frequencies and volumes followed by Condition 6, and finally Condition 5. This is to be expected since Condition 4 has the most stringent rehabilitation conditions of the three causing a larger reduction in peak flows to the plant. **Table 3-7** presents a Diversion analysis results summary for Conditions 4 through 6 for KWWTP at 120 mgd influent capacity.

Note that the storage volumes required to avert predicted Diversions differ from those for predicted surcharge exceedances in that they address those hydraulic peaks that come in between 120 mgd (the influent pump station maximum capacity) and the

secondary treatment maximum capacity (80, 70, and 60 mgd for the examples in Tables 3-6 and 3-7).

**Table 3-7**
**KWWTP Diversion Analysis Summary – Additional RDI/I Reductions (120 mgd)**

| Modeling Condition | Treatment Rate (mgd) | Nearby Plant Storage (MG) | Average Annual Statistics | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 6.5 MG Storage at Plant | | 5.2 MG Storage at Plant | | 3.9 MG Storage at Plant | | 2.6 MG Storage at Plant | | 0 MG Storage at Plant | |
| | | | Diversion Frequency | Volume (MG) | Diversion Frequency | Volume (MG) | Diversion Frequency | Volume (MG) | Diversion Frequency | Volume (MG) | Diversion Frequency | Volume (MG) |
| Condition 4 | 80 | 0 | 1.8 | 11.4 | | | | | | | 18.1 | 51.2 |
| | | 12 | 0.3 | 2.2 | | | | | | | 0.6 | 4.9 |
| Condition 5 | 80 | 0 | 3.1 | 22.7 | | | | | | | 21.6 | 78.9 |
| | | 12 | 0.5 | 5.7 | | | | | | | 1.2 | 11.4 |
| Condition 6 | 80 | 0 | 2.5 | 18.7 | | | | | | | 19.3 | 67.5 |
| | | 12 | 0.4 | 4.4 | | | | | | | 1.2 | 9.0 |
| Condition 4 | 70 | 0 | 3.7 | 30.1 | 5.0 | 35.9 | 7.0 | 45.2 | 9.0 | 54.5 | 25.9 | 99.5 |
| | | 12 | 0.8 | 8.5 | 0.9 | 9.6 | 1.1 | 11.0 | 1.3 | 12.4 | 1.8 | 16.2 |
| Condition 5 | 70 | 0 | 5.9 | 54.2 | 7.5 | 63.3 | 10.0 | 76.7 | 12.4 | 90.1 | 29.6 | 147.5 |
| | | 12 | 1.4 | 17.8 | 1.7 | 19.8 | 2.0 | 22.4 | 2.2 | 24.9 | 2.8 | 31.6 |
| Condition 6 | 70 | 0 | 4.7 | 42.4 | 6.1 | 49.7 | 8.2 | 60.7 | 10.4 | 71.8 | 25.5 | 120.9 |
| | | 12 | 1.2 | 13.7 | 1.3 | 15.3 | 1.5 | 17.3 | 1.7 | 19.3 | 2.1 | 24.4 |
| Condition 4 | 60 | 0 | 7.3 | 70.6 | | | | | | | 35.8 | 185.7 |
| | | 12 | 2.0 | 26.1 | | | | | | | 3.4 | 42.7 |
| Condition 5 | 60 | 0 | 11.1 | 120.3 | | | | | | | 39.7 | 264.5 |
| | | 12 | 3.1 | 49.1 | | | | | | | 5.7 | 75.6 |
| Condition 6 | 60 | 0 | 8.3 | 88.7 | | | | | | | 33.3 | 207.4 |
| | | 12 | 2.4 | 35.4 | | | | | | | 4.0 | 55.3 |

As indicated in Figure 3-14, the annual Diversion frequency with an influent capacity of 160 mgd and no available on-site storage (existing unused tankage is used for additional treatment capacity) is projected to be 37.

### Fourth Creek WWTP

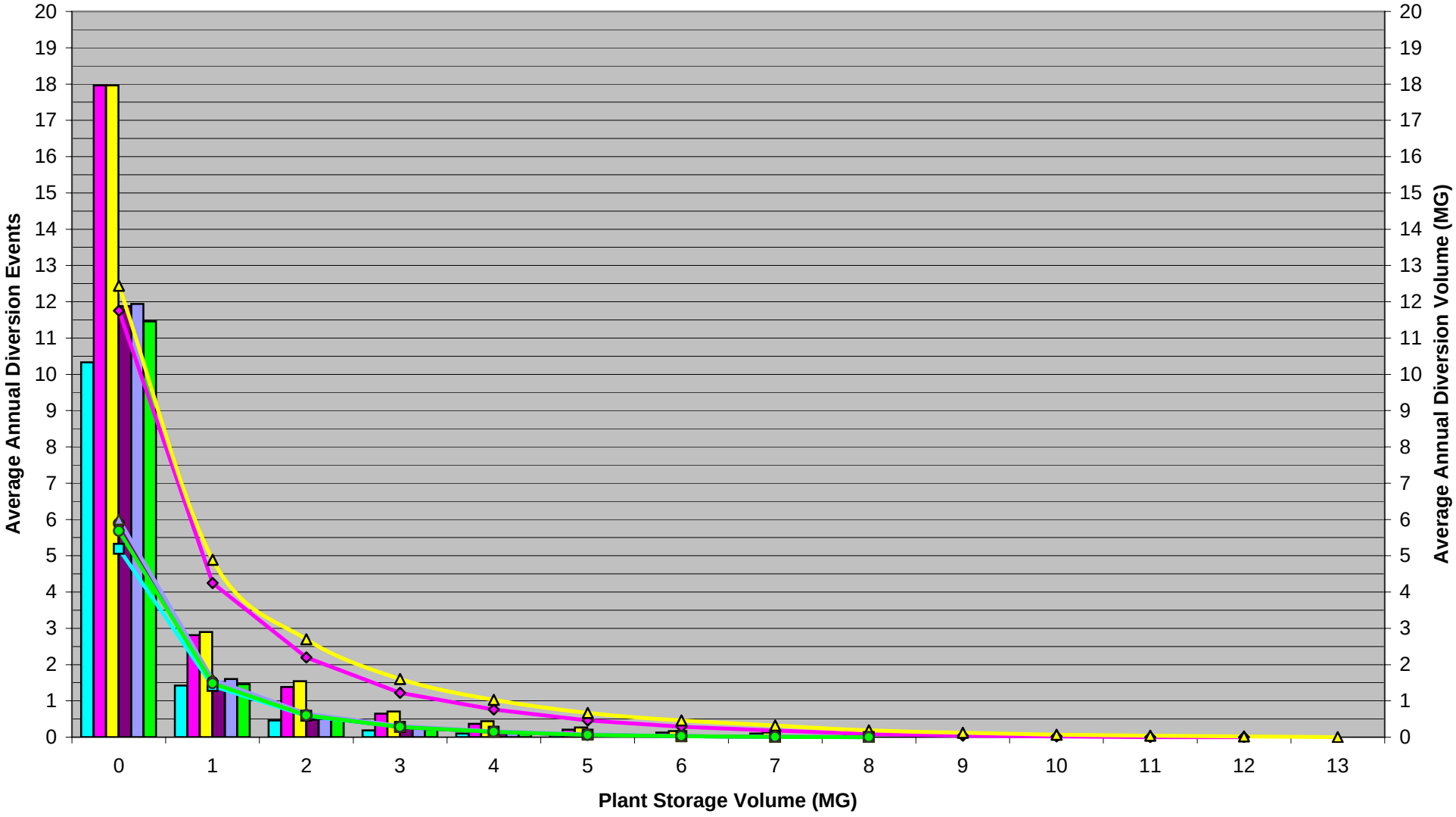
For FCWWTP, estimated annual Diversion frequencies and volumes were developed based on secondary treatment rates of 18 mgd and 16 mgd, and assuming 28 mgd influent pumping rate. One additional analysis was performed to evaluate the impacts on plant Diversions should the influent pumping rate be increased to 34 mgd to avoid capacity exceedance. Note the driving factor for the difference in Conditions 1 and 2 for FCWWTP is the increase in sewered area and the increase in dry weather flow from Condition 1 to 2. Under Condition 1, the estimated sewered service area is 9,724 acres. This sewered service area is projected to increase to 10,855 acres in Condition 2 based on TAZ population growth trends for the FCWWTP service area. Projected dry weather flow increases from the existing average dry weather flow of 4.7 mgd for Condition 1 to a future projected average dry weather flow of 5.7 mgd for

Condition 2. These factors dominate the graph responses on **Figures 3-19 and 3-20** and are the main driver for the Condition 2 curves going beyond Condition 1. Diversion frequencies and volumes both increase with a decrease in secondary treatment to 16 mgd. Any storage recorded on the graphs implies additional needed storage for Diversion frequency and volume reduction.

Just as in the surcharge exceedance analysis for Condition 3, even though it does contain some comprehensive rehabilitation, the location of the rehabilitation is upstream of the Walker Springs storage facility. The impact on peak wet weather flow has already been alleviated by the storage facility. Because of this, Condition 3 Diversion response out of NetSTORM mimics Condition 2 responses for the Fourth Creek system.

Conditions 4 through 6 were also applied to the Fourth Creek system for Diversion analysis. Figures 3-19 and 3-20 reflect the graphical results of this analysis for the 18 mgd and 16 mgd secondary treatment rates. Note that for Conditions 4 through 6 for FCWWTP, there is little variance in Diversion frequencies and volumes. However, there is a notable initial reduction in Diversion frequency and volumes when compared to the CAP/ER Phase I (Condition 2) system. The curve results for Conditions 4 through 6 display minimal difference with the CAP/ER Phase I system curve as Diversion frequency is reduced to 0.5 events per year. This may be attributed to projected dry weather peak flows playing a greater role on the impact of secondary treatment more so than the peak wet weather flows within the Fourth Creek service area. Because of this, the cost of additional rehabilitation beyond CAP/ER Phase I in Fourth Creek may be more costly than the return gained at the treatment plant. Diversion frequencies and volumes both decrease with an increase in secondary treatment to 18 mgd. Under the additional pumping rate analysis (Conditions 2, 3* on Figure 3-19), increasing the pumping rate to 34 mgd causes a shift in flows from potential surcharge conditions in front of the plant to Diversions within the plant. Minor increases in both Diversion frequency and volumes occur. These minor changes reflect the limited amount of Diversion events and volumes that occur between 28 mgd and 34 mgd for the Condition 2, 3 responses in Fourth Creek. **Table 3-8** summarizes the Diversion analysis results for Conditions 1 through 6 for the FCWWTP at 28 mgd influent capacity.

**Fourth Creek WWTP**
**Diversion Analysis Preliminary Results - 18 mgd Secondary Treatment**




*Note: These results reflect a change in the influent pumping rate from 28 mgd up to 34 mgd at FCWWTP.

**Figure 3-19**

**Fourth Creek WWTP**
**Diversion Analysis Preliminary Results - 16 mgd Secondary Treatment**

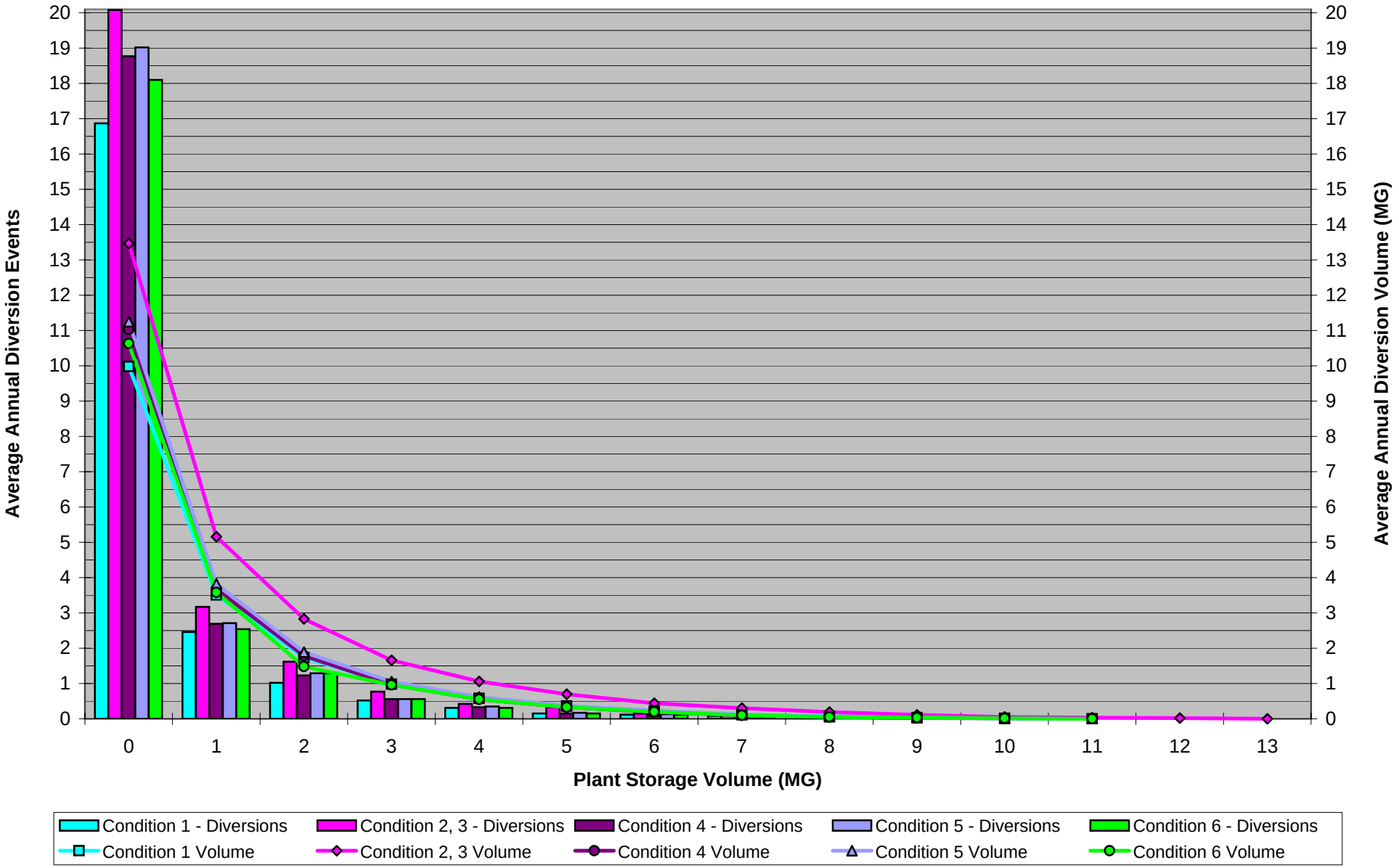



**Figure 3-20**

**Table 3-8**
**FCWWTP Diversion Analysis Summary (28 mgd)**

| Modeling Condition | Treatment Rate (mgd) | Nearby Plant Storage (MG) | Average Annual Statistics | |
|---|---|---|---|---|
| | | | Diversion Frequency | Volume (MG) |
| Condition 1 | 18 | 0 | 10.3 | 5.2 |
| | | 1 | 1.4 | 1.4 |
| Condition 2, 3 | 18 | 0 | 18.0 | 11.8 |
| | | 1 | 2.8 | 4.3 |
| Condition 4 | 18 | 0 | 11.9 | 5.9 |
| | | 1 | 1.5 | 1.5 |
| Condition 5 | 18 | 0 | 11.9 | 6.0 |
| | | 1 | 1.6 | 1.6 |
| Condition 6 | 18 | 0 | 11.5 | 5.7 |
| | | 1 | 1.5 | 1.5 |
| Condition 1 | 16 | 0 | 16.9 | 10.0 |
| | | 1 | 2.5 | 3.5 |
| Condition 2, 3 | 16 | 0 | 20.1 | 13.5 |
| | | 1 | 3.2 | 5.2 |
| Condition 4 | 16 | 0 | 18.8 | 11.0 |
| | | 1 | 2.7 | 3.7 |
| Condition 5 | 16 | 0 | 19.0 | 11.3 |
| | | 1 | 2.7 | 3.8 |
| Condition 6 | 16 | 0 | 18.1 | 10.6 |
| | | 1 | 2.5 | 3.6 |

Note that for 28 mgd influent capacity, the 1 MG storage facility at the plant can also have a significant impact on Diversion frequency. However, use of this storage to avoid Diversions could result in an increased frequency of capacity exceedance conditions.

## 3.3 KWWTP Site-Specific Storage Analysis

As a further analysis of how storage affects upstream trunk sewer surcharge exceedances for KWWTP, site specific locations were evaluated for hydraulic impacts at the plant. Using the storage volume attained from the NetSTORM model with the site-specific hydraulics of the EXTRAN basin models, an EXTRAN analysis was performed on the approximately 12 MG storage volume required in NetSTORM to achieve an average of 0.5 predicted surcharge exceedance events per year based on Condition 2 – CAP/ER Phase I (Figure 3-4). The purpose of this analysis is to evaluate how potentially available sites chosen by KUB can be utilized to achieve desired peak flow reductions at the Kuwahee WWTP site. The analyzed locations provide opportunities to site needed storage volumes while reducing peak flow impacts within the Kuwahee service area.

**Figure 3-21** shows the hydrographs produced from each EXTRAN basin model for CAP/ER Phase I flow conditions. Noted on the figure is the high peak response of the Second Creek and Third Creek models. Both basins have rainfall dependent inflow and infiltration (RDI/I) characterizations that initiate steeper peak flow responses to wet weather than the neighboring basins. These sharper peak flow responses to wet weather make both basins good candidates for peak flow reductions through storage. Figure 3-21 illustrates that less storage volume is required in both of these basins to achieve greater peak flow reductions to the KWWTP than in the other basins.

Peak flows illustrated in Figure 3-21 and summarized in Table 3-3 were used as guidance for limiting flow out of storage within the Second Creek and Third Creek EXTRAN models. Flows in excess of these limitations were diverted into each modeled storage location. Under CAP/ER Phase I conditions, total peak one hour flow going to the KWWTP amounts to approximately 159.1 mgd (Table 3-3). To be conservative, Second and Third Creek storage tanks were designed in the models to limit flows coming out of those basins to help reduce peak flows to just below 120 mgd (the current peak influent pumping capacity at KWWTP). The EXTRAN CAP/ER design storm basin models for Second and Third Creek were run several times readjusting the flow limitation from each storage location to achieve the desired peak flow reduction. Note that the basin models used convey all flows within Consent Decree surcharge standards (per the Capacity Assurance Plan). After the desired reductions were achieved, the resulting volume of flow diverted to storage was calculated for each location. CCP storage locations were modeled based on the most recent site investigations conducted for Gresham, Smith and Partners. In Third Creek, the CCP storage site most recently investigated is the west end of the Kuwahee WWTP currently utilized for maintenance Building A and reserved for future Digester No. 1. In Second Creek, the site most recently investigated is near the intersection of Cooper Street and Bernard Avenue.

In the case of the Bernard Avenue Second Creek site, approximately 3.2 MG of storage was used in EXTRAN. For Third Creek, approximately 4.2 MG of flow was diverted to storage in EXTRAN. Note that these resulting volumes are what would occupy the tank for a single design storm event with a maximum flow of 120 mgd going on to KWWTP.

If flow were restricted to occupy the full NetSTORM predicted 12 MG (approximately 5.5 MG at the Second Creek sites and 6.5 MG at Third Creek), the resulting peak 1-hour flow to KWWTP is approximately 116.5 mgd for the Second Creek site and Third Creek combination. The storage volumes given for the differing peak flows reveal that there is room for dynamic operations of the storage facility return flow rates. These values are preliminary and they do allow room for some shift in storage volume from one site to the other.

# CAP/ER Phase I Flows to Kuwahee WWTP

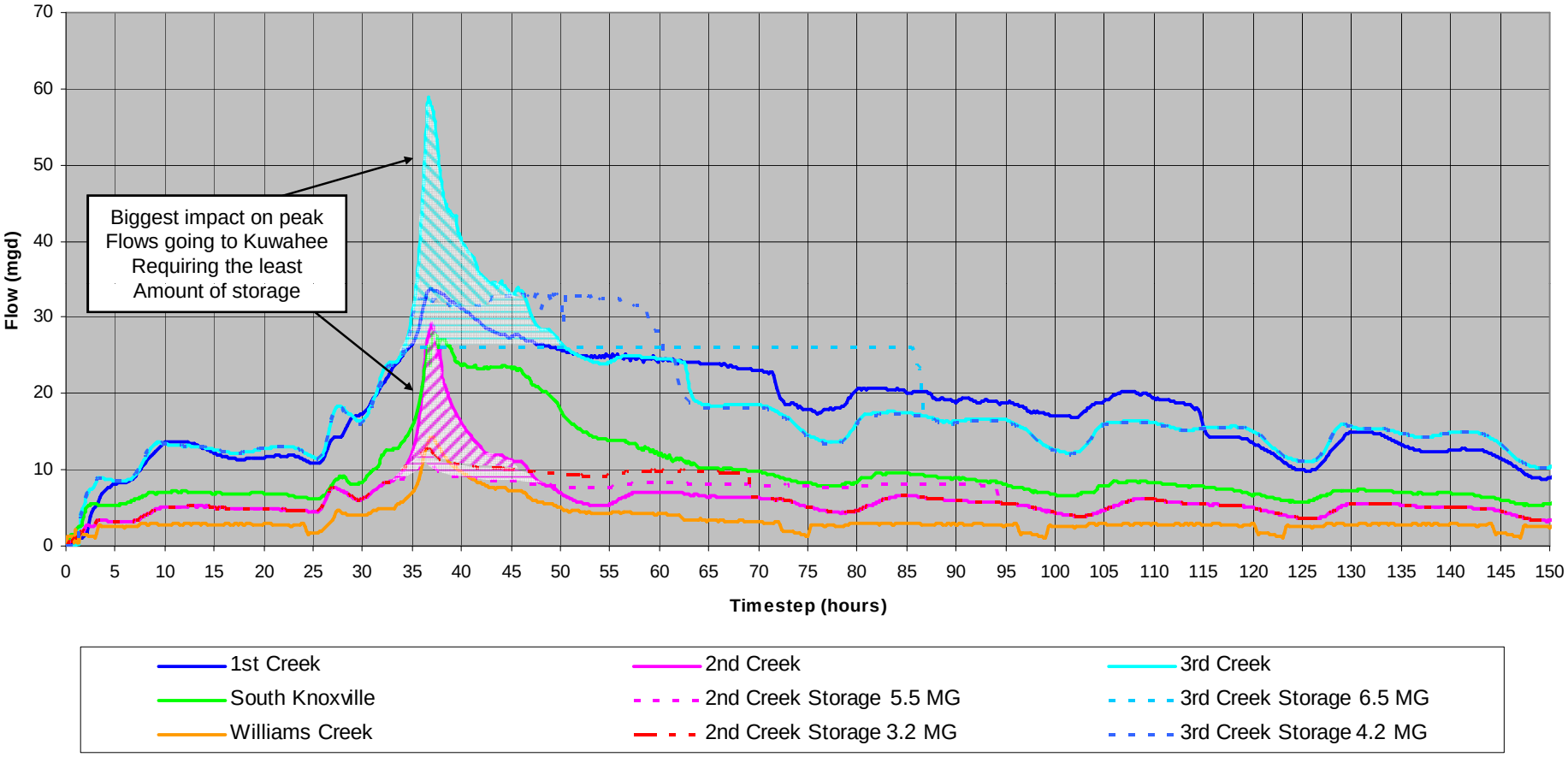



**Figure 3-21**

Using the 3.2 MG Second Creek and 4.2 MG Third Creek storage volumes, the River Interceptor model was used to test the system for the CAP/ER design storm condition. The resulting impacts to the river interceptors are shown on **Figures 3-22 through 3-24**. As illustrated, the river interceptors comply with CAP/ER design and CAP compliance standards.

## 3.4 Summary

The purpose of this analysis was to estimate the frequencies, durations, and volumes of wet weather CAP surcharge criteria exceedances and Diversions at the KWWTP and FCWWTP under various conditions and to evaluate alternatives to reduce these CAP surcharge criteria exceedances and Diversions. In so doing, the results could be used to help guide improvements which directly impact wet weather plant performance.

Results of the CAP surcharge criteria exceedance analysis for the KWWTP showed a decrease in required additional storage for each condition as the analysis progressed from assumptions made under Condition 1 up through Condition 4. The only deviation in this consecutively decreasing pattern occurs when R value reduction assumptions were changed for Conditions 5 and 6. Resulting additional volumes for no predicted surcharge exceedances ranged from 70 MG (Condition 1) down to 9 MG (Condition 4) for the 120 mgd influent pumping capacity. If the influent pumping rate is changed to 160 mgd, the resulting storage for no predicted surcharge exceedances decreases to 40 MG for Condition 1 and to 4 MG for Condition 4. Even though increasing the influent pumping rate from 120 to 160 mgd tends to decrease surcharge exceedance storage requirements, it would come at the expense of an increase in Diversion storage or frequency and amount of Diversions. With that noted, this should be taken into consideration before increasing influent pumping capacity from the current 120 mgd, unless additional treatment capacity is provided. Also as discussed further in Section 4 of this report, certain methods of providing additional wet weather treatment capacity, such as additional conventional activated sludge treatment, have practical, operational, and physical limitations.

Surcharge exceedance results from the FCWWTP analysis reacted differently than those for KWWTP. CAP/ER Phase I (Condition 2) caused an increase in the storage required to avert predicted capacity exceedance conditions. This increase is attributed to growth in future baseflows and the fact that CAP/ER Phase I in the proposed plan for Fourth Creek does not implement rehabilitation to remove wet weather flows. Instead it includes more trunk sewer relief projects. As a result, under Condition 2, surcharge exceedance storage reaches its maximum size of 2.5 MG for the 28 mgd influent pumping capacity and decreases to 1.4 MG for the 34 mgd influent pumping capacity for no surcharge exceedances. Because of the location of the Condition 3 rehabilitation upstream of the Walker Springs storage facility, wet weather impacts are felt at the storage unit and not at the FCWWTP. For this reason, the Condition 3 results mimic those of Condition 2 at the plant. The extra rehabilitation undertaken in the assumptions for Conditions 4 through 6 does not remove enough I/I to

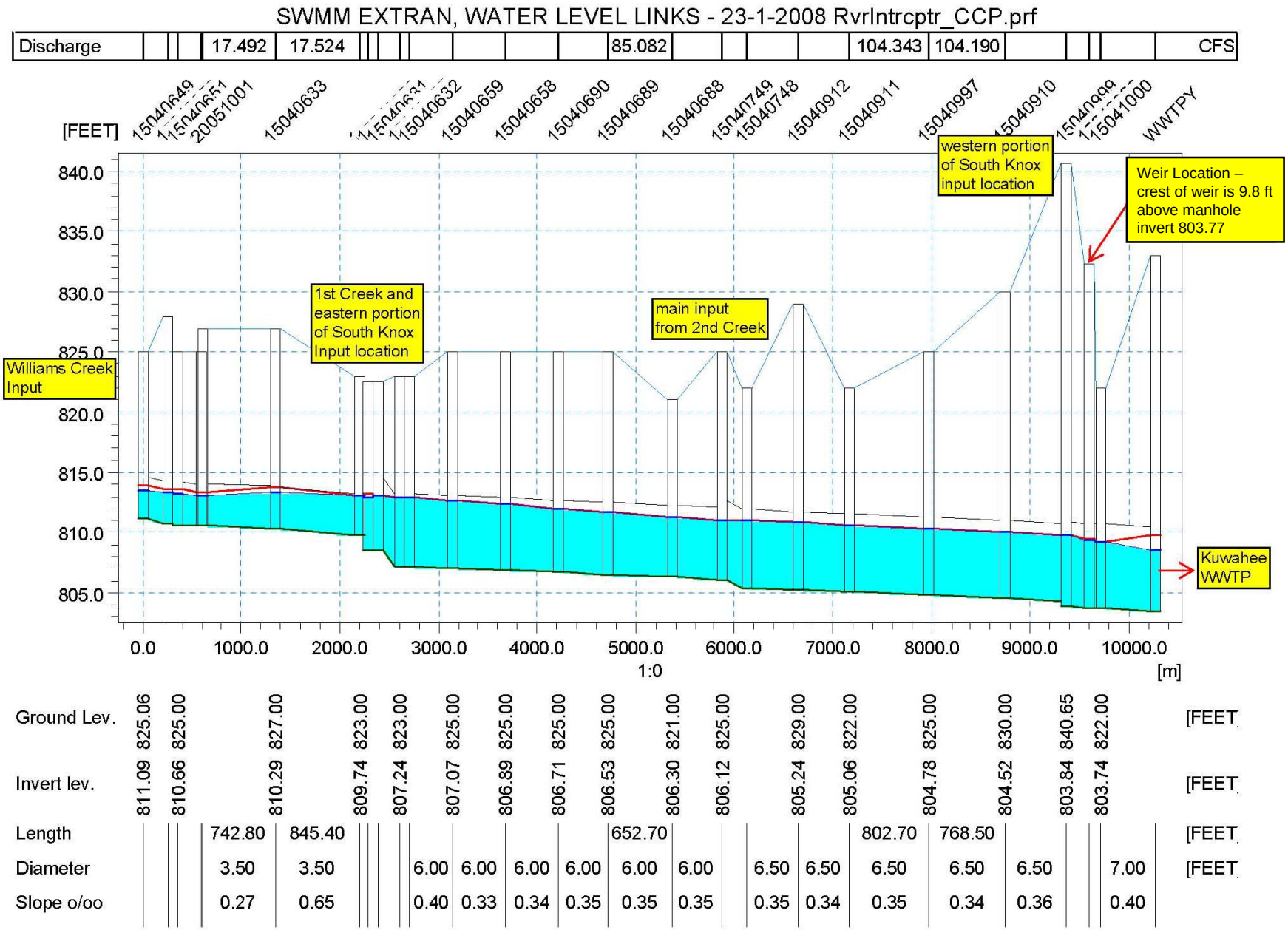
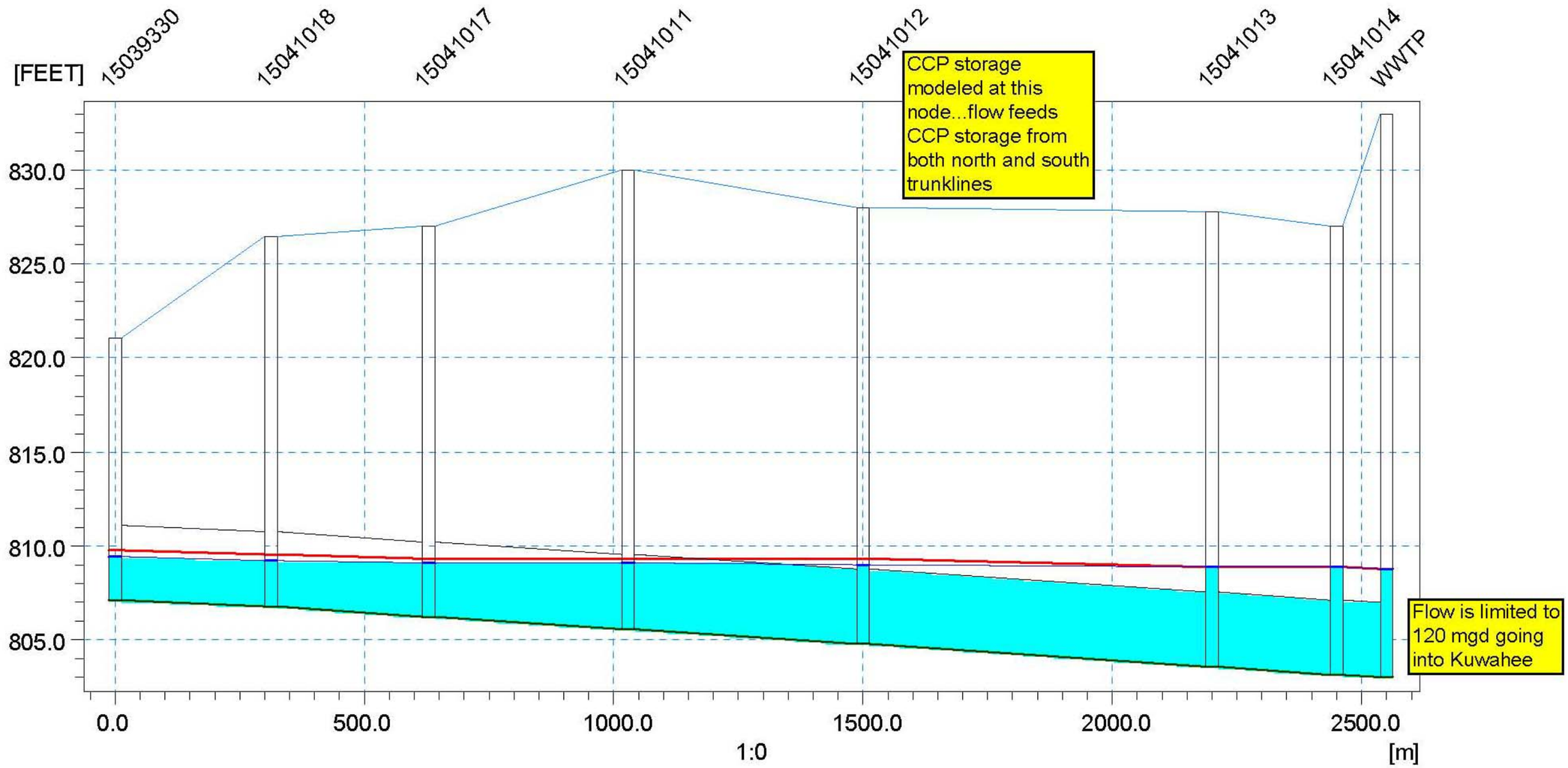



Figure 3-22
River Interceptor
East of Kuwahee WWTP

SWMM EXTRAN, WATER LEVEL LINKS - 23-1-2008 RvrIntrcptr_CCP.prf

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Discharge | 22.686 | 22.705 | 22.710 | 22.704 | 7.000 | 7.001 | | CFS |

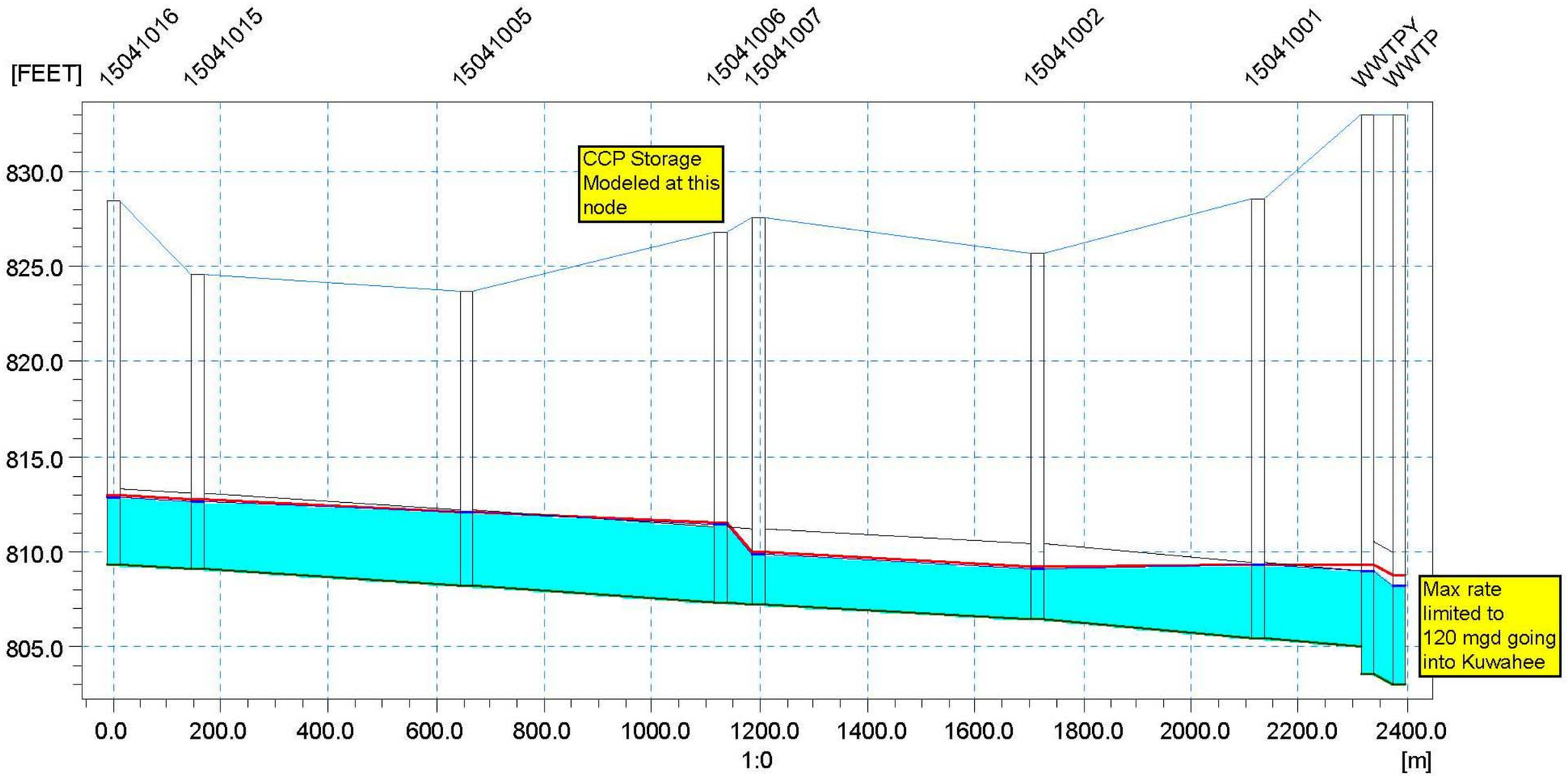



| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ground Lev. | 821.00 | | 826.50 | | 827.00 | | 830.00 | | 828.00 | 827.78 | 827.00 | [FEET |
| Invert lev. | 807.02 | | 806.77 | | 806.22 | | 805.52 | | 804.70 | 803.48 | 803.04 | [FEET |
| Length | | 314.44 | | 315.00 | | 400.00 | | 470.00 | 700.00 | 250.00 | | [FEET |
| Diameter | | 4.00 | | 4.00 | | 4.00 | | 4.00 | 4.00 | 4.00 | | [FEET |
| Slope o/oo | | 0.80 | | 1.75 | | 1.75 | | 1.74 | 1.74 | 1.76 | | |

Figure 3-23
North line of River Interceptor
West of Kuwahee WWTP

SWMM EXTRAN, WATER LEVEL LINKS - 23-1-2008 RvrIntrcptr_CCP.prf

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Discharge | 55.695 | 55.821 | 55.906 | | 40.508 | 44.311 | 52.079 | | CFS |




| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Ground Lev. | 828.48 | 824.61 | | 823.74 | | 826.77 | 827.56 | 825.67 | 828.57 | 833.00 | [FEET] |
| Invert lev. | 809.34 | 809.08 | | 808.23 | | 807.32 | 807.20 | 806.44 | 805.40 | 803.50 | [FEET] |
| Length | 156.20 | 500.00 | | 470.00 | | 517.50 | | 410.00 | 200.00 | | [FEET] |
| Diameter | 4.00 | 4.00 | | 4.00 | | 4.00 | | 4.00 | 4.00 | | [FEET] |
| Slope o/oo | 1.66 | 1.70 | | 1.94 | | 1.47 | | 2.54 | 2.00 | | |

Figure 3-24
South line of River Interceptor
West of Kuwahee WWTP

completely eliminate surcharge exceedances. However, it does further reduce storage size and under the 34 mgd flow capacity eliminate the need for storage for 0.5 surcharge exceedances per year. The cost of additional rehabilitation in Fourth Creek may be worthwhile to avoid additional surcharge exceedance storage and at the same time add capacity in the collection system to offset future growth in baseflows.

General Diversion analysis results for the KWWTP show for every 10 mgd increase in secondary treatment capacity, storage required to avert predicted Diversions and reduce Diversion volumes reduces to the range of 40% to 50%. As the treatment rates decrease from 80 mgd down to 60 mgd, gains in more rehabilitation under CAP/ER Phase I (Condition 2) lose their impact over existing conditions due to growth in dry weather flows becoming more prominent at lower secondary treatment rates. Under the analysis with and without the existing 6.5 MG of storage in the intermediate clarifiers, the difference in predicted storage volumes for all the analyses is approximately that of the storage unit itself. Given the higher rate of decrease in predicted Diversion frequency and volume per increased secondary treatment rate, the 6.5 MG of storage at the plant may be better suited for use in increasing treatment capacity rather than being utilized as storage. As rehabilitation is increased under the assumptions in Conditions 4 through 6, further reductions in predicted storage requirements reduce greatly, however increased levels of RDI/I reduction can not achieve the target surcharge exceedance and Diversion levels without the additional construction of CCP storage or increases in WWTP wet weather treatment capacity.

Similar to the capacity exceedance analysis for the FCWWTP, the Diversion analysis shows an increase in predicted Diversion frequencies and volumes under CAP/ER Phase I (Condition 2). Again, this can be attributed to the growth in projected baseflows under Condition 2 without rehabilitation to offset the growth. Because of the geographical location of the Condition 3 rehabilitation upstream of the Walker Springs storage, the Diversion results mimic those of Condition 2. Conditions 4 through 6 assumptions produce Diversion results with minimal differences, thus attributing to projected dry weather peak flows playing a greater role on the impact of secondary treatment more so than the peak wet weather flows within the Fourth Creek service area.

Storage sites available within the KUB service area were tested in EXTRAN for hydraulic impacts at the KWWTP. Using the storage volume attained from the NetSTORM model with the site-specific hydraulics of the EXTRAN basin models, an EXTRAN analysis was performed on the approximately 12 MG storage volume achieved in NetSTORM for 0.5 predicted surcharge exceedance events per year based on Condition 2 – CAP/ER Phase I. Using the two preliminary sites chosen by KUB, one in lower Second Creek and the other in lower Third Creek, it was determined that approximately 12 MG of storage split over the two sites would deliver the desired impacts at the KWWTP, i.e., limiting the peak wet weather flow to 120 mgd.

KUB has begun site investigations to identify available sites suitable for construction of the recommended CCP storage tanks. As previously indicated, a potential storage location within the Third Creek basin has been identified at the west end of the Kuwahee WWTP. Within the Second Creek basin, a potential storage location has been identified at the intersections of Cooper Street and Bernard Avenue. The ultimate location of the Second Creek and Third Creek CCP storage will be a result of continuing site investigations and procurement activities. The final locations of the CCP storage will be consistent with the hydraulic operations presented herein.

## 3.5 Conclusions

The basis for evaluating WWTP improvements to mitigate capacity-related surcharge exceedances and address Diversions will be Condition 2 for KWWTP (Phase I CAP/ER completion) and Condition 3 for FCWWTP (Phase II CAP/ER completion). These represent worst case scenarios and will be reevaluated during preliminary design using ongoing flow monitoring results. These conditions reflect physical collection and transmission system improvements anticipated to be completed by June 2016, with performance based upon build-out dry weather flows. While it is expected that additional RDI/I removals will be achieved through implementation of KUB's MOM programs, it is not possible to determine at this time if Conditions 4, 5, or 6 are achievable within the CCP implementation schedule (June 2021).

Additional RDI/I removal above the Phase II CAP/ER levels (Conditions 4, 5, and 6 analyses) are not capable of meeting the target maximum WWTP capacity exceedance recurrence frequency of 0.5 occurrences per year without also implementing additional CCP storage and/or CCP WWTP peak wet weather treatment capacities. As increased RDI/I does not achieve the capacity exceedance target levels and would be cost prohibitive (i.e., comprehensive rehabilitation of approximately 1.2 million linear feet of collection sewer above the Phase II CAP/ER level), achieving the CCP project goals through increased system rehabilitation is considered to not be feasible.

Therefore, WWTP improvements will be evaluated based upon the flow and storage scenarios presented in **Table 3-9**.

**Table 3-9**
**Flow and Storage Scenarios for WWTP Operating Conditions**

| Plant | Peak Flow Conditions (mgd) | Additional Surcharge Exceedance Storage (MG) * | Average Annual Surcharge Exceedances | On-Site Diversion Storage (MG) | Existing Secondary Treatment Rate (MG) | Annual Diversion Frequency |
|---|---|---|---|---|---|---|
| KWWTP | 120 | 12 | 0.5 | 0 to 6.5 | 70 | 4 - 12 |
| | 160 | 0 | 0.5 | 0 | 70 | 37 |
| FCWWTP | 28 | 1 | 0.5 | 0 | 18 | 3 - 18 |
| | 34 | 0 | 0.5 | 0 | 18 | 18 |

* Increased to nearest MG volume

The predicted annual Diversion frequencies assume that no additional secondary treatment capacity is provided. The predicted range of Diversion frequencies reflects the extent to which the surcharge exceedance storage facilities are used to avoid Diversion (i.e., the higher number in each range indicates they are not used for this purpose). CCP surcharge exceedance storage facilities exceed all approved CAP/ER design and CAP surcharge criteria. Surcharge exceedance storage has been evaluated based on future baseflow conditions and includes the probability of multiple consecutive rainfall events. In addition, in the storage evaluation no credit was given for ongoing RDII reductions resulting from IRP and CSSAP activities. Table 3-10 contains a summary of the storage requirements based on specific site locations within KUB's Kuwahee WWTP service area.

**Table 3-10**
**CCP Surcharge Exceedance Storage Facilities (Kuwahee WWTP)**

| CCP Tank Location | CAP/ER Required Volume (MG) | NetSTORM Analysis Volume (MG) | Proposed CCP Volume (MG) |
|---|---|---|---|
| Second Creek | 3.2 | 5.5 | 5.5 (1.72xCAP/ER criteria) |
| Third Creek | 4.2 | 6.5 | 6.5 (1.55x CAP/ER criteria) |

Options to provide additional secondary treatment capacity are addressed in Section 4, as are options to continue Diversions while meeting NPDES Permits effluent limits with blended flows.

# Section 4
# WWTP Alternatives Analysis

## 4.1 Background

As discussed in Section 1, in order to comply with the requirements of the Consent Decree (CD), KUB conducted a Comprehensive Performance Evaluation (CPE) for the Kuwahee, Fourth Creek, and Loves Creek wastewater treatment plants. The CPE was conducted to identify flow and loading restrictions in the plants' treatment process units.

Two CD programs were developed in conjunction with the CPE. The first program is a Process Controls Program (PCP) consisting of standard procedures for wet weather flow operating conditions and documentation to optimize treatment in order to achieve NPDES Permits compliance. The PCP is discussed in a separate document.

The second program is the Composite Correction Plan (CCP). The CCP is a systematic approach to implementing administrative, operational, and maintenance improvements, as well as identifying rehabilitation and/or upgrades needed to address treatment capacity problems identified in the CPE.

The CPE identified hydraulic and biological capacity limitations at the Kuwahee and Fourth Creek wastewater treatment plants (WWTP) that occur during wet weather events. The CPE also confirmed that the Loves Creek WWTP has adequate capacity to meet current and planned flows including peak wet weather flows, and will therefore not be included in the CCP analysis. To address the high wet weather flows at Kuwahee and Fourth Creek WWTPs, currently a portion of the wet weather flow is diverted around secondary treatment and a portion of flow receives primary treatment only prior to chlorination. During this operating scenario, the primary and secondary treated flows are combined prior to disinfection and discharge. Occasionally, this solution results in both plants experiencing difficulty meeting maximum daily limits for biochemical oxygen demand (BOD) and total suspended solids (TSS) effluent concentrations.

KUB worked to identify various alternatives that would consistently meet BOD and TSS limits set in the NPDES Permits. In general, two types of alternatives were identified. Alternatives involve either:

1. Continuing to divert flow and blending of primary and secondary effluent with the provision of increased level of treatment in the Diversion flow and the reduction in frequency of Diversion events (i.e. Diversions as defined by NPDES Permits), or

2. Expanding treatment facilities to provide all flow with secondary treatment.

All treatment alternatives must be capable of producing a final effluent that meets NPDES Permits effluent limits. For a parallel process train to be considered secondary treatment, it must be capable of removing at least 85 percent of BOD and TSS on a

monthly average basis (i.e. this criteria is applied to each stream prior to blending of effluents from parallel treatment trains).

Nine alternatives were identified for each of the Kuwahee and Fourth Creek WWTPs. Each of these potential CCP improvement alternatives was first developed to a conceptual level. At the conceptual level, the alternatives were screened to rule out those that were considered by KUB not to be feasible due to operational, site, or treatment constraints. Also as part of the screening analysis, each alternative was evaluated in terms of costs and non-monetary factors to determine if the alternative should be considered further for analysis. Next, the screened alternatives were developed further to generate preliminary process flow diagrams, hydraulic profiles, plant layouts and preliminary cost estimates.

## 4.2 Summary of Existing WWTP Operations

### 4.2.1 KWWTP Process and Operation Criteria

The Kuwahee WWTP was originally constructed in the 1950's to serve residential, commercial, and industrial customers. The plant underwent a major expansion and upgrade in the late 1970's when the existing secondary and tertiary facilities, digesters, and dewatering system were constructed. The Kuwahee WWTP was designed to provide secondary treatment to an average daily flow of 40 mgd with a maximum daily flow of 70 mgd. Recent studies concluded that the average day flow capacity is at least 44 mgd at current loadings. The bar screens, raw sewage pumps/wet well, aerated grit chamber, and chlorination/dechlorination facilities are designed to handle a peak flow of 120 mgd. However, after the aerated grit chamber, flows greater than 70 mgd must be routed through the preaeration basin in order to fully utilize the wet weather treatment provisions originally designed, approved, and built into the plant.

During peak wet weather flow events, diverted flows serve to avoid overloading the primary clarifiers and the remainder of the biological treatment processes and to avoid a Washout of the aeration biological system. The effluent from the preaeration basin flows into the secondary aeration basins. All or part of the effluent from the primary clarifiers is also routed to the secondary aeration basins where it combines with the flow from preaeration, for a maximum flow of 70 mgd, to be treated by the existing secondary treatment processes. The remainder of peak wet weather flow greater than 70 mgd is treated by primary clarifiers and is combined with the secondary clarifier effluent where the combined flow is disinfected with chlorine, dechlorinated with sodium bisulfite, and discharged into the Tennessee River. A flow schematic of the Kuwahee WWTP is shown in **Figure 4-1**.

The wastewater treatment plant includes preliminary, primary, secondary, and disinfection treatment. Secondary treatment originally included a high purity oxygen activated sludge system (UNOX) with secondary aeration basins and clarifiers; however, the cryogenic oxygen generator and liquid oxygen facilities were no longer needed following the closure of a local paper mill with high BOD wastes and have been removed. An intermediate pump station pumps flows to secondary treatment

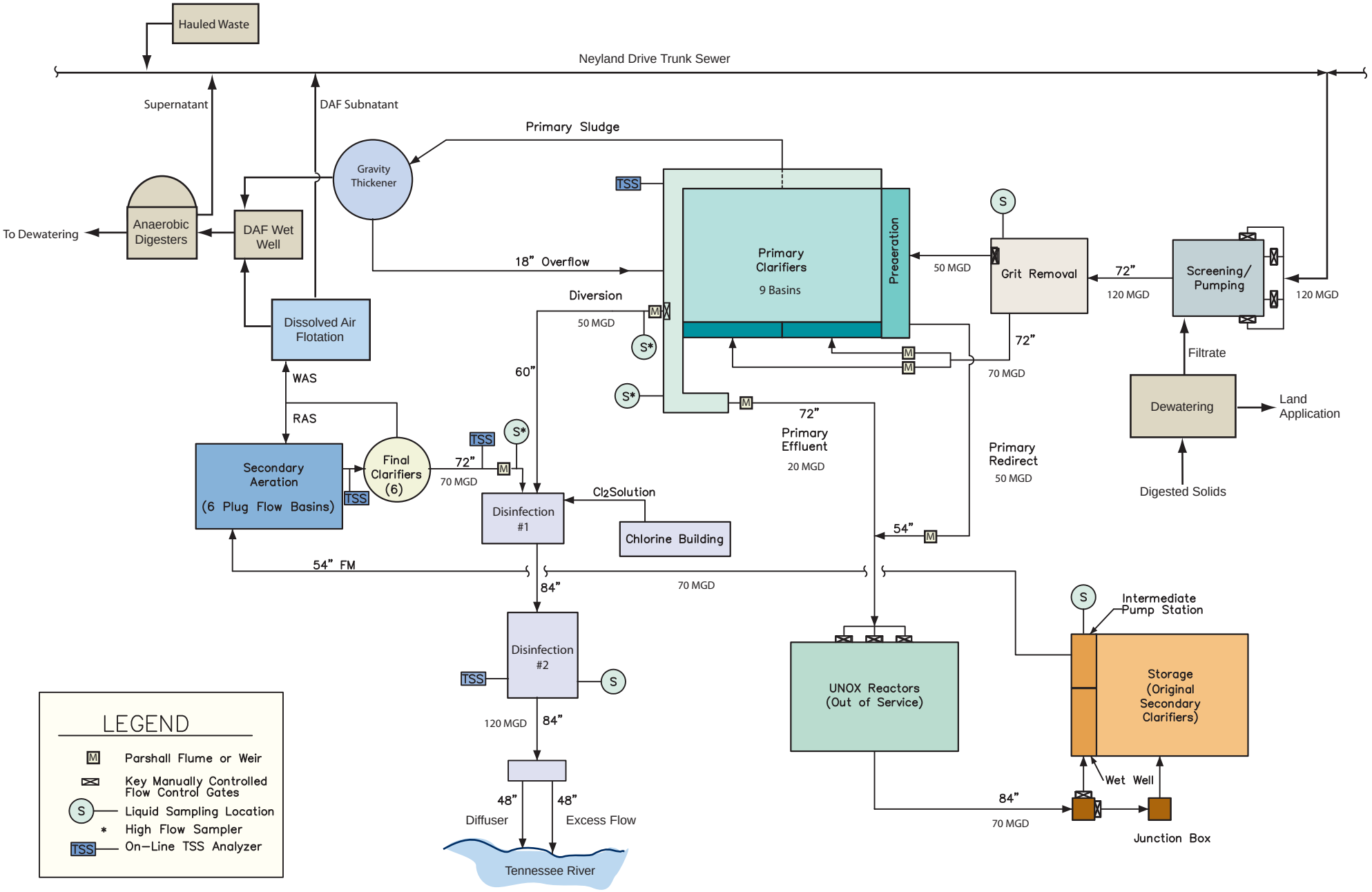



Figure 4-1
Existing Kuwahee WWTP Process Schematic

accomplished by an activated sludge nitrification system and final clarification. Effluent from the secondary facilities is disinfected in chlorine contact tanks and then dechlorinated by use of sodium bisulfite prior to discharge into the Tennessee River.

Solids processing is achieved through several different mechanisms. Sludge from primary treatment is thickened by a gravity sludge thickener, and sludges from secondary treatment are thickened by dissolved air flotation (DAF) units.

The thickened sludge from both sludge thickening processes is then digested using anaerobic sludge digesters. The digested sludge is dewatered by a centrifuge dewatering system. The dewatered sludge is currently land applied by a private contractor. Methane produced by sludge digestion is used to run the sludge heat exchanger boilers. Excess methane is flared.

### 4.2.2 KWWTP Wet Weather Treatment

At flows up to 70 mgd, all but 2 mgd receive primary treatment prior to secondary treatment. The plant features a preaeration basin that receives approximately 2 mgd which is routed around primary treatment, but receives full secondary treatment. The preaeration basin is kept full with 1 to 2 mgd flow at all times to avoid damaging the diffusers by routing high flows into an empty basin. Flows in excess of 70 mgd must pass through the preaeration basin to avoid overloading the primary clarifiers.

As influent flows increase above 70 mgd, flow to the preaeration basin increases to maintain a maximum flow of 70 mgd through primary clarification. Flows above 70 mgd through the primary clarifiers cause flooding of the effluent launders.

Primary and preaeration effluent cannot currently be routed around the original high purity oxygen process tanks. Primary effluent (up to 70 mgd) and preaeration effluent (up to 50 mgd) flows pass through the high purity oxygen aeration basins and enter the intermediate pump station for pumping to biological treatment. The original intermediate clarifiers provide up to approximately 6.5 MG of storage for flows that exceed the capacity of the intermediate pump station or reliable secondary treatment rate. Use of the intermediate clarifiers for storage results in operation of the intermediate pump station with a wet well level that is up to 5-feet higher than normal elevations. This higher wet well level results in a capacity of more than 70 mgd with all five pumps in service.

Although the original design provided for a Diversion to automatically occur whenever plant flows exceed 70 mgd, KUB has found that using the intermediate clarifiers for storage and performance monitoring results in minimizing Diversion volume and sometimes eliminates the need for Diversion, even at flows in excess of 70 mgd. Once the Diversion criteria as specified in the PCP is met, a portion of the primary clarifier effluent is diverted in order to protect the biological treatment process as previously described.

The biological system consists of six plug flow aeration basins with fine bubble ceramic diffusers that are designed to also be operated in the complete mix mode.

Effluent is distributed to the six final clarifiers through a channel with a weir to control flow to each clarifier. Sludge in each clarifier is collected by a rotating hydraulic removal system which discharges through an adjustable telescopic valve. All of the sludge flows by gravity to the sludge pump station where it is returned to the aeration basin influent stream or is wasted. An in-line total suspended solids meter in the aeration basin effluent channel continuously measures mixed liquor suspended solids (MLSS).

Process control of the biological system is influenced by the hydraulics of the clarifier feed channel which make it difficult to achieve uniform flow and solids loadings to each clarifier. As a result, the telescope valves must be set at different levels to maintain similar sludge blanket levels in each clarifier. This aspect of the system makes it difficult to adjust sludge removal rates as flows change, even though sludge blanket levels are checked frequently during high flow conditions and the telescopic valves are adjusted to maintain uniform low blanket levels. The difficulty in increasing the return sludge rate can result in a Washout under sustained high flow conditions.

The in-line TSS meter recently installed at the aeration basin effluent channel is used to monitor for a Washout condition. As is common for plug flow aeration basins, use of effluent MLSS to monitor for Washout conditions does not accurately reflect the solids levels within the tank. This is because of the variability of MLSS concentration from the influent to the effluent end of the basin. This variability in influent and effluent MLSS concentration has been accounted for in the PCP protocol.

The decision to divert flow at the head of treatment is dependent on measurements of the MLSS concentration in the aeration basin. The procedure for completing Diversion process preparation activities is included in the PCP, and is described as follows:

1. Establish pre-event MLSS concentration – this is the MLSS concentration that will be used to calculate the percentage of biomass lost from aeration.

2. The pre-Diversion approval threshold is the MLSS concentration at which supervisory approval is obtained for a possible Diversion. It is set at 10 percent of the pre-event MLSS value. (There is also a pre-Diversion approval threshold for storage tank level as described below).

3. The Diversion threshold is the MLSS concentration at which the Diversion gate is opened to avoid a Washout condition. It is set at 15 percent of the pre-event MLSS value.

The pre-event MLSS concentration is the average concentration determined by TSS meter readings for the 12 hours preceding the time the second influent pump comes on. The pre-Diversion approval and Diversion thresholds described above are used as guidelines to take the indicated actions. Due to the typically rapid changes in flows and process performance characteristic of wet weather operations and manual operation required to adjust gates, these actions may be taken when TSS measurements are within two percent of the action levels.

In addition to monitoring MLSS for Washout conditions, the operator must concurrently monitor the storage basin level to ensure maximum use of available plant storage while not exceeding the capacity of the junction box. When flows to the intermediate pump station exceed the biological treatment capacity of 70 mgd, the storage basins begin to fill. Once the storage basins are full and plant flows are at or exceeding biological system capacity, the Diversion gate must be opened if the additional wet weather design capacity of the plant is to be utilized. The pre-Diversion notification level (elevation) for the storage tanks is approximately 823 and the Diversion threshold is approximately 824. If the Diversion gate is open as a result of reaching the MLSS threshold, the operator must continue to monitor the storage basin level. If the level reaches approximately 823, it is necessary to adjust the influent gates.

### 4.2.3 KWWTP Effluent Discharge Limits

The KWWTP is currently permitted to treat an average daily flow of 44 mgd. The KWWTP is permitted to meet the maximum monthly average, maximum weekly average and daily maximum effluent requirements for an average annual flow of 40 mgd as imposed under NPDES Permit No. TN0023582 (issued on September 30, 1994). The plant was re-rated in 2001 at a flow of 44 mgd; however this rerating has not yet been reflected in a revised NPDES permit. The permit limits for conventional pollutants are shown in **Table 4-1**.

**Table 4-1**
**NPDES Effluent Limits for the Kuwahee WWTP**

| | Monthly Average | Weekly Average | Daily Maximum |
|---|---|---|---|
| Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)[1] | 25 mg/L<br>9,174 lb/d | 35 mg/L<br>12,844 lb/d | 40 mg/L |
| Total Suspended Solids (TSS)[1] | 30 mg/L<br>11,009 lb/d | 40 mg/L<br>14,678 lb/d | 45 mg/L |
| Ammonia, as Nitrogen (NH3-N) | | | |
| - May 1 to October 31 | 5 mg/L<br>1,835 lb/d | 7.5 mg/L<br>2,752 lb/d | 10 mg/L |
| - November 1 to April 30 | 15 mg/L<br>5,504 lb/d | 20 mg/L<br>7,339 lb/d | 25 mg/L |
| Fecal Coliforms | 200 colonies / 100 mL | -- | 1,000 colonies / 100 mL |
| Total Residual Chlorine | -- | -- | 0.6 mg/L (instantaneous) |
| Settleable Solids | -- | -- | 1.0 mg/L |
| Dissolved Oxygen | -- | -- | 1.0 mg/L (instantaneous) |

[1] 85% minimum monthly average removal and 40% minimum daily removal are also required.

Additionally, the daily effluent pH shall not be less than 6.0 or greater than 9.0 standard units. The existing permit also contains limits for numerous other chemical constituents.

### 4.2.4 FCWWTP Processes and Operation Criteria

The Fourth Creek WWTP is a secondary wastewater treatment plant that was originally constructed to serve residential and commercial customers. The Fourth Creek WWTP is designed to provide secondary treatment to an average daily flow of 10.8 mgd. The maximum daily design flow is not known but is estimated to be 24 mgd, based upon the size and slope of the influent piping, as noted in the CTI report of June, 2002 (Study of Improvements to Fourth Creek Wastewater Treatment Plant). The maximum daily average flow reported during the period evaluated was approximately 40 mgd (however this data is not correct since this exceeds influent pumping capacity and is likely due to flooding of the Parshall flume).

The plant underwent a major expansion and upgrade in the mid-1980's when the screening, grit removal, primary clarifiers, secondary activated sludge system, and disinfection facilities were expanded. In 1995, new chlorination and dechlorination facilities were constructed. The effluent from the Fourth Creek WWTP is discharged into the Tennessee River.

The wastewater treatment plant includes preliminary, primary, secondary, and disinfection treatment. Effluent from the secondary facilities is disinfected in chlorine contact tanks and then dechlorinated by use of sodium bisulfite prior to discharge into the Tennessee River.

Sludge from primary treatment and the activated sludge process is thickened in a gravity sludge thickener. The thickened sludge is then pumped from the sludge thickening processes to a gravity sewer that flows to the Kuwahee WWTP. A flow schematic of the Fourth Creek WWTP is shown in **Figure 4-2**.

### 4.2.5 FCWWTP Wet Weather Treatment

For flows up to 11 mgd, all flow receives full primary treatment with a portion of the primary clarifiers out of service, secondary treatment disinfection and dechlorination. As flow increases above 11 mgd, the empty primary clarifiers (typically 3 or 4 of the 8 clarifiers are in service) are put into service and flows up to approximately 27 mgd receive primary treatment; however the primary clarifier effluent launders flood at flows above 15 mgd. At this point, an on-line TSS meter in the aeration basin monitors effluent to detect loss of solids; loss of solids does not typically occur until flows through the biological process exceed 15 mgd.

Deciding to divert flow is related to the loss of MLSS in the aeration basin. The procedure for completing Diversion process preparation activities is included in the PCP and is described as follows:

1. Establish pre-event MLSS concentration – this is the MLSS concentration that will be used to calculate the percentage of biomass lost from aeration.

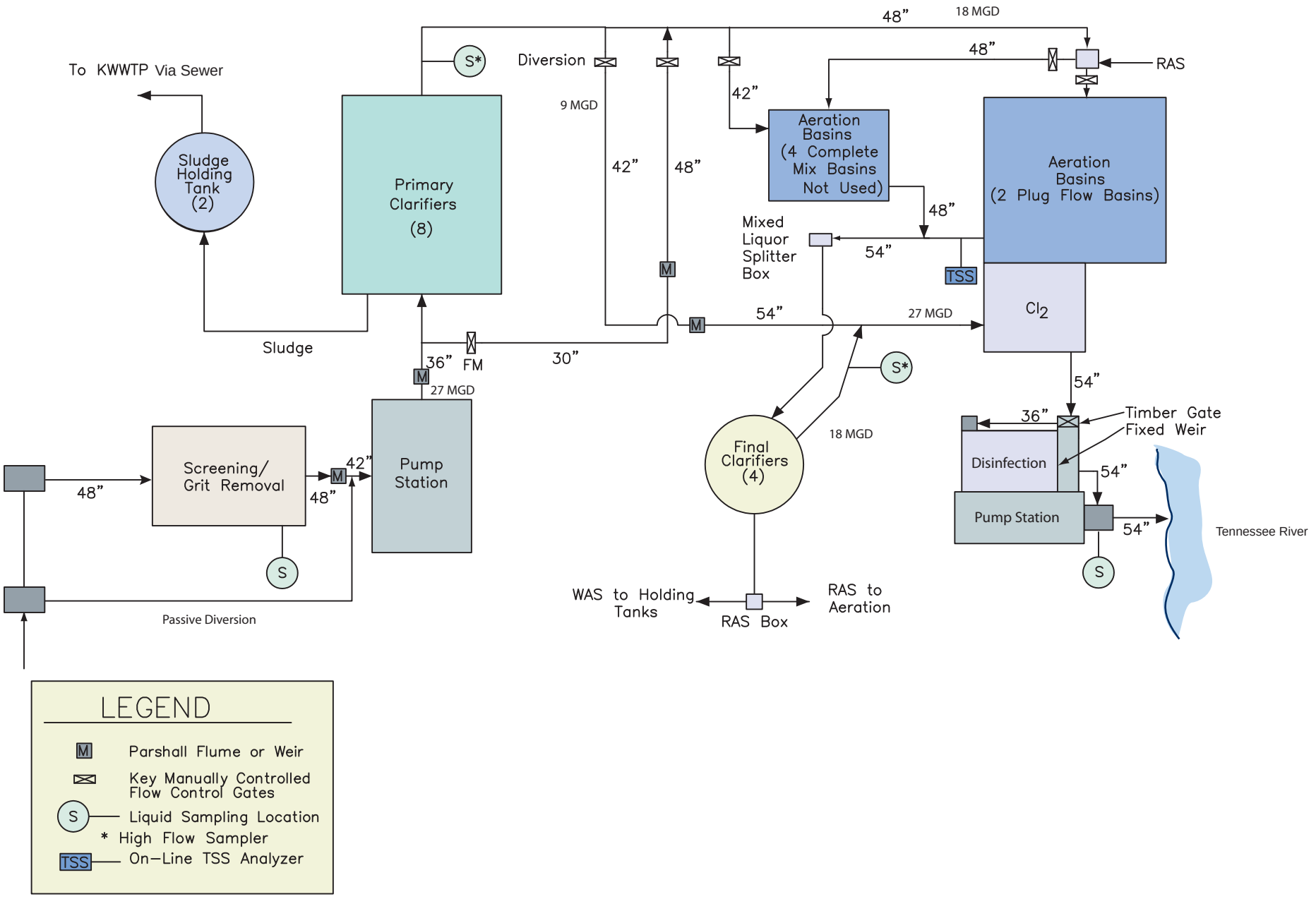



Figure 4-2
Existing Fourth Creek WWTP Process Schematic

2. The pre-Diversion approval threshold is the MLSS concentration at which supervisory approval is obtained for a possible Diversion. It is set at 10% of the pre-event MLSS value.

3. The Diversion threshold is the MLSS concentration at which the Diversion gate is opened to avoid a Washout condition. It is set at 15% of the pre-event MLSS value.

The pre-event MLSS concentration is the average concentration as determined by TSS meter readings for the 12 hours preceding the time when influent flow reaches 8 mgd. The pre-Diversion approval and Diversion thresholds described above are used as guidelines to take the indicated actions. Due to the typically rapid changes in flows and process performance characteristic of wet weather operations, and manual operation required to adjust gates, these actions may be taken when TSS measurements are within 2% of the action levels.

It is up to the discretion of the operator to open the Diversion gate once the Diversion threshold is reached. If plant flows are decreasing or final clarifier performance is satisfactory (sludge blanket levels are controlled in all clarifiers and excessive solids are not being lost), the operator may decide not to open the Diversion gate.

## 4.2.6 FCWWTP Effluent Discharge Limits

The Fourth Creek WWTP was designed to treat an average daily flow of 10.8 mgd. The Fourth Creek WWTP is permitted to meet the maximum monthly average, maximum weekly average, and daily maximum effluent requirements for an average annual flow of 10.8 mgd as imposed under NPDES Permit No. TN0023574. **Table 4-2** shows the permit limits for conventional pollutants.

**Table 4-2**
**NPDES Effluent Limits for the Fourth Creek WWTP**

| | Monthly Average | Weekly Average | Daily Maximum |
|---|---|---|---|
| Biochemical Oxygen Demand ($BOD_5$)[1] | 30 mg/L<br>2,702 lb/d | 40 mg/L<br>3,603 lb/d | 45 mg/L |
| Total Suspended Solids (TSS)[1] | 30 mg/L<br>2,702 lb/d | 40 mg/L<br>3,603 lb/d | 45 mg/L |
| Fecal Coliforms | 200 colonies / 100 mL | -- | 1,000 colonies / 100 mL |
| Total Residual Chlorine | -- | -- | 1.0 mg/L (instantaneous) |
| Settleable Solids | -- | -- | 1.0 mg/L |
| Dissolved Oxygen | -- | -- | 1.0 mg/L Minimum (instantaneous) |

[1] 85% minimum monthly average removal and 40% minimum daily removal are also required.

Additionally, the daily effluent pH shall not be less than 6.0 or greater than 9.0 standard units. The existing permit also contains limits for numerous other chemical constituents.

## 4.3 Wet Weather Treatment Options Process Descriptions

In compliance with the CD requirements for the CCP analysis, nine treatment options were identified to address the hydraulic and process limitations identified for KWWTP and FCWWTP as part of the CPE. The treatment options would provide hydraulic and process treatment capacity required during current and future wet weather events. Options that were identified considered combinations of the following conditions:

- additional system storage would be provided (on-site or off-site storage) to minimize peak treatment rates (as described in Section 3),
- no additional system storage would be provided,
- processes to provide treatment meeting secondary treatment standards (non-Diversion conditions), and
- processes to improve the level of treatment on the Diversion flow stream but not meeting secondary treatment standards (Diversion conditions).

For purposes of the CCP, it is assumed that compliance with NPDES effluent limits for Diversion and non-Diversion options will be based upon sampling of the combined effluent stream. However, non-Diversion options will be capable of meeting the 85 percent minimum monthly removal criteria for BOD and TSS.

To improve WWTP reliability during dry and wet weather conditions, all options for both WWTPs include the addition of an emergency generator(s). The emergency generators will be sized to meet the requirements of all liquid treatment processes.

**Tables 4-3 and 4-4** summarize the options that were considered at the Kuwahee and Fourth Creek WWTPs, respectively. A discussion of each treatment process and preliminary screening of the options follows.

**Table 4-3**
**Kuwahee WWTP Summary of CCP Improvement Options**

| Options | Treatment Process | Total Influent Flow (mgd) | System Storage Required (MG) | Existing Primary Capacity (mgd) | Existing Biological Capacity (mgd) | Additional Treatment Process Capacity (mgd) | Additional Headworks Capacity (mgd) | Additional Conventional Biological Treatment Capacity (mgd) | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| 1 | CEPT | 120 | 12 | 70 | 70 | -- | -- | -- | Diversion |
| 2 | HRC | 120 | 12 | 70 | 70 | 50 | -- | -- | Diversion |
| 3 | BEHRC | 120 | 12 | 70 | 70 | 50 | -- | -- | Non-Diversion |
| 4 | Deep Bed Filters | 120 | 12 | 70 | 70 | 50 | -- | -- | Non-Diversion |
| 5 | Full Biological | 120 | 12 | 70 | 70 | -- | -- | 50 | Non-Diversion |
| 6 | HRC | 160 | -- | 70 | 70 | 90 | 40 | -- | Diversion |
| 7 | BEHRC | 160 | -- | 70 | 70 | 90 | 40 | -- | Non-Diversion |
| 8 | Deep Bed Filters | 160 | -- | 70 | 70 | 90 | 40 | -- | Non-Diversion |
| 9 | Full Biological | 160 | -- | 70 | 70 | -- | 40 | 90 | Non-Diversion |

CEPT – Chemically Enhanced Primary Treatment; HRC – Ballasted Flocculation / High Rate Clarification; BEHRC – Biologically Enhanced Ballasted Flocculation / High Rate Clarification

**Table 4-4**
**Fourth Creek WWTP Summary of CCP Improvement Options**

| Option | Treatment Process | Total Influent Flow (mgd) | System Storage Required (MG) | Existing Primary Capacity (mgd) | Existing Biological Capacity (mgd) | Additional Treatment Process Capacity (mgd) | Additional Headworks Capacity (mgd) | Additional Conventional Biological Treatment Capacity (mgd) | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| 1 | CEPT | 27 | 1 | 27 | 18 | -- | -- | -- | Diversion |
| 2 | HRC | 27 | 1 | 27 | 18 | 9 | -- | -- | Diversion |
| 3 | BEHRC | 27 | 1 | 27 | 18 | 9 | -- | -- | Non-Diversion |
| 4 | Deep Bed Filters | 27 | 1 | 27 | 18 | 9 | -- | -- | Non-Diversion |
| 5 | Full Biological | 27 | 1 | 27 | 18 | -- | -- | 9 | Non-Diversion |
| 6 | HRC | 34 | -- | 27 | 18 | 16 | 7 | -- | Diversion |
| 7 | BEHRC | 34 | -- | 27 | 18 | 16 | 7 | -- | Non-Diversion |
| 8 | Deep Bed Filters | 34 | -- | 27 | 18 | 16 | 7 | -- | Non-Diversion |
| 9 | Full Biological | 34 | -- | 27 | 18 | -- | 7 | 16 | Non-Diversion |

CEPT – Chemically Enhanced Primary Treatment; HRC – Ballasted Flocculation / High Rate Clarification; BEHRC – Biologically Enhanced Ballasted Flocculation / High Rate Clarification

### 4.3.1 Chemically Enhanced Primary Treatment (CEPT)

Under current wet weather operating guidelines, as defined in the PCP for each WWTP, portions of the wastewater flow are diverted around the secondary treatment process to avoid a Washout condition. The diverted portion of flow receives treatment through the screening and grit removal processes, the primary clarifiers, and the disinfection contact basins. While this Diversion is necessary under peak flow conditions, recent sampling data indicates that some of the wet weather effluent total suspended solids (TSS) violations were related to higher concentration of TSS in the diverted flow and not from the higher flows passing through biological treatment.

Chemically enhanced primary treatment (CEPT) is one proposed option for improving the TSS removal efficiency and decreasing the concentration of TSS in the primary clarifier effluent. Chemically enhanced primary clarification involves adding a chemical coagulant to the influent of the primary clarifiers during wet weather events. The coagulant promotes the conglomeration of particles in the wastewater into larger particles. The larger particles are more readily separated from the wastewater in the primary clarifiers. **Table 4-5** summarizes typical primary clarification performance levels for plants that use standard primary clarification and those that utilize CEPT.

**Table 4-5**
**Chemically Enhanced Primary Treatment Performance[1]**

| Parameter | No Coagulant Added | CEPT |
|---|---|---|
| Total Solids Removal | 40% - 70% | 60% - 90% |
| $BOD_5$ Removal | 25% - 40% | 40% - 70% |

[1] Performance values from Design of Municipal Wastewater Treatment Plants, WEF MOP-8

The benefits of CEPT are that it allows for higher overflow rates in the primary clarifiers, provides greater TSS and BOD removal, and provides more consistent performance during wet weather conditions. Disadvantages are that enhanced primary treatment will result in an increase in the mass of primary solids generated, and there will be an increase in operations and maintenance (O&M) costs from the chemical addition and increased solids handling.

Chemically enhanced primary treatment is effective at removal of TSS and particulate biochemical oxygen demand (BOD). However, it is not considered equal to full secondary treatment because it does not remove soluble BOD. Consequently, chemically enhanced primary treatment would still be considered a 'Diversion' option. CEPT was considered as a stand alone improvement alternative as well as combined with the other improvement alternatives.

Examples of chemical coagulants that can be used include ferric chloride, alum, or coagulant polymer. KUB is currently in the process of collecting full-scale pilot testing

data for the use of a polymer coagulant during wet weather primary treatment operations.

## 4.3.2 High Rate Clarification

High rate clarification (HRC) has applications in drinking water, stormwater, and wet weather wastewater treatment. HRC employs physical/chemical treatment and utilizes special flocculation and sedimentation systems to achieve rapid settling. **Figure 4-3** presents a system schematic for the HRC system.

For wet weather treatment, high rate clarification includes preliminary treatment of the wastewater by fine screening and the addition of a chemical coagulant. Ballast is then added to the wastewater to promote the formation of particulate flocs with a dense center. This process is also commonly referred to as ballasted flocculation. Typically the ballast is microsand, but other materials such as powdered activated carbon or chemical sludge may be used.

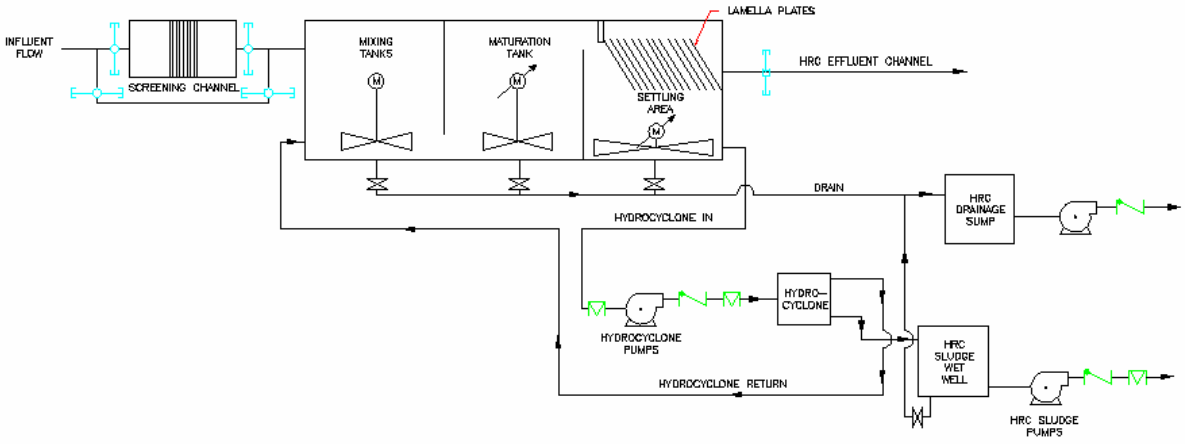



**Figure 4-3**
**General Process Schematic of HRC System**

The coagulated solids are removed in a clarification basin, typically with the use of tube or plate settlers. Tube settlers use multiple tubular channels sloped at an angle of 60 ° and adjacent to each other, which combine to form an increased effective settling area. This provides for a particle settling depth that is significantly less than the settling depth of a conventional clarifier, reducing settling times. In HRC applications, microsand adds weight to the floc, thus increasing its settling velocity and allowing for tube or plate settlers to operate at high overflow rates.

The treated wastewater effluent may then proceed to the next downstream process or be blended with other treatment process effluents depending on the application. Solids handling for ballasted flocculation vary by manufacturer; however, most manufacturers either recycle a portion of the chemical sludge or separate the microsand from the waste solids using a hydrocyclone. The microsand or recycle chemical sludge is reintroduced in the coagulation contact chamber and recycled

through the process. The waste solids are collected and combined with the other WWTP waste solids for processing and ultimate disposal.

High rate clarification can provide an increased level of TSS and particulate BOD removal in a smaller footprint when compared to chemically enhanced primary clarification. HRC offers advantages including compact units, rapid start-up time (usually less than 30 minutes) to achieve peak efficiency, and a highly clarified effluent produced for treating wet weather flows at less cost than conventional biological treatment systems.

High rate clarification systems are currently used at several wastewater treatment plants throughout the U.S. as a treatment technology for excess wet weather flows. Treated effluent from these facilities is often blended with secondary or tertiary treated wastewater prior to discharge, and the combined effluents typically meet the plant's permitted discharge limits. The HRC systems have proven very effective in removing total suspended solids (TSS) and moderately effective in biochemical oxygen demand (BOD) reduction. Typically, HRC systems are capable of achieving in excess of 90% TSS removal and 60 to 65% BOD removal. The BOD removed is all in particulate form. Therefore the HRC option is also not considered secondary treatment because it does not remove soluble BOD. Consequently, high rate clarification is considered as a 'Diversion' option.

An example of the high rate clarification process is Actiflo® by Kruger, Inc.

### 4.3.3 Biologically Enhanced High Rate Clarification

While traditional high rate clarification is not secondary treatment, the addition of a biological solids contactor will introduce return activated sludge (RAS) to the treatment train and can enhance the performance of the high rate clarifier through the removal of soluble BOD.

Biologically enhanced high rate clarification (BEHRC) is a relatively new wet weather secondary treatment option. BEHRC has been demonstrated during pilot testing at another treatment facility to be capable of achieving secondary treatment limits. **Figure 4-4** presents a system schematic for the BEHRC system.

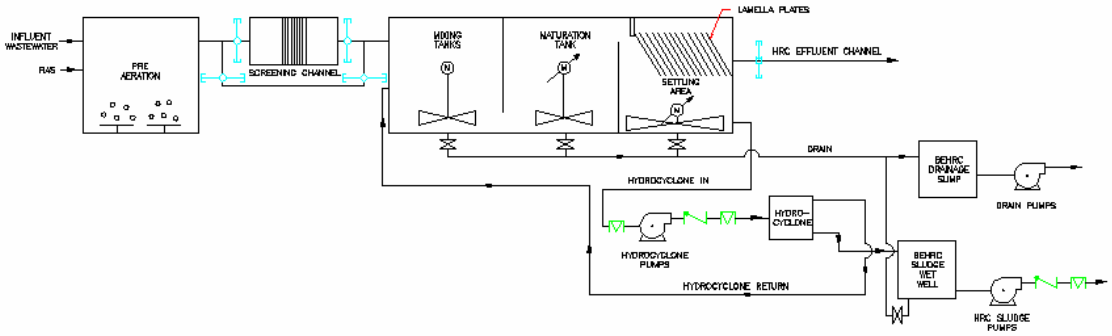



**Figure 4-4**
**General Process Schematic of BEHRC System**

The process is similar to high rate clarification with the exception that biologically active solids (typically return activated sludge) are added prior to the ballasted flocculation process. Approximately 10-15 minutes of contact time allows soluble BOD to be absorbed into the biologically activate solids. Similar to HRC, fine screening of the BEHRC flow is required in order to prevent plugging of downstream solids separation and handling equipment. The chemical coagulant and ballast, typically microsand, are then added in a manner similar to the traditional high rate clarification.

A hydrocyclone is used to separate the ballast from the waste sludge. The ballast is recycled and the waste sludge is returned to the influent of the aeration basins. Unlike standard HRC where waste sludge may be sent directly to the WWTP solids handling facilities, the waste sludge from the BEHRC process must be given the contact time in the aeration process to degrade the soluble BOD absorbed by the wet weather treatment process solids.

CDM has pilot tested BEHRC at the P Street WWTP in Fort Smith, Arkansas. During the pilot testing analysis the impacts of treatment variables were studied including the concentration of biologically active solids added to the ballasted flocculation process and the effective contact time of the biologically active solids with the influent treatment flow. The predicted BOD and TSS removal rates from the P Street BEHRC pilot testing is presented in **Table 4-6**.

**Table 4-6**
**Predicted Overall BOD and TSS Removal in BEHRC Process based on the Fort Smith Pilot Testing**

| | |
|---|---|
| Influent Total $BOD_5$ (mg/L) | 90 |
| Influent Dissolved $BOD_5$ (mg/L) | 27 |
| Influent Particulate $BOD_5$ (mg/L) | 63 |
| Particulate BOD % Removal | 98% |
| Dissolved $BOD_5$ Removal (mg/L) [1] | 24 |
| Effluent Total $BOD_5$ (mg/L) | 9 |
| Particulate $BOD_5$ after BEHRC (mg/L) | 2 |
| Dissolved $BOD_5$ after BEHRC (mg/L) [1] | 3 |
| $BOD_5$ Attributable to TSS after BEHRC (mg/L) | 4 |
| Total $BOD_5$ Removal through BEHRC | 90% |
| Total TSS Removal through BEHRC | 95-99% |

[1] Removal rate is based on MLSS concentration of 400 mg/L.

Although the operation and effectiveness of BEHRC will be effected by the nature of the wastewater being treated, it is anticipated that performance results similar to the P Street WWTP pilot study can be achieved at the KWWTP and FCWWTP. Prior to the design and implementation of BEHRC at either KUB facility, pilot testing would be conducted to identify optimal design and operating conditions for the predicted wastewater conditions at each WWTP. Predicted BEHRC performance at each WWTP

would be refined following the pilot testing study based on the most effective demonstrated biologically active solids concentration and contact time.

At present, Kruger, Inc. is working on a patent for a biologically enhanced high rate clarification process utilizing the Actiflo® process.

### 4.3.4 Full Biological Treatment

Under normal operating conditions, biological treatment is provided to all of the wastewater flow in the aeration basins. The capacity of the biological treatment system at both Kuwahee WWTP and Fourth Creek WWTP is limited, as are all biological systems. During peak wet weather events, a portion of the wastewater is diverted around the secondary treatment process to avoid a Washout. Provision of additional aeration basin volume and final clarifier volume was considered for conventional biological treatment for peak wet weather flows. However, maintenance of a larger biological system creates many other operational problems during normal dry weather flow conditions associated with maintaining a healthy biomass with low food:biomass ratios. Operation and maintenance considerations for maintenance of the larger biological system during normal operating conditions and slower system reaction time under wet weather treatment conditions categorized full conventional biological treatment as not feasible. In addition, costs increase significantly when considering the limited time these traditional facilities are used.

### 4.3.5 Deep Bed Filtration

Filtration of particles from water and wastewater is a proven process for high efficiency solids and turbidity removal. By encouraging and managing biological growth within its media, filters are capable of removing soluble compounds such as soluble BOD and soluble nitrate.

Deep bed filters are typically greater than 10-feet deep with a sand media. The media is placed into a filter box that rests on an underdrain suitable for collection of filtered water as well as for the distribution of backwash air and backwash water.

Typical design filter velocities for wastewater filters treating secondary effluent are 5-10 gpm/ft$^2$. If the filters are used for denitrifying secondary effluent, the design filter velocity is typically 2.5 gpm/ft$^2$.

The use of biologically active filters for treating peak wet weather flows has limited operating experience. However, for the purpose of this analysis, a 5 gpm/ft$^2$ filter loading was assumed. This filter loading is well within the reported operating range of a similar wet weather deep bed filter application.

An example of a deep bed filter is TetraFilters by Severn Trent.

### 4.3.6 Preliminary Screening of Options

The nine options for each plant were narrowed during a feasibility screening analysis that identified five alternatives per plant for further alternatives development. Preliminary screening involved using matrix scoring to rank options based on nine

screening criteria. Each of the criteria were given equal weight, and the options were ranked from 1 (least desirable) to 5 (most desirable). The highest scoring options at each plant were selected for more detailed analysis.

Preliminary feasibility screening included evaluating:

- Conceptual level, relative capital cost,
- Conceptual level, relative estimates of plant O&M costs,
- Ease of operation,
- The availability of on-site space required for each option,
- Facility start-up time,
- Dry weather sustainability,
- Equivalency to secondary treatment limits,
- Whether the option was a proven technology, and
- The ability to upgrade for future biological nutrient removal (BNR).

### Preliminary Screening of Kuwahee WWTP Options

**Table 4-7** presents the results of the Kuwahee WWTP screening analysis. These options are considered more desirable and were further developed as part of this CCP.

**Table 4-7**
**Kuwahee WWTP**
**Wet Weather Treatment Options Evaluation Matrix**

| Option | Capital Cost | Whole Plant O&M Cost | Ease Of Operation | On-Site Space Required | Facility Start-up Time | Dry Weather Sustain-ability | Equivalency To Secondary Treatment | Proven Technology | Ability To Upgrade To BNR | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5 | 5 | 5 | 5 | 5 | 5 | 1 | 5 | 5 | 41 |
| 2 | 4 | 4 | 4 | 4.5 | 4.5 | 5 | 1 | 4.5 | 4 | 35.5 |
| 3 | 3.5 | 3.5 | 3.5 | 4 | 4.5 | 5 | 5 | 3 | 4 | 36 |
| 4 | 3 | 3 | 4 | 3 | 5 | 4 | 4 | 3 | 4.5 | 33.5 |
| 5 | 2.5 | 2.5 | 2 | 2 | 5 | 1 | 5 | 3 | 2 | 25 |
| 6 | 2 | 3.5 | 4 | 2 | 4.5 | 4.5 | 1 | 4.5 | 3.5 | 29.5 |
| 7 | 1 | 2 | 3.5 | 2 | 4.5 | 4.5 | 5 | 3 | 3.5 | 29 |
| 8 | 1 | 1.5 | 4 | 1.5 | 5 | 3 | 5 | 3 | 4 | 28 |
| 9 | 1 | 1 | 1 | 1 | 5 | 1 | 5 | 2.5 | 1 | 18.5 |

Options 1 (CEPT), 2 (HRC with storage), and 6 (HRC without storage) were selected for further evaluation as 'Diversion' options. Options 3 (BEHRC with storage), 4 (deep bed filtration), and 7 (BEHRC without storage) were selected as 'non-Diversion' options.

Early into the detailed analysis, it was determined that Option 4, deep bed filtration, would not be feasible due to site constraints and impacts from filter backwash disposal at the Kuwahee plant. Option 4 was eliminated from consideration at this point.

### Preliminary Screening of Fourth Creek WWTP Options

**Table 4-8** summarizes the results of the Fourth Creek WWTP screening analysis. The highlighted options were ranked the highest and were further developed as part of the CCP.

**Table 4-8**
**Fourth Creek WWTP**
**Wet Weather Treatment Options Evaluation Matrix**

| Option | Capital Cost | Whole Plant O&M Cost | Ease Of Operation | On-Site Space Required | Facility Start-up Time | Dry Weather Sustain-ability | Equivalency To Secondary Treatment | Proven Technology | Ability To Upgrade To BNR | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5 | 5 | 5 | 4.5 | 5 | 5 | 1 | 5 | 4 | 39.5 |
| 2 | 3.5 | 4 | 4 | 4 | 4.5 | 5 | 1 | 4.5 | 3 | 33.5 |
| 3 | 3 | 3.5 | 3.5 | 3.5 | 4.5 | 5 | 5 | 3 | 3 | 34 |
| 4 | 2.5 | 3 | 4 | 3 | 5 | 4 | 4 | 3 | 3.5 | 32 |
| 5 | 2 | 2 | 2 | 2 | 5 | 1 | 5 | 3 | 1.5 | 23.5 |
| 6 | 3.5 | 4 | 4 | 5 | 4.5 | 4.5 | 1 | 4.5 | 5 | 36 |
| 7 | 2.5 | 3.5 | 3.5 | 4.5 | 4.5 | 4.5 | 5 | 3 | 4.5 | 35.5 |
| 8 | 2.5 | 2 | 4 | 2 | 5 | 3 | 5 | 3 | 4 | 30.5 |
| 9 | 1 | 1 | 1 | 1 | 5 | 1 | 5 | 2.5 | 1 | 18.5 |

For the Fourth Creek WWTP, Options 1 (CEPT), 2 (HRC with storage), and 6 (HRC with storage) were selected for further evaluation as 'Diversion' options and Options 3 (BEHRC with storage) and 7 (BEHRC without storage) were selected for further evaluation as 'non-Diversion' options.

Deep bed filtration and full biological treatment options (Options 4, 5, 8, and 9) were determined as infeasible due to the reasons discussed for KWWTP above.

Due to the low screening analysis ratings and the operational challenges associated with dry weather operation and maintenance of a larger biological system, full-biological treatment (Options 5 and 9) was determined to be technically infeasible.

## 4.4 Kuwahee WWTP Wet Weather Treatment Options Evaluation

As detailed in Section 4.3, the Kuwahee WWTP options were screened to identify the alternatives that would be feasible to construct and operate. After preliminary screening, five of the nine options were determined to be feasible and were developed further.

Each option included a combination of process improvements. **Table 4-9** summarizes the process components included with each option.

**Table 4-9**
**Kuwahee WWTP Wet Weather Treatment Option Process Components**

| Process | Option | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 6 | 7 |
| Off-site CCP WWTP Storage | ✪ | ✪ | ✪ | | |
| Emergency Stand-by Power | ✪ | ✪ | ✪ | ✪ | ✪ |
| Wet Weather Pump Station | | | | ✪ | ✪ |
| Primary Redirect | | ✪ | ✪ | ✪ | ✪ |
| Chemically Enhanced Primary Treatment | ✪ | ✪ | ✪ | ✪ | ✪ |
| RAS Pump Station | | | ✪ | | ✪ |
| Gravity Thickener | ✪ | ✪ | ✪ | ✪ | ✪ |
| UNOX Bypass | ✪ | ✪ | ✪ | ✪ | ✪ |
| Existing On-site Storage Improvements | ✪ | ✪ | | | |
| Biologically Enhanced High Rate Clarification | | | ✪ | | ✪ |
| Chlorine Supply Pipeline | | ✪ | ✪ | ✪ | ✪ |
| High Rate Clarification Effluent | | ✪ | ✪ | | |
| Existing Chlorine Contact Basin Modifications | | ✪ | ✪ | | |
| New Chlorine Contact Tank | | | | ✪ | ✪ |
| Dechlorination | | | | ✪ | ✪ |
| Existing Outfall Modifications | | | | ✪ | ✪ |

Each process component, as it relates to each improvement alternative, is discussed within the description of each option below. Process schematics, site plans, process flow diagrams, and hydraulic profiles for each option have been developed. For ease of reading, all oversized figures are included at the end of this section. **Figure 4-5** presents a legend of symbols and list of abbreviations used in the improvement alternative figures.

The process treatment for each option is described in the following sections. The description of flows is based on the peak wet weather flow anticipated for that alternative. For operations below the peak wet weather flow, it is anticipated that the existing secondary treatment train is operated at its highest reliable treatment rate and the new process train would be operated to meet the treatment needs above the 70 mgd estimated biological treatment capacity. Preliminary design calculations have been conducted for the analysis of improvement alternatives and for the purpose of estimating construction capital costs. It is noted that the preliminary sizing and details for the final implemented solution will be refined during pilot testing, preliminary design, and final design.

Process modeling using the BioWin model was performed to assess the performance of each option and its ability to meet current effluent limits. A summary of this analysis is provided in Appendix A.

### 4.4.1 Option 1: CEPT

Option 1 consists of modifications to enhance primary treatment of influent flows that are to be diverted around secondary treatment during wet weather conditions (or combined with pre-aeration basin flows up to a combined flow of 70 mgd). The improvements will involve constructing:

- Off-site CCP WWTP storage,
- Emergency stand-by power,
- Chemical storage and feed system for primary treatment,
- A UNOX bypass line,
- Upgrade existing gravity thickener and provide a new gravity thickener, and
- Modify the existing secondary settling basins to optimize on-site wet weather storage.

**Figure 4-6** is a process schematic of Option 1. **Figure 4-7** presents a process flow diagram of Option 1 improvements. **Figure 4-8** shows the proposed layout for Option 1, and **Figure 4-9** shows the preliminary hydraulic profile for the Option 1 improvements.

With the construction of the Phase I CAP/ER collection system improvements and off-site CCP storage, the anticipated future peak wet weather flow is 120 mgd. The existing headworks at the Kuwahee WWTP, including screening, influent pumping, and grit removal, are designed to treat and pump the peak influent flow of 120 mgd.

At a flow of 120 mgd, approximately 70 mgd would receive chemical addition for enhanced primary treatment and the remaining 50 mgd would be diverted around primary treatment through the pre-aeration basin. The 50 mgd of wastewater flow diverted through the pre-aeration basin would be combined with 20 mgd of primary clarifier effluent. This total flow of 70 mgd would be routed around the out of service UNOX reactors into the intermediate pump station. From the intermediate pump station, 70 mgd would be pumped for secondary treatment by the aeration basins and final clarifiers.

Following secondary treatment, 70 mgd of flow is recombined with the 50 mgd that received enhanced primary clarification and was diverted around the secondary treatment system. The full combined flow (120 mgd) is disinfected using chlorine and existing Contact Basins 1 and 2 before dechlorination and discharge into the Tennessee River.

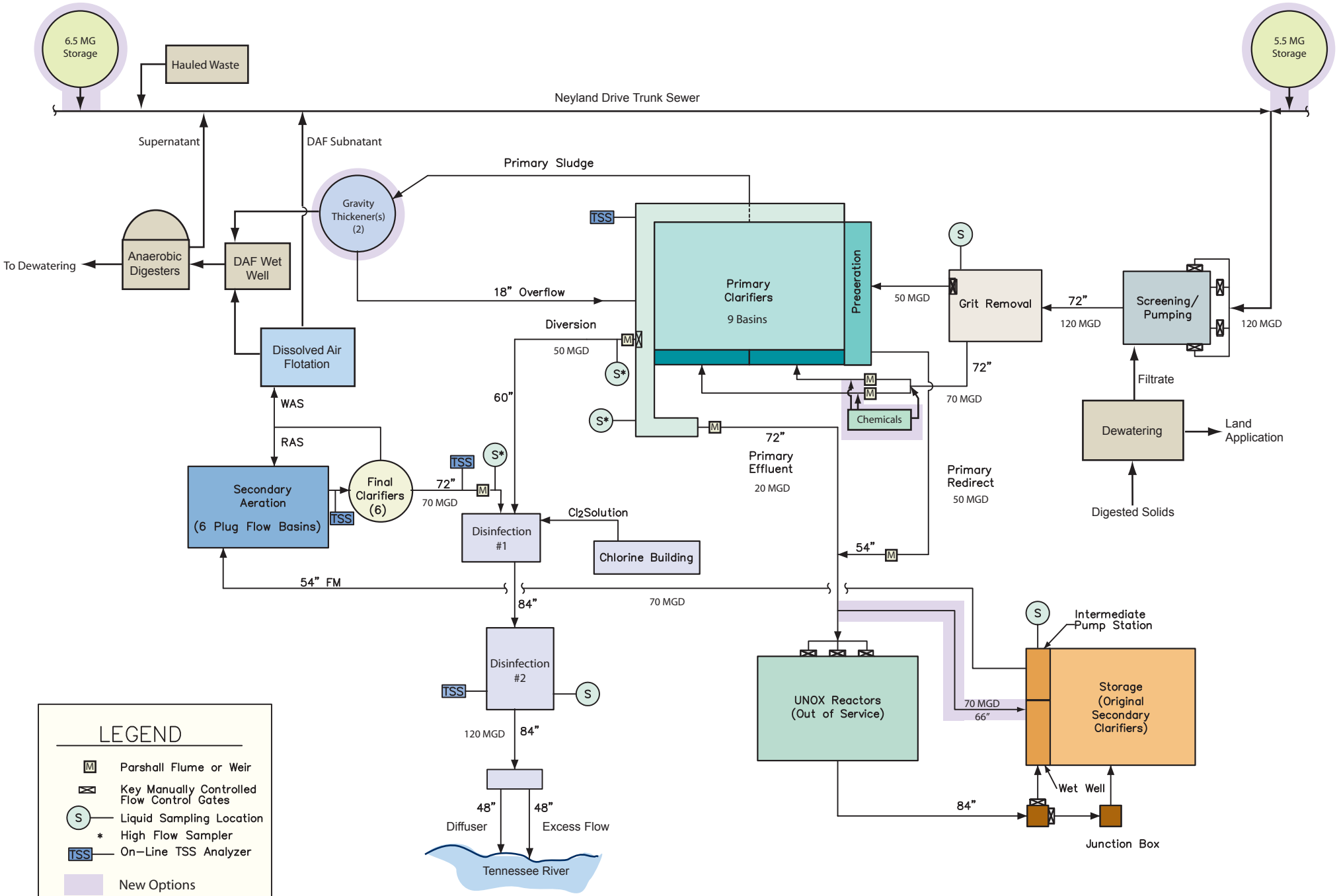



Figure 4-6
Kuwahee WWTP Option 1: CEPT Process Schematic

In addition, Option 1 also includes the modification of the intermediate clarifiers on the south side of Neyland Drive to optimize on-site flow equalization storage. Modification of the tanks would include removal of unnecessary equipment and mid-basin structures, structural modifications to improve drainage and cleaning, addition of a return/drain pump station, and improved cleaning capabilities.

To summarize, the required facilities to implement Option 1 include off-site CCP storage, chemical storage and feed system for the chemical coagulant, upgrade of the existing gravity thickener, addition of a new gravity thickener, conversion of the intermediate clarifiers to optimize on-site flow equalization tanks, and installation of a UNOX basin bypass.

The preliminary design details of each process improvement, as they relate to Option 1, are described below in more detail.

### Chemical Addition for Enhanced Primary Clarification

Process analysis of the KWWTP indicates that CEPT will improve overall process performance for each of the proposed improvements. The following description of CEPT facilities applies to all potential KWWTP CCP improvements options.

The CEPT system will require an area to store coagulant, a pumping/metering system and chemical feed lines. Coagulant will be introduced into the wet weather flow at three locations in the primary clarifier flow splitter area. Coagulant will be stored and pumped near the primary clarifier flow splitter, in the sludge dewatering building.

### Coagulant Storage and Pumping

Chemical coagulants that can be used for enhanced primary treatment include ferric chloride, alum, or polymer. KUB is conducting full-scale pilot tests of polymer coagulant during wet weather operations to determine the optimal coagulant dosing and document performance results. For the proposed layout and cost comparison, polymer coagulant is assumed.

It was assumed that most wet weather events would have a duration of no more than three days. As a result, a three day supply of coagulant will be stored on-site. Coagulant storage will be located in the south-west quadrant of the existing sludge dewatering building as shown in Figure 4-8. An abandoned ferric chloride tank is currently located in this area. If ferric chloride is used for the coagulant, this tank will need significant rehabilitation. If not, the tank will need to be removed.

A three day polymer supply will require storing approximately four totes on site. Because emulsion polymer can separate if unused, a small ½-hp mixer will be provided for each tote. The sludge dewatering facility has two pull through garages located directly east of the coagulant storage area. The west-most garage can be used for coagulant supply load in.

Metering pumps will be installed in the coagulant storage area. Three metering pumps will be required for this option. Installing two service pumps will allow

independent polymer dosing to each of the two primary clarifier influent flumes. The third pump will be reserved as a standby.

### Coagulant Supply Lines and Chemical Induction

Three parallel 1-inch PVC lines will be routed from the chemical storage area to the primary clarifier flow splitter box as shown in Figure 4-8. The chemical feed lines will cross the existing driveway and enter the primary clarifier metering and splitter box. A three line layout will allow maximum operational flexibility. The polymer induction can occur either at the discharges of the parshall flumes or via a submersible chemical induction system installed upstream of the flow split.

Chemical metering pump operation will be controlled by VFDs and will be able to dose a coagulant solution at a rate of up to 15 gpm per pump. Controls for the units will be located in the coagulant storage area and will also be connected to the plant's PLC.

### Utilities Considerations

If polymer is used as a coagulant, the raw polymer will require dilution water. The metering pumps will require a connection to either the plant water or potable water system. Plant water piping is located approximately 20-feet from the proposed metering pumps, so minimal plumbing improvements will be needed to operate the polymer system.

### O&M Considerations

The coagulant system will have fairly low maintenance requirements. The pumps and chemical inductor would have motors that are smaller than 2 hp. All equipment will be installed for easy removal for maintenance.

### Gravity Thickener

Process analysis of the KWWTP indicates that increased solids loadings as a result of chemically enhanced primary treatment (and HRC for some alternatives) will require additional gravity thickening capacity. It is recommended that the existing mechanical equipment be replaced in the existing thickener and a second thickener be added under all improvement scenarios. The following description of gravity thickener improvements applies to all potential KWWTP CCP improvement options.

A new gravity thickener will be installed to thicken solids collected in the primary clarifiers. The solids removal in the clarifiers is expected to increase due to chemical addition in greater percent removal rates for TSS. Solids collected in the primary clarifiers will be pumped to either the new or the upgraded existing gravity thickener during normal and wet weather operation.

The new gravity thickener will be 70-feet in diameter (similar to the existing gravity thickener) and will be installed in a new circular concrete tank. The new gravity thickener will be located west of the Leinard Lane between the final clarifiers and the existing gravity thickener as shown in Figure 4-8. Primary sludge will be pumped to the new gravity thickener through an 8-inch ductile iron primary sludge pipeline.

The gravity thickener employs gravity thickening by feeding sludge to a center feed well. Solids are allowed to settle and compact in the quiescent environment. Thickened sludge is withdrawn from the conical tank bottom and pumped to one of the anaerobic digesters.

Dilution water is used in the existing gravity thickener to keep the primary sludge fresh. The new gravity thickener will employ the same design. Primary clarifier effluent will be used as dilution water. Primary effluent will be conveyed from the primary clarifier effluent channel to a booster pump station that includes two booster pumps (one duty, one standby) for pumping the dilution water to the new gravity thickener.

Thickened sludge will be pumped from the new thickener. Progressive cavity pumps (one duty, one standby) installed in the dry pit of the thickened sludge pumping station will then be used to pump sludge to the digesters. The dry pit will have a footprint of 10-feet by 12-feet. A 15-foot by 20-foot control building will be constructed on the top of the sludge pumping station.

An 8-inch overflow effluent line will be installed for the new gravity thickener. Overflow from the new thickener will flow by gravity through the effluent line into a drain that ties into the main influent sewer for the Kuwahee WWTP. The alignment of this drain line is shown in Figure 4-8.

Thickening improvements for Option 1 also include upgrade of the existing gravity thickener mechanism by replacing the flush valves, drive unit and worm gear assembly, rotating arms, scum skimmer assembly and trough, scum scraper assembly, scum baffles and controls.

A process analysis of gravity thickening requirements is provided in Appendix B.

### UNOX Bypass

For all options, it is recommended that the out-of-service UNOX basin be removed from the process flow. All flow to the intermediate pump station and biological system must first flow through the abandoned basin. To improve system performance and eliminate the potential for solids deposition in the basin, a new pipe routed directly to the intermediate pump station is recommended.

The proposed UNOX bypass consists of a 66-inch diameter PCCP pipeline that diverts the primary treatment flows upstream of the existing secondary aeration basin (UNOX system) to the wet well of the intermediate pump station. The UNOX bypass has a hydraulic capacity of over 70 mgd. The UNOX bypass includes replacement of the existing UNOX influent chamber with a new structure that diverts the incoming flows to the intermediate pump station. The new structure receives flows from the north through the existing crossing of Neyland Drive and discharges flow to the east through the pipeline proposed to be located along the north exterior wall of the secondary aeration basin, immediately south of Neyland Drive. The pipeline then turns south and passes between the secondary aeration basin and the sludge pump

station building. Upon passing the sludge pump station building, the pipeline proceeds east where it discharges to the wet well of the intermediate pump station.

### On-Site Equalization Storage

The proposed equalization storage will be located in the existing secondary settling tanks located south of Neyland Drive, immediately adjacent to the intermediate pump station. The existing secondary settling tanks are unused, except that during excess flow events, the intermediate pump station can back-up flow into the tanks as needed. Modifying the existing secondary storage tanks into formal equalization storage during wet weather will include structural modifications to the existing basins; removal of mechanical components; removal of adjacent piping; installation of weirs to allow the intermediate pump station to overflow into successive basins as needed; installation of a drain line and drain pump station; and installation of water cannons to wash down the facilities after use.

For Option 1, the proposed equalization storage will utilize all five existing basins, and approximately 6.5 MG of excess flow will be capable of being stored. During filling, the water surface elevation in the intermediate pump station will rise to an elevation of 826-feet, and will then overflow a 20-foot long weir located in the SE corner of the intermediate pump station. As long as the water surface elevation in the intermediate pump station remains above 826, successive settling tanks will begin to fill through similar 20-foot long weirs installed between each basin. During small events it may be possible to limit storage to the first few basins, minimizing the amount of washdown required after wet weather events. During large events, all five basins would be utilized.

In order to facilitate drainage and cleaning of the basins after use, a center channel will be added to the center of the existing tanks, running from north to south. The east-west axis of each tank will be grouted to facilitate drainage toward the center channel. All tanks are emptied through a 16-inch automated sluice gate located on the south wall of each tank. A drain line collects flow from each basin and delivers it to a pump station containing two-3 mgd submersible pumps and a sump pump. Each of the pumps operates independently through separate forcemains that discharge into the intermediate pump station wet well.

After each use, water cannons mounted on the north end of each tank and at the one-third points located between tanks can be used to wash down the basins to prevent solids accumulation and associated odors. At the conclusion of the washdown cycle, the sump pump located in the drain pump station will empty the remaining contents of the wet well into the intermediate pump station.

## 4.4.2 Option 2: HRC with Storage

Option 2 consists of constructing new high rate clarifiers, wet weather storage, and related facilities for the current peak influent flow capacity of 120 mgd. Specific components of the option include constructing:

- Off-site CCP WWTP storage,

- Emergency stand-by power,
- Chemical storage and feed systems for primary treatment,
- A UNOX bypass line,
- Upgrade existing gravity thickener and provide a new gravity thickener,
- A primary redirect line to the HRC,
- Modifying the existing secondary settling basin for HRC systems,
- Modifying the existing chlorine contact basins, and
- Modifying the existing secondary settling basins to optimize on-site wet weather storage.

**Figure 4-10** shows a process schematic of Option 2. Process flow diagrams for Option 2 are shown in **Figures 4-11 and 4-12**. **Figures 4-13 and 4-14** present preliminary layouts of Option 2, and **Figures 4-15 through 4-17** present the preliminary hydraulic profile of the improvements.

With the construction of the Phase I CAP/ER collection system improvements and the off-site CCP storage referenced above, the anticipated future peak wet weather flow is 120 mgd. The existing headworks at the Kuwahee WWTP, including screening, influent pumping, and grit removal, are designed to treat and pump the peak influent flow of 120 mgd.

At a flow of 120 mgd, approximately 70 mgd of flow (65 mgd wastewater flow and up to 5 mgd HRC solids) is treated using the existing primary clarifiers, aeration basins and final clarifiers. Flow through the primary clarifiers would be dosed with a chemical coagulant for chemically enhanced primary clarification.

Up to 55 mgd in excess peak wet weather flow is treated in a parallel high rate clarification treatment train. After fine screening and the addition of the chemical coagulant and ballast, the solids are collected in the high rate clarifier. The solids collected in the high rate clarification process (approximately 5 mgd at peak capacity) are returned to the influent of the primary clarifiers. The treated wastewater from the high rate clarification process (approximately 50 mgd) is combined with the effluent from the final clarifiers for disinfection, dechlorination, and discharge into the Tennessee River.

In addition, Option 2 includes modification of the intermediate clarifiers not used to house the HRC process for use as dedicated, on-site flow equalization tanks. Modification of the tanks would include removal of unnecessary equipment and mid-basin structures and the addition of a return/drain pump station and improved cleaning capabilities.

The required facilities to implement Option 2 include off-site system storage, fine screens and high rate clarification equipment to be located in the intermediate

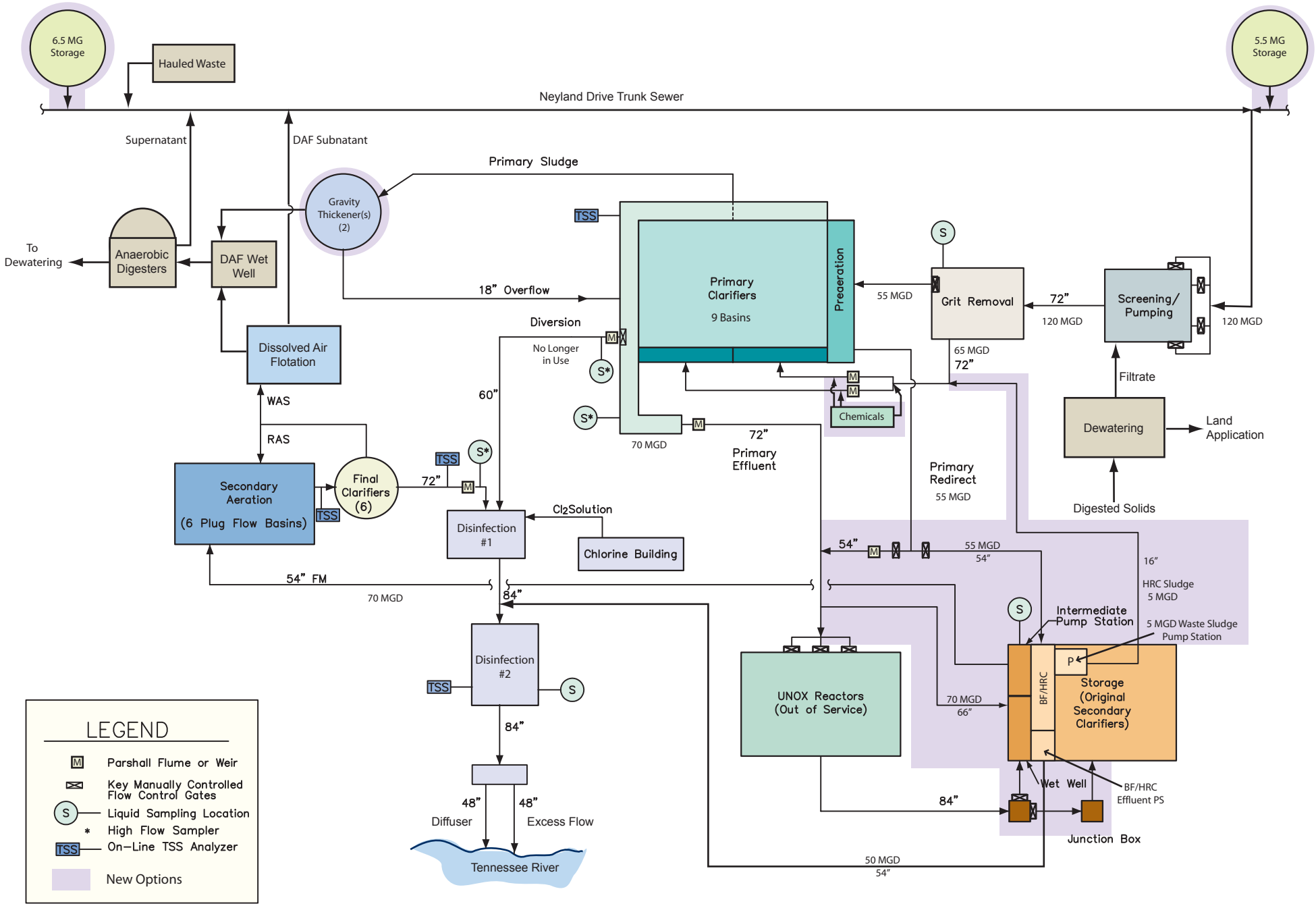



Figure 4-10
Kuwahee WWTP Option 2: HRC With Storage Process Schematic

clarifiers, chemical coagulant feed equipment, high rate clarifier solids pumping, upgrade of the gravity thickener and addition of a second gravity thickener, and conversion of the remaining intermediate clarifiers to on-site flow equalization tanks.

### CEPT

Chemically enhanced primary treatment will be included in Option 2 as is detailed for Option 1 in Section 4.4.2.

### Primary Redirect Line

Existing wet weather flows that exceed approximately 65 mgd (i.e., 70 mgd less the HRC solids flow) are routed from pre-aeration to the existing clarifiers. The proposed primary redirect would intercept up to 55 mgd in the existing 54-inch diameter pipeline between the existing pre-aeration basin and the proposed UNOX bypass. The intercepted flows would be conveyed through a 54-inch diameter pipe to the influent of the proposed high rate clarifiers located in the original secondary clarifiers.

Under this option, a junction structure would be constructed on the existing 54-inch diameter pipeline, and a new 54-inch diameter line would connect the junction structure to the original secondary clarifiers through a 54-inch diameter steel carrier pipe within a 66-inch diameter casing crossing Neyland Drive. The new junction structure would have automated gates on both outlets of the structure, allowing flow to be delivered to the UNOX bypass during normal operation and to the high rate clarifiers during wet weather events.

### Gravity Thickener

The thickening improvement for Option 2 will be identical to the one proposed for Option 1.

### UNOX Bypass

The proposed UNOX bypass for Option 2 will be identical to the one proposed for Option 1.

### HRC

The HRC system in Option 2 has a peak capacity of 55 mgd and consists of fine screening, HRC influent pumping, influent channel, HRC unit, sludge and microsand pumping, chemical addition, and effluent channel. The HRC influent pump station takes suction after fine screening and discharges to the influent channel which conveys the flow via gravity to the HRC unit. The HRC unit discharges to an effluent channel that conveys flow to the HRC effluent pipeline. The process will be installed within one of the existing intermediate clarifiers.

### HRC Fine Screening

Fine screening is needed to prevent plugging of downstream solids separation and handling equipment. Wastewater flows up to 55 mgd enter the HRC screening channel through the 54-inch primary redirect pipe and an influent channel. The HRC screening area, with an 800-ft footprint, will house a fine screen, a screening conveyor,

and a screenings compactor. The mechanically cleaned fine screen will have ¼-inch or smaller openings. Screenings are conveyed and dewatered through a screw conveyor and a screenings compactor and are then deposited into a covered roll off dumpster. A covered roll off dumpster is located on the north side of the existing original secondary clarifiers.

The influent channel for screens is divided into two channels within the HRC screening building. One channel will be designed for a mechanically cleaned bar screen and the other as an emergency bypass. Each channel will be 7-feet wide and 12-feet deep.

### HRC Influent Pumping

The new HRC influent pump station takes suction from the fine screening effluent channel and discharges to the HRC influent channel. The new pump station will include 5 (4 duty, 1 standby) submersible, low lift propeller pumps with variable-speed drives to meet projected system demand. Each pump will have a capacity of 9,550 gpm.

The HRC influent pumping wet well is sized for a minimum 15 min cycle time (4 starts per hour) at a peak flow of 55 mgd. The footprint of the proposed wet well will be 21-feet by 25-feet, and the wet well will be 22-feet deep. The bottom of the wet well will be at elevation 807.0 allowing operating range of 17.5-feet with a high water level at elevation 824.5-feet.

After fine screening and HRC influent pumping, 55 mgd flow is treated in one of two parallel HRC trains. Each HRC treatment train consists of four subsystems: HRC influent channel and static mixer, HRC basins, chemical feed system, and sludge and microsand pumping. Figure 4-14 presents a plan view of the HRC system.

### HRC Influent Channel and Static Mixer

The influent channel (65-feet long, 8-feet wide and 16-feet deep) distributes flow to the parallel high rate clarifier basins through 5-foot x 5-foot slide gates. There will be three baffled static mixers providing mixing of coagulant with wastewater in the influent channel. The baffled static mixers will be approximately 6-feet long by 1-foot wide by 12-feet deep and have 3-foot spacing between each baffle wall. Coagulant (alum) will be dosed inline approximately 2-feet before the baffled static mixers and approximately 40-feet before the coagulation mixers in the HRC basins.

### HRC Basins

Two parallel HRC trains are located immediately downstream of the HRC pumping station and HRC influent channel, and each HRC train has a footprint approximately 56-feet long by 23-feet wide. Each HRC train includes multiple coagulation/ flocculation tanks and a clarification tank. The HRC described below is the Actiflo® Process by Kruger, Inc. This process is recommended over other HRC processes based on the ability to upgrade to a biological process as described later in this text and the use of a micro-sand floc.

The first tank in each HRC train is called the coagulation tank. The coagulation tank receives coagulated wastewater from the HRC influent channel and provides more contact time for the coagulation process. Flow from the coagulation tank will then be directed to a mixing tank where microsand and polymer are injected to maximize the efficiency of flocculation and enhance settling of suspended solids. The polymer acts as a bonding agent for adhering the destabilized solids to the microsand. In the third tank, the maturation tank, the particles agglomerate and grow into high-density flocs known as microsand ballasted flocs, which settle quickly to the bottom of the settling tank. A top-mounted mixer will be provided in each coagulation/flocculation tank. The mixer in the maturation tank will be controlled by VFD operation to provide the range of mixing intensity.

The coagulation tank will have a total volume of 2,760 cubic feet and will be about 12.3-feet long and 11.2-feet wide with a side water depth of 20-feet. The mixing tank has the same dimension as the coagulation tank. The maturation tank will have a footprint of approximately 17.8-feet by 23.3-feet and a side water depth of 20-feet, resulting in a total volume of 8,300 cubic feet.

Flow from the maturation tank will exit over a weir and be directed to a clarification tank. In the clarification tank, solids are allowed to settle to the bottom. The clarification tank will have a total volume of 10,860 cubic feet and will be about 23.3-feet long and 23.3-feet wide with a side water depth of 20-feet. The clarification tank uses polystyrene lamella tube settlers. The total settling area of the tube settlers is 324-$ft^2$ with a rise rate at the design capacity is 60 gpm/$ft^2$. Clarified wastewater will be collected into six 13.9-feet long and 1.75-feet wide fiberglass reinforced plastic (FRP) effluent troughs and transported to the HRC effluent channel (65-feet long, 8-feet wide and 16-feet deep).

Scrapers located along the bottom of clarification tank direct the settled solids to the sludge sump located near the center of the conical bottom tank.

### HRC Sludge and Microsand Pumping

The solids collected at the bottom of the clarification tank flow to the sludge recirculation pump station, which is located south of the HRC trains. The sludge recirculation pump station (25-feet long by 10-feet wide) includes two duty pumps, plus one standby for each HRC train. Settled solids are pumped to the hydrocyclones where the more dense microsand is separated from the less dense sludge by centrifugal force. Each HRC train will have 2 hydrocyclones and the hydrocyclones will be located above the mixing tank so the recovered microsand is recycled by gravity into the mixing tank.

The remaining solids discharge from the hydrocyclone to the sludge pump station to be pumped to the influent of the primary clarifiers. The sludge pump station includes 3 (2 duty, 1 standby) submersible, centrifugal pumps. The sludge pump station will be located directly to the west of the sludge recirculation pump station. The wet well for the sludge pump station will have a footprint of approximately 16-feet x 16-feet and a depth of 16-feet. The bottom of the wet well will be at elevation 810.0.

### HRC Chemical Feed System

The HRC process relies on chemical coagulation and flocculation aids with proper mixing to create particles that flocculate with the ballast prior to settling. The most common chemical coagulants used are ferric chloride and alum; however, other coagulants such as polyaluminum chloride and ferric sulfate can also be used. Kruger, Inc. recommends using anionic polymer added with the microsand as a flocculation aid. The system layout proposed in this report is based on alum as a coagulant and anionic dry polymer as a flocculation aid.

The alum storage and feed system includes one new 8,500 gal high density cross-linked polyethylene (HDXLPE) tank and three (two duty and one standby) diaphragm metering pumps rated for 300 gal/hr. The 8,500 gal HDXLPE tank will be 10-foot diameter x 16.75-foot height. The design criteria established for alum includes providing a minimum 3 days bulk storage for an average alum dose of 70 mg/L and average daily flow of 19 mgd through the high rate clarifiers (assumes 84 mgd average daily flow influent at Kuwahee WWTP with 65 mgd through primary treatment). The expected alum concentration is 4.0 lbs/gal. The design criteria established for the metering pumps is a maximum alum dose of 125 mg/L at a flow of 55 mgd.

For the alum solution, diaphragm metering pumps (2 duty and 1 standby) and carrier water system are required. The solution will flow through a 2-inch PVC pipe from the metering pumps to the HRC mixing tanks. The pipeline will be aligned from the chemical building across the intermediate pump station to the HRC mixing tanks as shown in Figure 4-14.

The recommended polymer preparation system includes a dry polymer hopper, a volumetric screw feeder to meter dry polymer into a wetting chamber, a wetting chamber, and two mix/age/feed tanks. In general, the polymer preparation system will automatically batch polymer and dilution water into one of the mix/age/feed tanks. At the same time the drain from the second tank is connected to the suction of a chemical metering pump for dosing polymer. Once the polymer in the feed tank reaches a low level, a valve will automatically switch so that the batch of polymer that has been aging becomes the feed tank. The cycle is repeated continuously. Typically 30 minutes is recommended for polymer aging, so the tanks are typically sized to create a 1 percent polymer solution with the 45 – 60 minute detention time. These polymer preparation systems are packaged together by manufacturers and are available in a variety of sizes.

The polymer metering system should be sized to dose an average of 1 mg/L polymer and a maximum of 2 mg/L polymer. Assuming the maximum flows through the HRC is 55 mgd, the polymer feed system should be capable of adding 38 lb/hr.

Dry polymer is recommended for long term storage between wet weather events. It is recommended that polymer be stored in bags or buckets in a cool, dry place. Storage of 2,750 lbs polymer is recommended in anticipation of wet weather.

For the polymer solution, diaphragm metering pumps (2 duty and 2 standby) and carrier water system are required. The solution will flow through a 1.5-inch PVC pipe from the metering pumps to the HRC mixing tanks. The pipeline will be aligned from the chemical building across the intermediate pump station to the HRC mixing tanks as shown in Figure 4-14.

A 30-foot x 30-foot new chemical building will be constructed to house the dry polymer preparation system, dry polymer storage, alum and polymer metering pumps, and the HDXLPE alum storage tank. The new chemical building will be located west of the intermediate pump station between the cryogenic building and the sludge pumping station as shown in Figure 4-14.

The dilution water assembly and post dilution system for dry polymer require a connection to either plant water or potable water, which is located approximately 30-feet from the proposed dry polymer system.

The dry polymer and alum coagulant systems will have fairly low maintenance requirements. The pumps and tank mixers would have motors that are smaller than 5 hp. All equipment will be installed for easy removal for maintenance.

### HRC Effluent

The proposed 54-inch diameter PCCP HRC effluent pipeline conveys the effluent flow from the HRCs to Chlorine Contact Basin #2 immediately north of the wall separating the basin from the dechlorination basin.

### Chlorine Supply Pipeline

The currently proposed HRC chlorine supply pipeline is a 6-inch diameter PVC pipeline that begins in the existing chlorine room located immediately south of the north chlorine contact Basin. The line extends easterly along the north side of the existing railroad spur, before turning south and crossing Neyland Drive in the vicinity of the existing intermediate pump station forcemain. The pipeline continues south between the existing sludge pump station and the intermediate pump station and discharges chlorine solution into the HRC effluent line located near the southwest corner of the intermediate pump station.

### Existing Chlorine Contact Basin Modifications

The existing chlorine contact tanks provide sufficient contact time for a total capacity of 120 mgd. However, to accommodate treated flow from the HRC units south of Neyland Drive, chlorine contact basin #2 must be reconfigured to provide adequate detention time for the biological treatment train (contact basin #1 and a portion of basin #2) and for the HRC treatment train (portion of basin #2).

To provide adequate chlorine contact time for both the conventional treatment process train and the HRC process train, Option 2 includes modifications to the existing chlorine contact tank #2 to proportion the amount of chlorine contact time. The modifications include a new pipe penetration in the northern portion of the tank near the southwest corner of the UNOX basin. This penetration is for the HRC

effluent pipe and allows for the additional chlorine contact time needed for the wet weather treatment train. The modifications also include removing portions of existing baffle walls, adding new baffle walls and installation of two new motor operated 6-foot x 6-foot sluice gates in order to divide the existing tank into the required contact time for each process train during peak flow conditions. The motor operated sluice gates may be used to utilize the majority of the chlorine contact tank #2 contact time during normal operating conditions or during small wet weather events where the HRC unit(s) are not activated. During wet weather flows when the HRC system is activated, the contact tank will be operated to utilize the contact channels to provide the required contact time for each treatment train effluent. Disinfected flows from each set of chlorine contact channels will be combined as flows enter the southern portion of the tank for dechlorination, as currently operated.

### Equalization Storage

The proposed equalization storage for Option 2 is similar to the storage concept presented in Option 1, except that the existing settling basin immediately adjacent to the intermediate pump station contains the HRC equipment, and the remaining four basins are used for storage.

The proposed equalization storage will utilize the four easterly existing basins and will be capable of providing approximately 4.8 MG of excess flow storage.

## 4.4.3 Option 3: BEHRC with Storage

Option 3 is considered to be secondary treatment and consists of constructing new biologically enhanced high rate clarifiers, wet weather storage and related facilities for the current peak influent flow capacity of 120 mgd. Specific components of the option include constructing:

- Off-site CCP WWTP storage,
- Emergency stand-by power,
- Chemical storage and feed systems for primary treatment,
- A UNOX bypass line,
- Upgrade existing gravity thickener and provide a new gravity thickener,
- A RAS pump station to the BEHRC,
- A primary redirect line to the BEHRC, and
- Modifications to the existing chlorine contact basin.

**Figure 4-18** presents a process schematic for Option 3. A process flow diagram was developed and is presented as **Figures 4-19 and 4-20**. **Figures 4-21 and 4-22** show a plan layout for Option 3, and **Figures 4-23 through 4-25** present the preliminary hydraulic profile of the proposed improvements.

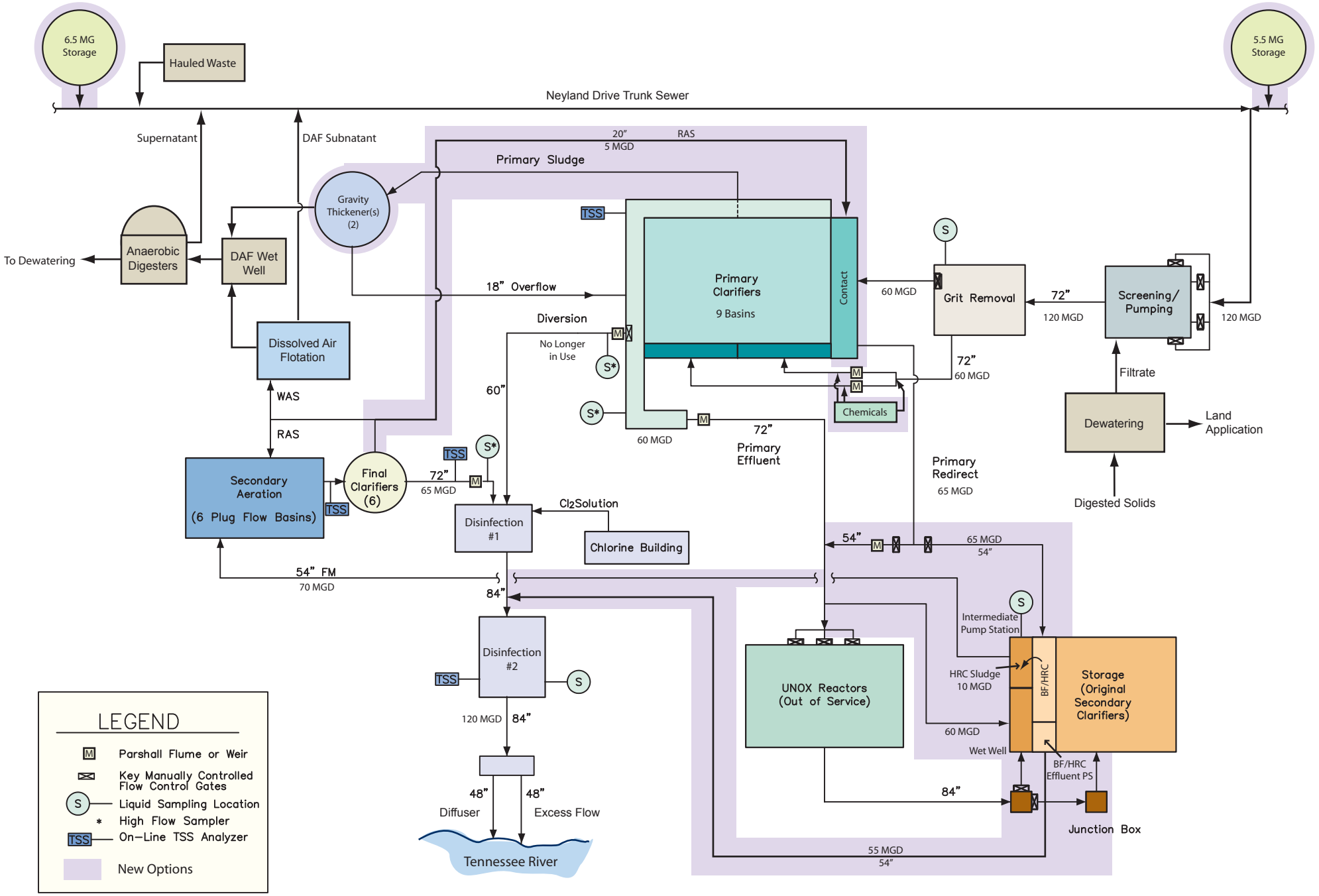



Figure 4-18
Kuwahee WWTP Option 3: BEHRC
With Storage Process Schematic

CDM

With the construction of the Phase I CAP/ER collection system improvements and the off-site CCP storage, the anticipated future peak wet weather flow is 120 mgd. The existing headworks at the Kuwahee WWTP, including screening, influent pumping, and grit removal, are designed to treat and pump the peak influent flow of 120 mgd.

Under this option, at a flow of 120 mgd, approximately 60 mgd of influent flow is treated in the primary clarifiers and is then combined with up to 10 mgd of BEHRC solids for secondary treatment using the aeration basins and final clarifiers. A with the other improvement alternatives under consideration, flow through the primary clarifier would be dosed with a chemical coagulant for chemically enhanced primary clarification.

Based on the BioWin process model analysis summarized in Appendix A, supplemental nutrients are required for adequate biological treatment under the KWWTP BEHRC options. In order to provide sufficient nutrients for biological degradation of the BOD loadings under peak wet weather conditions, a methanol feed facility will be provided with this improvement option.

The remaining 60 mgd of influent flow not receiving CEPT and conventional biological treatment is treated in a parallel biologically enhanced high rate clarification (BEHRC) process. Adding the biological enhanced treatment to the HRC process, return activated sludge from the final clarifiers (up to 5 mgd) is combined with the wet weather treatment train flow (up to 60 mgd) at the existing pre-aeration basin. Approximately 10 minutes of contact time is provided in the pre-aeration basin allowing soluble BOD uptake by the activated biomass. After fine screening and the addition of the chemical coagulant and ballast, the solids are collected in the high rate clarifier.

The solids collected from the high rate clarification process are returned to the intermediate pump station for pumping to the influent of the aeration basins. The treated effluent from the high rate clarification process (up to 55 mgd) is then combined with the effluent from the final clarifiers (65 mgd) for disinfection, dechlorination, and discharge into the Tennessee River. The required facilities to implement Option 3 are discussed in more detail below.

### CEPT

Chemically enhanced primary treatment will be included in Option 3 as is detailed for Option 1 in Section 4.4.2.

### Primary Redirect Piping

The proposed primary redirect pipe for Option 3 is identical to that described in Option 2. Existing wet weather flows that exceed 60 mgd are routed from pre-aeration to the existing original secondary clarifiers. The proposed primary redirect would intercept up to 65 mgd in the existing 54-inch diameter pipeline between the existing pre-aeration basin and the proposed UNOX bypass. The intercepted flows would be conveyed through a 54-inch diameter pipe to become the influent of the proposed BEHRCs located in the original secondary clarifiers.

Under this option, a junction structure would be constructed on the existing 54-inch diameter pipeline, and a new 54-inch diameter line would connect the junction structure to the original secondary clarifiers through a 54-inch diameter steel carrier pipe within a 66-inch diameter casing crossing Neyland Drive. The new junction structure would have automated gates on both outlets of the structure, allowing flow to be delivered to the UNOX bypass during normal operation and to the BEHRCs during wet weather events.

### RAS Pump Station

Biological treatment in the BEHRC will be aided by RAS feed from the final clarifiers. The RAS pump station will divert a portion of the RAS flow into the pre-aeration basin where it will be mixed with influent flow. The mixed flow will then be conveyed to the BEHRC.

### RAS Pump Station Influent Line

RAS for the BEHRC will be drawn off of the existing RAS line located between the final clarifiers. The existing RAS line allows RAS to flow to the RAS pump station located to the west in the nitrification pump and blower building. The elbow located near Final Clarifier #5 will be replaced with a tee, a motor operated plug valve and a gravity line aligned from the final clarifiers to the new RAS pump station. The plug valve will be able to be opened to allow flow into the RAS pump station.

The gravity line to the new RAS pump station will need to be aligned to the west of the existing maintenance path located east of Final Clarifier #6. Several utilities and smaller process pipes are located to the west of this path. The gravity line will be an 18-inch ductile iron line. The line will be sloped to about 1.3% to convey 5 mgd of flow to the RAS pump station.

### RAS Pump Station

The RAS pump station will be located directly to the northeast of final clarifier #6. The wet well will have a footprint of approximately 14-feet x 14-feet and a depth of 30-feet. The low water level of the wet well will be around 814-feet, which is the same as the low water level of the existing RAS wet well in the nitrification pumping building. A similar low water level will allow both lift stations to operate during wet weather conditions.

Three submersible, centrifugal pumps will be installed in the RAS pump station. Each pump will have a capacity of 1,740 gpm and will have VFD control to pace RAS return rate with the BEHRC process influent flow rate. With two pumps in service and one pump as standby, the RAS pump station will have a firm capacity of 5 mgd. A 20-inch ductile iron forcemain will convey flow from the RAS pump station to the pre-aeration basin located east of the primary clarifiers.

### O&M Considerations

The motorized plug valve located on the influent line to the RAS pump station can be closed to isolate the line when the BEHRCs are not in use. A flushing connection will be provided on the gravity line to clean the line and prevent odors when not in use.

A sump pump will be installed in the wet well to empty the sump when not in use. Access hatches and guide rails will be provided over each pump for maintenance. The hatches can also be used for wash down of the pump station. Access hatches will also be provided over the discharge valves in the valve vault.

### Gravity Thickener

The thickening improvements for Option 3 will be identical to those proposed for Option 1.

### UNOX Bypass

The proposed UNOX bypass will be as described in Option 1.

### BEHRC

The BEHRC system in Option 3 has a capacity of 65 mgd, and consists of pre-aeration, fine screening, BEHRC influent pumping, an influent channel, BEHRC unit, sludge and microsand pumping, chemical addition and an effluent channel. The BEHRC influent pump station takes suction after fine screening and discharges to the influent channel which conveys the flow via gravity to the BEHRC unit. The BEHRC unit discharges to an effluent channel that conveys flow to the BEHRC effluent pipeline.

### Pre-aeration

Approximately 10-15 minutes contact time is required in the pre-aeration basin. **Table 4-10** lists the detention times in the existing pre-aeration basin, primary redirect pipe, and BEHRC influent pumping wet well. As shown in the table, the total detention time in the existing pre-aeration basin, primary redirect pipe, and BEHRC influent pumping wet well is 11 minutes; thereby no contact basin is provided in addition to the existing pre-aeration basin.

**Table 4-10**
**Pre-aeration Design Criteria**

| Design Criteria | Value |
|---|---|
| **Wastewater Character** | |
| Wet weather flow, mgd | 65 |
| MLSS, mgd/L | 900 |
| **Existing Pre-aeration Basin Dimensions** | |
| Length, ft | 160 |
| Width, ft | 22 |
| Side water depth per basin, ft | 15.5 |
| Volume, $ft^3$ | 54,600 |
| **Primary Redirect Pipe Dimensions** | |
| Pipe diameter, inch | 54 |
| Pipe length, ft | 180 |
| Volume, $ft^3$ | 2,900 |
| **HRC Influent Pumping Wet Well** | |
| Length, ft | 24 |
| Width, ft | 25 |

| Table 4-10<br>Pre-aeration Design Criteria | |
|---|---|
| **Design Criteria** | **Value** |
| Side water depth, $ft^3$ | 16 |
| Volume, $ft^3$ | 9,600 |
| **Hydraulic Retention Time** | |
| Existing pre-aeration basin, min | 9 |
| Primary redirect pipe, min | 0.5 |
| HRC influent pumping wet well, min | 1.6 |
| Total, min | 11 |

### Fine Screening

The BEHRC fine screening for Option 3 will be identical to the one proposed for Option 2 and will have a screening capacity of 65 mgd.

### BEHRC Influent Pumping

The new BEHRC influent pump station for Option 3 will be similar to the one proposed for Option 2. The footprint of proposed wet well will be 24-feet by 25-feet, and the depth will be 22-feet. Five (4 duty and 1 standby) submersible, low lift propeller pumps will be installed in the wet well. Each pump will have a capacity of 11,300 gpm giving a firm capacity of 65 mgd.

### BEHRC

After fine screening and BEHRC influent pumping, 65 mgd flow is treated in four parallel BEHRC trains. The BEHRC system consists of four subsystems: BEHRC influent channel and static mixer, BEHRC basins, chemical feed system, and sludge and microsand pumping. Figure 4-22 presents plan view of the BEHRC system.

### BEHRC Influent Channel and Static Mixer

The BEHRC influent channel and static mixer for Option 3 will be similar to the one proposed for Option 2 except that the BEHRC influent channel will be 100-feet long.

### BEHRC Basins

The BEHRC basins for Option 3 will be similar to the one proposed for Option 2 except that four parallel BEHRC trains are required for this option to treat a flow of 65 mgd. The basins will have a footprint approximately 51-feet long by 81-feet wide.

### Sludge and Microsand Pumping

The microsand recirculation pumping structure for Option 3 will be similar to the one proposed for Option 2. No sludge pumping station is required for this option. Waste sludge from the hydrocyclones will flow by gravity via 16-inch PVC lines to the adjacent intermediate pump station.

### Chemical Feed System

The chemical feed system for Option 3 will be similar to the one proposed for Option 2 except that one new 12,250 gal HDXLPE tank will be required for alum storage and storage of 3,250 lbs of dry polymer is required.

### BEHRC Effluent

The proposed BEHRC effluent pipeline for Option 3 is identical to that described in Option 2.

### Chlorine Supply Pipeline

The proposed chlorine supply pipeline for Option 3 is identical to the line described in Option 2.

### Existing Chlorine Contact Basin Modifications

The proposed modifications to the existing chlorine contact basin #2 are identical to that described in Option 2.

## 4.4.4 Option 6: HRC without Storage

Option 6 consists of constructing new high rate clarifiers and related facilities for a peak influent flow of 160 mgd. Specific components of the option include constructing:

- A new headworks wet weather pump station,
- Emergency stand-by power,
- Chemical storage and feed systems for primary treatment,
- A UNOX bypass line,
- Upgrade existing gravity thickener and provide a new gravity thickener,
- A primary redirect line to the HRC,
- Modifying the existing secondary settling basin for HRC systems,
- New chlorine contact basin and sodium bisulfite contact basin,
- A new dechlorination effluent pipe, and
- Modifications to the existing effluent outfall.

A process schematic for Option 6 is shown in **Figure 4-26**. **Figures 4-27 and 4-28** show process flow diagrams. The proposed layout for Option 6 is shown in **Figures 4-29 and 4-30**, and the preliminary hydraulic profile for this option is shown in **Figures 4-31 through 4-34**.

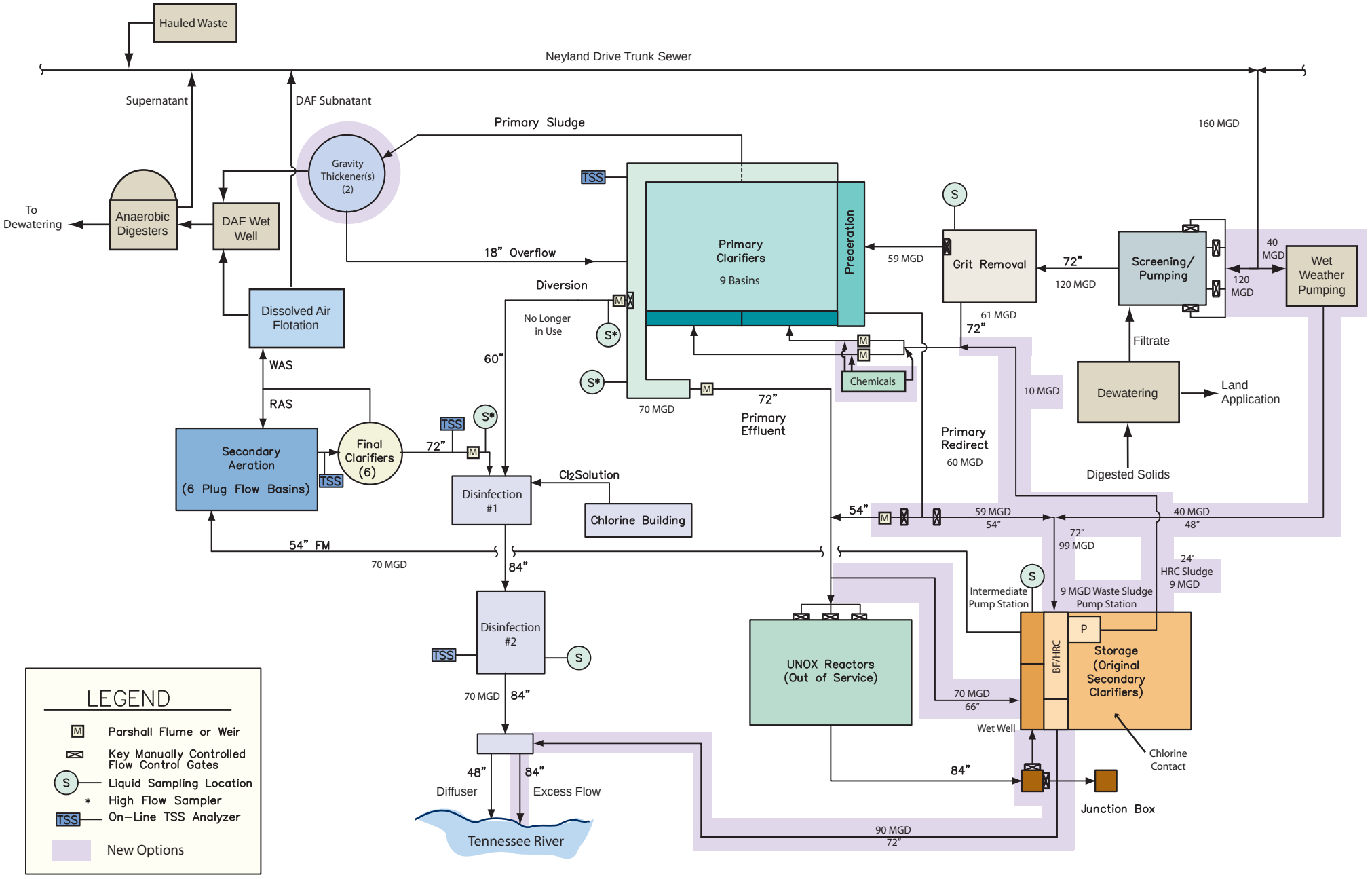



Figure 4-26
Kuwahee WWTP Option 6: HRC Without Process Schematic

The process flow for flows up to 120 mgd is similar to the process flow described in Option 2 with 70 mgd (61 mgd wastewater flow and 9 mgd HRC solids) receiving treatment through the primary clarifiers, aeration basins, and final clarifiers. Flows greater than 61 mgd and less than 120 mgd will be routed through the pre-aeration basin to HRC. For influent flows from 120 mgd to 160 mgd, the additional 40 mgd is routed through a new wet weather preliminary treatment facility and pump station. Excess peak flows from the pre-aeration basin and wet weather pump station combine prior to being routed to the HRC process. The combined flow of 99 mgd receives fine screening and is treated in the high rate clarification system. Waste sludge from the HRC (9 mgd) is returned to the primary clarifier influent for removal and solids handling in the existing solids treatment train (with new additional gravity thickener). Flow through the primary clarifier would be dosed with a chemical coagulant for chemically enhanced primary clarification.

A new chlorination system, chlorine contact basin, and dechlorination system is required for 90 mgd of HRC treated effluent. Finally, the HRC 90 mgd treatment train is combined with 70 mgd effluent from the existing secondary treatment and final clarifier treatment train and is discharged through the existing diffuser and a new overflow outfall into the Tennessee River.

Each process required for Option 6 implementation is discussed in more detail below.

### CEPT

Chemically enhanced primary treatment will be included in Option 6 as detailed for Option 1.

### Wet Weather Pump Station Diversion Structure

Wet weather flow exceeding 120 mgd will be screened at the existing headworks and will be diverted from the existing wet well to a new wet weather pump station located near the headworks building.

The existing headworks wet well has a normal operating level of 806-feet. During wet weather flows, two lag pumps will operate in conjunction with the lead pump allowing for 120 mgd to pass through the headworks. Flows exceeding 120 mgd will flow over a weir at the existing pump station wet well and into the wet weather pump station.

A 19-foot long Diversion weir will be installed at the new wet weather pump station and set at an elevation of 808-feet; this will allow 1-foot for each of the headworks lag pumps to operate before a Diversion. Flow will be conveyed to the Diversion weir by a 30-inch ductile iron line. This line would be located in the parking lot to the east of the existing headworks structure. Once flow passes over the weir it will be pumped by the wet weather pump station.

### Wet Weather Pump Station

The wet weather pump station will be located to the north-east of the existing headworks. The existing, abandoned administration building is located on the proposed site and would need to be demolished before construction.

The wet well will have a footprint of approximately 30-feet by 30-feet and a depth of 35-feet. The high water level is at 807.5, which is 6 in. below the Diversion weir elevation.

Five submersible, centrifugal pumps will be installed in the wet weather pump station. Four pumps will be in service and one will be a standby. Each pump will have a capacity of 6,940 gpm, and the pump station will have a firm capacity of 40 mgd. The pumps will be VFD controlled to match influent flow rates.

### Wet Weather Pump Station Forcemain

A 48-inch PCCP forcemain will convey flow from the wet weather pump station to a junction box with the primary redirect line. From there, flows will be conveyed to the high rate clarifiers similar to Option 2.

### O&M Considerations

The 30-inch ductile iron line connecting the existing headworks wet well and the Diversion structure will be sloped towards the existing headworks wet well at 2%. This will help to drain the pipe back into the headworks wet well when wet weather flows recede. The 30-inch line will also have sluice gates which will allow staff to isolate the Diversion structure and wet weather pump station when they are not in use.

The Diversion structure will have two access hatches for wash down and for access to maintain the weirs. The wet weather pump station will have access hatches and guide rails installed above each pump. Hatches will also be installed above the check and plug valves in the valve vault. A sump will be installed in the wet weather pump station to empty the sump when not in use.

### Primary Redirect Line

The proposed primary redirect line for Option 6 is similar to that described in Options 2 and 3, except that it conveys additional flows from the new wet weather pump station. Existing wet weather flows that exceed 61 mgd are routed from pre-aeration to the existing original secondary clarifiers. The proposed primary redirect would intercept up to 59 mgd in the existing 54-inch diameter pipeline between the existing pre-aeration basin and the proposed UNOX bypass and combine this flow with up to 40 mgd of additional flow that is conveyed to a common junction structure by the wet weather pump station forcemain. Once combined, the 99 mgd total intercepted flows would be conveyed through a 72-inch pipe to become the influent for the proposed high rate clarifiers located in the original secondary clarifiers.

Under this option, a junction structure would be constructed on the existing 54-inch pipeline, and a new 60-inch line would connect the junction structure to another

junction structure that receives flow from the wet weather pump station. The combined flows are then conveyed to the original secondary clarifiers through a 72-inch steel carrier pipe within an 84-inch casing crossing Neyland Drive. The new junction structure would have automated gates on both outlets of the structure, allowing flow to be delivered to the intermediate pump station during normal operation and to the HRCs during wet weather events. An additional gate would be included to isolate flows from the wet weather pump station when the station is not in use.

### Gravity Thickener

The thickening improvement for Option 6 will be identical to the one proposed for Option 1.

### UNOX Bypass

The proposed UNOX bypass is as described for Option 1.

### High Rate Clarification

The HRC system in Option 6 will be similar as the system described for Option 2 and will have a peak design capacity of 99 mgd.

### Fine Screening

The HRC fine screening for Option 6 will be similar to the one proposed for Option 2 except that the influent channel for screens will be divided into three channels with two channels for fine screens and the third channel for an emergency bypass to treat a wastewater flow up to 99 mgd. The HRC screening area will have a 1,120 sf footprint. An interconnection channel will be located after the bar screens, and slide gates will be installed in the interconnection channel to allow operational flexibility between the screen channels.

### HRC Influent Pumping

The new HRC influent pump station for Option 6 will be similar to the one proposed for Option 2. The footprint of the proposed wet well will be 34-feet by 30-feet, and the wet well will be 22-feet deep. Five (4 duty and 1 standby) submersible, low lift propeller pumps will be installed in the wet well. Each pump will have a capacity of 17,200 gpm giving a rated capacity of 99 mgd for the pump station.

### HRC

After fine screening and HRC influent pumping, up to 99 mgd of flow will be treated in four parallel HRC trains. The HRC system consists of four subsystems: HRC influent channel and static mixer, HRC basins, chemical feed system, and sludge and microsand pumping. Figure 4-30 presents the plan view of the HRC system.

### HRC Influent Channel and Static Mixer

The HRC influent channel for Option 6 will be similar to the one proposed for Option 2 except that the HRC influent channel will be 100-feet long. The HRC influent static mixer for Option 6 will be as proposed for Option 2.

### HRC Basins

The HRC basins for Option 6 will be similar to the one proposed for Option 2 except that four parallel HRC trains are required to treat a flow of 99 mgd. Each basin will have a footprint approximately 56-feet long by 22-feet – 4-inches wide.

### Sludge and Microsand Pumping

The microsand recirculation pumping structure for Option 6 will be similar to the one proposed for Option 2 except that the pumping structure will be located directly to the south of the HRC basins.

The sludge pumping station for Option 6 will be identical to the one proposed for Option 2 and will route HRC system sludge back to the primary clarifier influent.

### Chemical Feed System

The chemical feed system for Option 6 will be similar to the one proposed for Option 2 except that two HDXLPE tanks (one 14,950 gal, the other one 8,500 gal) will be required for alum storage and storage of 5,000 lbs of dry polymer is required.

### HRC Effluent

The 72-inch HRC effluent receives flow discharged by the HRCs and conveys it to a new chlorine contact basin located in the existing secondary clarifier adjacent to the HRC units.

### New Disinfection System

Because peak flows for this option are in excess of the existing 120 mgd chlorine contact basin capacity, supplemental disinfection facilities are required.

Disinfection system improvements will include construction of a chlorine contact basin, sodium bisulfite contact basin, chemical mixing and storage equipment to be located in the existing chlorination equipment room, and chemical pumping and distribution from the existing chlorination equipment room to the new chlorine contact basin. For the new disinfection system design, it is assumed that chlorination is accomplished by injecting chlorine gas solution at the influent end of the new chlorine contact basin and that dechlorination is accomplished by the injection of sodium bisulfite solution into the effluent of the new chlorine contact basin.

### New Chlorine Contact Basin and Sodium Bisulfite Contact Basin

HRC effluent flows to the new chlorine contact basin influent box through an 84-inch PCCP pipe. The influent box will have a footprint of 22-feet x 13-feet. Two 7-foot x 7-foot sluice gates will be installed in the influent box to divert the flow to the new chlorine contact basin or the 84-inch chlorine contact basin bypass pipe, located directly to the west of and parallel to the new chlorine contact basin. The bypass pipe discharges flow to the dechlorination effluent chamber.

The new chlorine contact basin and new sodium bisulfite contact basin are sized for a peak design flow of 90 mgd and a hydraulic retention time of 15 minutes for chlorination (in accordance with TDEC disinfection requirement) and 2 minutes for

dechlorination. The chlorine contact basin will have a footprint of 68-feet by 110-feet with a side water depth of 17-feet and will be located in the fourth and fifth existing secondary settling basins. Four baffle walls (85-feet long by 1-foot wide by 19-feet deep) will be constructed in the chlorine contact basin to form plug flow contact chambers. Flow from the chlorine contact basin will be directed to the sodium bisulfite contact basin through a 5-foot x 5-foot opening. The sodium bisulfite contact basin will have a footprint of 63-feet by 14-feet with a side water depth of 17-feet and will have two baffle walls (12-feet long by 1-foot wide by 19-feet deep) constructed in the basin. Effluent from the sodium bisulfite contact basin flows over a 14-foot broad crested weir to the effluent chamber (22-feet by 12-feet). A chlorine meter will be installed in the effluent chamber to measure the chlorine residual in the effluent. Figure 4-30 presents the layout of the new chlorine contact basin and the new sodium bisulfite contact basin.

### New Chlorination Equipment

The new chlorination equipment is to provide an additional 10,000 lbs/day chlorination capacity. Design criteria established for the new chlorination equipment is a peak flow of 90 mgd, chlorine dose of 12 mg/L, and 100% chlorine concentration. Based on these criteria, 2 sets of new chlorination equipment will be required including chlorinator, chlorine liquid vaporizer, pressure relief valve assembly, and 6-ton cylinder manifold system to be located in the existing chlorine equipment room. Relocation of the sink and the lab counter in the middle of the chlorine equipment room may be required if the new chlorinators can't fit on the existing chlorinator equipment pad.

### Chemical Storage

The chemical storage system is to provide bulk storage of chlorine gas and sodium bisulfite. Design criteria established for the storage of liquefied chlorine gas is minimum of 3 days, average chlorine dose, and 100% chlorine concentration. Based on the preceding criteria, fifteen new 1-ton cylinders and two chlorine tank scales will be required for storing chlorine gas in the existing chlorine equipment room.

Design criteria established for the storage of bisulfite is minimum of 3 days, average bisulfite dose of 6 mg/L, and 38% concentration. Based on these criteria, one 5,500 gal new tank will be required for storing bisulfite outside of the new dechlorination contact basin. The tank will be constructed of FRP and outfitted with fittings and access ways meeting requirements for the chemical delivery system, storage, and maintenance.

At temperatures below 45°F, bisulfite solution will freeze and solution salts will crystallize. Crystals can plug pumps, valves, and piping. Pipe heat tracing will be provided and the 5,500 gal FRP tank will be equipment with heat tracing to maintain a constant temperature of 60-70 °F, reducing the likelihood of freezing the solution.

### Chemical Pumping, Distribution, and Mixing

A 6-inch PVC line will distribute chlorine gas solution from the existing chlorine equipment room to the chlorine contact basin.

The sodium bisulfite solution delivery system includes 3 metering pumps (2 operation and 1 standby). Each pump is rated 70 gph (with the needed 20:1 turndown) premounted and prepiped on a skid with required pumping system accessories. Pump will be variable speed control in operation. Sodium bisulfite solution will be pumped from the sodium bisulfite storage tank to the mixing equipment.

Induction type mechanical mixers will be used to disperse the chlorine solution and sodium bisulfite solution in the new chlorine contact basin and new sodium bisulfite contact basin. Induction mixers can inject and disperse liquid/chemicals into the primary effluent without the need for additional mixing water. Both induction mixers will be operated by 10 hp motors. The induction mechanical mixers will be mounted on the walls of the influent channel of the chlorine contact basin and the sodium bisulfite contact basin.

### Dechlorination Effluent

The dechlorination effluent chamber discharges effluent to the southwest through the 72-inch PCCP pipeline as shown in Figure 4-29. Demolition of existing pipelines south of the existing secondary aeration basin and secondary settling basins is required to install this 72-inch dechlorination effluent pipeline. In addition, protection of the existing 6-inch water line in the area is required.

### Retrofit of Existing Effluent Outfall

Retrofit of the existing outfall consists of construction of a new effluent maintenance structure, expansion of the existing outfall structure, installation of a new 96-inch PCCP outfall structure influent pipe, removal of existing 48-inch PCCP overflow pipe, and installation of a new 84-inch PCCP overflow pipe.

The new effluent maintenance structure receives effluent from the existing chlorine contact basin and existing sodium bisulfite contact basin #2 from the west through an existing 84-inch PCCP pipe, while effluent from the new chlorine contact basin and new sodium bisulfite contact basin flows into the structure from the east via the new 72-inch PCCP pipe. The new effluent maintenance structure will be 12-feet long by 12-feet wide, and will be located due east of the existing effluent chamber of the existing chlorine contact basin and existing sodium bisulfite contact basin #2 as shown in Figure 4-29.

Flow from the new effluent maintenance structure will be directed to the existing outfall structure through a new 96-inch PCCP pipe. The existing outfall structure will be expanded to have a footprint of 12-feet by 12-feet to accommodate the total peak flow of 160 mgd. Flow from the outfall structure will be discharged by gravity flow through the existing 48-inch effluent diffuser into the Tennessee River. The existing 48-inch PCCP overflow pipe, which discharges directly to the Tennessee River, will be replaced with a new 84-inch PCCP overflow pipe for use during peak wet weather conditions.

### 4.4.5 Option 7: BEHRC without Storage

Option 7 is considered secondary treatment and consists of constructing new biologically enhanced high rate clarifiers and related facilities for a peak influent flow of 160 mgd. Specific components of the option include constructing:

- A new wet weather pump station at the headworks,
- Emergency stand-by power,
- Chemical storage and feed systems for primary treatment,
- A UNOX bypass line,
- Upgrade existing gravity thickener and provide a new gravity thickener,
- A RAS pump station to the BEHRC,
- A primary redirect line to the BEHRC,
- Modifying the existing secondary settling basin for BEHRC systems,
- New chlorine contact basin and sodium bisulfite contact basin,
- A new dechlorination effluent pipe, and
- Modifications to the existing effluent outfall.

**Figure 4-35** shows a process schematic for Option 7. Process flow diagrams are shown on **Figures 4-36 and 4-37**. The proposed layout for Option 7 is shown in **Figures 4-38 and 4-39**, and the preliminary hydraulic profile for the Option 7 improvements are shown in **Figure 4-40 through 4-43**.

The process flow for flows up to 120 mgd is similar to the process flow described in Option 3 with 53 mgd wastewater flow passing through primary clarifiers and 70 mgd (53 mgd primary treated influent wastewater flow and 17 mgd HRC solids) treated in the aeration basins and final clarifiers. Flow through the primary clarifier would be dosed with a chemical coagulant for chemically enhanced primary clarification.

Based on the BioWin process model analysis summarized in Appendix A, supplemental nutrients are required for adequate biological treatment under the KWWTP BEHRC options. In order to provide sufficient nutrients for biological degradation of the BOD loadings under peak wet weather conditions, a methanol feed facility will be provided with this improvement option.

Return activated sludge (7 mgd) is combined with a portion of the screened influent flow (67 mgd) at the pre-aeration basins to form the primary redirect flow. The primary redirect flow (74 mgd) and peak wet weather flow in excess of 120 mgd is routed through the wet weather preliminary treatment facility and pump station (40 mgd) are combined near the influent to the BEHRC process. The combined flow (114 mgd) receives fine screening and is treated in the biologically enhanced high rate

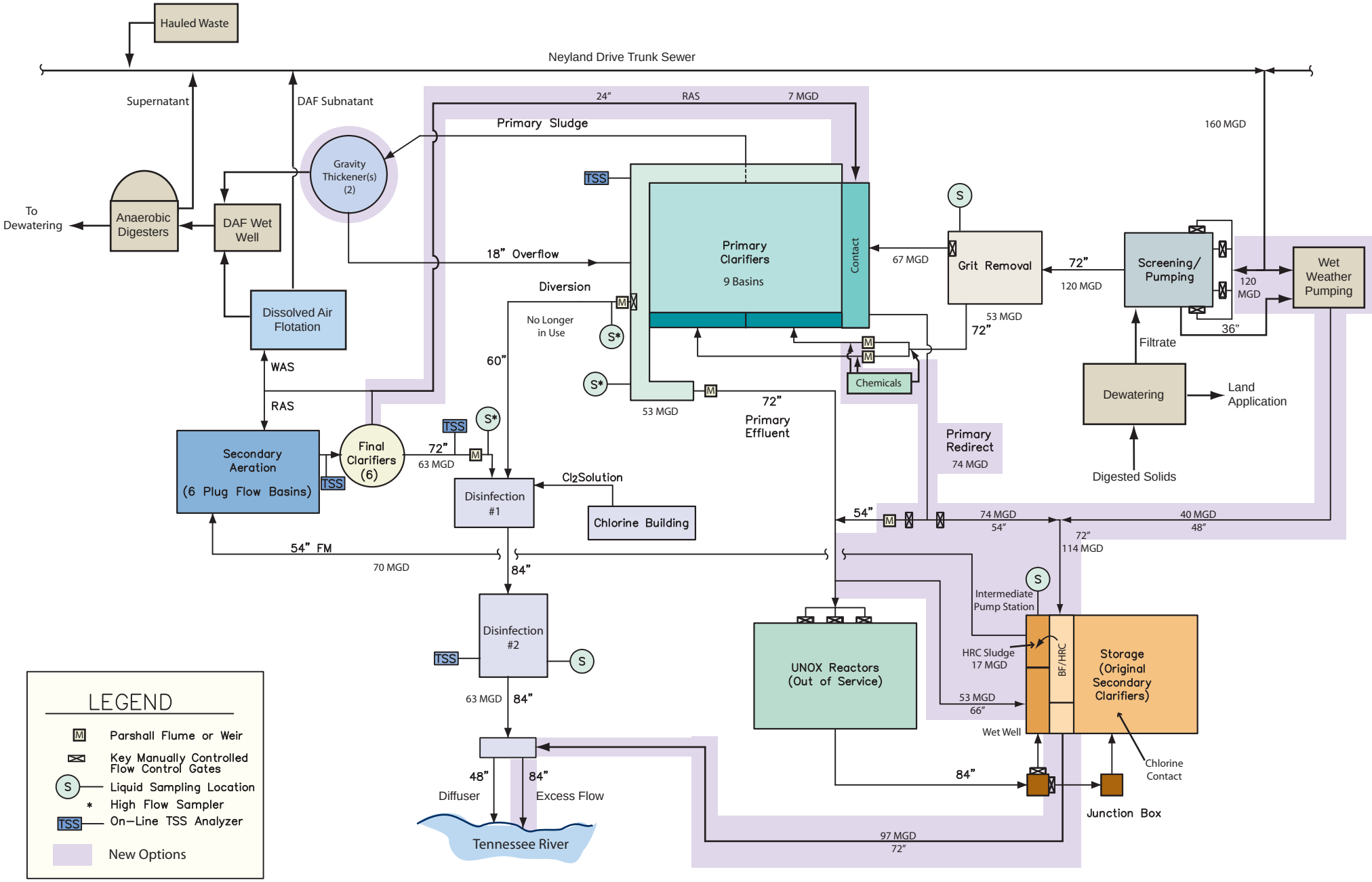



Figure 4-35
Kuwahee WWTP Option 7: BEHRC Without Storage Process Schematic

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clarification system. Similar to Option 3, waste sludge from the BEHRC process (17 mgd) is returned to the existing intermediate pump station for transfer to and further treatment in the aeration basins.

A new chlorination system, chlorine contact basin, and dechlorination system similar to Option 6 is required for treatment capacity of 97 mgd. Finally, the 97 mgd from the BEHRC treatment train is combined with 63 mgd effluent from the existing secondary treatment and final clarifier treatment train and is discharged through a new outfall into the Tennessee River.

Each treatment process included in Option 7 is discussed in further detail below.

### CEPT

Chemically enhanced primary treatment will be included in Option 7 as detailed for Option 1.

### Wet Weather Pump Station

The wet weather pump station for Option 7 is similar to the one proposed for Option 6. The line from the existing headworks to the diversion structure will be 30-inch ductile iron pipe. The wet well will have a 30-foot by 30-foot footprint and will be 35-feet deep. Five 6,940 gpm pumps will be installed in the wet well, for a firm rated capacity of 40 mgd. The effluent forcemain will be 48-inch PCCP and will be aligned from the wet weather pump station to the primary redirect junction box.

### Primary Redirect Line

The proposed primary redirect line for Option 7 is as described in Option 6. Existing wet weather flows that exceed 53 mgd are routed from pre-aeration to the existing original secondary clarifiers. The proposed primary redirect would intercept up to 74 mgd in the existing 54-inch diameter pipeline between the existing pre-aeration basin and the proposed UNOX bypass and combine this flow with up to 40 mgd of additional flow that is conveyed to a common junction structure by the wet weather pump station forcemain. Once combined, the 114 mgd total intercepted flows would be conveyed through a 72-inch diameter pipe to the influent of the proposed BEHRCs located in the original secondary clarifiers.

Under this option, a junction structure would be constructed on the existing 54-inch diameter pipeline, and a new 54-inch diameter pipe would connect the junction structure to another junction structure that receives flow from the wet weather pump station. The combined flows are then conveyed to the original secondary clarifiers through a 72-inch diameter steel carrier pipe within an 84-inch diameter casing crossing Neyland Drive. The new junction structure would have automated gates on both outlets of the structure, allowing flow to be delivered to the intermediate pump station during normal operation and to the HRCs during wet weather events. An additional gate would be included to isolate flows from the wet weather pump station when the station is not in use.

### RAS Pump Station Influent Line

The RAS pump station influent line would be designed and operated similar to Option 3. The gravity pipe from the final clarifier underdrain header to the RAS pump station will be a 20-inch ductile iron pipe with a slope of approximately 1.5% to convey 7 mgd.

### RAS Pump Station

The RAS pump station will have a footprint of 14-feet by 14-feet and will be 30-feet deep, the same size as Option 3. The three submersible, centrifugal pumps will have a capacity of 2,430 each, for a firm pump station capacity of 7 mgd.

### RAS Forcemain to Pre-aeration

The RAS forcemain will be aligned and operated the same as Option 3. The forcemain will be a 24-inch ductile iron pipe to convey 7 mgd during peak wet weather events.

### O&M Considerations

Operations and maintenance of the RAS pump station will be identical to Option 3.

### Gravity Thickener

The thickening improvement for Option 7 will be as proposed for Option 1.

### UNOX Bypass

The proposed UNOX bypass for Option 7 will be as proposed for Option 1.

### BEHRC

The BEHRC system in Option 7 has a capacity of 114 mgd and consists of pre-aeration, fine screening, BEHRC influent pumping, an influent channel, BEHRC unit, sludge and microsand pumping, chemical addition and an effluent channel. The BEHRC influent pump station takes suction after fine screening and discharges to the influent channel which conveys the flow via gravity to the BEHRC unit. The BEHRC unit discharges to an effluent channel that conveys flow to the BEHRC effluent pipeline.

### Pre-aeration

For the peak capacity of the BEHRC system, additional contact time is required for the RAS and wet weather treatment train influent than that available form the existing pre-aeration basin. For Option 7, new contact basins are provided on the south side of Neyland Drive.

74 mgd of screened wastewater from the existing plant headworks combined with 40 mgd raw wastewater flows to a new contact basin splitter structure. The influent splitter structure is sized for a peak flow of 114 mgd. Three 10-foot broad crested weirs will be installed to serve the new contact basins.

The BEHRC pre-aeration basin is designed to absorb soluble BOD to the biological solids in RAS and store it as food. The absorption rate is based on the concentration of

RAS and the amount of time the RAS is allowed to contact the wastewater. Typically, 10-15 minutes contact time is required. The amount of biological solids allowed to contact the primary effluent is also directly proportional with the amount of BOD that is absorbed.

The BEHRC contact tanks consist of three basins, each basin is 80-feet long and 45-feet wide with a side water depth of 14.7-feet. Each basin will have a total volume of 53,000 cubic feet, which provides a hydraulic retention time of 15 min for the peak flow of 38 mgd (114 mgd for total of three basins).

Aeration systems are used in the contact basins to keep the biological solids aerobic and uniformly mixed within the wastewater. Diffused aeration has been selected for the contact tank design. Diffused aeration is accomplished by blowing compressed air through pipes and diffusers at the bottom of contact basins. A total of three blowers will be provided, one for each basin, plus a spare unit maintained on-site for redundancy. Each blower would require a nominal capacity of 2,200 scfm and a horsepower of 150 hp to satisfy a maximum oxygen demand of 1,200 lbs/hr. Ninety-six coarse bubble diffusers will be installed in each basin to supply air.

### Fine Screening

The BEHRC fine screening for Option 7 will be similar to the one proposed for Option 2 except that the influent channel for screens will be divided into three channels with two channels for fine screens and the third one for an emergency bypass with a manually cleaned rack. The 114 mgd capacity BEHRC screening building will have an 1,120 sf footprint. An interconnection channel will be located after the bar screens and slide gates will be installed in the interconnection channel to allow operational flexibility between the screens.

### BEHRC Influent Pumping

The new BEHRC influent pump station for Option 7 will be similar to the one proposed for Option 2. The footprint of the proposed wet well will be 34-feet by 30-feet, and the wet well will be 22-feet deep. Five (4 duty, 1 standby) submersible, low lift propeller pumps will be installed in the wet well. Each pump will have a capacity of 20,000 gpm giving a firm rated capacity of 114 mgd.

### BEHRC

After fine screening and BEHRC influent pumping, 114 mgd flow is treated in six parallel BEHRC trains. The BEHRC system consists of four subsystems: BEHRC influent channel and static mixer, BEHRC basins, chemical feed system, and sludge and microsand pumping. Figure 4-39 presents plan view of the BEHRC system.

### BEHRC Influent Channel and Static Mixer

The BEHRC influent channel for Option 7 will be similar to the one proposed for Option 2 except that the BEHRC influent channel will be 135-feet long. The BEHRC influent static mixer for Option 7 will also be similar to the one proposed for Option 2.

### BEHRC Basins

The BEHRC basins for Option 7 will be similar to the one proposed for Option 2 except that six parallel BEHRC trains are required for this option to treat a flow of 114 mgd and each basin will have a footprint approximately 53-feet long by 22-feet – 3-inches wide.

### Sludge and Microsand Pumping

The microsand recirculation pumping structure for Option 7 will be similar to the one proposed for Option 2 except that the pumping structure will be located directly to the south of the BEHRC basins. No sludge pumping station is required for this option. Waste sludge from the hydrocyclones will flow by gravity via 16-inch PVC lines to the adjacent intermediate pump station.

### Chemical Feed System

The chemical feed system for Option 7 will be similar to the one proposed for Option 2 except that two 14,950 gal HDXLPE tanks will be required for alum storage and storage of 5,700 lbs of dry polymer is required.

### BEHRC Effluent

The proposed BEHRC effluent pipeline for Option 7 is identical to that presented in Option 6.

### New Disinfection System

New disinfection system improvements for Option 7 will be identical to the one proposed for Option 6.

### Dechlorination Effluent

The dechlorination effluent pipeline for Option 7 will be identical to the one proposed for Option 6.

### Retrofit of Existing Effluent Outfall

Retrofit of the existing effluent outfall for Option 7 will be identical to the one proposed for Option 6.

## 4.5 Fourth Creek WWTP Wet Weather Treatment Options Analysis

The Fourth Creek WWTP options were screened to identify the alternatives that would be feasible to construct and operate. After preliminary screening, five of the nine options were determined to be feasible and were developed further.

Each option included a combination of process improvements. **Table 4-11** summarizes the process components included with each option.

**Table 4-11**
**Fourth Creek WWTP Wet Weather Treatment Option Process Components**

| Process | Option | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 6 | 7 |
| Storage | ✪ | ✪ | ✪ | | |
| Emergency Stand-by Power | ✪ | ✪ | ✪ | ✪ | ✪ |
| Wet Weather Pump Station | | ✪ | ✪ | ✪ | ✪ |
| Chemically Enhanced Primary Treatment | ✪ | ✪ | ✪ | ✪ | ✪ |
| RAS Pump Station | | | ✪ | | ✪ |
| High Rate Clarification | | ✪ | | ✪ | |
| Biologically Enhanced High Rate Clarification | | | ✪ | | ✪ |
| Existing Chlorine Contact Basin Modifications | | | | ✪ | ✪ |

Each process component, as it relates to each improvement alternative, is discussed within the description of each option below. Process schematics, site plans, process flow diagrams, and hydraulic profiles for each option have been developed. For ease of reading, all oversized figures are included at the end of this section.

The process treatment for each option is described in the following sections. The description of flows is based on the peak wet weather flow anticipated for that alternative. For operations below the peak wet weather flow, it is anticipated that the existing secondary treatment train is operated at its highest reliable treatment rate and the new process train would be operated to meet the treatment needs above the 18 mgd estimated biological treatment capacity. Preliminary level design calculations have been conducted for the analysis of improvement alternatives and for the purpose of estimating construction capital costs. It is noted that the preliminary sizing and details for the final implemented solution will be refined during pilot testing and final design.

Process modeling using the BioWin model was performed to assess the performance of each option and its ability to meet current effluent limits. A summary of this analysis is provided in Appendix A.

## 4.5.1 Option 1: CEPT

Option 1 includes 1 MG of wet weather storage at the Fourth Creek WWTP, CEPT, and emergency stand-by power. **Figure 4-44** is a schematic representation of the Fourth Creek WWTP with on-site storage and chemically enhanced primary treatment (CEPT) for a wet weather, peak flow of 27 mgd. **Figure 4-45** presents a process flow diagram for this Option. **Figure 4-46** shows the layout of major

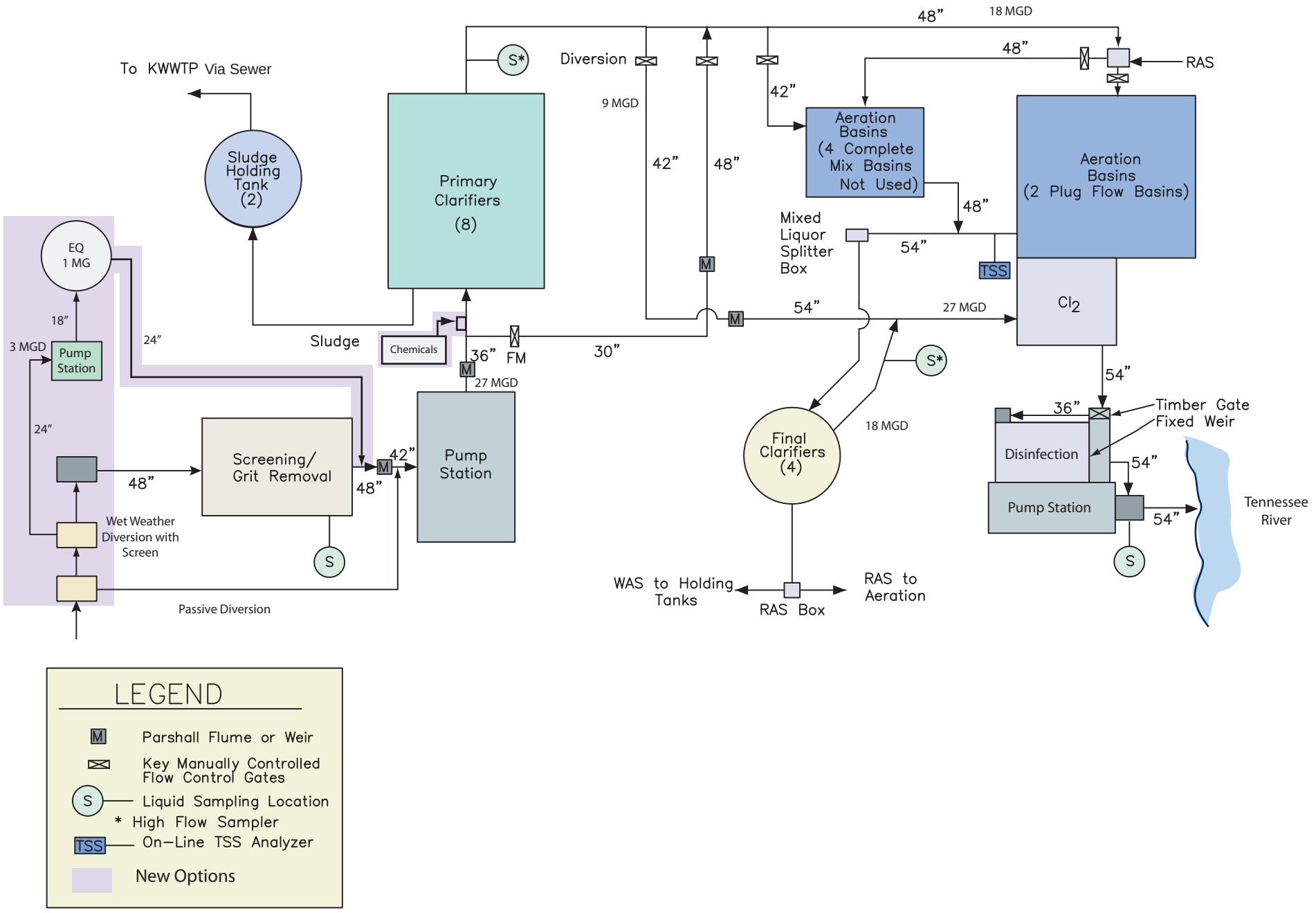


Figure 4-44
Fourth Creek WWTP Option 1: CEPT Process Schematic

equipment and process lines, and **Figures 4-47 and 4-48** presents the preliminary hydraulic grade line for the improvements.

For Option 1, an additional 1 MG of on-site storage of wastewater flow is required to minimize peak wet weather flows. After completion of the Phase I CAP/ER collection system improvements and the additional on-site storage, the anticipated future peak wet weather flow at the Fourth Creek WWTP is 27 mgd.

The existing headworks at the Fourth Creek WWTP, including screening, grit removal and influent pumping currently have a design capacity to treat and pump the peak influent flow of 27 mgd.

At a flow of 27 mgd, all flow passes through the existing primary treatment. Flow through the primary clarifiers would be dosed with a chemical coagulant for CEPT.

Preliminary level design details for Option 1 are discussed next.

### Wet Weather Storage

In order to properly contain and treat future, peak wet weather flows at the Fourth Creek WWTP, on-site flow equalization has been considered for several of the CCP improvement options. The flow equalization system will consist of an excess flow diversion structure, an equalization pump station, and 1-MG wet weather equalization storage tank. Excess flow will be transferred for storage by the equalization pump station, stored during the period of peak flow, and then drained by gravity after the peak wet weather flows subside.

### Wet Weather Diversion Box

A new wet weather diversion box will be constructed between existing Diversion Box 'E' and Diversion Box 'A'. Flows in excess of the existing headworks facility, estimated to be 27 mgd, will be diverted through a horizontal, fine screen along the overflow weir. Screenings will remain in the primary flow path and be conveyed to the existing bar screen building for removal. Screened flow, up to a peak flow of 10 mgd, will flow over the weir and into a 24-inch ductile iron gravity sewer. The sewer will route excess flows to the equalization pump station.

### Equalization Pump Station

Excess peak flows will be conveyed to the new equalization pump station wet well by the 24-inch gravity sewer. The wet weather pump station will consist of a 22 feet x 15 feet x 19 feet deep wet well, a valve vault and a control/electrical building. The wet well will contain three submersible, centrifugal pumps, each with a capacity of 2,500 gpm with variable frequency control drives. The pumps will consist of two duty and one stand-by pumps.

A dewatering pump will also be located in the wet well to drain the pump station and equalization tank fill piping when the flow equalization system is not in service. The drain pump will discharge into Diversion Box 'A', located immediately upstream of the headworks.

### Equalization Storage Tank

From the flow equalization pump station flow is pumped from the wet well and into the 1-MG equalization storage tank. The storage tank may be constructed as a prestressed concrete tank (e.g. Crom style tank) or a welded steel tank. For consistency with existing KUB storage facilities, the preliminary design and cost estimate is based on a Crom tank approximately 75-feet in diameter and 35-feet tall.

The bottom slab of the storage tank will be sloped to a center collection well and discharge pipe to reduce grit deposits. After peak wet weather flows subside, stored flow will be returned to the plant by a 24-inch ductile iron, gravity pipe. Flow will be reintroduced to plant flow downstream of the grit chambers and upstream of the parshall flume.

### O&M Considerations

The equalization storage system will be designed to minimize the amount of maintenance that is required. The diversion box to the wet well will include a mechanically cleaned screen and a high level overflow weir that will prevent screenings and excess grit from entering the equalization pump station and storage tank.

A drain pump will be installed in the wet well to empty the pump station and equalization storage tank influent piping when not in use. Access hatches and guide rails will be provided over each pump for maintenance and wash down of the pump station. Access hatches will also be provided over the discharge valves in the valve vault.

The storage tank will have access ports located near ground level. The ports will allow for an easy confined space entry while maintenance workers are accessing the tanks for inspection or wash down. Vents will be cast into the top of the tank to prevent hazardous gas accumulation. The vents will be filtered to prevent odor. The storage tank will also be equipped with a plant water wash down system with water cannons for tank clean-up following a wet weather event.

### Chemical Addition System

The CEPT system will require a structure to be constructed to store coagulant and a pumping/metering system. Coagulant will be introduced into influent flow by an in-line chemical inductor located in the influent line to the primary clarifiers.

### Coagulant Storage and Pumping

Coagulant will be stored in a garage constructed to the north of the existing grit building, as shown in Figure 4-46. KUB is conducting full-scale pilot tests to determine whether ferric chloride or polymer will be used for the enhanced primary treatment. For this option's layout and cost estimate, it will be assumed that polymer is used. Minor changes to storage area and metering pump size may be needed if ferric chloride is used.

The garage will be approximately 350 ft²; large enough to store three days of coagulant and two metering pumps. One metering pump will serve as the duty pump and the second will be a standby. Coagulant load in will be through a roll up door located at the west of the garage, and the garage will be near a road for access.

A three day supply of polymer will require two totes to be stored on site. A ½-hp, drop-in mixer will be provided for each tote to prevent polymer separation when stored.

### Coagulant Supply Lines and Chemical Induction

A 1-inch PVC coagulant supply lines will be aligned from the storage garage and into the influent line upstream of the primary clarifiers. Plant influent flow is currently pumped from a wet well in the main building, through a 36-inch PCCP forcemain and into the primary clarifiers. The forcemain will be modified to include a parallel pipe with chemical injectors.

During wet weather flows, gate valves will be throttled to direct flow through the parallel influent pipe. Coagulant will be injected into the parallel influent pipe by an in-line chemical inductor similar to a Water Champ in-line induction unit. The unit's speed will be controlled by VFD and it will be able to dose a coagulant solution at a rate of up to 30 gpm. Controls for the chemical inductor will be installed in the supply garage and also be connected to the plant's PLC.

### Utilities Considerations

If polymer is used as a coagulant, the raw polymer will require dilution water. Metering/dilution pumps will require a connection to either plant water or potable water. Plant water and potable water lines are located below ground and approximately 20 feet east of the proposed storage garage. Minimal plumbing improvements will be needed for the polymer dilution system.

### O&M Considerations

The coagulant system will have fairly low maintenance requirements. The roll up door in the storage garage will allow easy access to the metering pumps. The chemical induction system will also have fairly low maintenance requirements. A parallel pipe will be added to the primary clarifier influent forcemain. This parallel influent pipe will allow the chemical induction pipe to be taken out of service for maintenance but still allow flow to reach the primary clarifiers.

## 4.5.2 Option 2: HRC with Storage

Option 2 consists of constructing new HRC, wet weather storage and related facilities for a peak influent capacity of 27 mgd. Specific components of the option include constructing:

- A new chemical treatment system,
- Emergency stand-by power,

- A 1 MG wet weather storage tank,
- A wet weather pump station,
- Modifying the existing aeration tank for the HRC system, and
- Modifying the existing line from clarifier effluent to chlorine contact.

**Figures 4-49** is a schematic representation of the Fourth WWTP Option 2 with HRC wet weather treatment for a peak flow of 27 mgd. **Figure 4-50** presents a process flow diagram. **Figure 4-51** presents a preliminary layout of Option 2, and **Figures 4-52 through 4-54** present the preliminary hydraulic profile for Option 2.

For Option 2, an additional 1 MG on-site storage of wastewater flow is required. After completion of the Phase I CAP/ER collection system improvements and the additional on-site storage, the anticipated future peak wet weather flow is 27 mgd.

The existing headworks at the Fourth Creek WWTP, including screening, influent pumping, and grit removal, currently have a design capacity to treat and pump the peak influent flow of 27 mgd.

At peak wet weather flow conditions, up to 10 mgd is diverted prior to the primary clarifiers and sent to the HRC. The remaining flow (17 mgd wastewater flow and up to 1 mgd high rate clarifier solids) receives treatment through the existing primary clarifiers, aeration basins, and final clarifiers. Flow through the primary clarifier would be dosed with a chemical coagulant for chemically enhanced primary clarification.

The diverted flow receives fine screening and is treated in the parallel high rate clarifiers with the aid of a chemical coagulant and ballast. After the ballast is removed, solids collected in the high rate clarifiers are returned to the primary clarifier influent.

Treated effluent from the high rate clarifiers is combined with effluent from the final clarifiers before disinfection, dechlorination, and final discharge into the Tennessee River.

Preliminary level design details for Option 2 are discussed next.

### Wet Weather Storage

The wet weather storage system, including screening/diversion box, wet well and storage tank are identical to the system presented for Option 1 (Section 4.5.1).

### CEPT

Chemically Enhanced Primary Treatment will be included in Option 2 as is detailed for Option 1, except that it will be sized for a peak primary treatment rate of 18 mgd.

### Wet Weather Pump Station

To route excess wet weather flow to the HRC process, Option 2 includes the construction of a new wet weather pump station, located immediately south of the

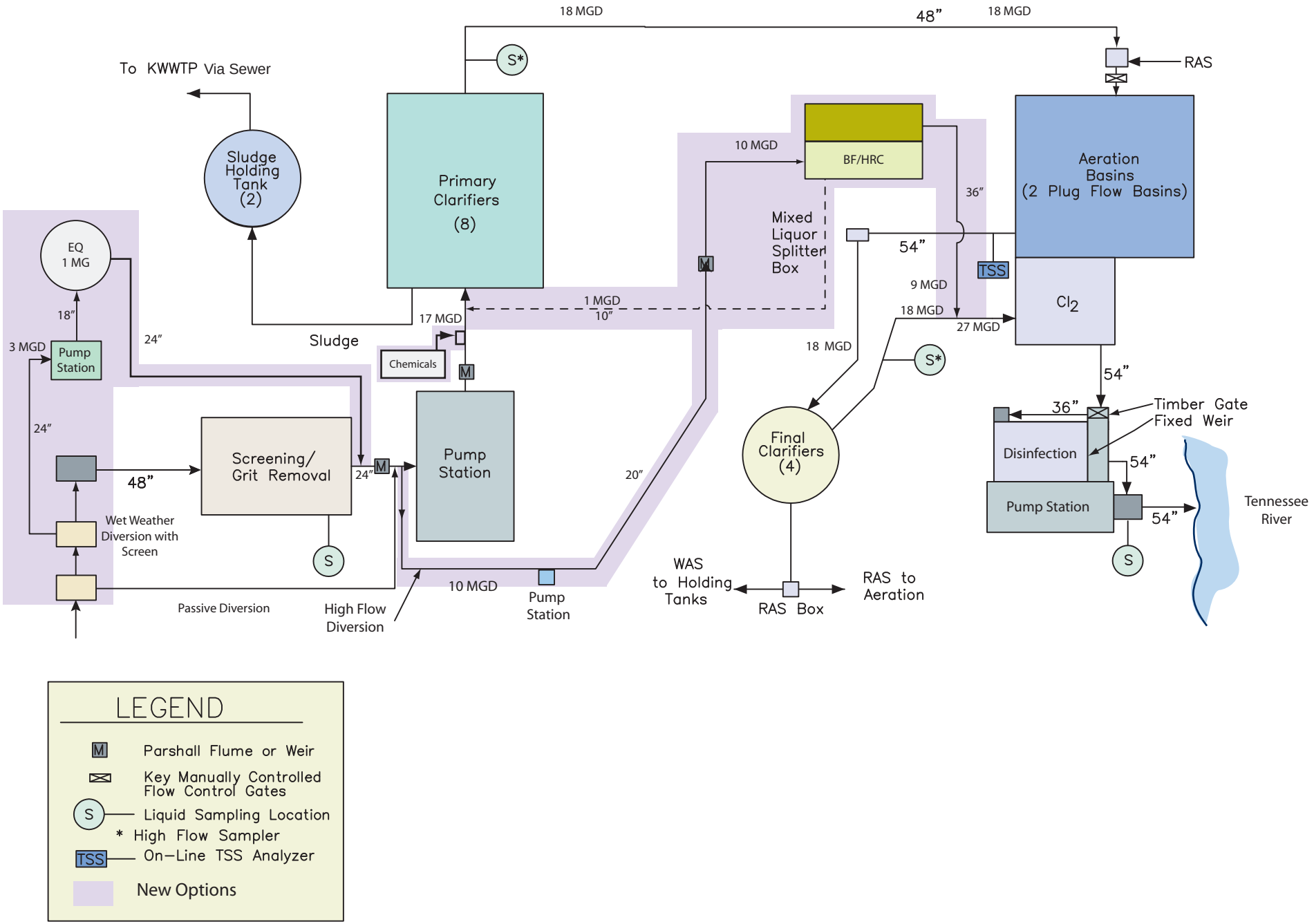


Figure 4-49
Fourth Creek WWTP Option 2: HRC With Storage Process Schematic

entrance to the Main Building parking lot. The wet weather pump station would have a capacity of 10 mgd. Wastewater enters the pump station through a diversion structure constructed on the influent line, immediately southwest of the main building. Wastewater flows exceeding 17 mgd in the influent line pass over weirs and continue on to the wet well of the pump station. The pump station then pumps all flow to the HRC unit located in the existing aeration tank through a 20-inch diameter forcemain with metering vault.

The diversion structure consists of two side weirs located in a structure on the existing 42-inch diameter influent line. As influent flows begin to approach 17 mgd, excess flow begins to be diverted into the wet weather pump station, up to a total of 10 mgd. These flows spill over the weirs into a lower chamber with an outlet pipe that drains to the wet weather pump station wet well. A motorized sluice gate isolates the diversion structure from the wet weather pump station wet well when not in use.

The wet weather pump station wet well houses four 45 hp submersible pumps, three are duty pumps and one is a standby pump, with a firm pumping capacity of 10 mgd. A sump pump is also included to drain the pump station fully after each use. The sump pump discharges to a manhole located on the influent line, immediately west of the existing influent pump station.

### HRC

The HRC system in Option 2 has a capacity of 10 mgd and consists of an influent channel, fine screening, HRC unit, sludge and microsand pumping, chemical addition and an effluent channel.

### Fine Screening

The wet weather pump station discharges to the influent channel which conveys the flow via gravity to fine screening prior to the HRC unit. Fine screening is needed to prevent plugging of downstream solids separation and handling equipment. Wastewater flows up to 10 mgd enter the HRC screening building through the influent channel. The 600 $ft^2$ HRC screening building will house a fine screen, a screening conveyor, and a screenings compactor. The mechanically cleaned fine screen will have 1/4 in. or smaller openings. Screenings are conveyed and dewatered through a screw conveyor and screenings compactor and are then deposited into a covered roll off dumpster located on the north side of the existing aeration tank. The influent channel for screens is divided into two channels within the HRC screening building. One channel will be designed for a mechanically cleaned fine screen and the other as an emergency bypass.

### HRC

After fine screening, the 10 mgd influent flow is treated in a single HRC train. The HRC system consists of four subsystems: HRC influent channel and static mixer, HRC basins, chemical feed system, and sludge and microsand pumping. The influent channel conveys flow to the HRC basin and includes a baffled static mixer for coagulant added to the wastewater in the influent channel. Coagulant (alum) will be fed in a pipe diffuser. After alum addition, the wastewater enters the HRC unit, which

includes a coagulation/flocculation tank, mixing tank, maturation tank and a clarification tank. The HRC described below is the Actiflo Process by Kruger Inc.

The first tank is the coagulation tank, which receives coagulated wastewater from the HRC influent channel and provides more contact time for the coagulation process. Flow from the coagulation tank will then be directed to a mixing tank where microsand and polymer (2 mg/L) are injected to maximize the efficiency of flocculation and enhance settling of suspended solids. The polymer acts as a bonding agent to adhere the destabilized solids to the microsand. In the third tank, the maturation tank, the particles agglomerate and grow into high-density flocs known as microsand ballasted flocs, which settle quickly to the bottom of the settling tank. A top-mounted mixer will be provided in each coagulation/flocculation tank. The mixer in the maturation tank will be controlled by VFD operation to provide the range of mixing intensity required for this operation.

The coagulation tank will have a total volume of 990 $ft^3$ and will be about 10.2 feet long and 6.9 feet wide with a side water depth of 14 feet. The mixing tank has the same dimension as the coagulation tank. The maturation tank will have a footprint of approximately 14.3 feet by 14.8 feet and a side water depth of 14 feet, resulting in a total volume of 3,000 $ft^3$.

Flow from the maturation tanks will exit over a weir and be directed to a clarification tank. The clarification tank will have a total volume of 3,100 $ft^3$ and will be about 14.8 feet long and 14.8 feet wide. In the clarification tank, solids are allowed to settle to the bottom. The clarification tank uses polystyrene lamella tube settlers. The total settling area of the tube settlers is 115 $ft^2$ and has a rise rate at the design capacity of 60 $gpm/ft^2$. Clarified wastewater will be collected into four fiberglass reinforced plastic (FRP) effluent troughs and transported to the HRC effluent channel.

Scrapers located along the bottom of the clarification tank will push the collected sludge/microsand mixture to the sludge sump located near the center of the tank.

### Sludge Pumping

The solids collected at the bottom of the clarification tank are piped to the sludge recirculation pump station. The sludge recirculation pump station includes two duty pumps, plus one standby for the single HRC train. Settled solids are pumped to the hydrocyclones, where the sludge is separated from the microsand by the centrifugal force of the vortex action. The single HRC train will have 2 duty hydrocyclones located above the mixing tank so the recovered microsand is recycled by gravity into the mixing tank.

The separated sludge discharges to the sludge pump station, and is returned to the influent of the Primary Settling Tanks. The sludge pump station includes one duty and one standby submersible, centrifugal pump with a firm pumping capacity of 1 mgd.

### Chemical Feed System

A new 625 ft² chemical building will be constructed to house the HRC screening and pump controls; dry polymer preparation system; dry polymer storage, alum and polymer metering pumps; and the high density cross-linked polyethylene (HDXLPE) alum storage tank. The new chemical building will be located immediately north of the aeration tank. Siting of the building will involve demolition of the existing division box 'D' which is located immediately north of the aeration tank, and will no longer be needed.

The alum storage and feed system includes one new 5,000 gal HDXLPE tank. For the alum solution, diaphragm metering pumps (2 duty and 1 standby) and carrier water system are required. The solution will flow through a 2-inch PVC pipe from the metering pumps to the HRC mixing tanks.

The recommended polymer preparation system includes a dry polymer hopper, a volumetric screw feeder to meter dry polymer into a wetting chamber, a wetting chamber, and two mix/age/feed tanks. In general, the polymer preparation system will automatically batch polymer and dilution water into one of the mix/age/feed tanks. At the same time the drain from the second tank is connected to the suction of a chemical metering pump for dosing polymer. Once the polymer in the feed tank reaches a low level, a valve will automatically switch so that the batch of polymer that has been aging becomes the feed tank. The cycle is repeated continuously until the wet weather event is over. Typically 30 minutes is recommended for polymer aging, so the tanks are typically sized to create a 1% polymer solution with a 45–60 minute detention time. These polymer preparation systems are packaged together by manufacturers and are available in a variety of sizes.

The dry polymer metering system should be sized to dose an average of 1 mg/L polymer and a maximum of 2 mg/L polymer. Assuming the maximum flows through the HRC is 10 mgd, the polymer system should be capable of adding 7 lbs/hr.

Dry polymer is recommended for long term storage between wet weather events. It is recommended that polymer be stored in bags or buckets in a cool, dry place. Storage of 500 lbs polymer is recommended in anticipation of wet weather.

For the polymer solution, diaphragm metering pumps (1 duty and 1 standby) and carrier water system are required. The solution will flow through a 1.5-inch PVC pipe from the metering pumps to the HRC mixing tanks.

## 4.5.3 Option 3: BEHRC with Storage

Option 3 is considered secondary treatment and consists of constructing new biologically enhanced high rate clarifiers (BEHRC), wet weather storage and related facilities for a peak influent flow of 27 mgd. Specific components of the option include constructing:

- New chemical enhancement systems,
- Emergency stand-by power,

- A 1 MG wet weather storage tank,
- A wet weather pump station,
- Modifying the existing aeration tank for BEHRC systems, and
- Modifying the existing clarifier effluent to chlorine contact.

**Figures 4-55** is a schematic representation of Option 3 at the Fourth WWTP. **Figures 4-56 and 4-57** present a process flow diagram and preliminary layout of Option 3, respectively. **Figures 4-58 through 4-60** show the preliminary hydraulic profile for the improvements.

For Option 3, an additional 1 MG on-site storage of wastewater flow is required. After completion of the Phase I CAP/ER collection system improvements and the additional on-site storage, the anticipated future peak wet weather flow is 27 mgd.

The existing headworks at the Fourth Creek WWTP, including screening, influent pumping, and grit removal, have a design capacity to treat and pump the peak influent flow of 27 mgd.

At peak wet weather flow conditions, up to 11 mgd is diverted prior to the primary clarifiers and sent to the biologically enhanced high rate clarifiers. The remaining flow (16 mgd wastewater flow and 2 mgd return solids) receives treatment through the existing primary clarifiers, aeration basins, and final clarifiers. Flow through the primary clarifier would be dosed with a chemical coagulant for chemically enhanced primary clarification.

The diverted flow is fine screened and treated in the biologically enhanced high rate clarifiers with the aid of return activated sludge (2 mgd), chemical coagulant, and ballast. A 10-15 minute (minimum) contact time is provided for the return activated sludge before the addition of chemical coagulant and ballast. Settled solids are collected in the high rate clarifiers and are returned to the aeration basin influent.

Treated effluent from the high rate clarifiers is combined with effluent from the final clarifiers before disinfection, dechlorination, and final discharge into the Tennessee River.

Preliminary level design details for Option 3 are discussed next.

### CEPT

Chemically Enhanced Primary Treatment will be included in Option 3 as is detailed in Option 1 and will have a design peak capacity of 18 mgd.

### Wet Weather Storage

The wet weather storage system, including screening/diversion box, wet well and storage tank are identical to the system presented for Option 1.

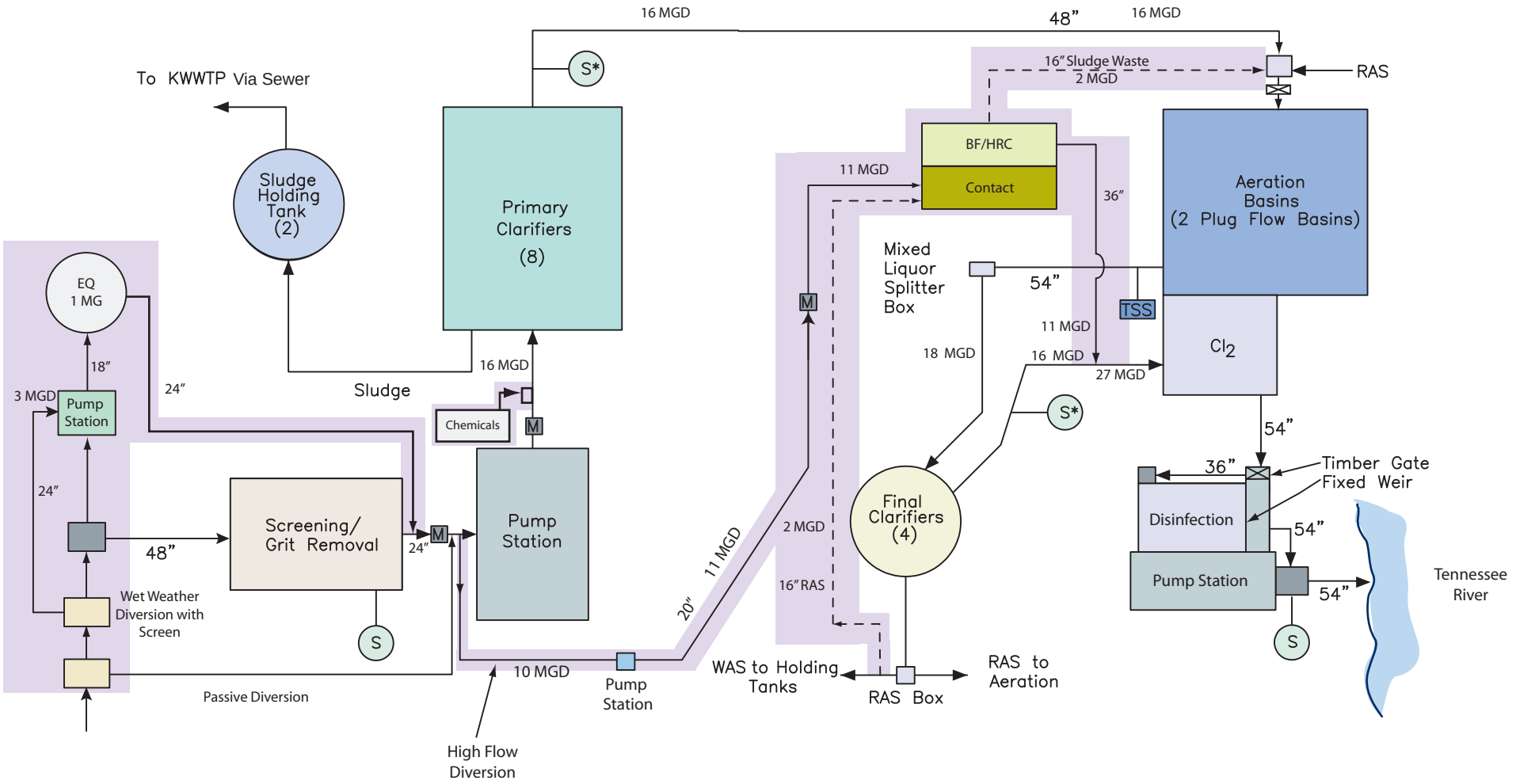


Figure 4-55
Fourth Creek WWTP Option 3: BEHRC With Storage Process Schematic

CDM

### Wet Weather Pump Station

The Wet Weather Pump Station for Option 3 is similar to that presented in Option 2, except that the firm pump station capacity is 11 mgd.

### RAS Pump Station

Biological treatment in the BEHRC will be aided by the addition of RAS. A portion of the discharge from the return pumps will be sent to a new RAS wet well. The RAS will then be conveyed to the BEHRC aeration basin.

### RAS Pump Station Influent Line

RAS from the final clarifiers and drainage flow from the aeration basins are currently conveyed by gravity to return pumps located in the effluent building. RAS is then pumped to division box 'C' located north of the new aeration basins.

Option 3 will require a RAS flow of up to 2 mgd to the BEHRC. The 2 mgd of RAS will be drawn from the return pump discharge line at a location directly east of the effluent building. A tee will be installed on the 24-inch discharge line and a portion of the RAS flow will be diverted to a new RAS wet well, controlled by a motorized plug valve.

### RAS Pump Station

The BEHRC RAS pump station will be located to the east of Final Clarifier #4 and south of the existing access path to the effluent building. The wet well will have a footprint of approximately 12 feet by 12 feet and a depth of 12 feet.

The wet well will have two submersible, centrifugal pumps. One pump will be used as the duty pump and one will be standby. Each pump will have a capacity of 1,388 gpm, which will give the station a firm 2 mgd capacity. The pumps will be speed controlled by VFD. A 14-inch ductile iron forcemain will convey flow from the new RAS pump station to the BEHRC contact basin which will be located in the plant's out of service aeration basin.

### O&M Considerations

The motorized plug valve located on the influent line to the RAS pump station can be closed to isolate the line when the BEHRCs are not in use.

A sump pump will be installed in the wet well to empty the sump when not in use. Access hatches and guide rails will be provided over each pump for maintenance. The hatches can also be used for wash down of the pump station. Access hatches will also be provided over the discharge valves in the valve vault.

### BEHRC

The BEHRC system in Option 3 has a capacity of 13 mgd and consists of an influent channel, pre-aeration basin, fine screening, BEHRC unit, sludge and microsand pumping, chemical addition and an effluent channel. The wet weather pump station discharges to the influent channel which conveys the flow via gravity to fine

screening prior to the BEHRC unit. The BEHRC unit discharges to an effluent channel that conveys flow to the BEHRC effluent pipeline.

### Contact Basin

The BEHRC contact basin is designed to absorb soluble BOD to the biological solids in RAS and store it as a food from the treated wastewater. The absorption rate is based on the amount of time the RAS is allowed to contact the wastewater. Typically, 10-15 minutes of contact time is required. The amount of biological solids allowed to contact the primary effluent is also directly proportional with the amount of BOD that is absorbed.

The BEHRC pre-aeration system consists of one basin, 55 feet long and 20 feet wide with a side water depth of 23 feet and a total volume of 27,000 cubic feet, which provides a hydraulic retention time of 15 min for the peak flow of 12 mgd.

Aeration systems are used in the pre-aeration basins to keep the biological solids uniformly mixed within the wastewater. Diffused aeration has been selected for the contact basin design. Diffused aeration is accomplished by blowing compressed air through pipes and diffusers at the bottom of pre-aeration basins. One duty blower will be provided, plus a spare unit maintained on-site for redundancy. Ninety-six coarse bubble diffusers will be installed in the basin to supply air.

### Fine Screening

The BEHRC fine screening for Option 3 will be similar to the one proposed for Option 2 to treat a wastewater flow of 13 mgd.

### BEHRC

After fine screening, the 13 mgd influent flow is treated in a single BEHRC train. The BEHRC system consists of four subsystems: BEHRC influent channel and static mixer, BEHRC basins, chemical feed system, and sludge and microsand pumping.

The BEHRC basins for Option 3 will be similar to the one proposed for Option 2 except that the basins will have a total footprint approximately 18.5 feet long by 48.5 feet wide and a side water depth of 16 feet.

### Sludge Pumping

The sludge pumping for Option 3 will be similar to the one proposed for Option 2 except that approximately 2 mgd of sludge is discharged from the sludge pump station to the east through a 14-inch diameter ductile iron forcemain that discharges to division box “C” at the influent to the new aeration basins.

### Chemical Feed System

The chemical feed system for Option 3 will be similar to the one proposed for Option 2.

### 4.5.4 Option 6: HRC without Storage

Option 6 includes constructing new HRCs and related facilities for a peak influent flow of 34 mgd. Specific components of the option include constructing:

- Wet weather headworks and Diversion channel,
- Emergency stand-by power,
- New chemical enhancement systems,
- A wet weather pump station,
- Modifying the existing aeration tank for HRC systems,
- Modifying the line from the existing clarifier to the chlorine contact basin, and
- Modifying the existing chlorine contact basin.

**Figure 4-61** is a schematic representation of the Fourth WWTP with HRC wet weather treatment for a peak flow of 34 mgd. **Figure 4-62** presents a process flow diagram, and **Figure 4-63** presents a preliminary layout of Option 6. **Figures 4-64 and 4-65** present the preliminary hydraulic profile for the proposed improvements.

With Option 6, no additional collection system storage or flow equalization is provided. After the completion of the Phase I CAP/ER collection system improvements, the anticipated future peak wet weather flow is 34 mgd.

Under this option, modifications to the headworks at the Fourth Creek WWTP are required to handle the additional peak influent flow. These modifications include conversion of the existing manual screenings bypass channel to an automatic peak flow channel with the addition of automated screening and flow measurement in the channel.

Treatment under this Option is provided in two parallel HRC trains. Flows up to 18 mgd (17 mgd wastewater flow and 1 mgd HRC solids) are treated through the existing primary clarifiers, aeration basins, and final clarifiers. Flow through the primary clarifier would be dosed with a chemical coagulant for chemically enhanced primary clarification.

Up to 17 mgd of peak wet weather flow is diverted around the conventional primary and secondary treatment, is fined screened, and is treated in the high rate clarification process. After the ballast is removed, solids from the high rate clarification process are returned to the primary clarifier influent.

The combined effluent from the final clarifiers and the high rate clarifier is disinfected and dechlorinated before discharge into the Tennessee River. Improvements to the effluent pump station wet well are required under this option.

Preliminary level design details for Option 6 are discussed below.

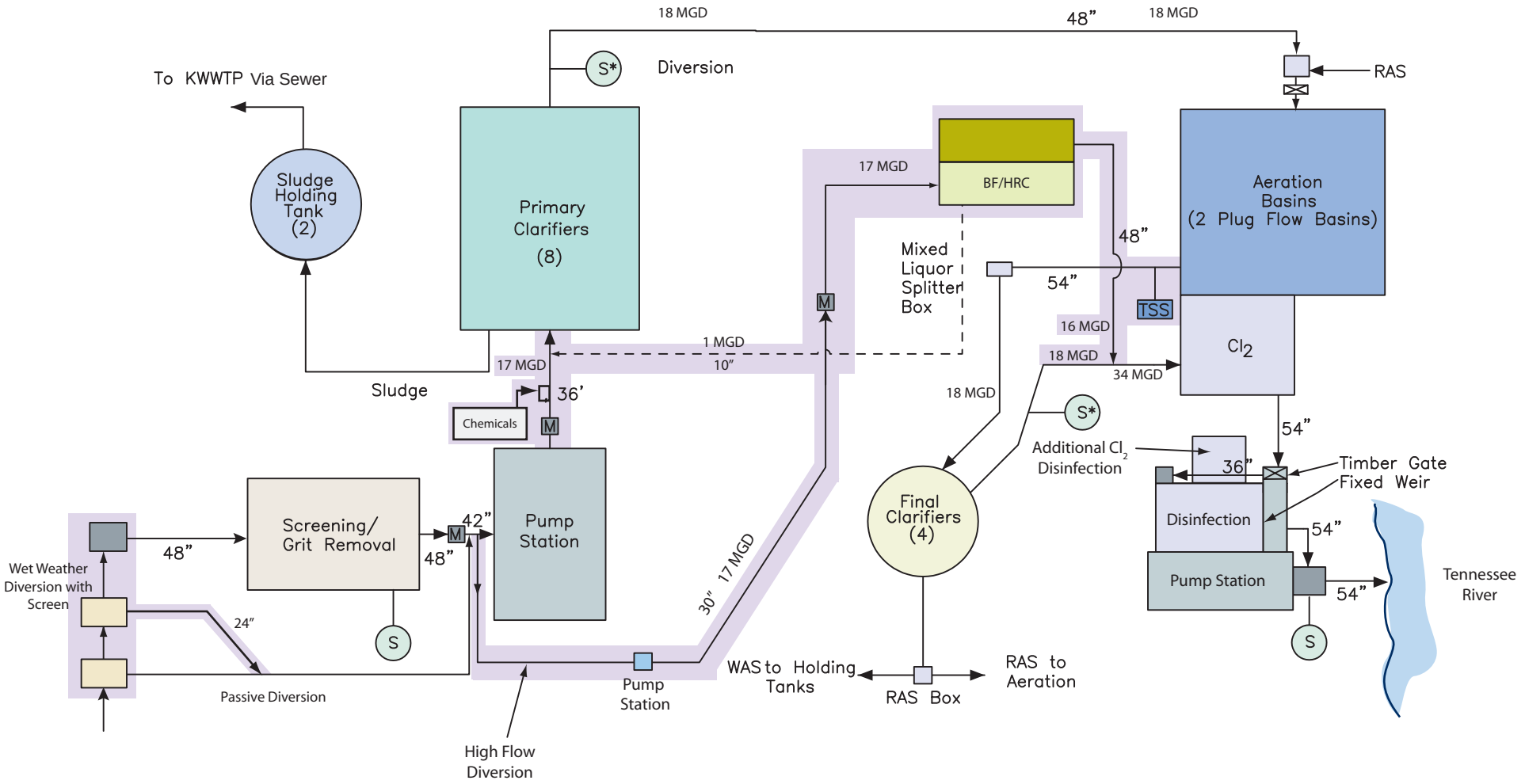


Figure 4-61
Fourth Creek WWTP Option 6: HRC Without Storage Process Schematic

CDM

### CEPT

Chemically Enhanced Primary Treatment will be included in Option 6 as is detailed for Option 1.

### Wet Weather Diversion Box

A new wet weather Diversion box will be constructed between existing Diversion Box 'E' and Diversion Box 'A'. Flows in excess of the existing headworks facility, estimated to be 27 mgd, will be diverted through a horizontal, fine screen along the overflow weir. Screenings will remain in the primary flow path and be conveyed to the existing bar screen building for removal. Screened flow, up to a peak flow of 10 mgd, will flow over the weir and into a 24-inch ductile iron gravity sewer.

### Wet Weather Pump Station

The wet weather pump station for Option 6 is similar to that presented in Option 2, except that the firm pump station capacity is increased to 17 mgd. In addition, the size of the forcemain is increased to a 30-inch diameter ductile iron pipe.

### HRC

The HRC system in Option 6 has a capacity of 17 mgd, and consists of an influent channel, fine screening, splitter box, two HRC units, sludge and microsand pumping, chemical addition and an effluent channel. The wet weather pump station discharges to the influent channel which conveys the flow via gravity to fine screening prior to the HRC units. The HRC units discharge to an effluent channel that conveys flow to the HRC effluent pipeline.

### Fine Screening

The HRC fine screening for Option 6 will be similar to the one proposed for Option 2 and will be sized to treat a wastewater flow of 17 mgd.

### HRC

After fine screening, the 17 mgd influent flow is treated in two parallel HRC trains. The HRC system consists of four subsystems: HRC influent channel and static mixer, HRC basins, chemical feed system, and sludge and microsand pumping.

The HRC influent channel and the HRC influent static mixer for Option 6 will be similar to the one proposed for Option 2. The HRC basins for Option 6 will be similar to the one proposed for Option 2 except that two parallel HRC trains are required for this option to treat a flow of 17 mgd. The basins will have a total footprint of approximately 28 feet long by 40 feet wide and a side water depth of 13 feet.

### Sludge Pumping

The sludge pumping for Option 6 will be similar to the one proposed for Option 2 and will have a firm pumping capacity of 1 mgd.

### Chemical Feed System

The chemical feed system for Option 6 will be similar to the one proposed for Option 2.

### HRC Effluent

The HRC effluent line in Option 6 is similar to those presented in Options 2 and 3, except that the effluent pipe has been increased to 48-inch diameter and the corresponding isolation gate has also been increased to 48-inch diameter.

### Existing Chlorine Contact Basin Modifications

In order to provide adequate chlorine disinfection at the increased wet weather peak flows, Option 6 includes modifications to the existing chlorine contact tank #2 to increase the amount of existing chlorine contact time. An expansion of chlorine contact tank #2 would be constructed along the north side of the existing tank. Flows from chlorine contact tank #1 would be routed through the new basin extension, before entering the existing chlorine contact #2 basin channels. Additional modifications include removing existing redwood baffles, removing an existing gate, installing a new motor operated gate, and relocation of the existing 24-inch scum drain that is presently located in the area of the proposed chlorine contact tank #2 expansion.

## 4.5.5 Option 7: BEHRC without Storage

Option 7 is considered secondary treatment and includes constructing new biologically enhanced high rate clarifiers and related facilities for a peak influent flow of 34 mgd. Specific components of the option include constructing:

- Wet weather headworks and diversion channel,
- Emergency stand-by power,
- New chemical enhancement systems,
- A wet weather pump station,
- Modifying the existing aeration tank for BEHRC systems,
- Modifying the existing clarifier effluent to chlorine contact, and
- Modifying the existing chlorine contact tank.

**Figures 4-66** is a schematic representation of the Fourth WWTP with BEHRC wet weather treatment for a peak flow of 34 mgd. **Figures 4-67 and 4-68** present a process flow diagram and preliminary layouts of Option 7, respectively. **Figures 4-69 through 4-70** present the preliminary hydraulic profile for the Option 7 improvements.

With Option 7, no additional collection system storage or flow equalization is provided. After the completion of the Phase I CAP/ER collection system improvements, the anticipated future peak wet weather flow is 30 mgd.

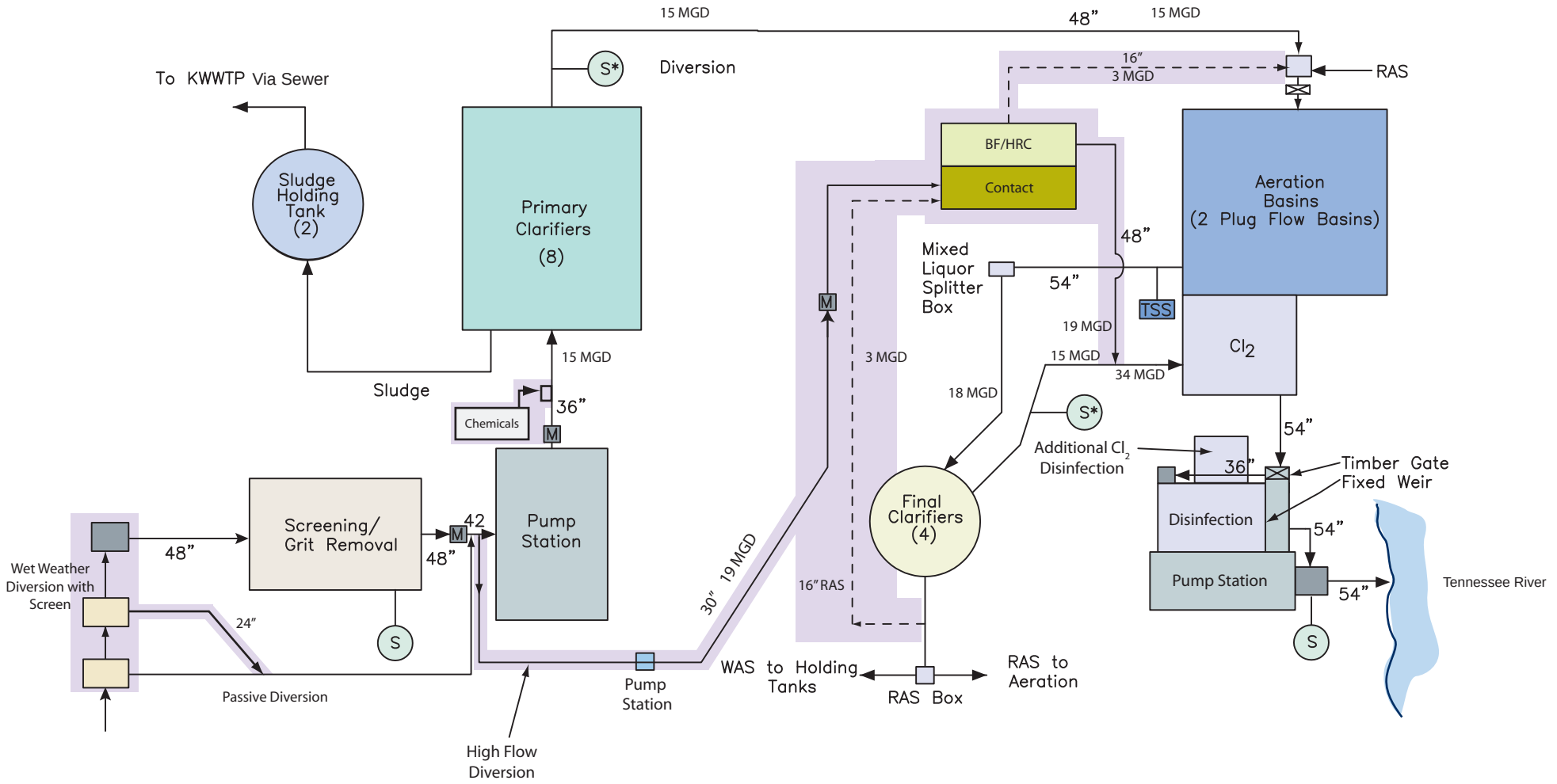


Figure 4-66
Fourth Creek WWTP Option 7: BEHRC Without Storage Process Schematic

CDM

Under this option, modifications to the headworks at the Fourth Creek WWTP are required to handle the influent flow. These modifications include conversion of the existing manual diversion channel to an automatic peak flow channel with the addition of automated screening and flow measurement in the channel, similar to that described for Option 6.

Treatment under this option is provided in two parallel trains. Flows up to 15 mgd are treated through the primary clarifiers and flows up to 18 mgd (15 mgd primary effluent and 3 mgd high rate clarifier solids) are treated in the aeration basins and final clarifiers. Flow through the primary clarifier would be dosed with a chemical coagulant for CEPT.

The second treatment train for up to 19 mgd of peak wet weather flow is diverted away from the conventional primary and secondary treatment, receives fine screening, and is treated in the biologically enhanced high rate clarification process. At peak influent flow conditions, approximately 3 mgd of returned activated sludge is added to the influent for the high rate clarification process. After a 10-15 minute contact time, the chemical coagulant and ballast are also added. After settling the solids and removing the ballast, solids are returned to the aeration basin influent. The combined effluent from the final clarifiers and the high rate clarifier is disinfected and dechlorinated before discharge into the Tennessee River. Improvements to the chlorine contact basin and effluent pump station wet well are required under this option.

Preliminary level design details for Option 7 are discussed below.

### CEPT

Chemically Enhanced Primary Treatment will be included in Option 7 as is detailed for Option 1.

### Wet Weather Diversion Box

A new wet weather diversion box will be constructed between existing Diversion Box 'E' and Diversion Box 'A', identical to that presented in Option 6.

### Wet Weather Pump Station

The wet weather pump station for Option 7 is similar to the one presented in Option 6, except that the firm pump station capacity is increased to 19 mgd.

### RAS Pump Station

#### *RAS Pump Station Influent Line*

The RAS pump station influent line will be similar to the influent line for Option 3. A 24-inch discharge line will tee off of the existing return pump discharge line and convey a RAS flow of up to 3 mgd to the new RAS pump station. Flow rate to the RAS pump station will be controlled by a motorized plug valve.

***RAS Pump Station***
The BEHRC RAS pump station will be located to the east of Final Clarifier #4 and south of the existing access path to the effluent building. The wet well will have a footprint of approximately 12 feet by 12 feet and a depth of 15 feet.

The wet well will have two submersible, centrifugal pumps. One pump will be used as the duty pump and one will be standby. Each pump will have a capacity of 2,083 gpm, which will give the station a 3 mgd firm capacity. The pumps will be speed controlled by VFD.

***RAS Forcemain to Pre-aeration***
A 16-inch ductile iron forcemain will convey flow from the new RAS pump station to the BEHRC pre-aeration basin located in the plant's out of service aeration basin. The RAS forcemain will be aligned identical to the alignment presented for Option 3.

***O&M Considerations***
The motorized plug valve located on the influent line to the RAS pump station can be closed to isolate the line when the BEHRCs are not in use.

A sump pump will be installed in the wet well to empty the sump when not in use. Access hatches and guide rails will be provided over each pump for maintenance. The hatches can also be used for wash down of the pump station. Access hatches will also be provided over the discharge valves in the valve vault.

### BEHRC

The BEHRC system in Option 7 has a capacity of 22 mgd, and consists of an influent channel, pre-aeration basin, fine screening, BEHRC unit, sludge and microsand pumping, chemical addition and an effluent channel. The wet weather pump station discharges to the influent channel which conveys the flow via gravity to fine screening prior to the BEHRC unit. The BEHRC unit discharges to an effluent channel that conveys flow to the BEHRC effluent pipeline.

### Pre-aeration

The BEHRC pre-aeration basin for Option 7 will be similar to the one proposed for Option 3 except that the basin will treat a wastewater flow of 22 mgd.

### Fine Screening

The BEHRC fine screening for Option 7 will be similar to the one proposed for Option 2 and will be capable of treating a peak wastewater flow of 22 mgd.

### BEHRC

After fine screening, the 22 mgd influent flow is treated in a single BEHRC train. The BEHRC system consists of four subsystems: BEHRC influent channel and static mixer, BEHRC basins, chemical feed system, and sludge and microsand pumping.

The BEHRC influent channel and the BEHRC influent static mixer for Option 7 will be similar to the one proposed for Option 3. The BEHRC basins for Option 7 will be

similar to the one proposed for Option 3 except that the basins will have a total footprint approximately 22.5 feet long by 55.5 feet wide and a side water depth of 19 feet.

### Sludge Pumping

The sludge pumping for Option 7 will be similar to the one proposed for Option 3 except that the flow of sludge increases to 3 mgd.

### Chemical Feed System

The chemical feed system for Option 7 will be similar to the one proposed for Option 2.

### Existing Chlorine Contact Basin Modifications

Modifications to the existing chlorine contact basins are similar to Option 6 improvements.

## 4.6 Resolution of Identified CPE Performance Issues

As defined in the CD, one of the functions of the CCP is to address performance issues identified during the CPE. The CCP improvement alternatives have been developed to address the CPE identified performance issues for the Kuwahee WWTP and the Fourth Creek WWTP. **Tables 4-12 and 4-13** present the CPE identified performance issues and how the proposed CCP improvements address these issues for the Kuwahee WWTP and Fourth Creek WWTP, respectively.

**Table 4-12**
**Summary CCP Address of CPE WWTP Performance Issues - KWWTP**

| Process | Current Performance Issue Identified by CPE | CCP Elements |
|---|---|---|
| Influent Pumping | Peak wet weather flow exceeds firm capacity. | All CCP options limit peak wet weather flows to the existing 120 mgd pumping capacity or provide supplemental wet weather pumping. |
| Screening | Peak wet weather flow may exceed firm capacity. | All CCP options limit peak wet weather flows to the existing screening capacity of 120 mgd. |
| Grit Removal | Peak wet weather flow may exceed firm capacity. | All CCP options limit peak wet weather flows to the existing grit removal capacity of 120 mgd. |
| Primary Clarifiers | Hydraulics limit peak wet weather flow to less than peak process capacity. | All CCP options provide means to limit peak wet weather flows to the primary clarifiers at 70 mgd or less. |
| | Poor effluent quality during wet weather flows. | All CCP options include CEPT to improve primary clarification performance. |

**Table 4-12**
**Summary CCP Address of CPE WWTP Performance Issues - KWWTP**

| Process | Current Performance Issue Identified by CPE | CCP Elements |
|---|---|---|
| Biological Treatment | Capacity limited to 50 mgd (ADF) and 80 to 90 mgd peak flow (3 to 4 hours). | All CCP options provide means to limit sustained, peak wet weather flows to the biological treatment system at 70 mgd. Anticipated biological treatment performance was confirmed with BioWins process modeling. |
| | Flow distribution to final clarifiers results in variable sludge blanket levels. | Existing flow distribution is determined to be sufficient for wet weather treatment. |
| | RAS rate difficult to control. | RAS rate method of control is determined to be sufficient for wet weather treatment. |
| Disinfection | Insufficient contact time at flows above 120 mgd. | All CCP options limit peak wet weather flow to the chlorine contact tanks to 120 mgd or provide supplemental chlorine contact time. |
| Outfall | Insufficient diffuser hydraulic capacity at peak flows. | All CCP options utilize the existing effluent diffuser and provides supplemental high flow discharge pipe capacity if needed. |
| Solids Processing | Gravity thickener capacity is marginal for current operation; capacity is insufficient if chemical addition to primary clarifiers is implemented. | All CCP options include upgrade of the existing gravity thickener mechanisms and addition of a second gravity thickener. |
| Misc. Process Monitoring & Control | Influent sampling location is downstream from several recycle streams. | Sidestream characterization work is currently being conducted to determine if recycle streams have a significant impact to the influent sampling. KUB is coordinating sampling of the recycle streams with TDEC. |
| | Diversion Parshall flume submerges under high flows. | Primary effluent diversions to the chlorine contact basin are no longer active for all CCP Options, except Option 1. |
| | Flow measurement to biological system is by effluent Parshall flume | Biological system flow measurement by effluent Parshall flume is determined to be sufficient for wet weather treatment. |
| | Discrepancy in solids balances. | Revised solids mass balances were performed for the recommended CCP Options. |
| | Some SOPs need revisions (i.e., wet weather operations) | PCP guidelines have been updated for current operations and will be revised following CCP improvement implementation. |
| | Influent /effluent flow measurement discrepancy. | Revised flow measurement will be investigated as part of the CCP improvements. |
| | Flow, load and performance trending not used. | Methods for operations data control and storage have been improved. |

**Table 4-13**
**Summary CCP Address of CPE WWTP Performance Issues - FCWWTP**

| Process | Current Performance Issue Identified by CPE | CCP Elements |
|---|---|---|
| Influent Pumping | Peak wet weather flow exceeds firm capacity. | All CCP options limit peak wet weather flows to the existing 27 mgd pumping capacity or provide supplemental wet weather pumping. |
| Screening | Peak wet weather flow exceeds firm capacity. | All CCP options limit peak wet weather flows to the existing 27 mgd screening capacity or provide supplemental screening. |
| Grit Removal | Peak wet weather flow exceeds firm capacity. | All CCP options limit peak wet weather flows to the existing grit removal capacity of 27 mgd. |
| Primary Clarifiers | Effluent weirs submerged at high flows. | CCP Options 2, 3, 6, and 7 reduce the peak wet weather flows to the primary clarifiers to 18 mgd or less (i.e. weirs will no longer be submerged). |
| Biological Treatment | Capacity limited to 15 mgd (ADF) and 18 mgd peak flow (3 to 4 hours). | All CCP options provide means to limit sustained, peak wet weather flows to the biological treatment system at 18 mgd. Anticipated biological treatment performance was confirmed with BioWins process modeling. |
| | RAS rate difficult to control. | RAS rate method of control is determined to be sufficient for wet weather treatment. |
| | Insufficient aeration capacity. | Supplemental aeration capacity must be provided in the new aeration basin to meet maximum day aeration demands. |
| | Clarifier distribution box overflows at peak flows. | CCP Options 2, 3, 6, and 7 reduce the peak wet weather flows to the secondary clarifiers to 18 mgd or less (i.e. distribution box overflows will no occur). |
| | Flow split to all aeration basins is not equal. | Hydraulic improvement will be made to improve flow distribution capabilities during CCP improvement implementation. |
| Disinfection | Hydraulic constraint between contact basins at high flows. | All CCP Options will remove hydraulic constraints between chlorine contact basins 1 and 2. |
| | Insufficient contact time at flows above 24 mgd. | CCP Options will provide adequate contact time for anticipated peak wet weather flows. |
| Effluent Pumping | Peak wet weather flow exceeds capacity. | All CCP Options include effluent pump station modifications to provide full pumping capacity for anticipated peak wet weather flows. |

**Table 4-13**
**Summary CCP Address of CPE WWTP Performance Issues - FCWWTP**

| Process | Current Performance Issue Identified by CPE | CCP Elements |
|---|---|---|
| Solids Processing | Gravity thickener capacity is marginal for current operation; capacity is insufficient if chemical addition to primary clarifiers is implemented. | Further process analysis of the gravity thickeners has confirmed that the existing thickeners are sufficient for all CCP options provided that solids processing for the FCWWTP solids remain at the KWWTP, as intended. |
| Misc. Process Monitoring & Control | Influent Parshall flume floods at high flows. | All CCP Options include alternate means of influent flow measurement at high flows. |
| | Some SOPs need revisions (i.e., wet weather operations) | PCP guidelines have been updated for current operations and will be revised following CCP improvement implementation. |
| | Discrepancy in measured and predicted flow (may be cause of "other" problem below). | NA. All CCP Options have been developed to meet the anticipated, future peak wet weather flows. |
| | Flow, load and performance trending not used. | Methods for operations data control and storage have been improved. |
| | Discrepancy in solids balances. | Revised solids mass balances were performed for the recommended CCP Options. |

## 4.7 Cost Estimates

For each wastewater improvement alternative passing the initial screening evaluation for the Kuwahee and Fourth Creek WWTPs, construction cost estimates were developed for further comparison of the alternatives and for use in the financial analysis. The American Association of Cost Engineers (AACE) recommends four levels of accuracy for construction cost estimating categories. The four major categories and expected accuracy are as follows:

| | |
|---|---|
| Category 1 – Conceptual Estimate | Accuracy = +50% to -30% |
| Category 2 – Study Estimate | Accuracy = +30% to -20% |
| Category 3 – Preliminary Estimate | Accuracy = +20% to -10% |
| Category 4 – Detailed Estimate | Accuracy = +15% to -5% |

Based on the level of detail conducted in the development of improvement alternatives, the cost estimates prepared for this report are considered equivalent to Category 2 estimates, study level estimates with an accuracy of +30% to -20%. Preliminary process flows and loadings were determined through a combination of collection system hydraulic statistical analyses, BioWin process simulations, and

previous process analyses conducted as part of the CPE. The preliminary process flows and loadings were used to calculate preliminary sizing of pumps, piping, and process equipment. Equipment vendors were contacted for budgetary quotes for major equipment needed for each option.

In preparation of the site plans and construction cost estimates, the existing record drawings for each plant were reviewed for preliminary siting and routing of proposed pipes, structures, and buildings in locations that did not conflict with known existing pipes and utilities. This level of detail allowed estimators to determine demolition, excavation, concrete, piping, and general site restoration quantities.

Each cost estimate includes industry standard mark-ups for project indirect expenses, contractor overhead and profit, project engineering and implementation costs, and construction contingencies. Based on the level of detail in the analysis and the relative difficulties associated with construction at the existing WWTP sites, a 35 percent contingency was used for the Kuwahee WWTP construction cost estimates, and a 25 percent contingency was used for the Fourth Creek WWTP construction cost estimates.

The detailed estimate of probable construction cost for the on-site WWTP improvements for each CCP improvement option is included in Appendix C of this report.

Preliminary capital costs in June 2007 dollars are tabulated **Table 4-14** for the Kuwahee WWTP improvement alternatives. Costs estimates for Kuwahee WWTP Options 1, 2 and 3 include the cost to construct off-site CCP system storage.

**Table 4-14**
**Study Level Construction Costs for the Kuwahee WWTP**

| Option | Description | Peak Plant Flow (mgd) | Includes Diversions | Capital Cost Estimate (Millions) |
|---|---|---|---|---|
| 1 | CEPT with Storage | 120 | Yes | $48.6 |
| 2 | CEPT, HRC with Storage | 120 | Yes | $71.7 |
| 3 | CEPT, BEHRC with Storage | 120 | No | $80.9 |
| 6 | CEPT, HRC without Storage | 160 | Yes | $60.9 |
| 7 | CEPT, BEHRC without Storage | 160 | No | $77.7 |

Preliminary capital costs in June 2007 dollars are tabulated **Table 4-15** for the Fourth Creek WWTP improvement alternatives.

**Table 4-15**
**Study Level Construction Costs for the Fourth Creek WWTP**

| Option | Description | Peak Plant Flow (mgd) | Includes Diversions | Capital Cost Estimate (Millions) |
|---|---|---|---|---|
| 1 | CEPT with Storage | 27 | Yes | $5.8 |
| 2 | CEPT, HRC with Storage | 27 | Yes | $17.5 |
| 3 | CEPT, BEHRC with Storage | 27 | No | $22.8 |
| 6 | CEPT, HRC without Storage | 34 | Yes | $14.3 |
| 7 | CEPT, BEHRC without Storage | 34 | No | $19.0 |

Based on the process performance analysis, neither WWTP will be capable of consistently meeting NPDES Permits effluent limits during wet weather flow conditions with Option 1 alone. Effluent limits should be met with all other options, based on the assumptions used in the BioWin process modeling (Appendix A).

## ABBREVIATIONS

### PROCESS SCHEMATIC:

| | |
|---|---|
| BFV | BUTTERFLY VALVE |
| BEHRC | BIOLOGICALLY ENHANCED HIGH RATE CLARIFIER |
| BV | BALL VALVE |
| CEPT | CHEMICALLY ENHANCED PRIMARY TREATMENT |
| CL2 | CHLORINE |
| CP | CONTROL PANEL |
| DIA | DIAMETER |
| DI/DIP | DUCTICLE IRON PIPE |
| FIT | FLOW INDICATING TRANSMITTER |
| FRP | FIBERGLASS REINFORECED PIPE |
| GV | GATE VALVE |
| HWL | HIGH WATER LEVEL |
| HRC | HIGH RATE CLARIFIER |
| IE | INVERT ELEVATION |
| INF | INFLUENT |
| INT | INTERMEDIATE |
| INV | INVERT |
| LAH | HIGH WATER LEVEL ALARM |
| LE | LEVEL ELECTRODE, LEVEL ELEMENT |
| LIT | LEVEL INDICATING TRANSMITTER |
| LWL | LOW WATER LEVEL |
| M | METER |
| MFG | MANUFACTURER |
| MGD | MILLION GALLONS PER DAY |
| MH | MANHOLE |
| MX | MIXER |
| NTS | NOT TO SCALE |
| OH | OVERHEAD |
| PCCP | PRESTRESSED CONCRETE CYLINDER PIPE |
| PSLUDGE | PRIMARY CLARIFIER SLUDGE |
| PVC | POLYVINYL CHLORIDE |
| RAS | RETURN ACTIVATED SLUDGE |
| SCH | SCEHDULE |
| SL | SLOPE |
| STOR | STORAGE |
| TYP | TYPICAL |
| VFD | VARIABLE FREQUENCY DRIVE |
| WW | WASTEWATER |

### VALVE AND FITTING NOMENCLATURE:

| | |
|---|---|
| ARV | AIR RELEASE VALVE |
| BF | BUTTERFLY VALVE |
| CV | CHECK VALVE |
| ER | ECCENTRIC REDUCER |
| GV | GATE VALVE |
| K | KNIFE VALVE |
| PV | PLUG VALVE |

## VALVE / GATE SYMBOLS

| SYMBOL | FEATURE |
|---|---|
| | BALL VALVE, DIAPHRAGM VALVE |
| | WEIGHT AND LEVER CHECK VALVE |
| | GATE VALVE |
| H | HYDRAULIC OPERATOR |
| M | MOTORIZED VALVE |
| | ECCENTRIC PLUG VALVE |
| | SLUCE GATE |
| | WEIR GATE |

## MISCELLANEOUS SYMBOLS

| SYMBOL | FEATURE |
|---|---|
| | WATER SUFACE |
| ø | DIAMETER |

## EQUIPMENT SYMBOLS

| SYMBOL | FEATURE |
|---|---|
| M | MAGNETIC FLOW METER |
| M | CONSTANT SPEED MOTOR |
| M | VARIABLE SPEED MOTOR |
| | METERING PUMP |
| | CENTRIFUGAL PUMP |
| | COMPACTOR / WASHER / CLASSIFIER |
| M | TANK MIXER |

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DRAWN BY: D.KRAFT
SHEET CHK'D BY: B.LUECK
CROSS CHK'D BY: J.NORTON
APPROVED BY: B.MALOY
DATE: MAY 2007

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KNOXVILLE UTILITIES BOARD
KNOXVILLE, TENNESSEE

COMPOSITE CORRECTION PLAN

LEGEND AND ABBREVIATIONS

PROJECT NO. 10561-54060
FILE NAME: IGNDI045

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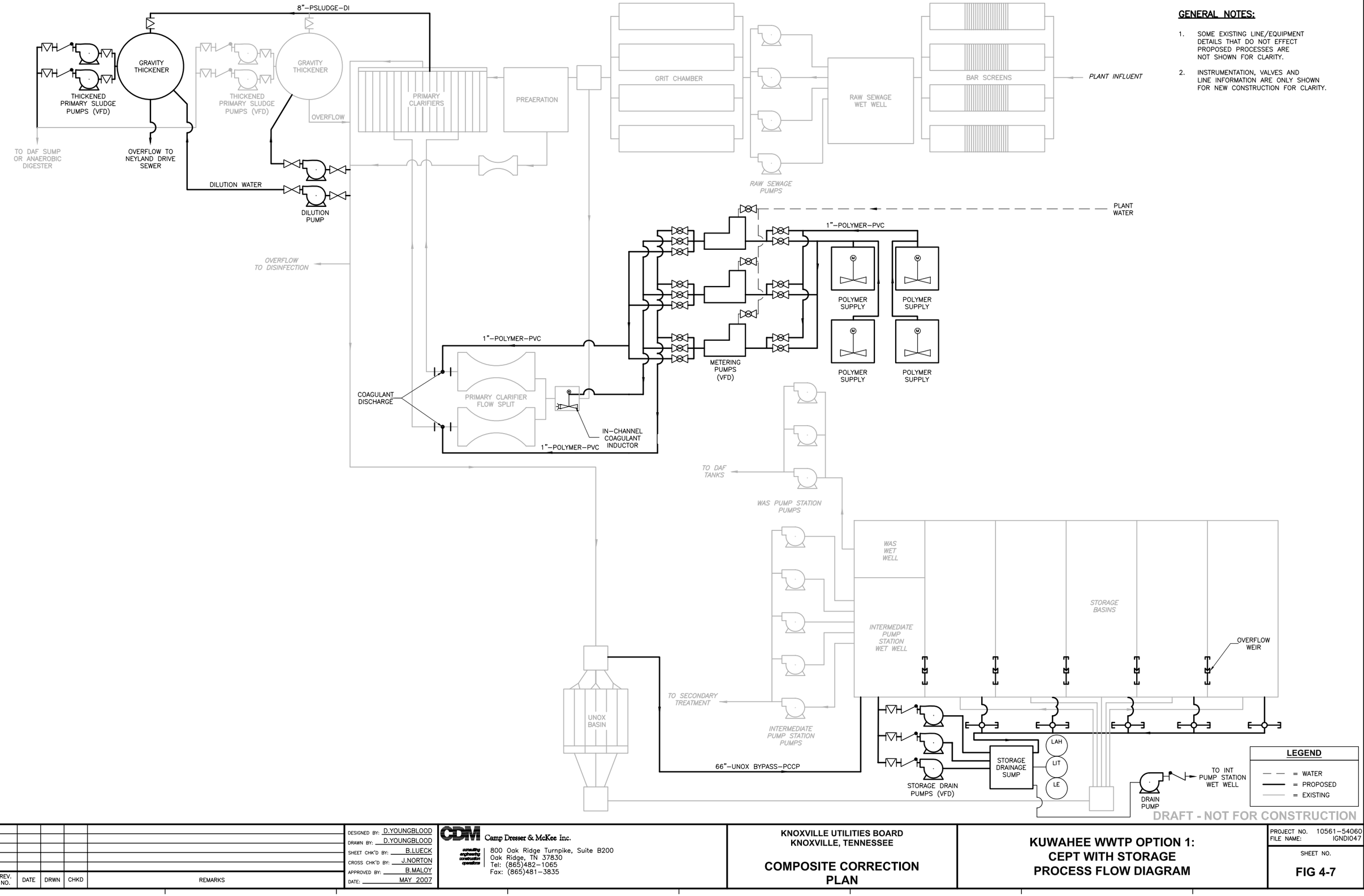
FIG 4-5




## GENERAL NOTES:

1. SOME EXISTING LINE/EQUIPMENT DETAILS THAT DO NOT EFFECT PROPOSED PROCESSES ARE NOT SHOWN FOR CLARITY.
2. INSTRUMENTATION, VALVES AND LINE INFORMATION ARE ONLY SHOWN FOR NEW CONSTRUCTION FOR CLARITY.

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CROSS CHK'D BY: J.NORTON
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KNOXVILLE UTILITIES BOARD
KNOXVILLE, TENNESSEE

**COMPOSITE CORRECTION PLAN**

# KUWAHEE WWTP OPTION 1: CEPT WITH STORAGE PROCESS FLOW DIAGRAM

PROJECT NO. 10561–54060
FILE NAME: IGNDI047

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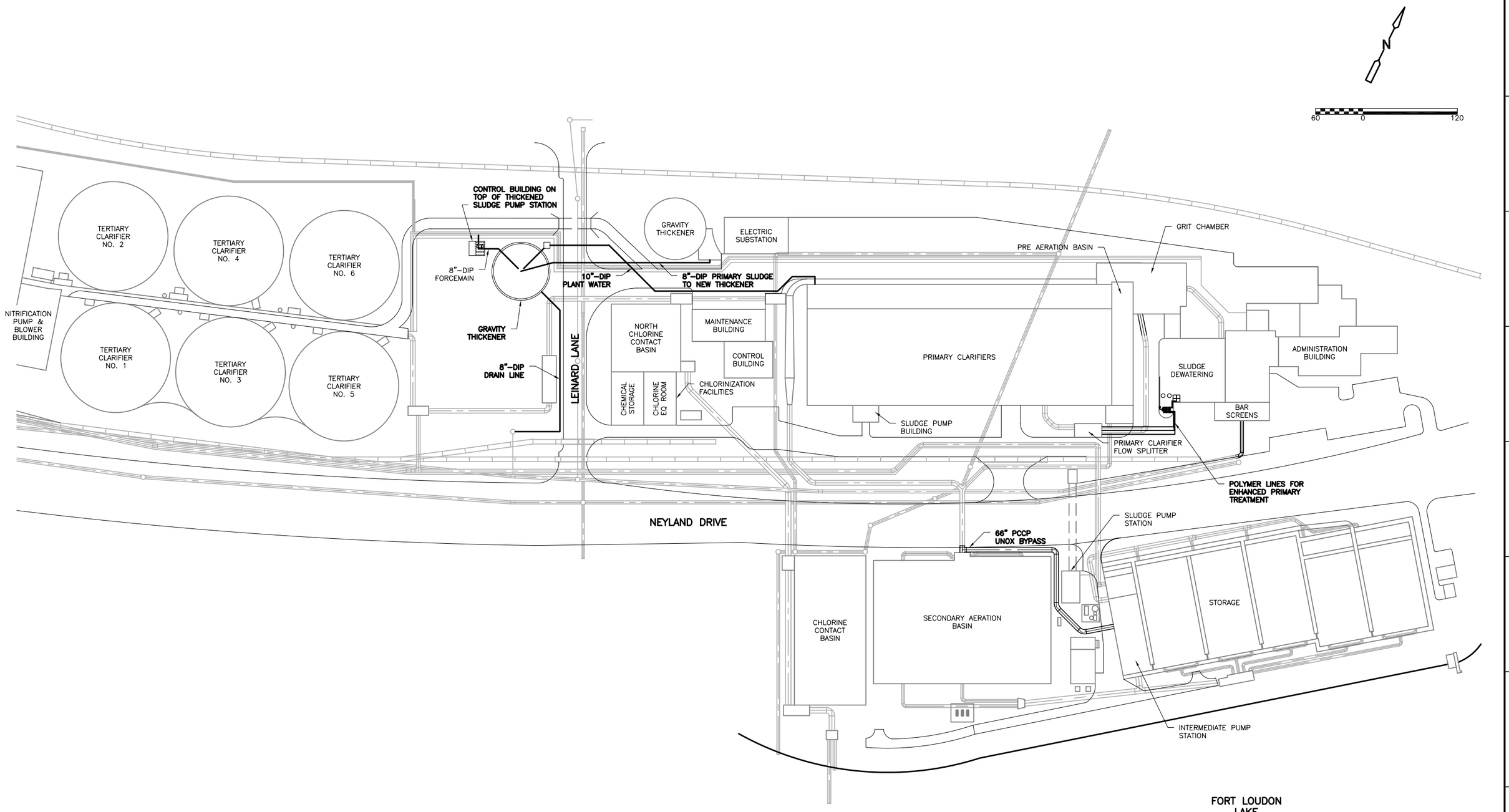
**FIG 4-7**




KUWAHEE WASTEWATER TREATMENT PLANT

**PLAN**

1" = 120'

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DESIGNED BY: D.YOUNGBLOOD
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CROSS CHK'D BY: J.NORTON
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**COMPOSITE CORRECTION PLAN**

**KUWAHEE WWTP OPTION 1: CEPT WITH STORAGE OVERALL SITE PLAN**

PROJECT NO. 10561-54060
FILE NAME: MSTPL048

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**FIG 4-8**

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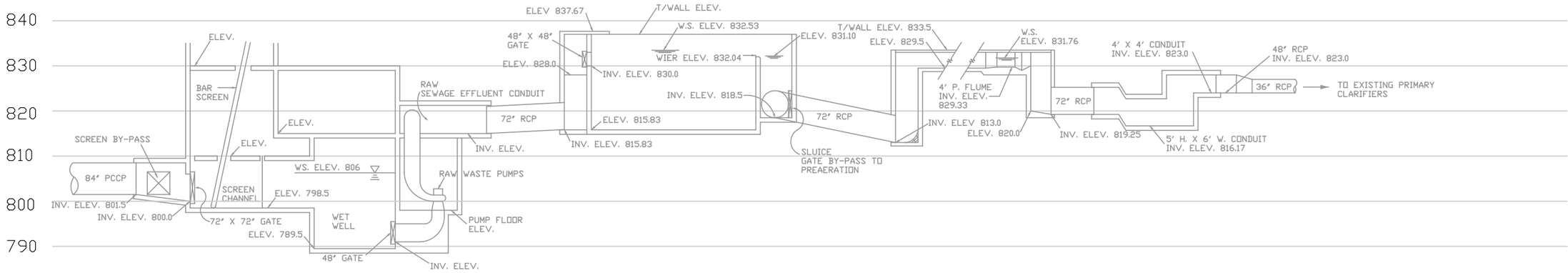
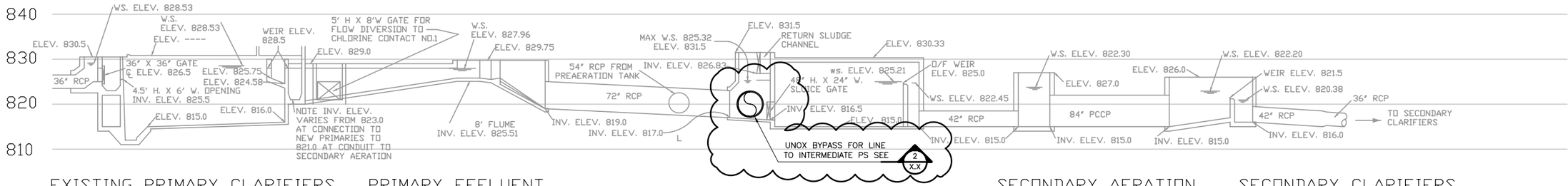



RAW WASTE PUMP STATION

AERATED GRIT TANK

EXISTING PRIMARY INFLUENT CLARIFIERS
PARSHALL FLUME



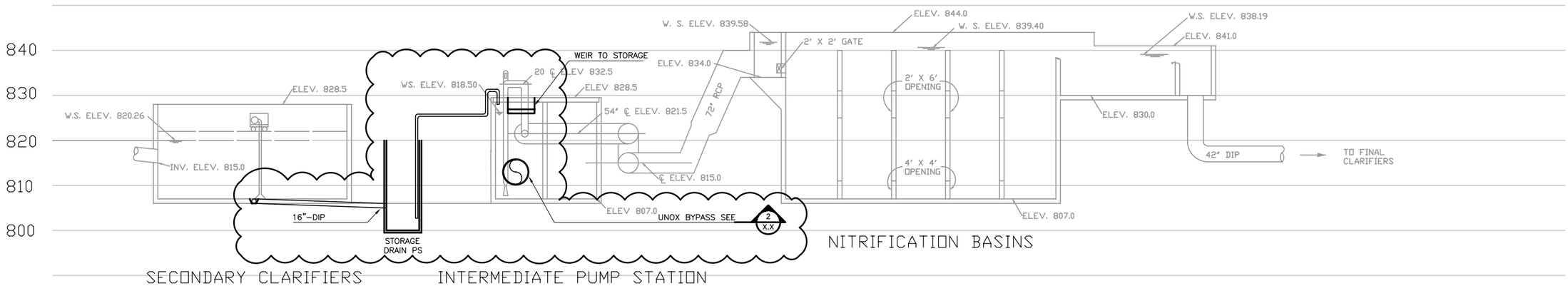

EXISTING PRIMARY CLARIFIERS

PRIMARY EFFLUENT PARSHALL FLUME

SECONDARY AERATION BASINS

SECONDARY AERATION JUNCTION BOX

SECONDARY CLARIFIERS INFLUENT STRUCTURE




SECONDARY CLARIFIERS

INTERMEDIATE PUMP STATION

NITRIFICATION BASINS

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**COMPOSITE CORRECTION PLAN**

**KUWAHEE WWTP OPTION 1: CEPT WITH STORAGE PLANT WIDE PROFILE**

PROJECT NO. 10561-54060
FILE NAME: CSTPR049

SHEET NO.

**FIG 4-9**

## GENERAL NOTES:

1. SOME EXISTING LINE/EQUIPMENT DETAILS THAT DO NOT EFFECT PROPOSED PROCESSES ARE NOT SHOWN FOR CLARITY.
2. INSTRUMENTATION, VALVES AND LINE INFORMATION ARE ONLY SHOWN FOR NEW CONSTRUCTION FOR CLARITY.

8"–PSLUDGE–DI
GRAVITY THICKENER
THICKENED PRIMARY SLUDGE PUMPS (VFD)
GRAVITY THICKENER
THICKENED PRIMARY SLUDGE PUMPS (VFD)
OVERFLOW
TO DAF SUMP OR ANAEROBIC DIGESTER
OVERFLOW TO NEYLAND DRIVE SEWER
DILUTION WATER
DILUTION PUMP
PRIMARY CLARIFIERS
PREAERATION
GRIT CHAMBER
RAW SEWAGE PUMPS
RAW SEWAGE WET WELL
BAR SCREENS
PLANT INFLUENT
HRC DIVERSION BOX
54"–PRIMARY REDIRECT–PCCP
OVERFLOW TO DISINFECTION
1"–POLYMER–PVC
COAGULANT DISCHARGE
PRIMARY CLARIFIER FLOW SPLIT
IN–CHANNEL COAGULANT INDUCTOR
1"–POLYMER–PVC
PLANT WATER
1"–POLYMER–PVC
METERING PUMPS (VFD)
POLYMER SUPPLY
POLYMER SUPPLY
POLYMER SUPPLY
POLYMER SUPPLY
CHLORINE SUPPLY
LOCATED AT NORTH DISINFECTION
6"–CL2–PVC
TO DAF TANKS
WAS PUMP STATION PUMPS
16"–HRC SLUDGE–DI
FROM NORTH DISINFECTION
SOUTH CHLORINE CONTACT BASIN (NEW BAFFLES)
OUTFALL TO FORT LOUDON LAKE
UNOX BASIN
WAS WET WELL
HRC SYSTEM SEE FIG 4–11 FOR PROCESS FLOW DETAILS
INTERMEDIATE PUMP STATION
STORAGE BASINS
STORAGE OVERFLOW WEIR
TO SECONDARY TREATMENT
INTERMEDIATE PUMP STATION PUMPS
72"–STOR OF–PCCP
16"–DRAIN–DIP
30"–DRAIN–DIP
24"–DRAIN–DIP
16"–DRAIN–DIP
LAH
LIT
LE
STORAGE DRAINAGE SUMP
STORAGE DRAIN PUMPS (VFD)
DRAIN PUMP
TO INTERMEDIATE PUMP STATION WET WELL
66"–UNOX BYPASS–PCCP
54"–HRC EFFLUENT–PCCP

**LEGEND**

— — = CHLORINE LINE
——— = PROPOSED
——— = EXISTING

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DRAWN BY: D.YOUNGBLOOD
SHEET CHK'D BY: B.LUECK
CROSS CHK'D BY: J.NORTON
APPROVED BY: B.MALOY
DATE: MAY 2007

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KNOXVILLE UTILITIES BOARD
KNOXVILLE, TENNESSEE

**COMPOSITE CORRECTION PLAN**

# KUWAHEE WWTP OPTION 2: HRC WITH STORAGE PROCESS FLOW DIAGRAM

PROJECT NO. 10561–54060
FILE NAME: IGNDI411

SHEET NO.

**FIG 4-11**

**GENERAL NOTES:**

1. SOME EXISTING LINE/EQUIPMENT DETAILS THAT DO NOT EFFECT PROPOSED PROCESSES ARE NOT SHOWN FOR CLARITY.
2. INSTRUMENTATION, VALVES AND LINE INFORMATION ARE ONLY SHOWN FOR NEW CONSTRUCTION FOR CLARITY.

**LEGEND**

- = CHLORINE LINE
- = PROPOSED
- = EXISTING

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**COMPOSITE CORRECTION PLAN**

**KUWAHEE WWTP OPTION 2: DETAIL OF HRC SYSTEM PROCESS FLOW DIAGRAM**

PROJECT NO. 10561–54060
FILE NAME: IGNDI412

SHEET NO.

**FIG 4-12**

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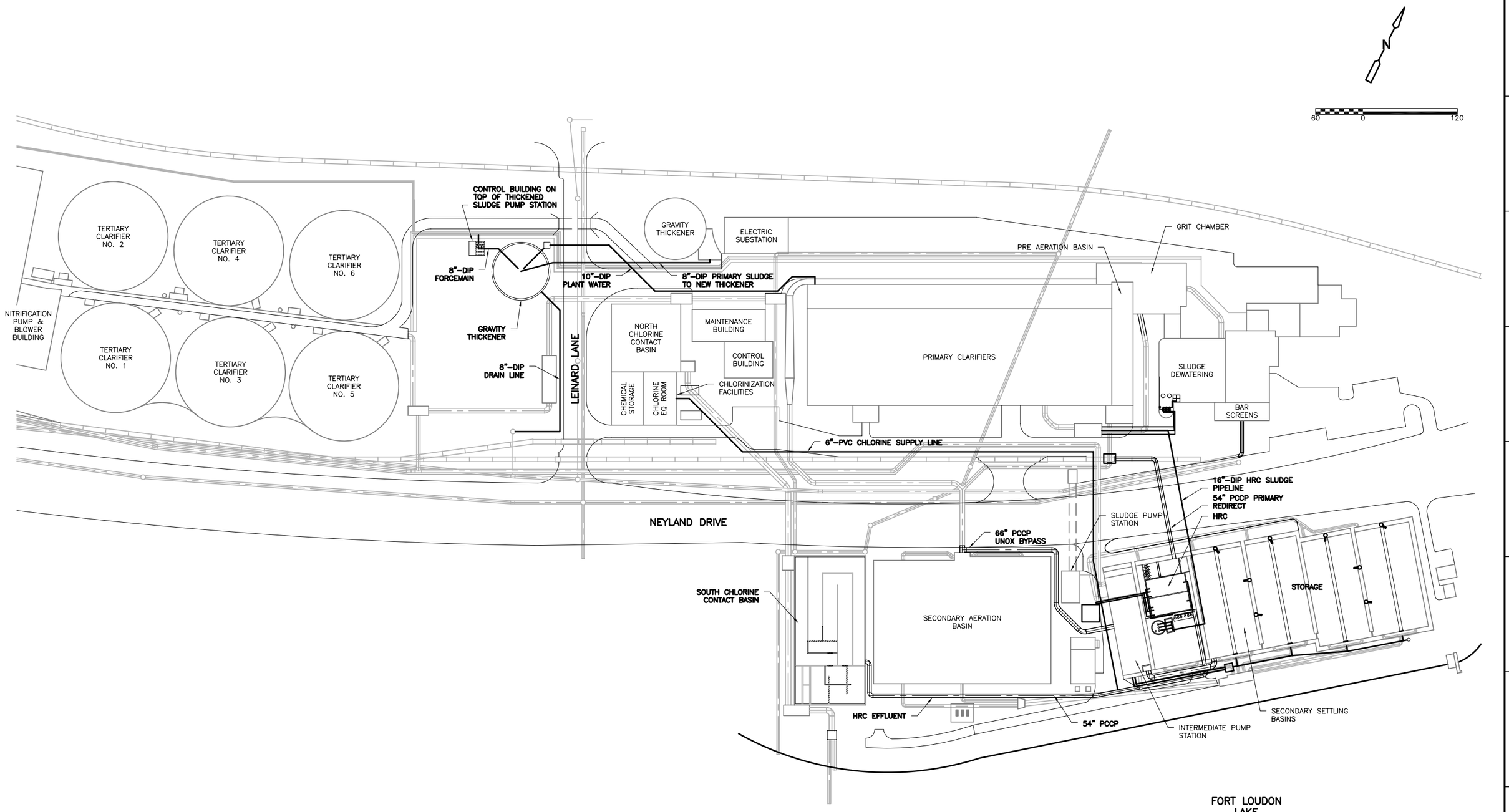


KUWAHEE WASTEWATER TREATMENT PLANT

**PLAN**

1" = 120'

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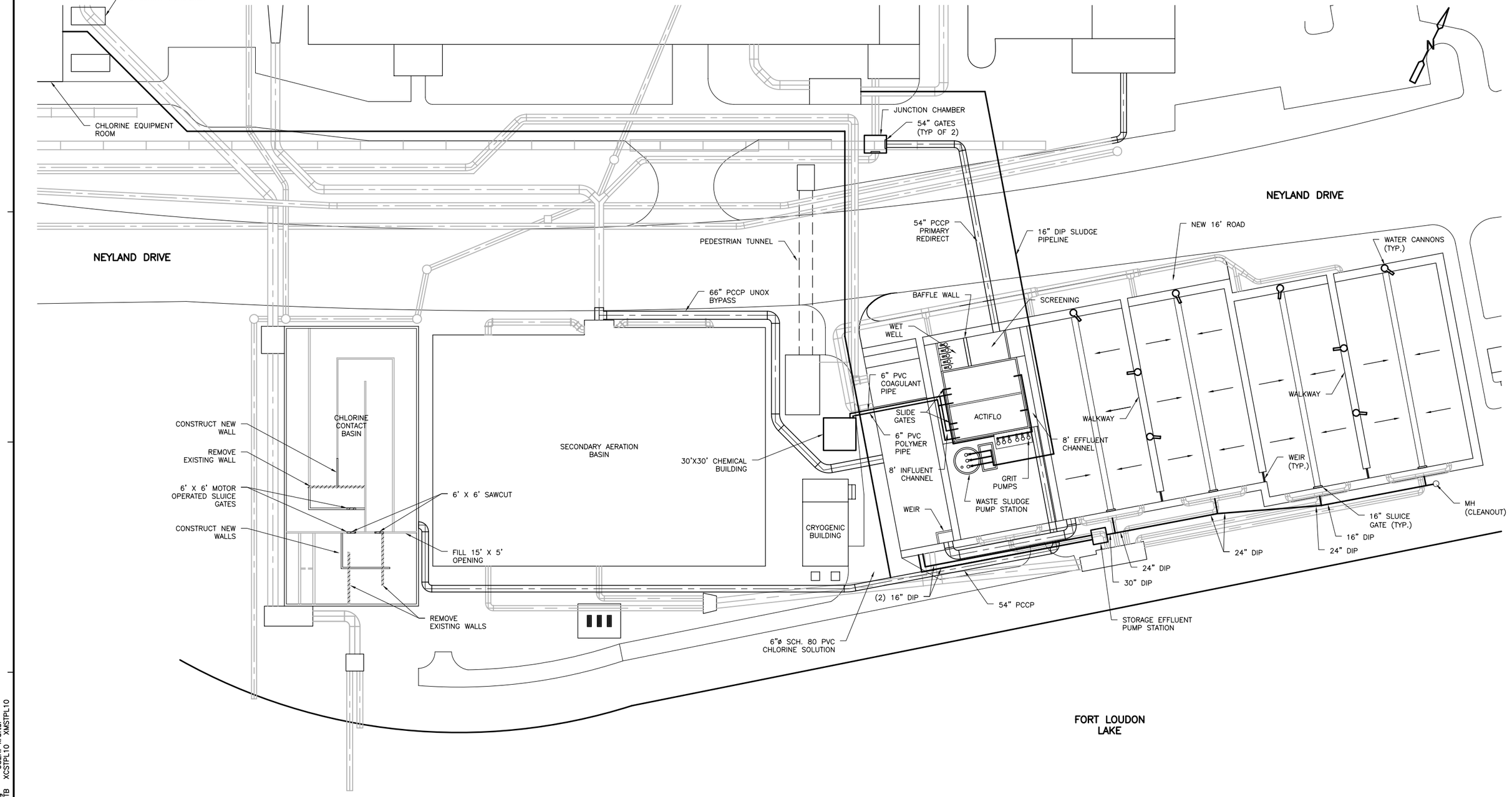
**COMPOSITE CORRECTION PLAN**

**KUWAHEE WWTP OPTION 2: HRC WITH STORAGE OVERALL SITE PLAN**

PROJECT NO. 10561-54060
FILE NAME: MSTPL413

SHEET NO.

**FIG 4-13**




ENLARGED HRC TREATMENT AREA

PLAN

1/64" = 1'- 0"

32 16 0 32 64

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DWG: G:\KUB\CAD\TM CAD FIGS\MOPPL414.dwg
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CROSS CHK'D BY: J.NORTON
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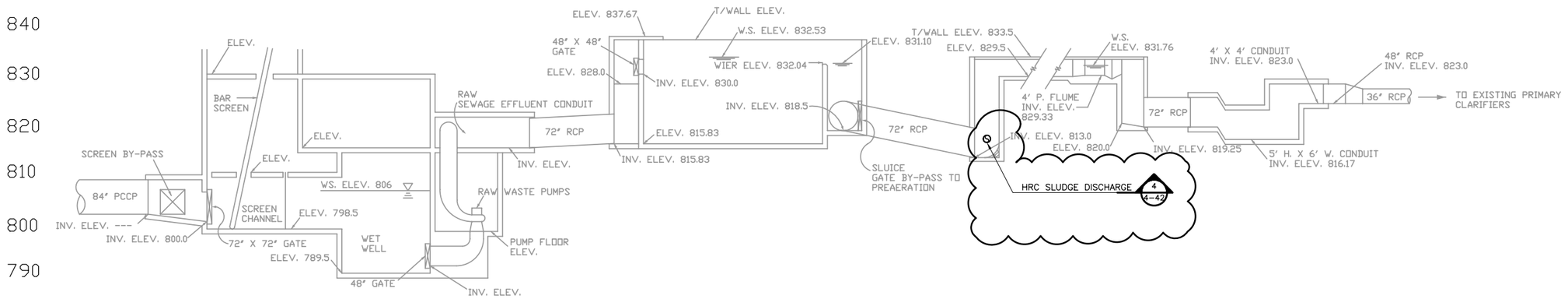
COMPOSITE CORRECTION PLAN

# KUWAHEE WWTP OPTION 2: HRC WITH STORAGE ENLARGED PLAN OF HRC

PROJECT NO. 10561-54060
FILE NAME: MOPPL414

SHEET NO.

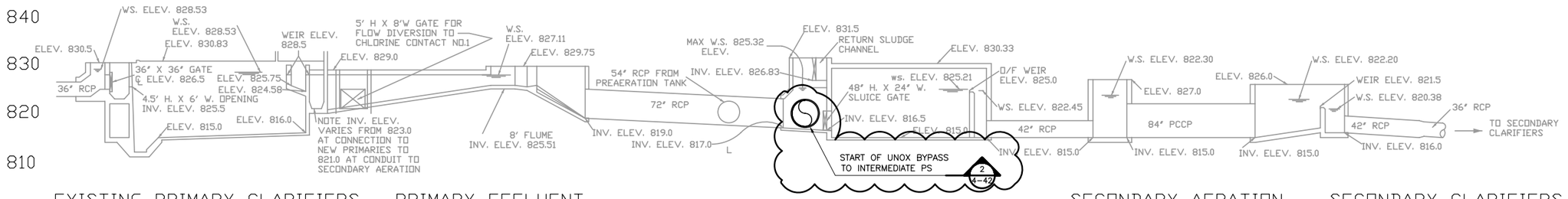
FIG 4-14




RAW WASTE PUMP STATION

AERATED GRIT TANK

EXISTING PRIMARY INFLUENT CLARIFIERS
PARSHALL FLUME



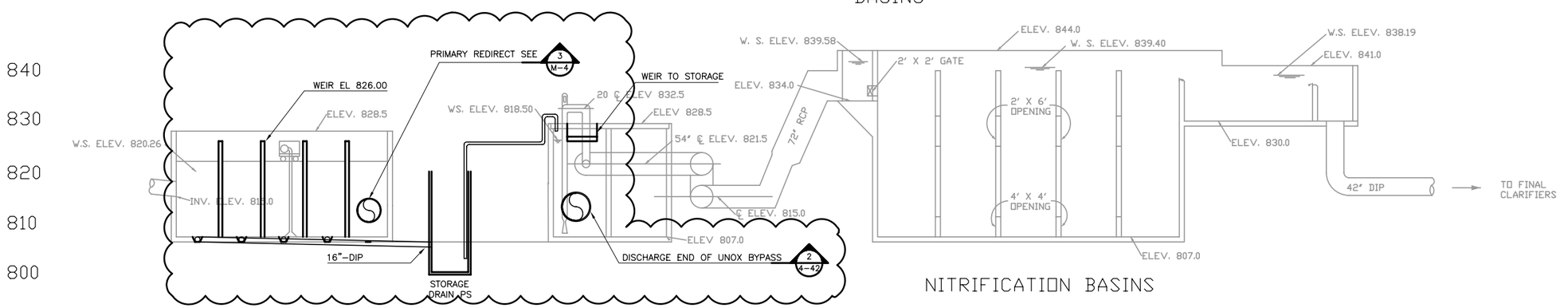

EXISTING PRIMARY CLARIFIERS

PRIMARY EFFLUENT PARSHALL FLUME

SECONDARY AERATION BASINS

SECONDARY AERATION JUNCTION BOX

SECONDARY CLARIFIERS INFLUENT STRUCTURE




SECONDARY CLARIFIERS

INTERMEDIATE PUMP STATION

NITRIFICATION BASINS



| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|
| | | | | |

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CROSS CHK'D BY:
APPROVED BY:
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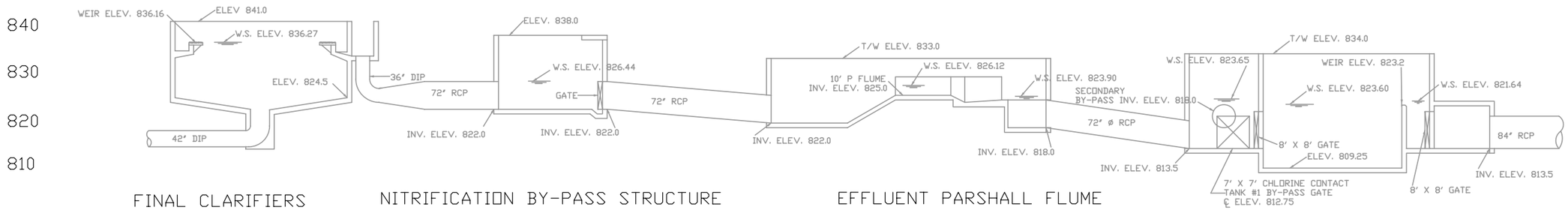
**COMPOSITE CORRECTION PLAN**

**KUWAHEE WWTP OPTION 2: HRC WITH STORAGE PLANT WIDE PROFILE**

PROJECT NO. 10561-54060
FILE NAME: CSTPR415

SHEET NO.

**FIG 4-15**

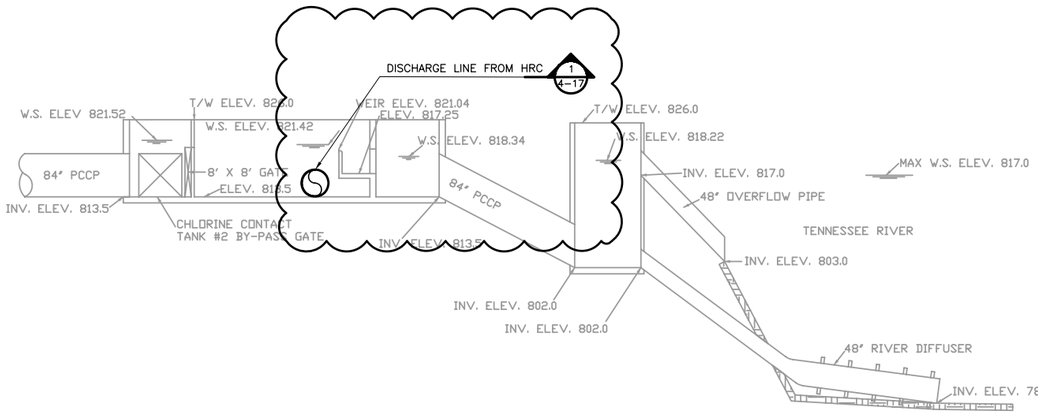



FINAL CLARIFIERS

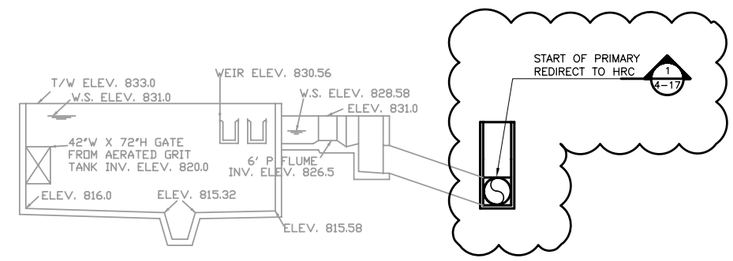
NITRIFICATION BY-PASS STRUCTURE

EFFLUENT PARSHALL FLUME

CHLORINE CONTACT TANK NO. 1

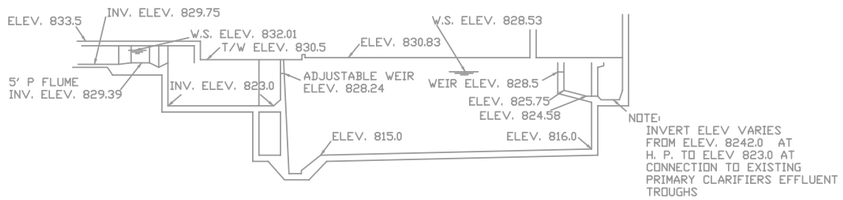



CHLORINE CONTACT TANK NO. 2

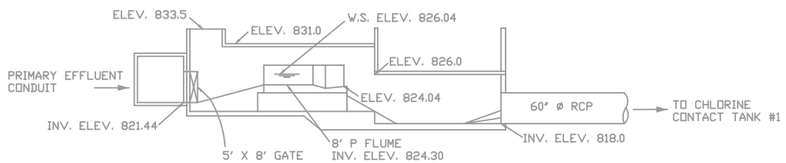



PREAERATION TANK

EFFLUENT OVERFLOW STRUCTURE




NEW PRIMARY CLARIFIERS




SECONDARY BY-PASS PARSHALL FLUME



USER: kraftar

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CROSS CHK'D BY:
APPROVED BY:
DATE: MAY 2007

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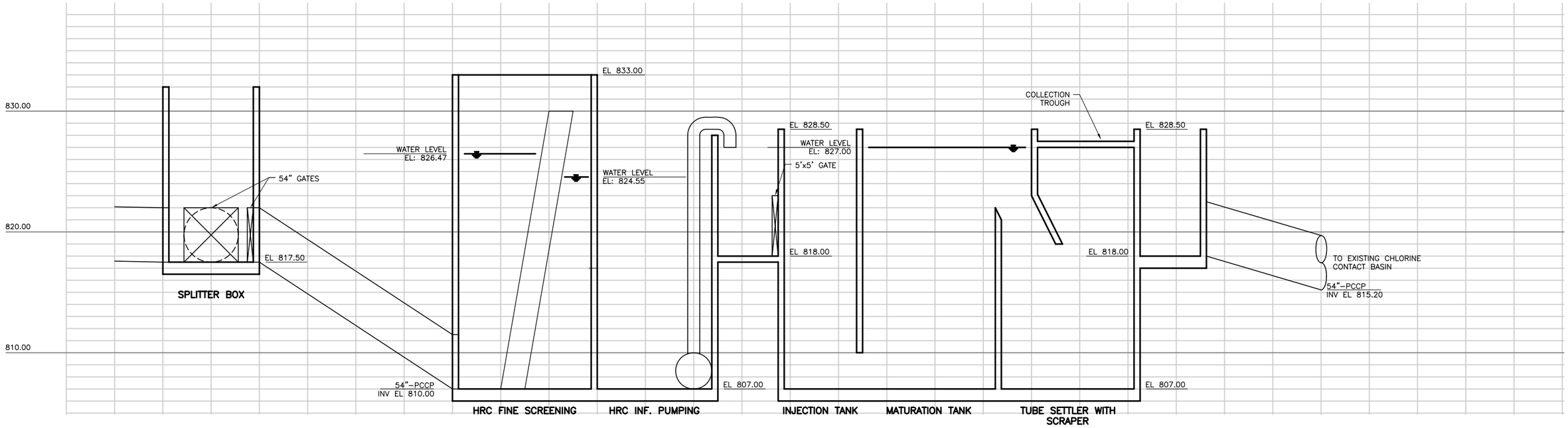
**COMPOSITE CORRECTION PLAN**

**KUWAHEE WWTP OPTION 2:
HRC WITH STORAGE
PLANT WIDE PROFILE**

PROJECT NO. 10561-54060
FILE NAME: CSTPR416

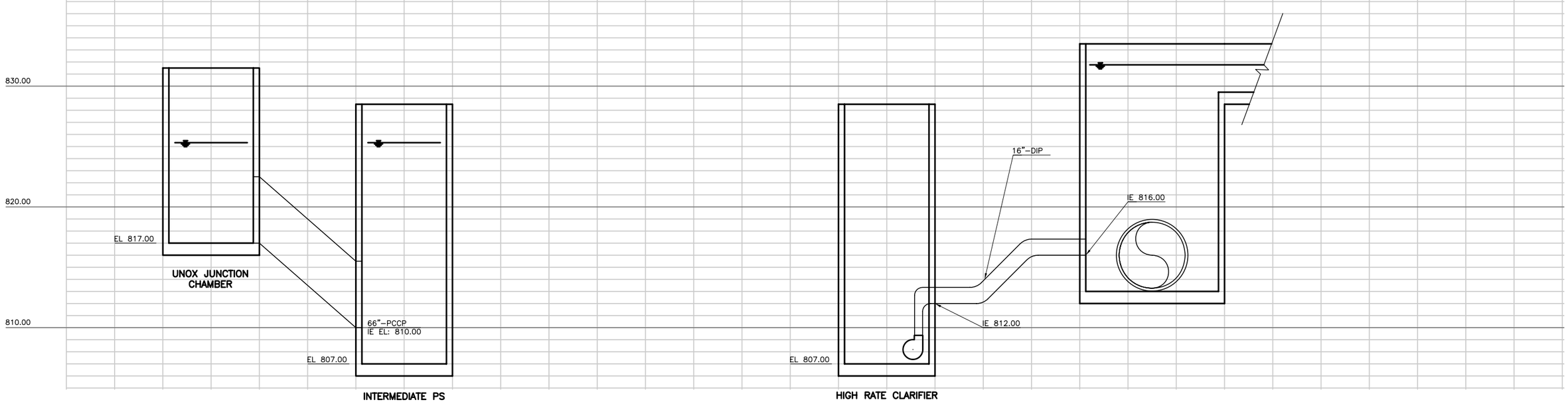
SHEET NO.

**FIG 4-16**




HRC FINE SCREENING TO CL2 CONTACT BASIN

**SECTION 1** — 4-17




UNOX BYPASS

**SECTION 2** — 4-17

HIGH RATE CLARIFIER SLUDGE PUMP STATION

**SECTION 3** — 4-17

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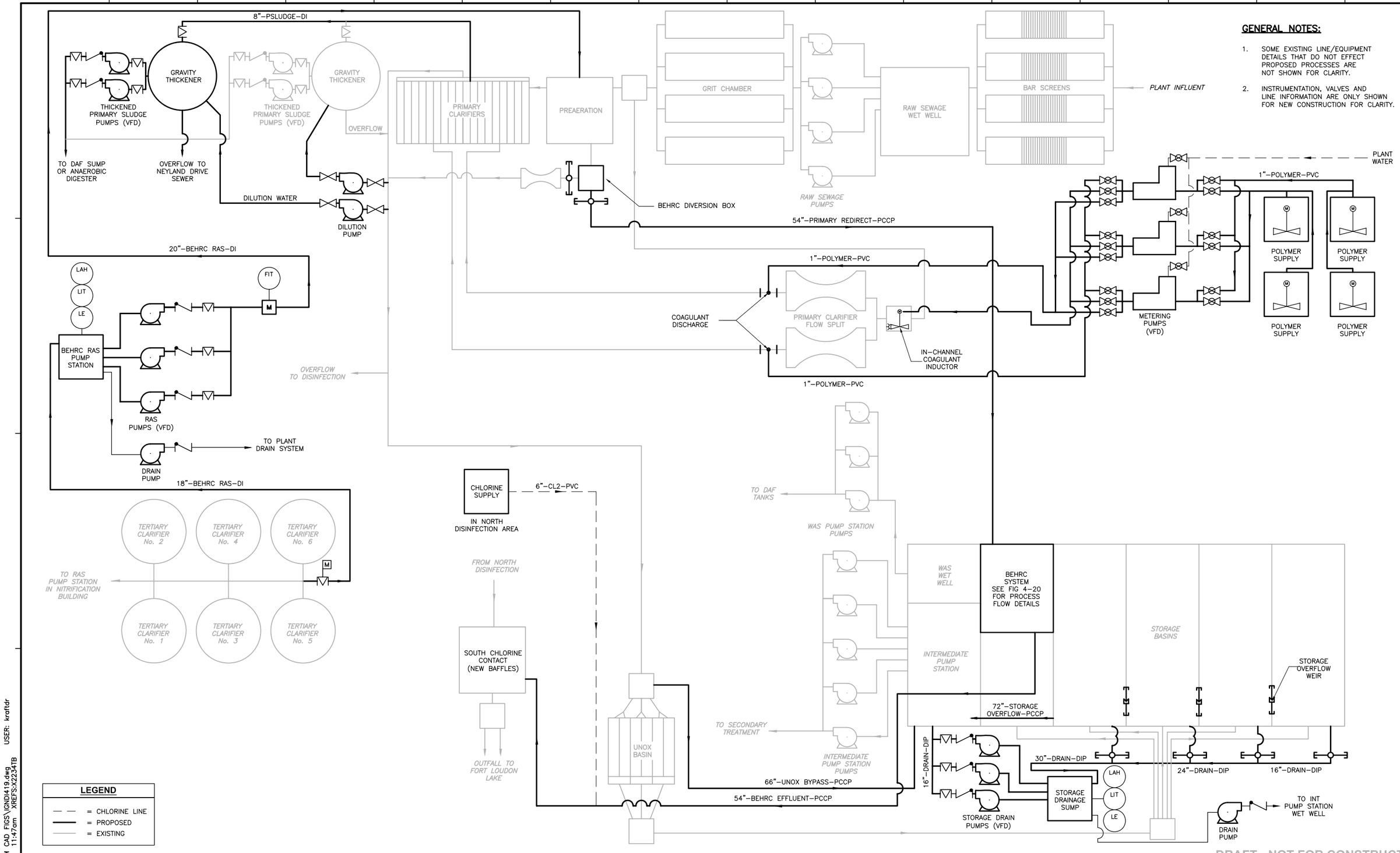
**COMPOSITE CORRECTION PLAN**

**KUWAHEE WWTP OPTION 2: HRC WITH STORAGE PROFILE DETAILS**

PROJECT NO. 10561-54060
FILE NAME: CSTPR417

SHEET NO.

**FIG 4-17**




## GENERAL NOTES:

1. SOME EXISTING LINE/EQUIPMENT DETAILS THAT DO NOT EFFECT PROPOSED PROCESSES ARE NOT SHOWN FOR CLARITY.
2. INSTRUMENTATION, VALVES AND LINE INFORMATION ARE ONLY SHOWN FOR NEW CONSTRUCTION FOR CLARITY.

**LEGEND**

- — — = CHLORINE LINE
- ——— = PROPOSED
- ——— = EXISTING

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**COMPOSITE CORRECTION PLAN**

# KUWAHEE WWTP OPTION 3: BEHRC WITH STORAGE PROCESS FLOW DIAGRAM

PROJECT NO. 10561–54060
FILE NAME: IGNDI419

SHEET NO.
**FIG 4-19**

DWG: G:\KUB\CAD\TM CAD FIGS\IGNDI419.dwg
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XREFS:X2234TB

BEHRC INFLUENT CHANNEL

LIT LE LAH

LAMELLA PLATES

COAGULATION TANK/MIX TANK (2 TANKS, 2 MIXERS)

MATURATION TANK

SETTLING AREA

M

10"–HYDROCYCLONE–DI

10"–DRAIN–DI

HRC INFLUENT PUMPS (VFD)

LAH LIT LE

HRC INFLUENT WET WELL

SCREENING CHANNEL

FROM PRIMARY REDIRECT

54"–PRIMARY REDIRECT–PCCP

BEHRC DRAINAGE SUMP

TO INT PUMP STATION WET WELL

DRAIN PUMP

HYDRO–CYCLONE

TO INTERMEDIATE PUMP STATION

HYDROCYCLONE PUMPS

10"–HYDROCYCLONE RETURN–DI

6"–POLYMER–PVC

CHEMICAL SUPPLY

6"–COAGULANT–PVC

TO SOUTH CHLORINE CONTACT

BEHRC EFFLUENT CHANNEL

**GENERAL NOTES:**

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2. INSTRUMENTATION, VALVES AND LINE INFORMATION ARE ONLY SHOWN FOR NEW CONSTRUCTION FOR CLARITY.

**LEGEND**

— — = CHLORINE LINE
——— = PROPOSED
——— = EXISTING

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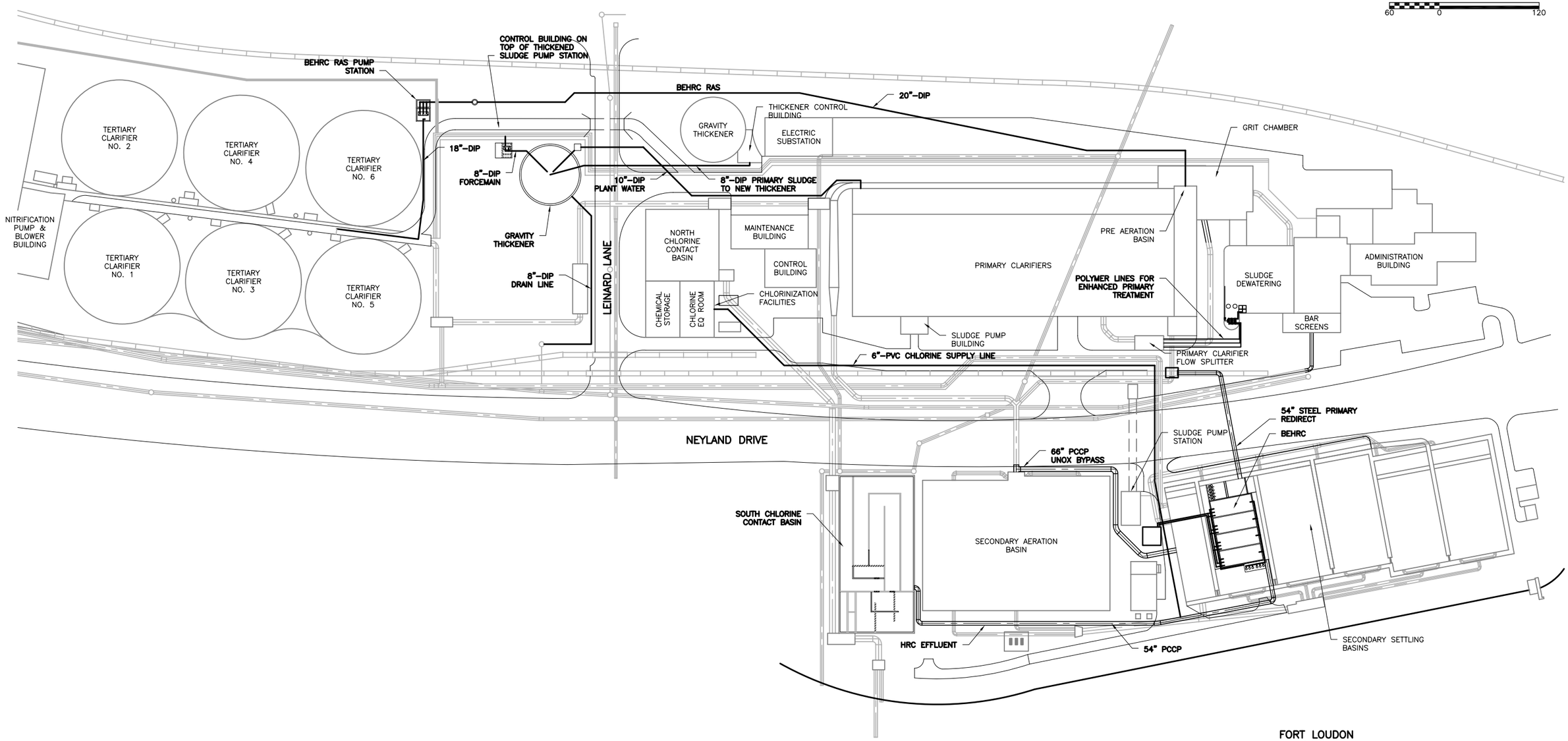
COMPOSITE CORRECTION PLAN

# KUWAHEE WWTP OPTION 3: DETAIL OF BEHRC SYSTEM PROCESS FLOW DIAGRAM

PROJECT NO. 10561–54060
FILE NAME: IGNDI420

SHEET NO.

FIG 4-20




KUWAHEE WASTEWATER TREATMENT PLANT

**PLAN**

1" = 120'

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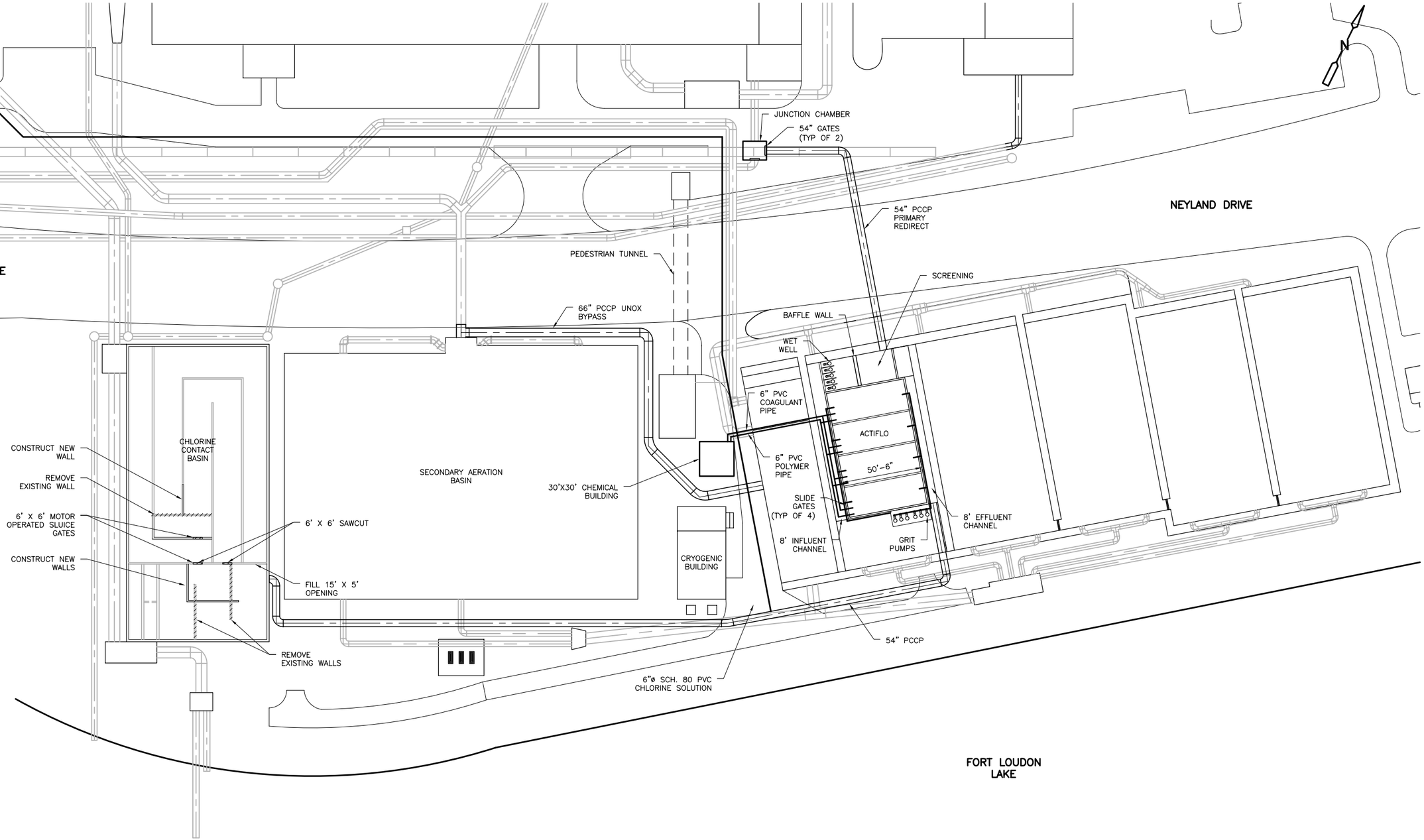
**COMPOSITE CORRECTION PLAN**

**KUWAHEE WWTP OPTION 3: BEHRC WITH STORAGE OVERALL SITE PLAN**

PROJECT NO. 10561-54060
FILE NAME: MSTPL421

SHEET NO.

**FIG 4-21**




## ENLARGED BEHRC TREATMENT AREA

## PLAN

1/64" = 1'- 0"

32 16 0 32 64

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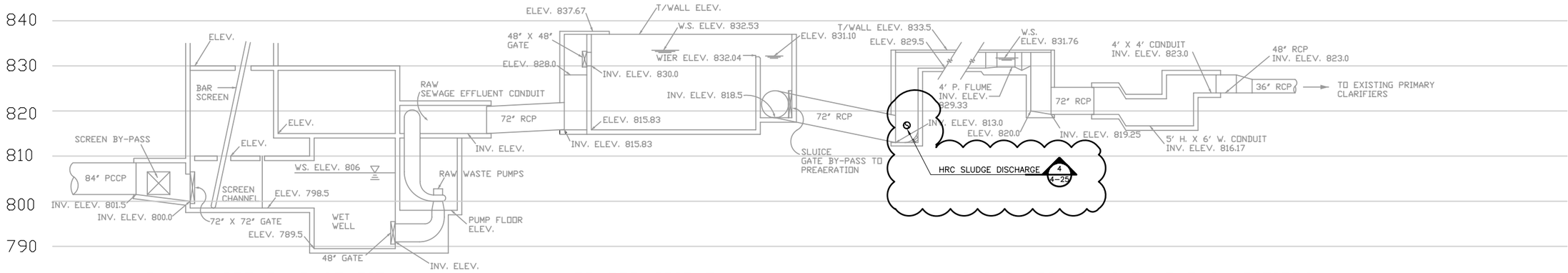
**COMPOSITE CORRECTION PLAN**

**KUWAHEE WWTP OPTION 3: BEHRC WITH STORAGE ENLARGED PLAN OF BEHRC**

PROJECT NO. 10561-54060
FILE NAME: MOPPL422

SHEET NO.

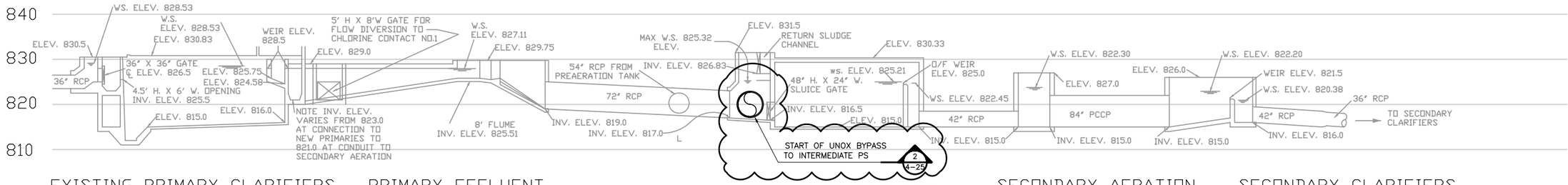
**FIG 4-22**




RAW WASTE PUMP STATION

AERATED GRIT TANK

EXISTING PRIMARY INFLUENT CLARIFIERS
PARSHALL FLUME



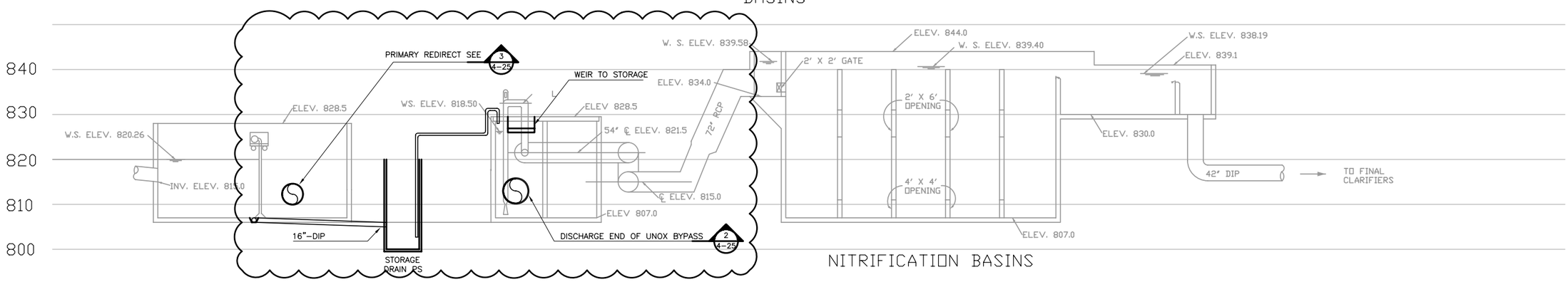

EXISTING PRIMARY CLARIFIERS

PRIMARY EFFLUENT PARSHALL FLUME

SECONDARY AERATION BASINS

SECONDARY AERATION JUNCTION BOX

SECONDARY CLARIFIERS INFLUENT STRUCTURE




SECONDARY CLARIFIERS

INTERMEDIATE PUMP STATION

NITRIFICATION BASINS

DRAFT - NOT FOR CONSTRUCTION

| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|
| | | | | |

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DRAWN BY: D.KRAFT
SHEET CHK'D BY: B.LUECK
CROSS CHK'D BY:
APPROVED BY:
DATE: MAY 2007


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**COMPOSITE CORRECTION PLAN**

**KUWAHEE WWTP OPTION 3: BEHRC WITH STORAGE PLANT WIDE PROFILE**

PROJECT NO. 10561-54060
FILE NAME: CSTPR423

SHEET NO.
**FIG 4-23**

DWG: G:\KUB\CAD\TM CAD FIGS\CSTPR423.dwg
DATE: May 16, 2007 11:48am
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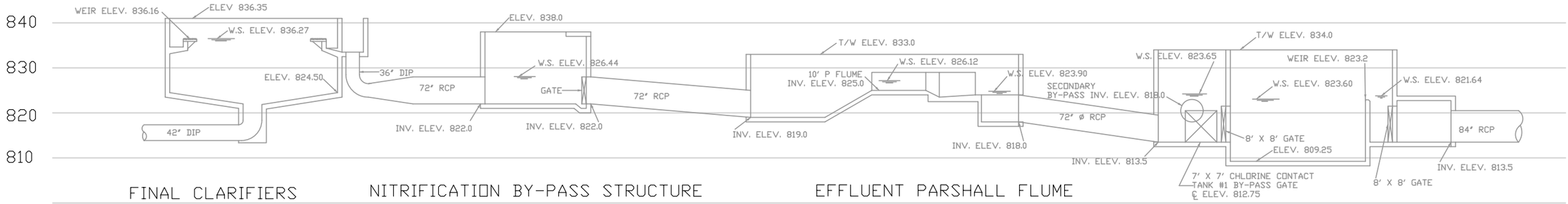
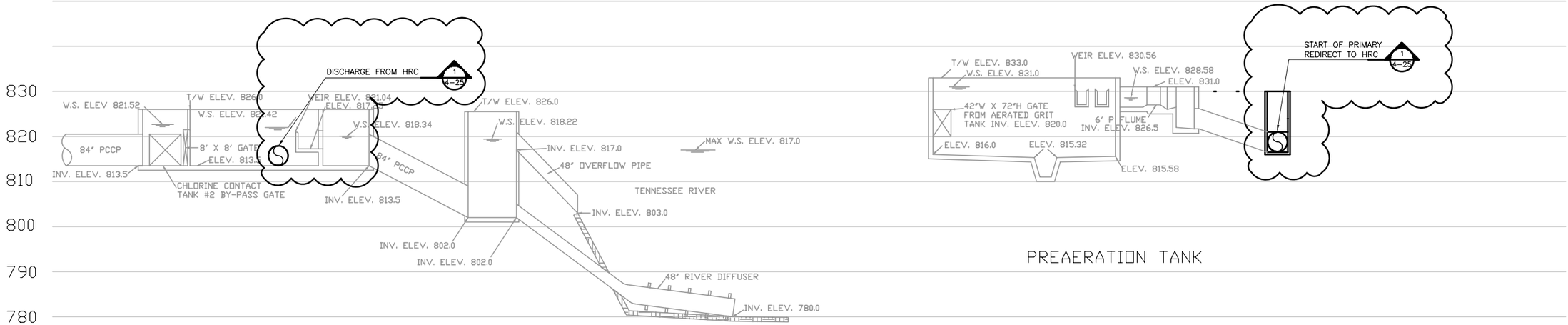
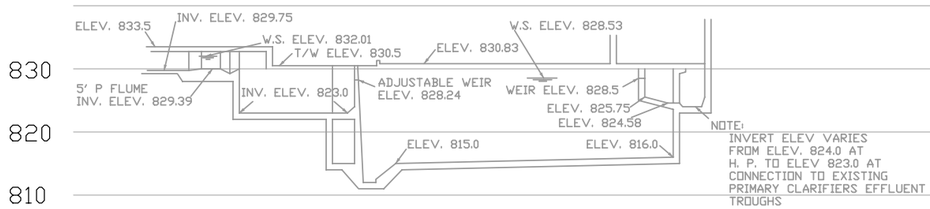
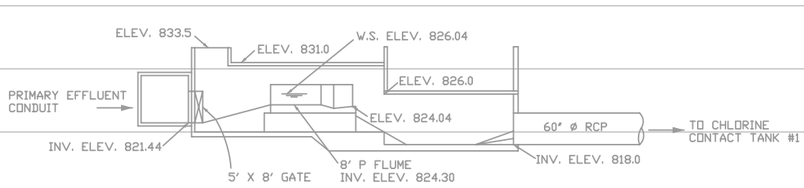



EFFLUENT OVERFLOW STRUCTURE

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SHEET CHK'D BY: B.LUECK
CROSS CHK'D BY:
APPROVED BY:
DATE: MAY 2007


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KNOXVILLE UTILITIES BOARD
KNOXVILLE, TENNESSEE

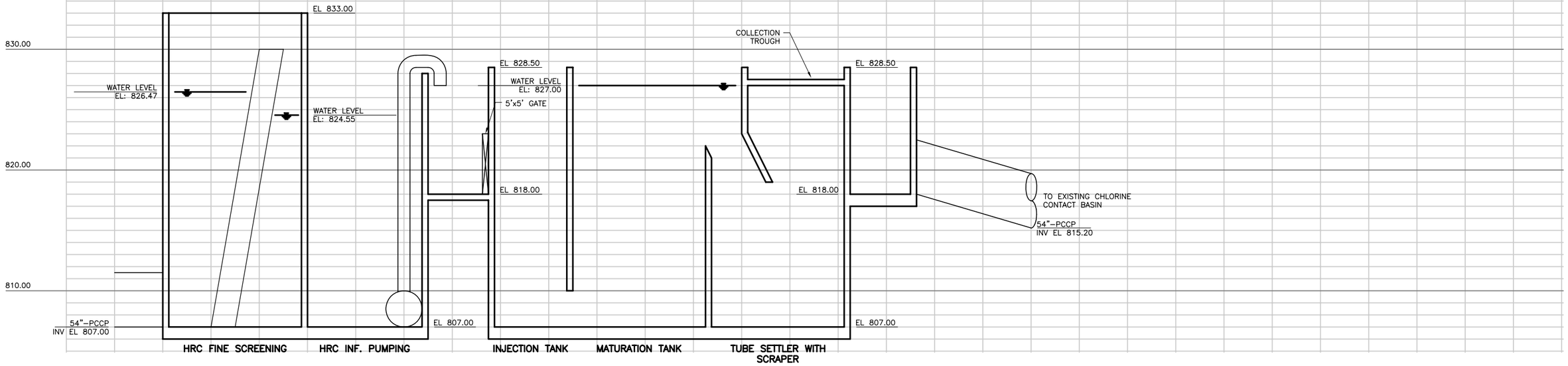
**COMPOSITE CORRECTION PLAN**

**KUWAHEE WWTP OPTION 3: BEHRC WITH STORAGE PLANT WIDE PROFILE**

PROJECT NO. 10561-54060
FILE NAME: CSTPR424

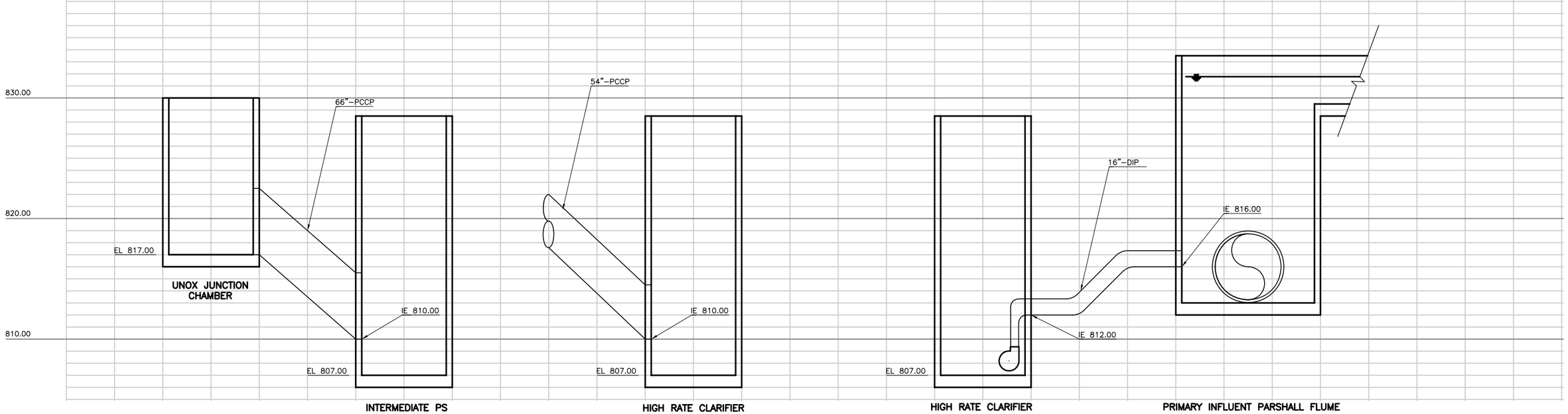
SHEET NO.

**FIG 4-24**




HRC FINE SCREENING TO CL2 CONTACT BASIN

**SECTION 1** — 4-25




UNOX BYPASS

**SECTION 2** — 4-25

PRIMARY REDIRECT

**SECTION 3** — 4-25

HIGH RATE CLARIFIER SLUDGE PUMP STATION

**SECTION 4** — 4-25

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APPROVED BY:
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**COMPOSITE CORRECTION PLAN**

**KUWAHEE WWTP OPTION 3: BEHRC WITH STORAGE PROFILE DETAILS**

PROJECT NO. 10561-54060
FILE NAME: CSTPR425

SHEET NO.

**FIG 4-25**

DWG: G:\KUB\CAD\TM CAD FIGS\CSTPR425.dwg
DATE: May 16, 2007 11:49am XREFS:K22341B
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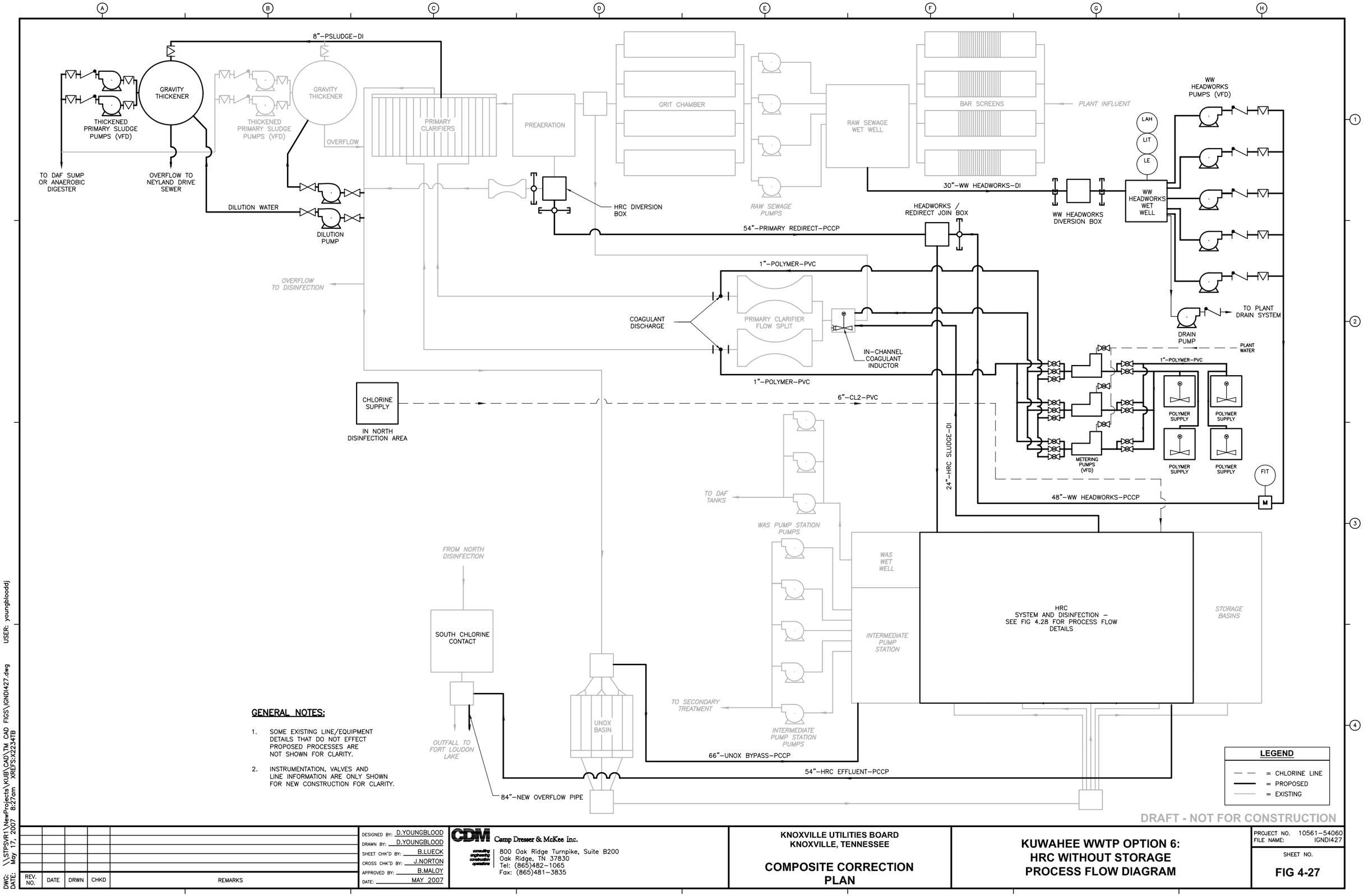


**GENERAL NOTES:**

1. SOME EXISTING LINE/EQUIPMENT DETAILS THAT DO NOT EFFECT PROPOSED PROCESSES ARE NOT SHOWN FOR CLARITY.
2. INSTRUMENTATION, VALVES AND LINE INFORMATION ARE ONLY SHOWN FOR NEW CONSTRUCTION FOR CLARITY.

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CROSS CHK'D BY: J.NORTON
APPROVED BY: B.MALOY
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**COMPOSITE CORRECTION PLAN**

# KUWAHEE WWTP OPTION 6: HRC WITHOUT STORAGE PROCESS FLOW DIAGRAM

PROJECT NO. 10561–54060
FILE NAME: IGND1427

SHEET NO.
**FIG 4-27**

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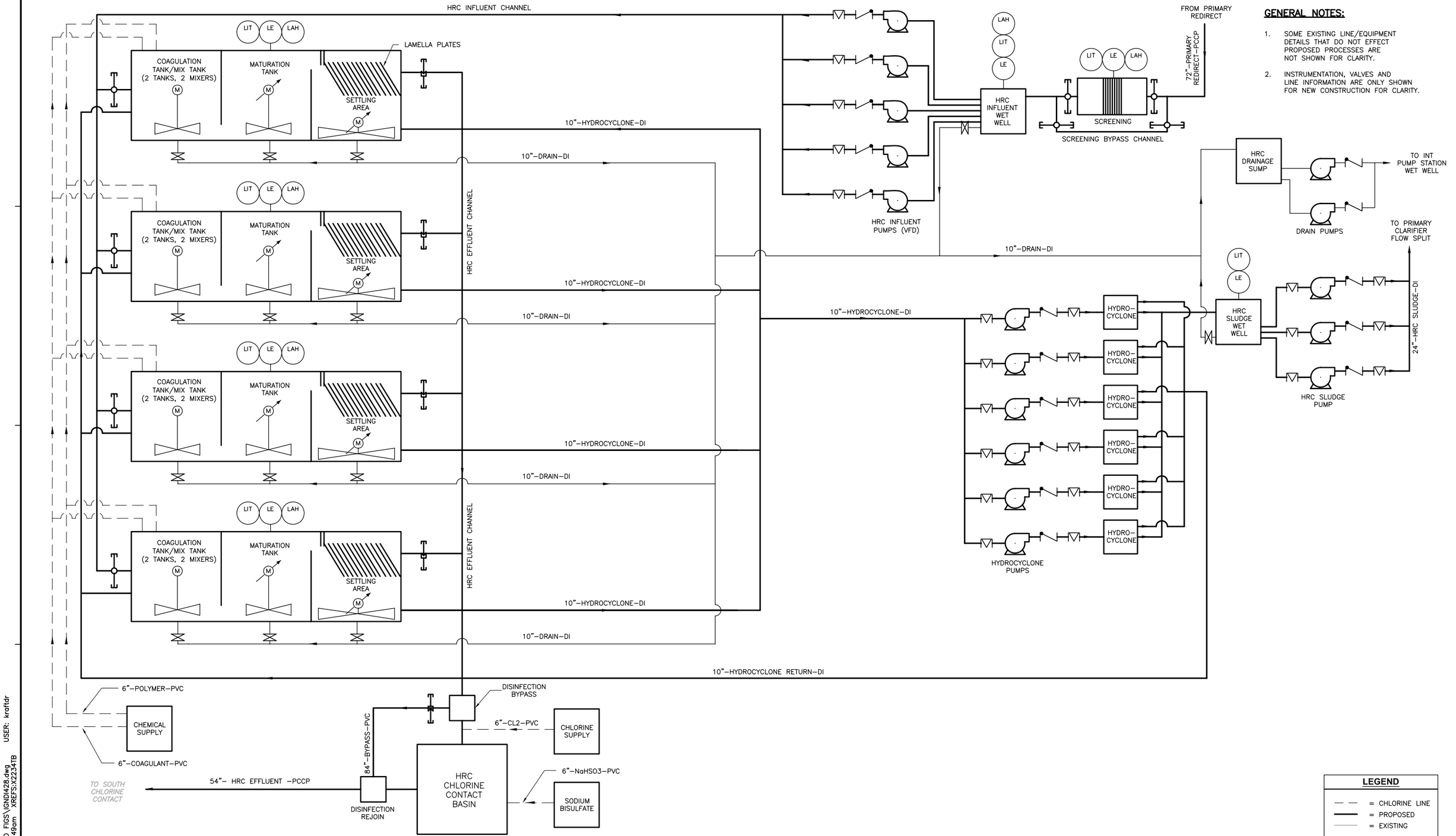


## GENERAL NOTES:

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2. INSTRUMENTATION, VALVES AND LINE INFORMATION ARE ONLY SHOWN FOR NEW CONSTRUCTION FOR CLARITY.

**LEGEND**

- — — = CHLORINE LINE
- ——— = PROPOSED
- ——— = EXISTING

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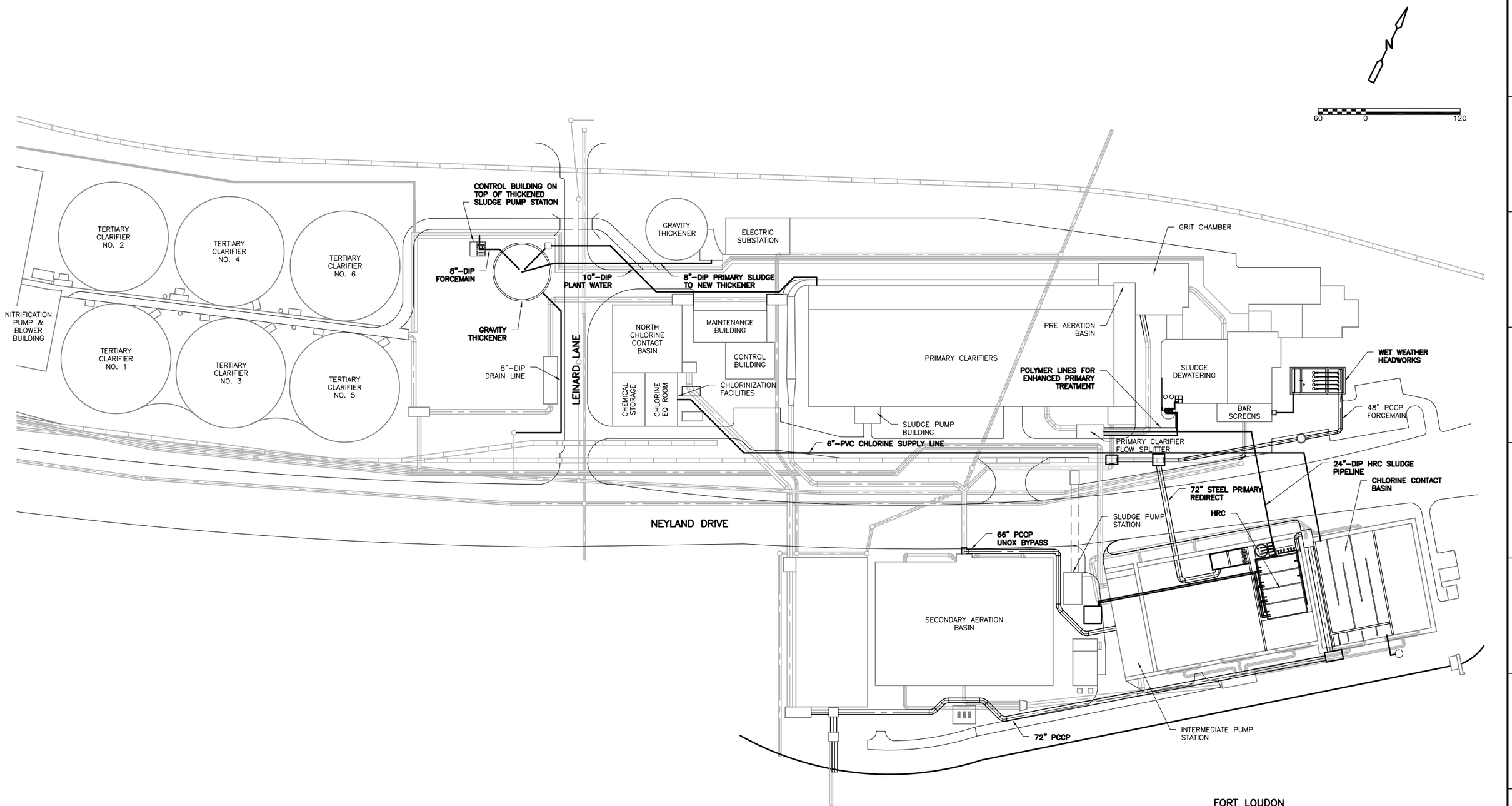
**COMPOSITE CORRECTION PLAN**

# KUWAHEE WWTP OPTION 6: DETAIL OF HRC SYSTEM PROCESS FLOW DIAGRAM

PROJECT NO. 10561–54060
FILE NAME: IGNDI428

SHEET NO.

**FIG 4-28**




KUWAHEE WASTEWATER TREATMENT PLANT

**PLAN**

1" = 120'

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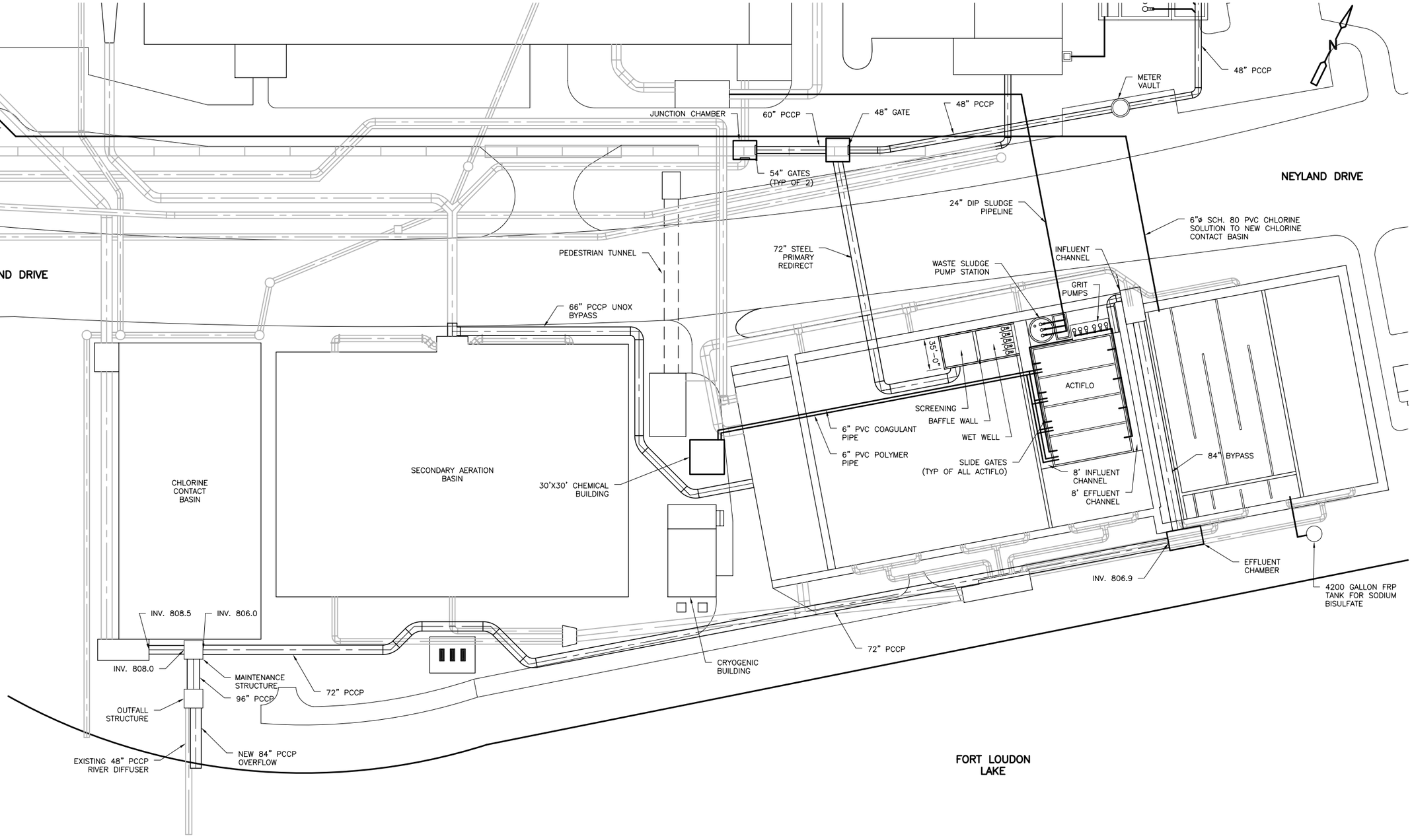
**COMPOSITE CORRECTION PLAN**

**KUWAHEE WWTP OPTION 6: HRC WITHOUT STORAGE OVERALL SITE PLAN**

PROJECT NO. 10561-54060
FILE NAME: MSTPL429

SHEET NO.

**FIG 4-29**




## ENLARGED HRC TREATMENT AREA

## PLAN

1/64" = 1'- 0"

32 16 0 32 64

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DWG: G:\KUB\CAD\TM CAD FIGS\MOPPL430.dwg XREFS:X2234TB XCSTPL10 XMSTPL10
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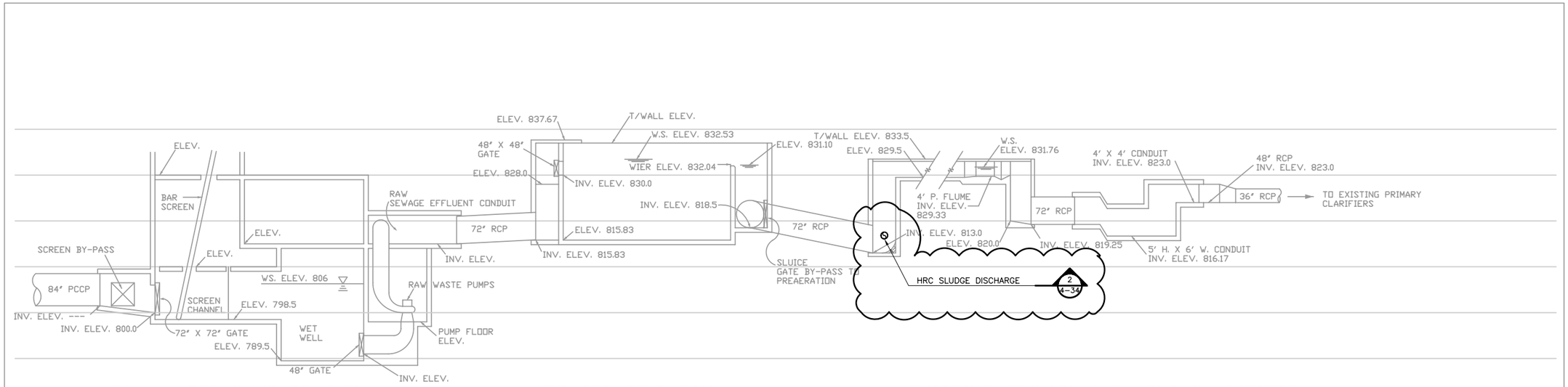
COMPOSITE CORRECTION PLAN

# KUWAHEE WWTP OPTION 6: HRC WITHOUT STORAGE ENLARGED PLAN OF HRC

PROJECT NO. 10561-54060
FILE NAME: MOPPL430

SHEET NO.

FIG 4-30

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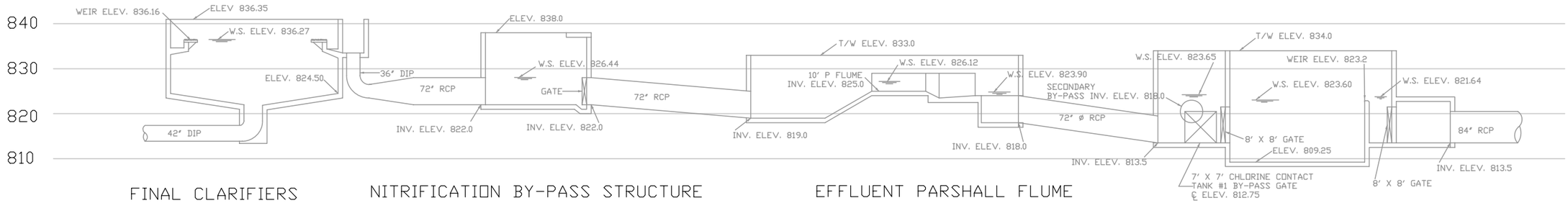
**COMPOSITE CORRECTION PLAN**

**KUWAHEE WWTP OPTION 6: HRC WITHOUT STORAGE PLANT WIDE PROFILE**

PROJECT NO. 10561-54060
FILE NAME: CSTPR431

SHEET NO.

**FIG 4-31**

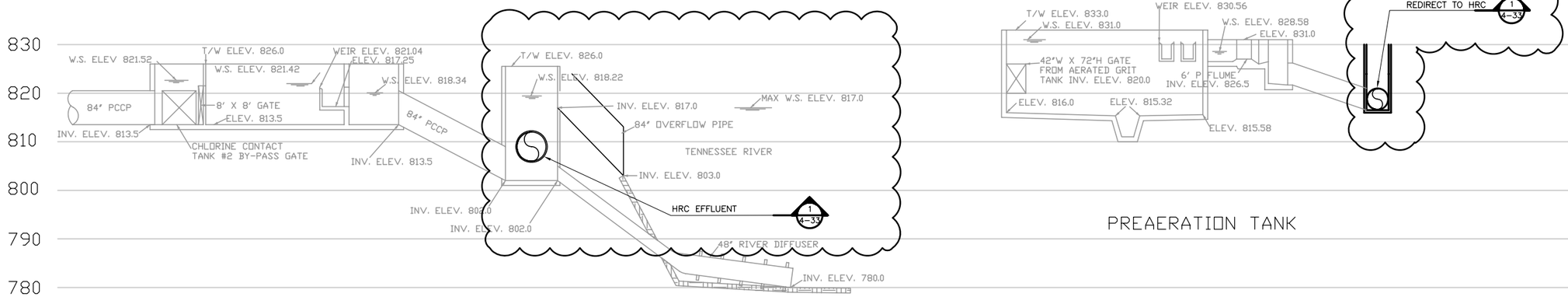



FINAL CLARIFIERS

NITRIFICATION BY-PASS STRUCTURE

EFFLUENT PARSHALL FLUME

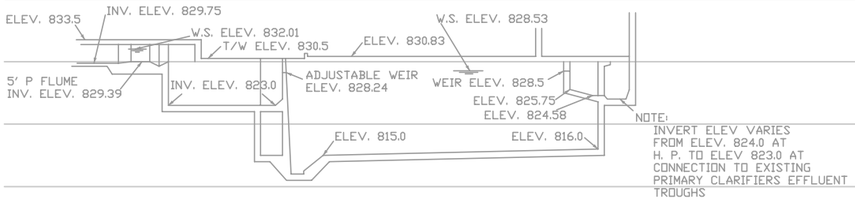
CHLORINE CONTACT TANK NO. 1



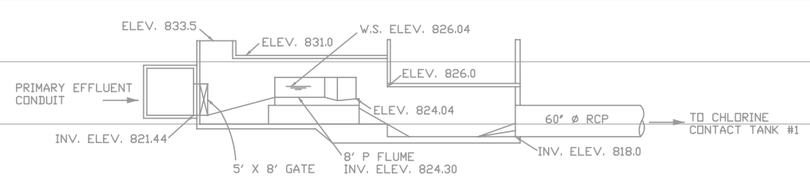

CHLORINE CONTACT TANK NO. 2

PREAERATION TANK

EFFLUENT OVERFLOW STRUCTURE




NEW PRIMARY CLARIFIERS




SECONDARY BY-PASS PARSHALL FLUME

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KNOXVILLE UTILITIES BOARD
KNOXVILLE, TENNESSEE

**COMPOSITE CORRECTION PLAN**

**KUWAHEE WWTP OPTION 6:**
**HRC WITHOUT STORAGE**
**PLANT WIDE PROFILE**

PROJECT NO. 10561-54060
FILE NAME: CSTPR432

SHEET NO.

**FIG 4-32**

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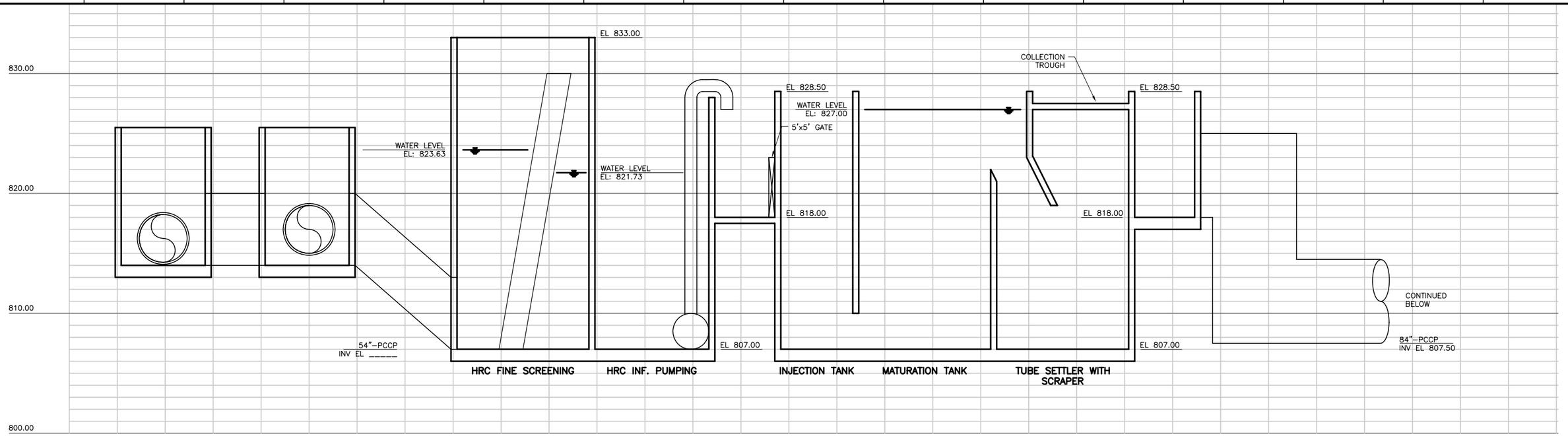
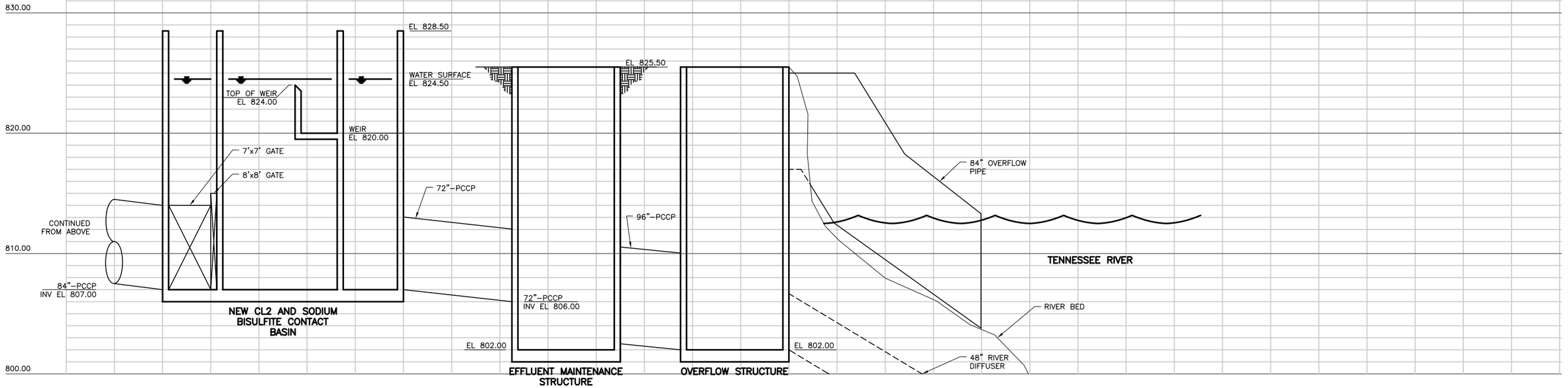



HRC FINE SCREENING TO EFFLUENT OVERFLOW STRUCTURE

**SECTION** 1 / 4-33

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**COMPOSITE CORRECTION PLAN**

**KUWAHEE WWTP OPTION 6: HRC WITHOUT STORAGE PROFILE DETAILS**

PROJECT NO. 10561-54060
FILE NAME: CSTPR433

SHEET NO.

**FIG 4-33**

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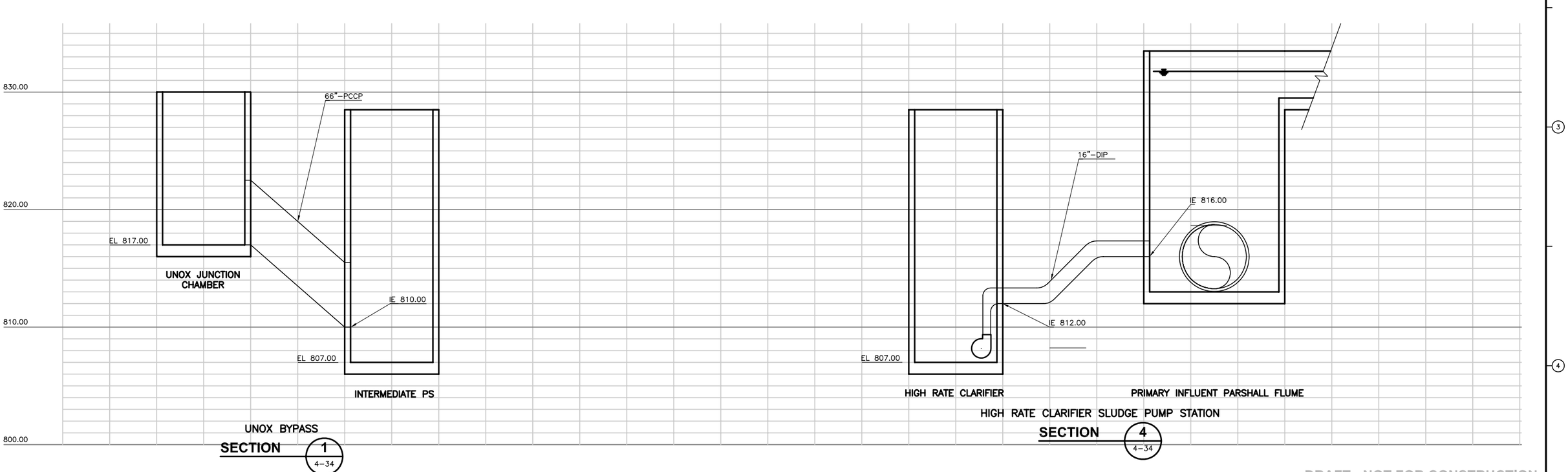


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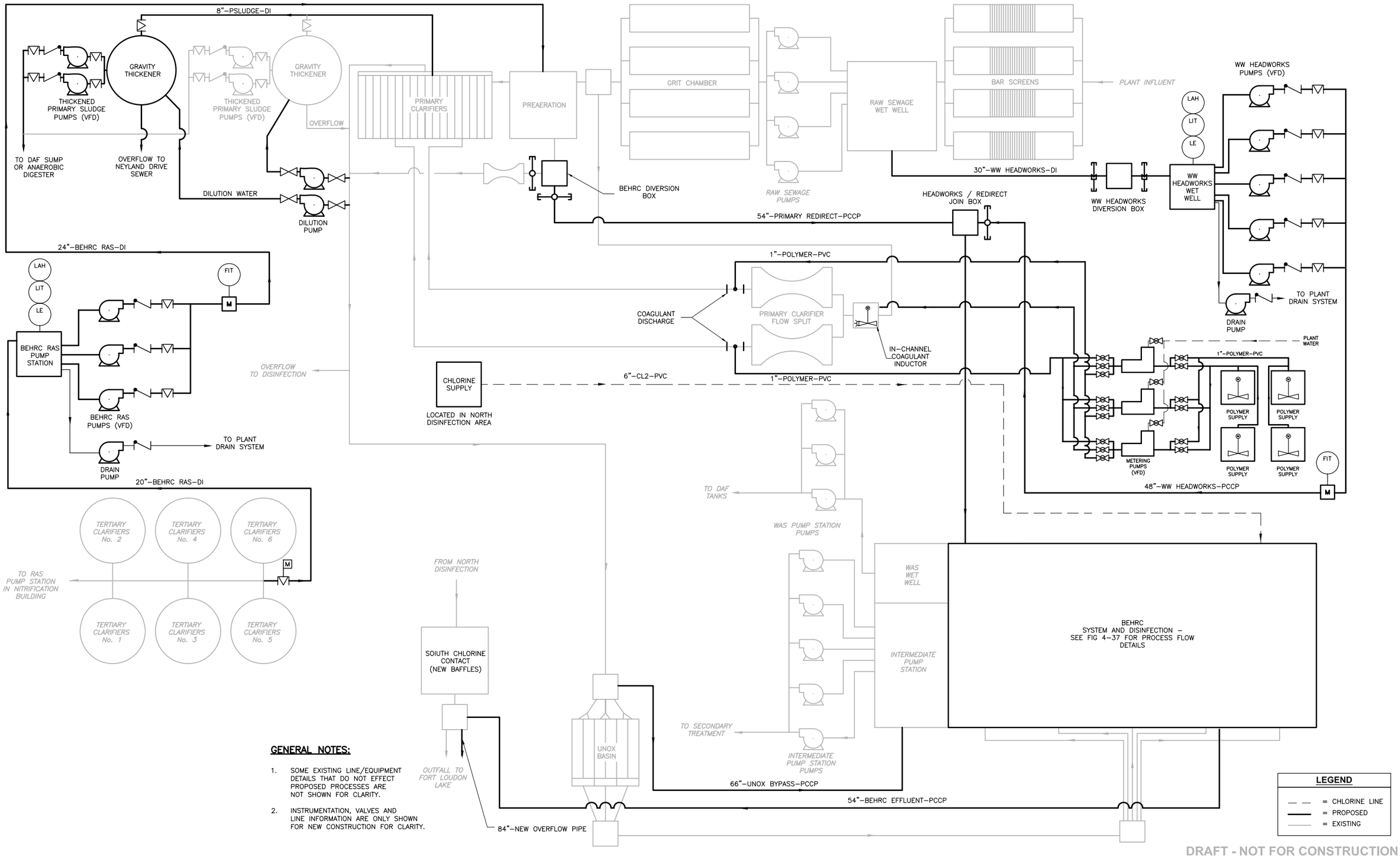
COMPOSITE CORRECTION PLAN

# KUWAHEE WWTP OPTION 6: HRC WITHOUT STORAGE PROFILE DETAILS

PROJECT NO. 10561–54060
FILE NAME: CSTPR434

SHEET NO.

FIG 4-34




**GENERAL NOTES:**

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**LEGEND**

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——— = EXISTING

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APPROVED BY: B.MALOY
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**COMPOSITE CORRECTION PLAN**

# KUWAHEE WWTP OPTION 7: BEHRC WITHOUT STORAGE PROCESS FLOW DIAGRAM

PROJECT NO. 10561–54060
FILE NAME: IGNDI436

SHEET NO.

**FIG 4-36**

BEHRC INFLUENT CHANNEL

LIT LE LAH

LAMELLA PLATES

COAGULATION TANK/MIX TANK (2 TANKS, 2 MIXERS)

MATURATION TANK

SETTLING AREA

BEHRC INFLUENT PUMPS (VFD)

BEHRC INFLUENT WET WELL

SCREENING

SCREENING BYPASS CHANNEL

AERATION EFFLUENT CHANNEL

AERATION BASINS

AERATION SPLITTER BOX

FROM PRIMARY REDIRECT

82"–PRIMARY REDIRECT–PCCP

42"–PRIMARY REDIRECT–PCCP

BEHRC DRAINAGE SUMP

DRAIN PUMP

TO INT PUMP STATION WET WELL

10"–DRAIN–DI

10"–HYDROCYCLONE–DI

HRC EFFLUENT CHANNEL

HYDRO–CYCLONE

HYDROCYCLONE PUMPS

TO INTERMEDIATE PUMP STATION

10"–HYDROCYCLONE RETURN–DI

TO 6TH BEHRC

FROM CHEMICAL SUPPLY LINE

6"–POLYMER–PVC

6"–COAGULANT–PVC

CHEMICAL SUPPLY

BEHRC EFFLUENT CHANNEL

DISINFECTION BYPASS

6"–CL2–PVC

CHLORINE SUPPLY

HRC CHLORINE CONTACT BASIN

6"–NaHSO3–PVC

SODIUM BISULFATE

54"–BEHRC EFFLUENT–PCCP

DISINFECTION REJOIN

TO SOUTH CHLORINE CONTACT

**GENERAL NOTES:**

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——— = PROPOSED
——— = EXISTING

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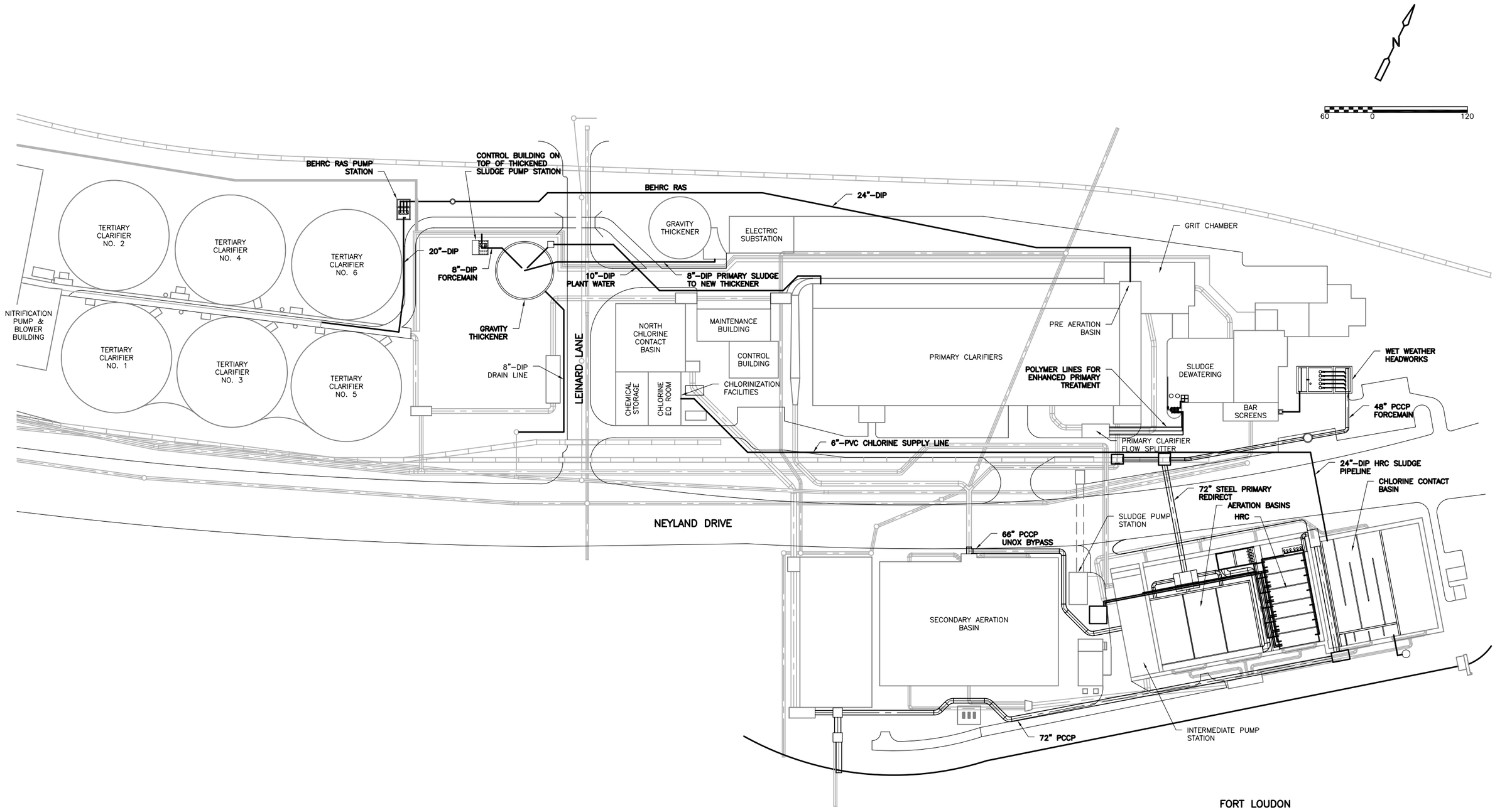
COMPOSITE CORRECTION PLAN

# KUWAHEE WWTP OPTION 7: DETAIL OF BEHRC SYSTEM PROCESS FLOW DIAGRAM

PROJECT NO. 10561–54060
FILE NAME: IGNDI437

SHEET NO.

FIG 4-37




KUWAHEE WASTEWATER TREATMENT PLANT

**PLAN**

1" = 120'

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DWG: G:\KUB\CAD\TM CAD FIGS\MSTPL438.dwg USER: kraftdr
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**COMPOSITE CORRECTION PLAN**

**KUWAHEE WWTP OPTION 7: BEHRC WITHOUT STORAGE OVERALL SITE PLAN**

PROJECT NO. 10561-54060
FILE NAME: MSTPL438

SHEET NO.

**FIG 4-38**

CHLORINE SCRUBBER

CHLORINE EQUIPMENT ROOM

NEYLAND DRIVE

PEDESTRIAN TUNNEL

66" PCCP UNOX BYPASS

CHLORINE CONTACT BASIN

SECONDARY AERATION BASIN

30'X30' CHEMICAL BUILDING

INV. 808.5

INV. 806.0

INV. 808.0

MAINTENANCE STRUCTURE

96" PCCP

72" PCCP

OUTFALL STRUCTURE

EXISTING 48" PCCP RIVER DIFFUSER

NEW 84" PCCP OVERFLOW

48" PCCP

METER VAULT

NEYLAND DRIVE

72" STEEL PRIMARY REDIRECT

6"ø SCH. 80 PVC CHLORINE SOLUTION TO NEW CHLORINE CONTACT BASIN

INFLUENT CHANNEL

BAFFLE WALL

WET WELL

SCREENING

GRIT PUMPS

SLIDE GATES (TYP. OF 3)

16" DIP

6" PVC COAGULANT PIPE

6" PVC POLYMER PIPE

48" PCCP (TYP. OF 3)

84" PCCP

ACTIFLO

8' INFLUENT CHANNEL

8' EFFLUENT CHANNEL

SLIDE GATES (TYP OF ALL ACTIFLO)

84" BYPASS

EFFLUENT WEIR

8' EFFLUENT CHANNEL

72" PCCP

CRYOGENIC BUILDING

INV. 806.9

EFFLUENT CHAMBER

4200 GALLON FRP TANK FOR SODIUM BISULFATE

FORT LOUDON LAKE

## ENLARGED HRC TREATMENT AREA

## PLAN

1/64" = 1'– 0"

32 16 0 32 64

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DWG: G:\KUB\CAD\TM CAD FIGS\MOPPL439.dwg
DATE: May 16, 2007 11:50am
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KNOXVILLE UTILITIES BOARD
KNOXVILLE, TENNESSEE

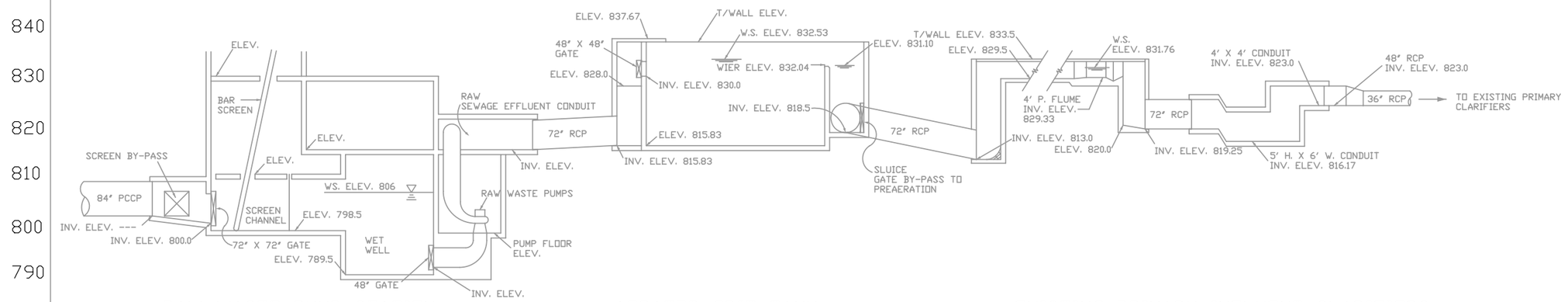
**COMPOSITE CORRECTION PLAN**

# KUWAHEE WWTP OPTION 7: BEHRC WITHOUT STORAGE ENLARGED PLAN OF BEHRC

PROJECT NO. 10561–54060
FILE NAME: MOPPL439

SHEET NO.

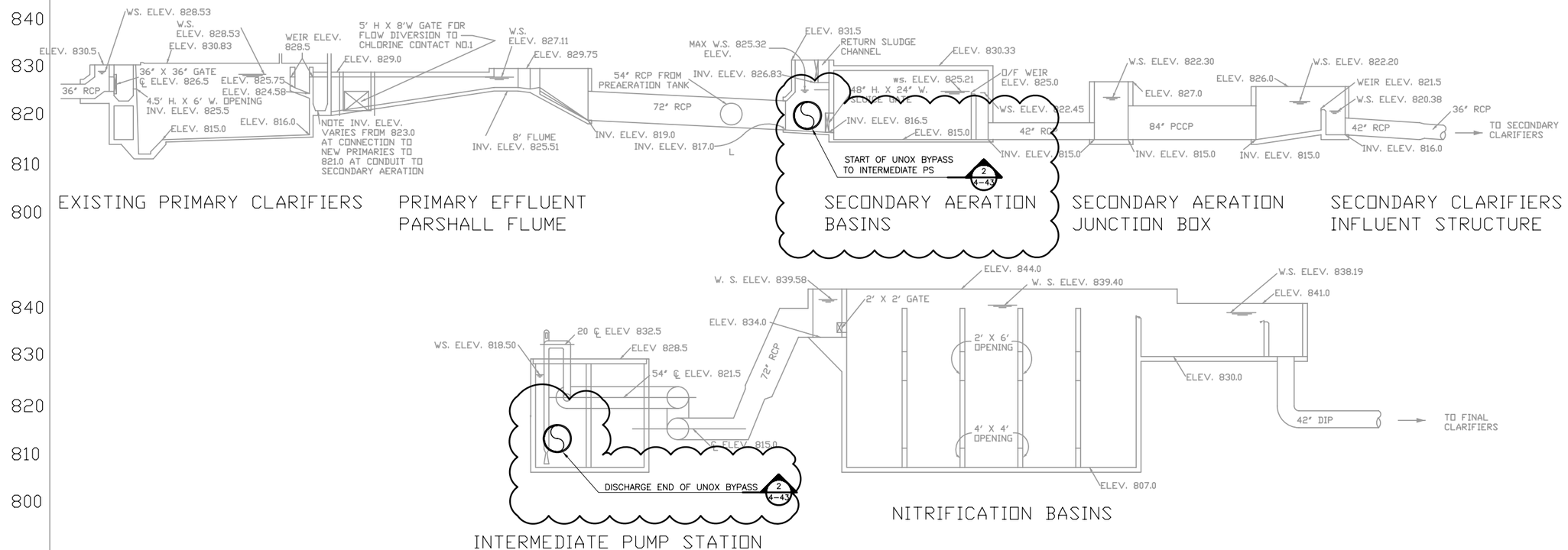
**FIG 4-39**




RAW WASTE PUMP STATION

AERATED GRIT TANK

EXISTING PRIMARY INFLUENT CLARIFIERS
PARSHALL FLUME

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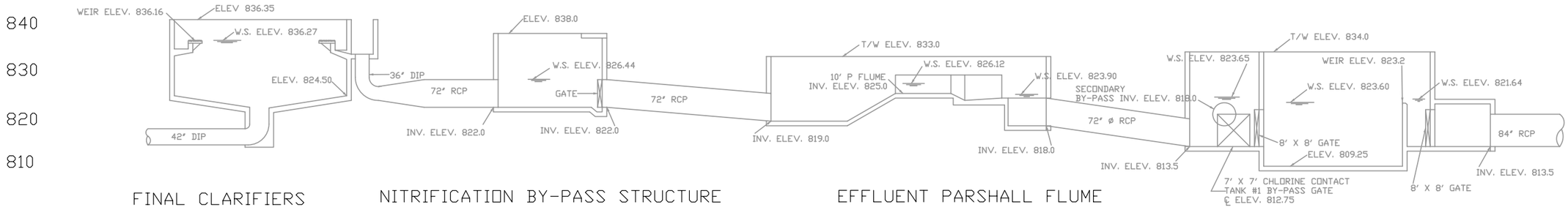
**COMPOSITE CORRECTION PLAN**

**KUWAHEE WWTP OPTION 7: BEHRC WITHOUT STORAGE PLANT WIDE PROFILE**

PROJECT NO. 10561-54060
FILE NAME: CSTPR440

SHEET NO.

**FIG 4-40**

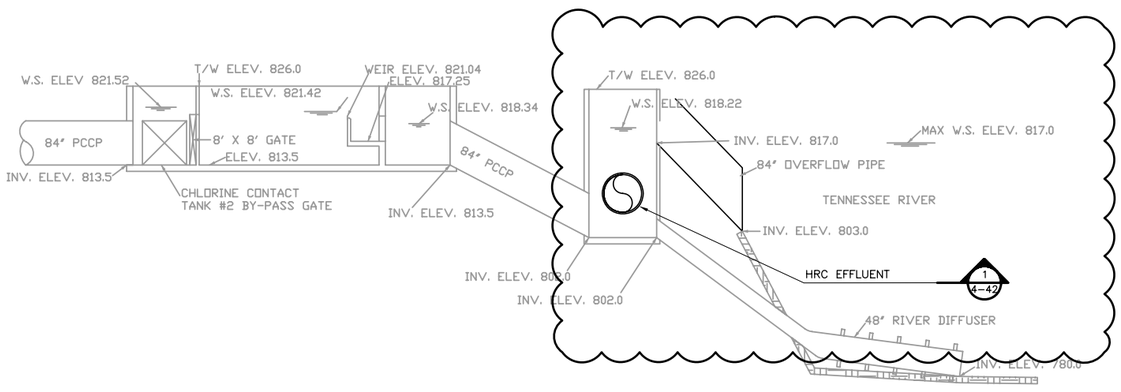



FINAL CLARIFIERS

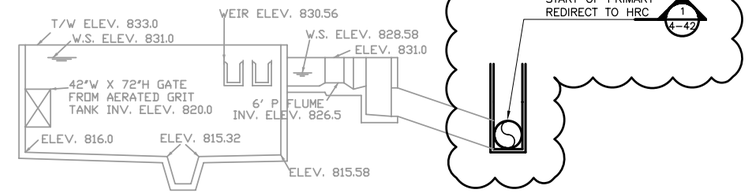
NITRIFICATION BY-PASS STRUCTURE

EFFLUENT PARSHALL FLUME

CHLORINE CONTACT TANK NO. 1

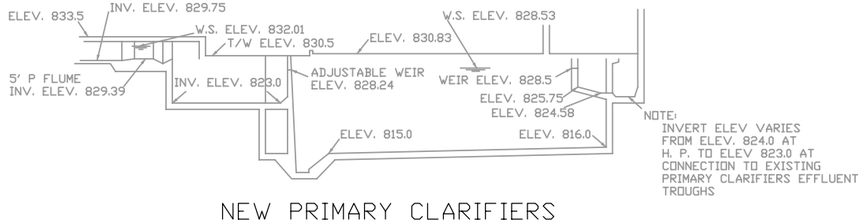



CHLORINE CONTACT TANK NO. 2

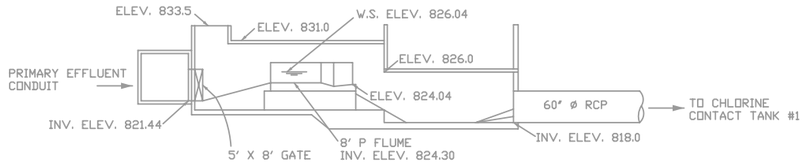



PREAERATION TANK

EFFLUENT OVERFLOW STRUCTURE




NEW PRIMARY CLARIFIERS




SECONDARY BY-PASS PARSHALL FLUME

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**COMPOSITE CORRECTION PLAN**

**KUWAHEE WWTP OPTION 7: BEHRC WITHOUT STORAGE PLANT WIDE PROFILE**

PROJECT NO. 10561-54060
FILE NAME: CSTPR441

SHEET NO.

**FIG 4-41**

DWG: G:\KUB\CAD\TM CAD FIGS\CSTPR441.dwg
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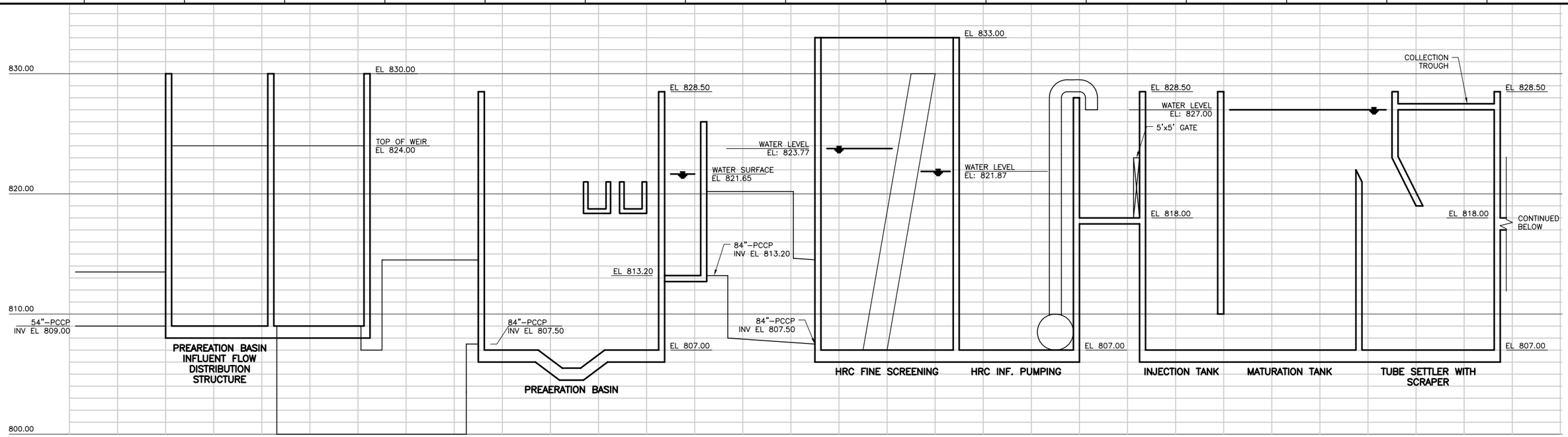
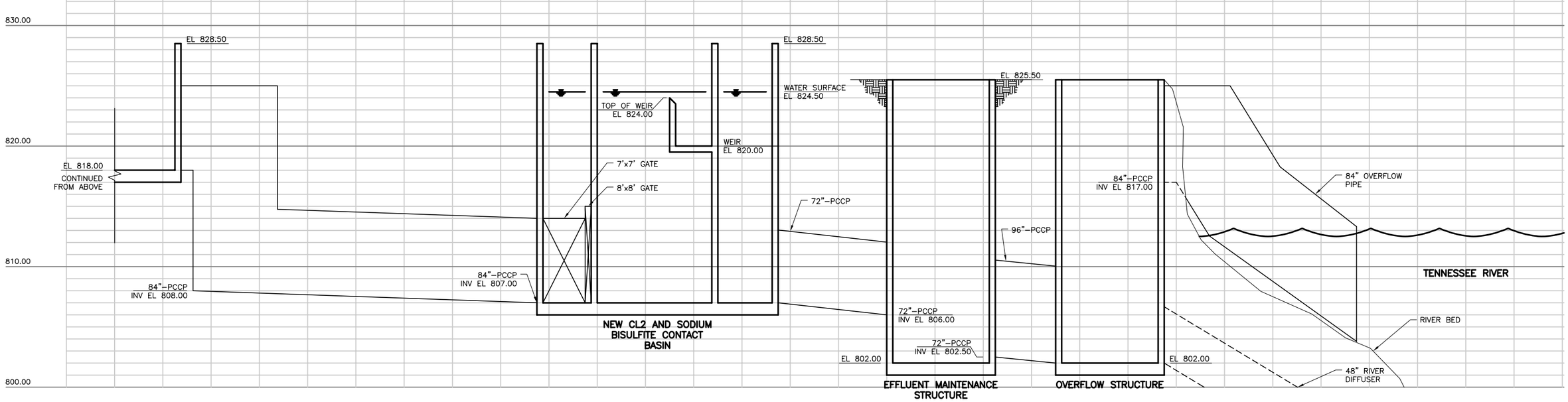



HRC FINE SCREENING TO EFFLUENT OVERFLOW STRUCTURE

**SECTION** 1 / 4-42

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**COMPOSITE CORRECTION PLAN**

**KUWAHEE WWTP OPTION 7: BEHRC WITHOUT STORAGE PROFILE DETAILS**

PROJECT NO. 10561-54060
FILE NAME: CSTPR442

SHEET NO.

**FIG 4-42**

DWG: G:\KUB\CAD\TM CAD FIGS\CSTPR442.dwg
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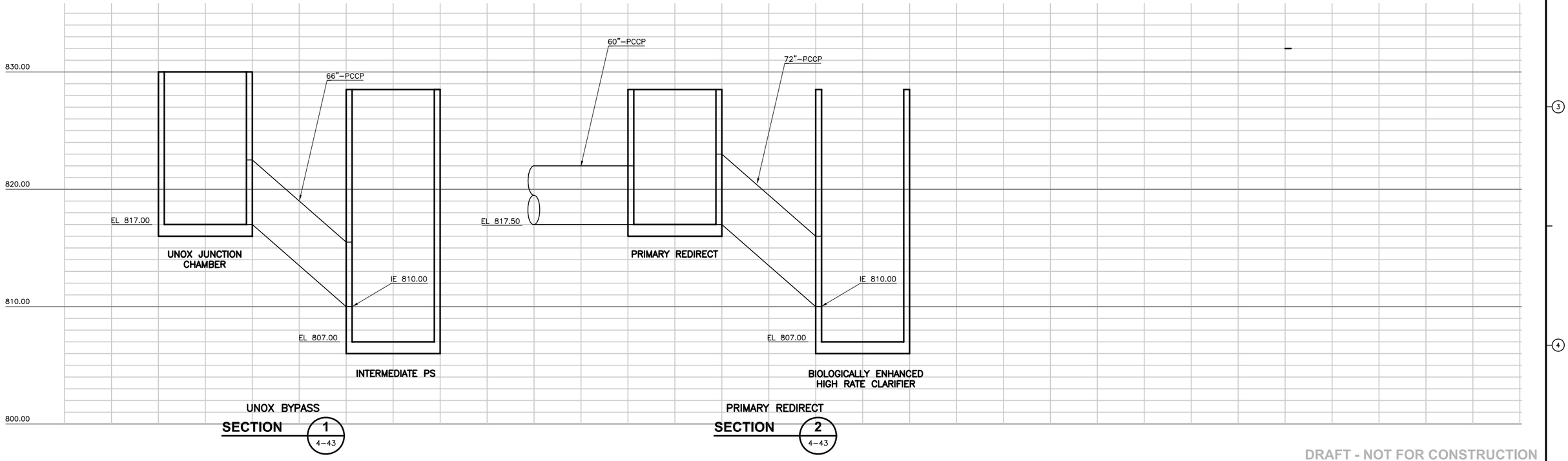
XREFS:X2234TB

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**COMPOSITE CORRECTION PLAN**

**KUWAHEE WWTP OPTION 7: BEHRC WITHOUT STORAGE PROFILE DETAILS**

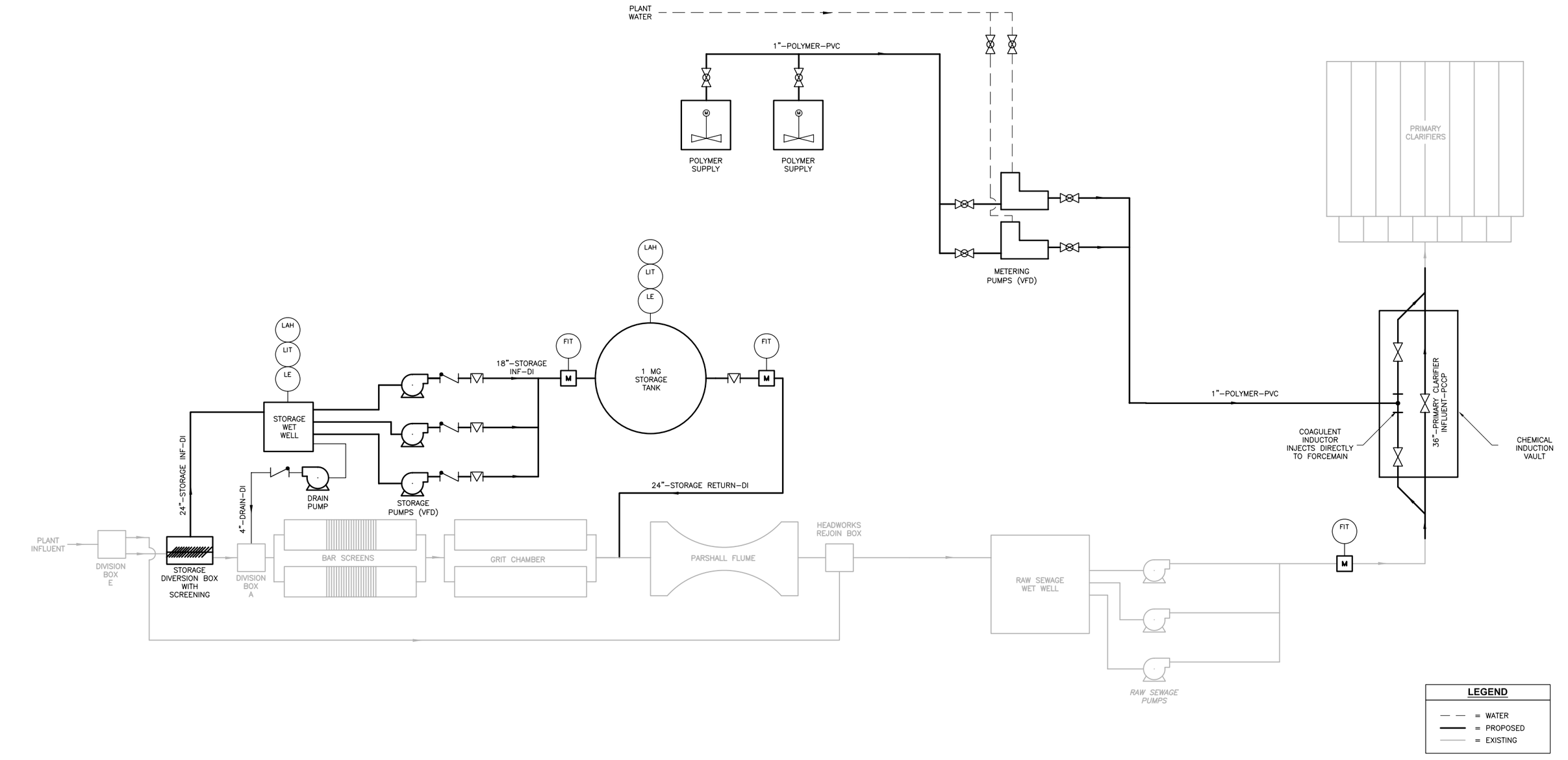
PROJECT NO. 10561-54060
FILE NAME: CSTPR443

SHEET NO.

**FIG 4-43**

## GENERAL NOTES:

1. SOME EXISTING LINE/EQUIPMENT DETAILS THAT DO NOT EFFECT PROPOSED PROCESSES ARE NOT SHOWN FOR CLARITY.
2. INSTRUMENTATION, VALVES, AND LINE INFORMATION ARE ONLY SHOWN FOR NEW CONSTRUCTION FOR CLARITY.




**LEGEND**

— — = WATER
——— = PROPOSED
——— = EXISTING

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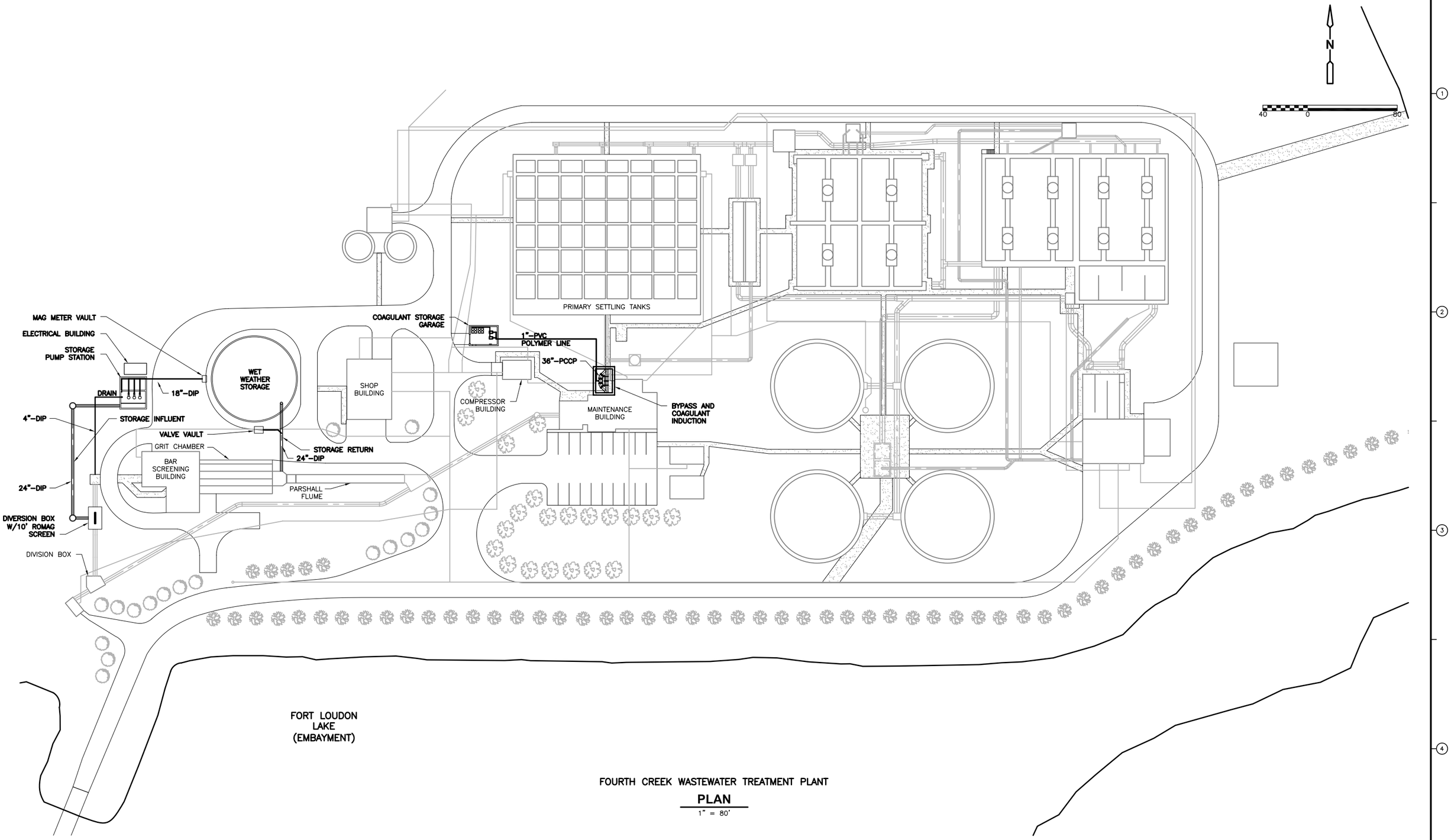
**COMPOSITE CORRECTION PLAN**

# FOURTH CREEK WWTP OPTION 1: CEPT WITH STORAGE PROCESS FLOW DIAGRAM

PROJECT NO. 10561–54060
FILE NAME: IGNDI445

SHEET NO.

**FIG 4-45**




FOURTH CREEK WASTEWATER TREATMENT PLANT

**PLAN**

1" = 80'

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XCSTPL20 XMSTPL20
DWG: G:\KUB\CAD\TM CAD FIGS\MOPPL446.dwg XREFS:X2234TB
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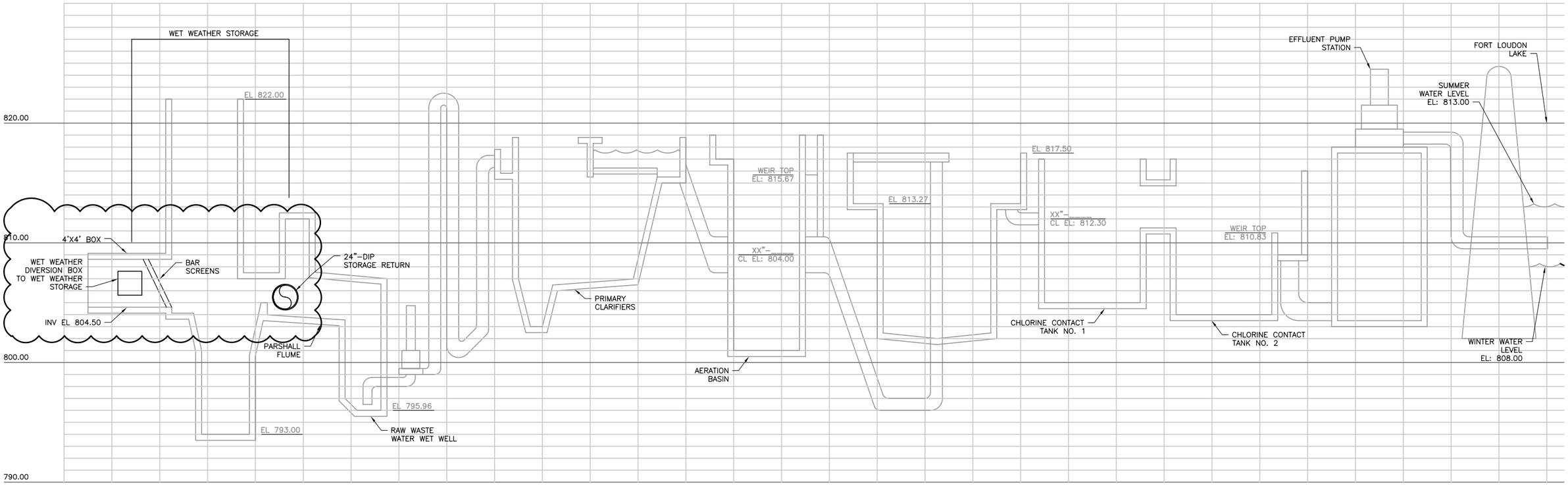
**COMPOSITE CORRECTION PLAN**

**FOURTH CREEK WWTP OPTION 1: CEPT WITH STORAGE OVERALL SITE PLAN**

PROJECT NO. 10561-54060
FILE NAME: MOPPL446

SHEET NO.

**FIG 4-46**

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**COMPOSITE CORRECTION PLAN**

# FOURTH CREEK WWTP OPTION 1: CEPT WITH STORAGE PLANT WIDE PROFILE

PROJECT NO. 10561-54060
FILE NAME: CSTPR447

SHEET NO.

**FIG 4-47**

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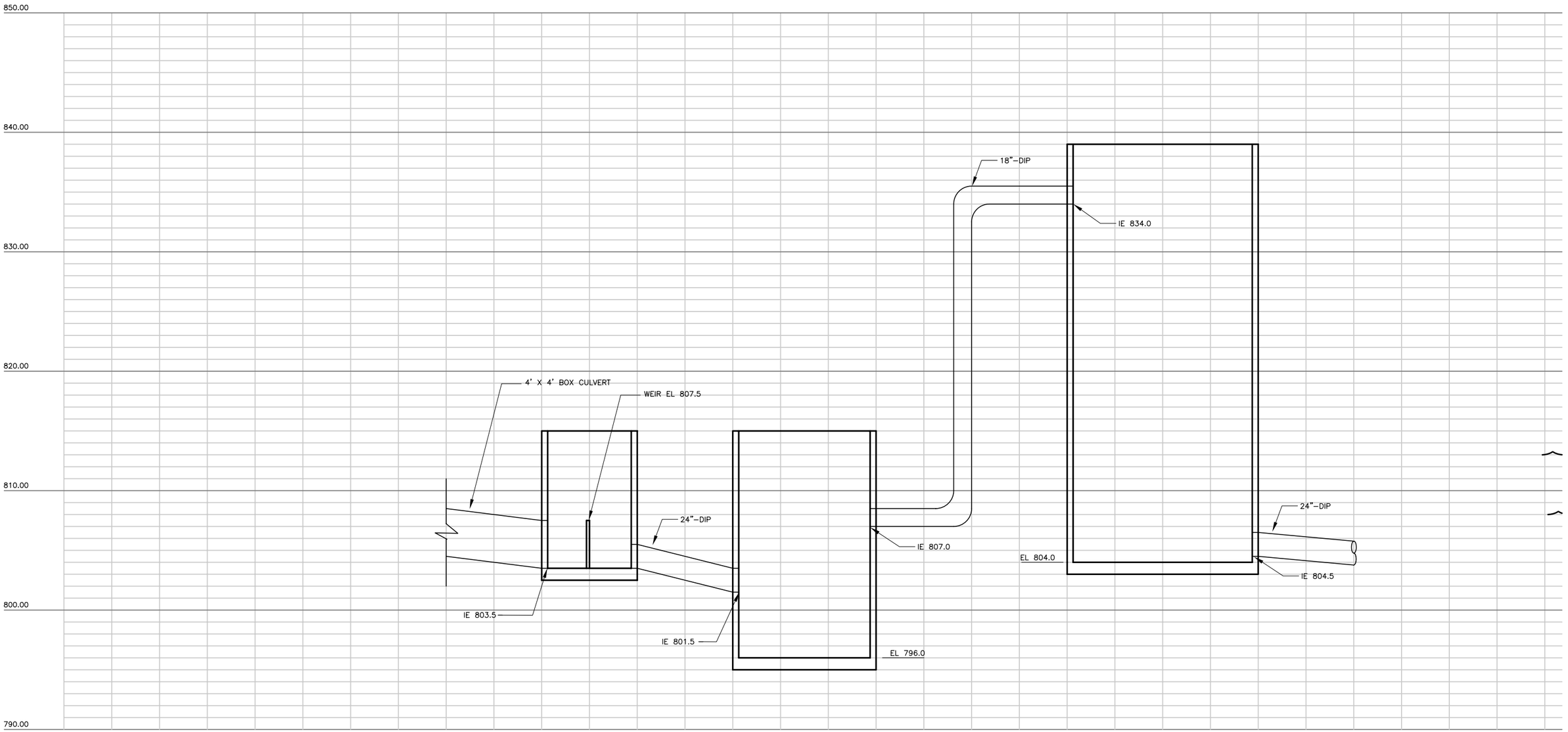


**WET WEATHER STORAGE**
**PROFILE** (1 / 4-48)

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DWG: G:\KUB\CAD\TM CAD FIGS\CSTPR448.dwg
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**COMPOSITE CORRECTION PLAN**

**FOURTH CREEK WWTP OPTION 1: CEPT WITH STORAGE PROFILE DETAILS**

PROJECT NO. 10561-54060
FILE NAME: CSTPR448

SHEET NO.
**FIG 4-48**

## GENERAL NOTES:

1. SOME EXISTING LINE/EQUIPMENT DETAILS THAT DO NOTE EFFECT PROPOSED PROCESSES ARE NOT SHOWN FOR CLARITY.
2. INSTRUMENTATION, VALVES AND LINE INFORMATION ARE ONLY SHOWN FOR NEW CONSTRUCTION FOR CLARITY.

WW PUMP STATION WET WELL
LAH
LIT
LE
HRC PUMP STATION PUMPS (VFD)
FIT
M
SCREENING CHANNEL
LIT
LE
LAH
MIXING TANKS
MATURATION TANK
SETTLING AREA
LAMELLA PLATES
FROM PARSHALL FLUME AFTER PRIMARY CLARIFIERS
HRC REJOIN BOX
TO CHLORINE CONTACT BASIN
HRC EFFLUENT CHANNEL
10"–DRAIN–DI
10"–HYDROCYCLONE–DI
HRC DRAINAGE SUMP
DRAIN PUMP
HYDRO–CYCLONE
HYDRO–CYCLONE
HYDRO–CYCLONE
HYDROCYCLONE PUMPS
10"–HYDROCYCLONE RETURN–DI
LIT
LE
HRC SLUDGE WET WELL
HRC SLUDGE PUMPS
FIT
M
10"–HRC SLUDGE–DI
TO PRIMARY CLARIFIERS
DRAIN–DI
DRAIN PUMP
DRAIN–DI
42"–WET WEATHER PUMP STATION–DI
CHEMICAL INDUCTION VAULT
PLANT WATER
1"–POLYMER–PVC
36"–PRIMARY CLARIFIER INFLUENT–PCCP
METERING PUMPS (VFD)
COAGULENT INDUCTOR INJECTS DIRECTLY TO FORCEMAIN
1"–POLYMER–PVC
POLYMER SUPPLY
POLYMER SUPPLY
LAH
LIT
LE
STORAGE WET WELL
18"–STORAGE INF–DI
FIT
M
1 MG STORAGE TANK
FIT
M
24"–STORAGE INF–DI
4"–DRAIN–DI
DRAIN PUMP
STORAGE PUMPS (VFD)
24"–STORAGE RETURN–DI
PLANT INFLUENT
DIVERSION BOX E
STORAGE DIVERSION BOX WITH SCREENING
DIVISION BOX A
BAR SCREENS
GRIT CHAMBER
PARSHALL FLUME
HEADWORKS REJOIN BOX
WW PUMP STATION DIVERSION BOX
INFLUENT WET WELL (IN MAIN BUILDING)
FIT
M
RAW SEWAGE PUMPS

**LEGEND**

= PROPOSED PROCESS LINES
= PROPOSED DRAIN LINES
= EXISTING

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**COMPOSITE CORRECTION PLAN**

# FOURTH CREEK WWTP OPTION 2: HRC WITH STORAGE PROCESS FLOW DIAGRAM

PROJECT NO. 10561–54060
FILE NAME: IGNDI450

SHEET NO.
**FIG 4-50**

DWG: G:\KUB\CAD\TM CAD FIGS\IGNDI450.dwg
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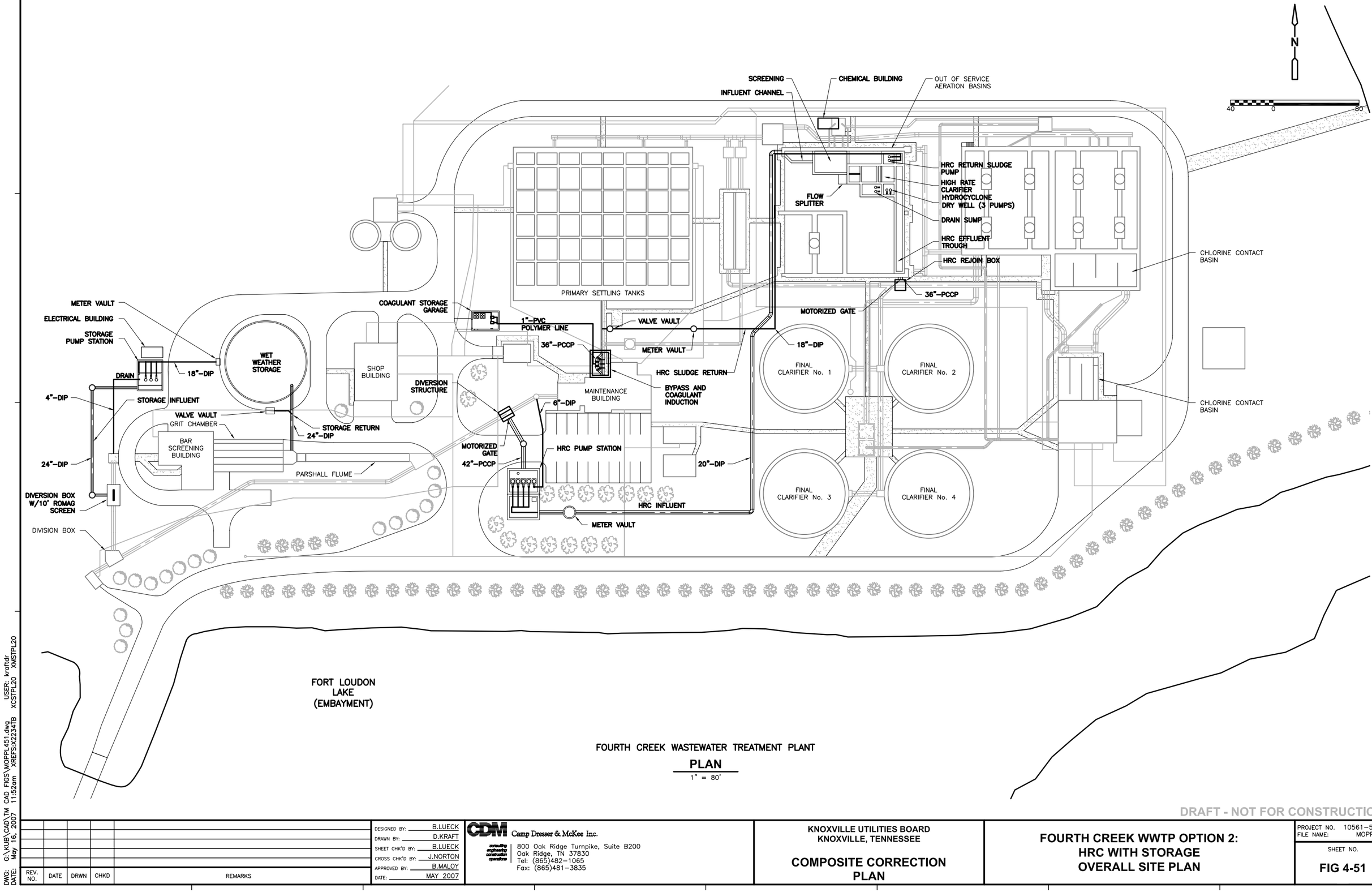


FOURTH CREEK WASTEWATER TREATMENT PLANT

**PLAN**

1" = 80'

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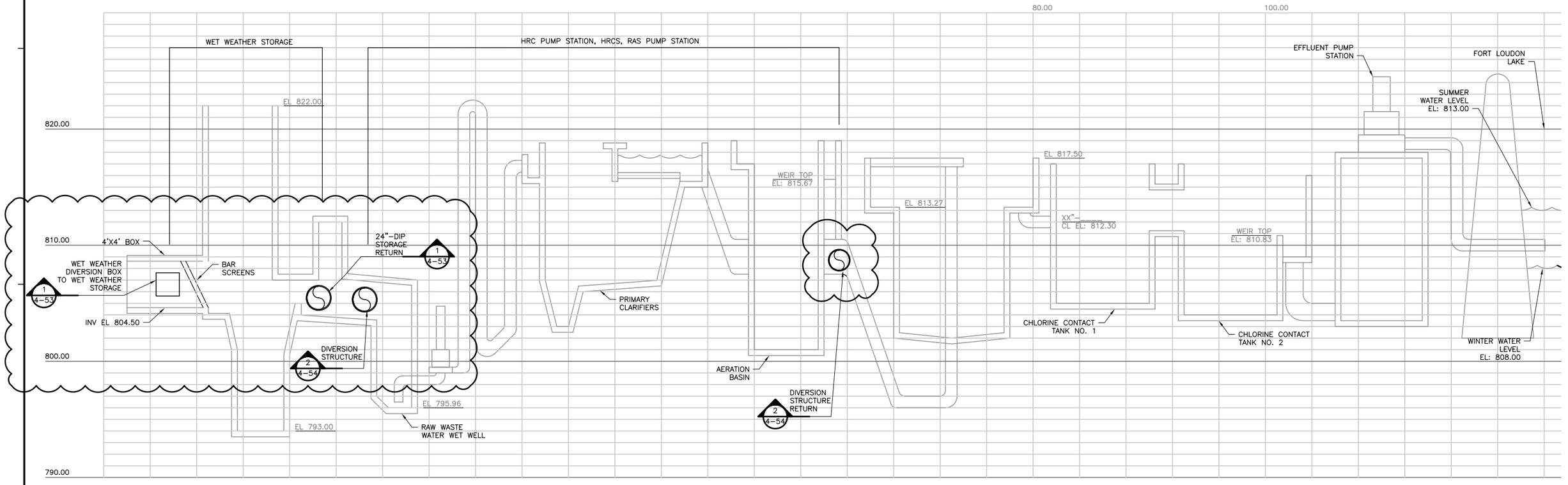
**COMPOSITE CORRECTION PLAN**

**FOURTH CREEK WWTP OPTION 2: HRC WITH STORAGE OVERALL SITE PLAN**

PROJECT NO. 10561-54060
FILE NAME: MOPPL451

SHEET NO.

**FIG 4-51**

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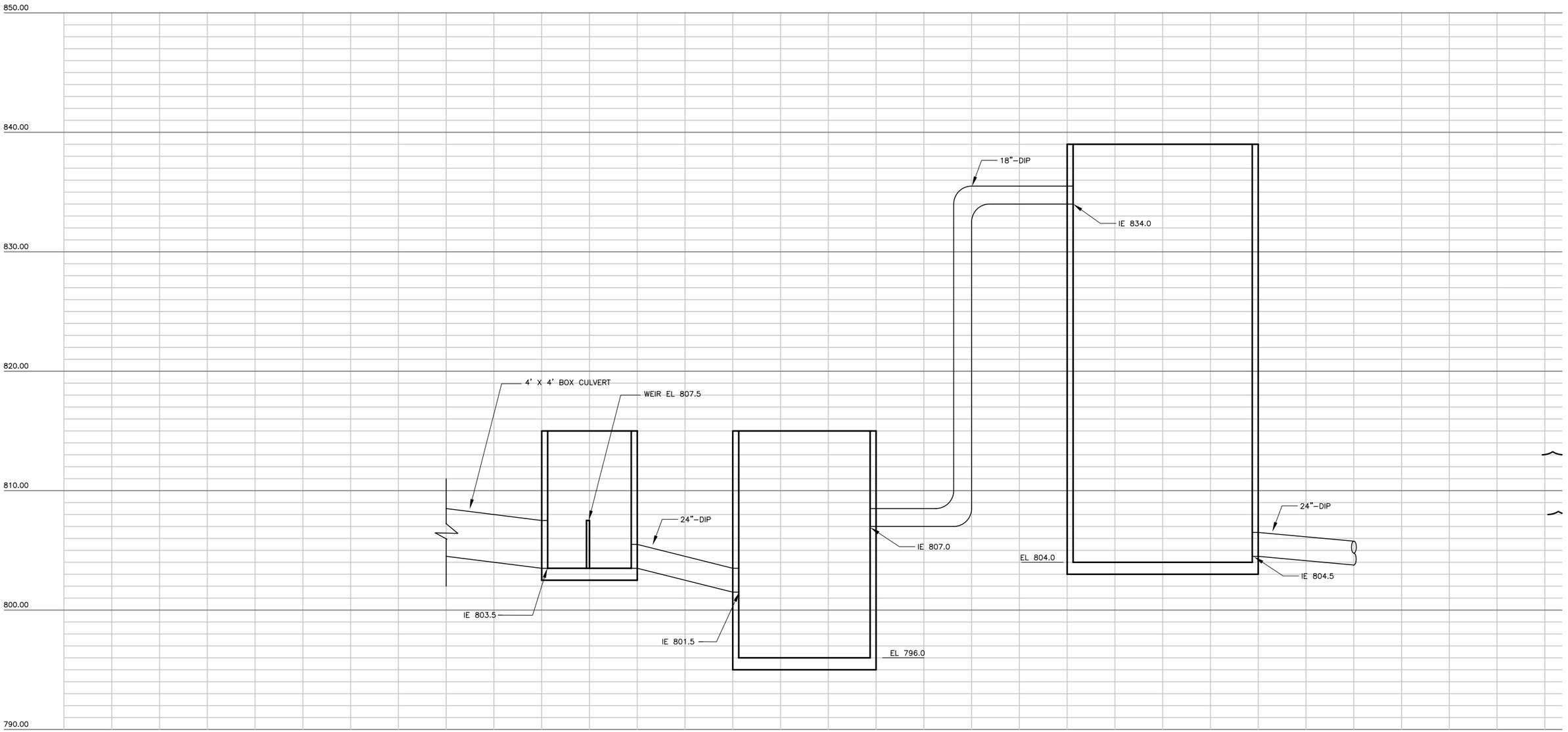
**COMPOSITE CORRECTION PLAN**

# FOURTH CREEK WWTP: OPTION 2
# HRC WITH STORAGE
# PLANT WIDE PROFILE

PROJECT NO. 10561-54060
FILE NAME: CSTPR452

SHEET NO.

**FIG 4-52**




**WET WEATHER STORAGE**
**PROFILE** (1 / 4-53)

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**COMPOSITE CORRECTION PLAN**

**FOURTH CREEK WWTP: OPTION 2**
**HRC WITH STORAGE**
**PROFILE DETAILS**

PROJECT NO. 10561-54060
FILE NAME: CSTPR453

SHEET NO.
**FIG 4-53**

DWG: G:\KUB\CAD\TM CAD FIGS\CSTPR453.dwg
DATE: May 16, 2007 11:53am XREFS:X2234TB
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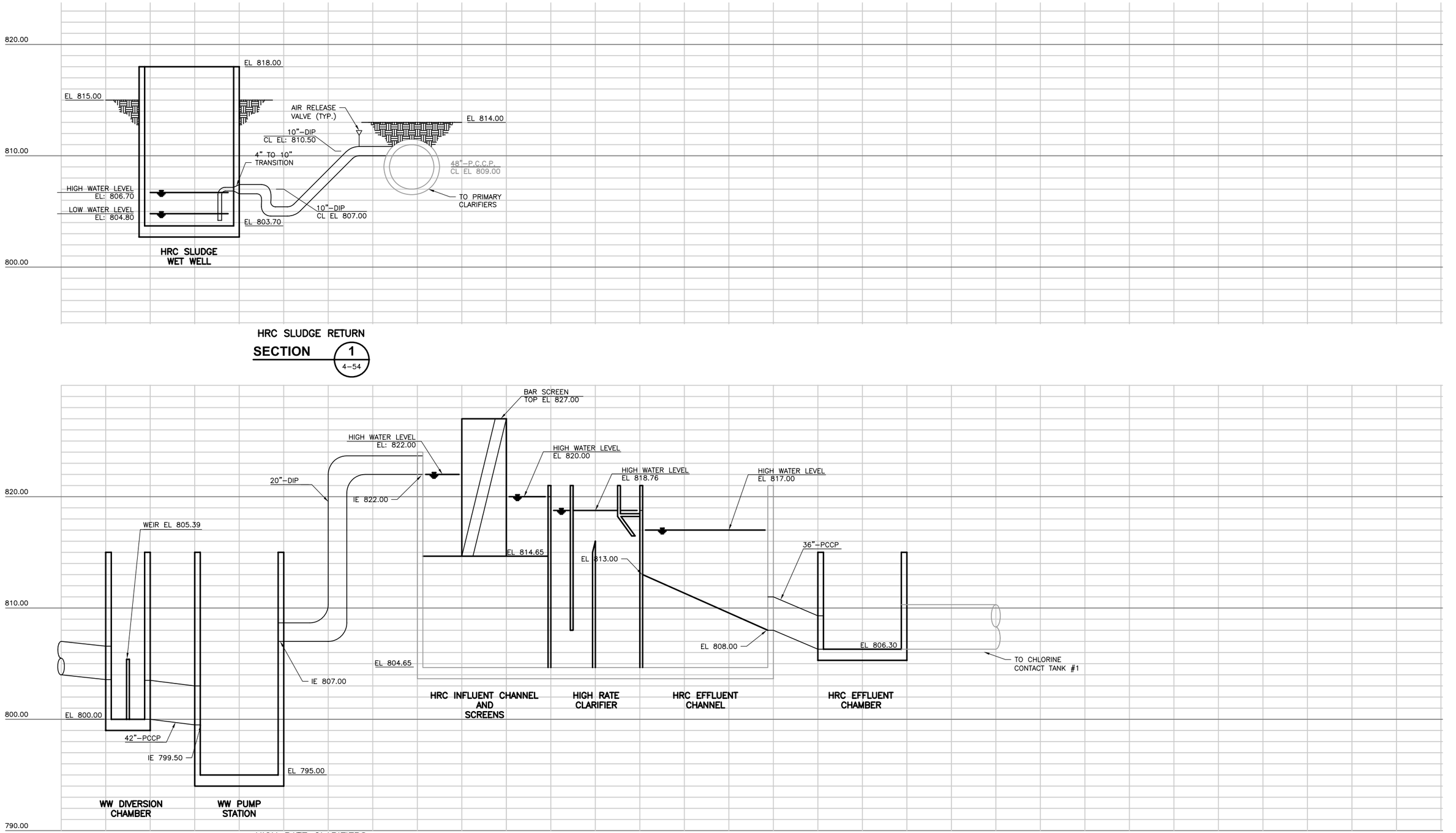


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SHEET CHK'D BY: B.LUECK
CROSS CHK'D BY:
APPROVED BY:
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**COMPOSITE CORRECTION PLAN**

# FOURTH CREEK WWTP OPTION 2: HRC WITH STORAGE PROFILE DETAILS

PROJECT NO. 10561–54060
FILE NAME: CSTPR454

SHEET NO.

**FIG 4-54**

DWG: G:\KUB\CAD\TM CAD FIGS\CSTPR454.dwg
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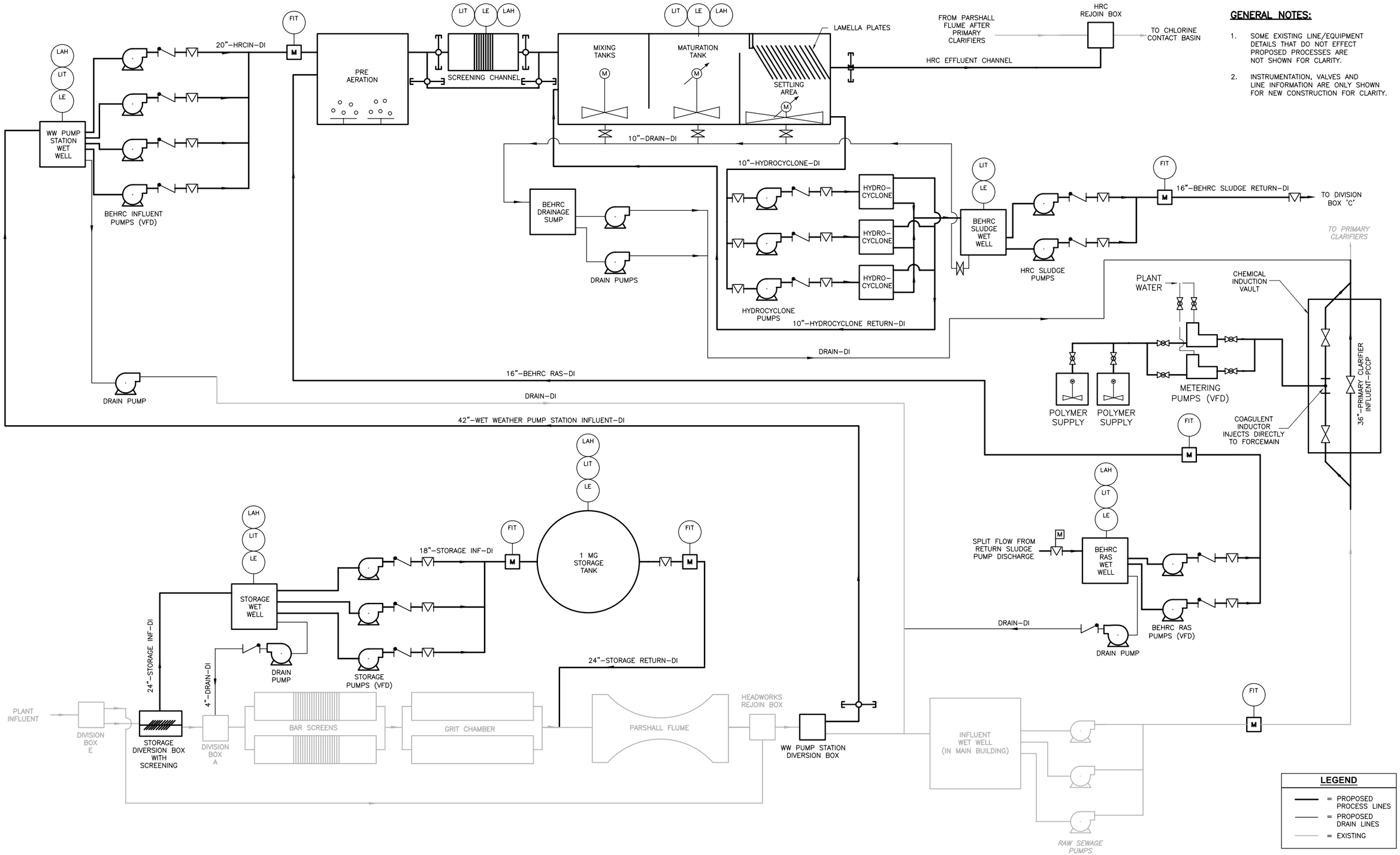


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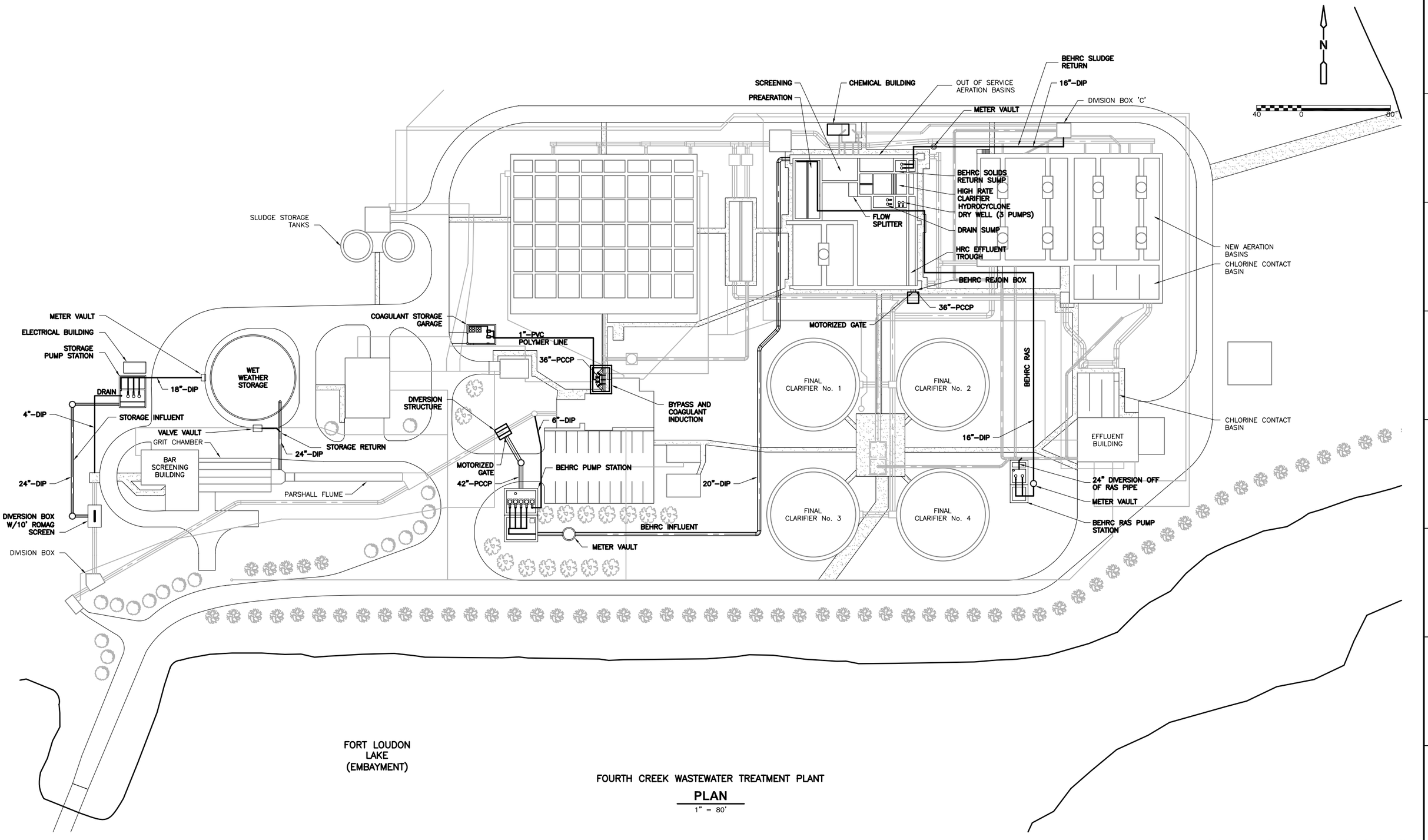
# FOURTH CREEK WWTP OPTION 3: BEHRC WITH STORAGE PROCESS FLOW DIAGRAM

PROJECT NO. 10561–54060
FILE NAME: IGNDI456

SHEET NO.

FIG 4-56




FOURTH CREEK WASTEWATER TREATMENT PLANT

**PLAN**

1" = 80'

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DWG: G:\KUB\CAD\TM CAD FIGS\MOPPL457.dwg
DATE: May 16, 2007 11:53am XREFS:X2234TB XCSTPL20 XMSTPL20
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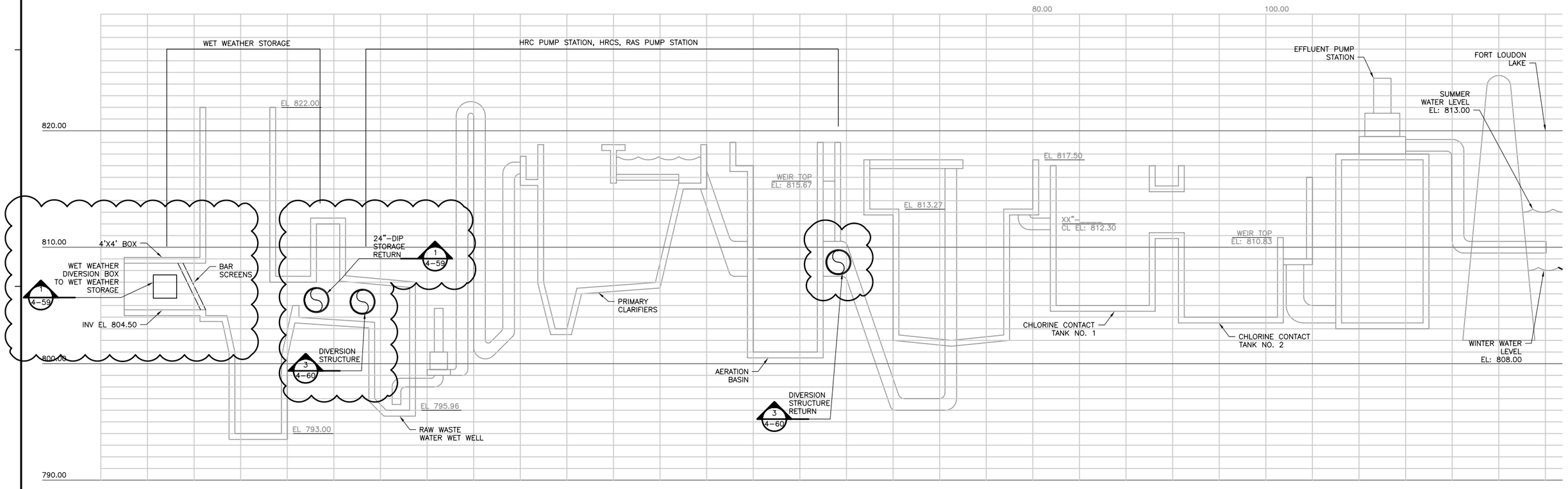
**COMPOSITE CORRECTION PLAN**

**FOURTH CREEK WWTP OPTION 3: BEHRC WITH STORAGE OVERALL SITE PLAN**

PROJECT NO. 10561-54060
FILE NAME: MOPPL457

SHEET NO.

**FIG 4-57**

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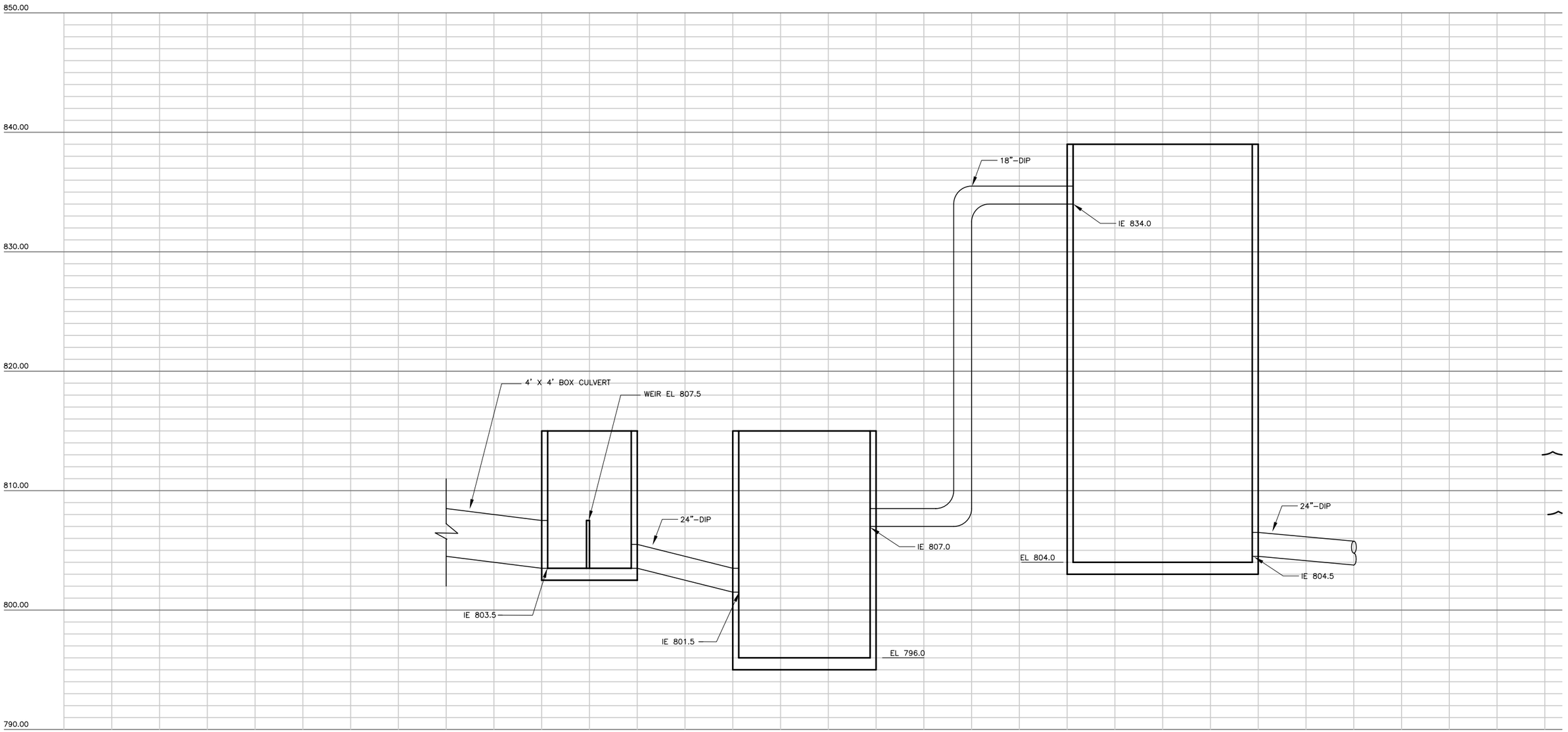
**COMPOSITE CORRECTION PLAN**

**FOURTH CREEK WWTP OPTION 3: BEHRC WITH STORAGE PLANT WIDE PROFILE**

PROJECT NO. 10561-54060
FILE NAME: CSTPR458

SHEET NO.
**FIG 4-58**

DWG: G:\KUB\CAD\TM CAD FIGS\CSTPR458.dwg
DATE: May 16, 2007 11:53am XREFS:X2234TB
USER: kraftdr




**WET WEATHER STORAGE**
**PROFILE** 1 4-59

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**COMPOSITE CORRECTION PLAN**

**FOURTH CREEK WWTP OPTION 3: BEHRC WITH STORAGE PROFILE DETAILS**

PROJECT NO. 10561-54060
FILE NAME: CSTPR459

SHEET NO.
**FIG 4-59**

DWG: G:\KUB\CAD\TM CAD FIGS\CSTPR459.dwg
DATE: May 16, 2007 11:53am XREFS:X2234TB
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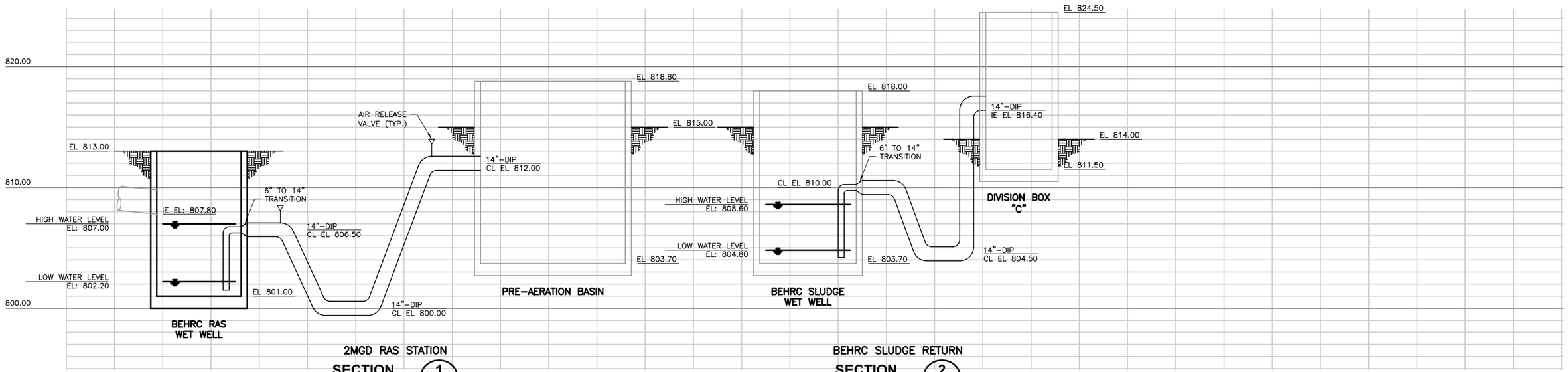
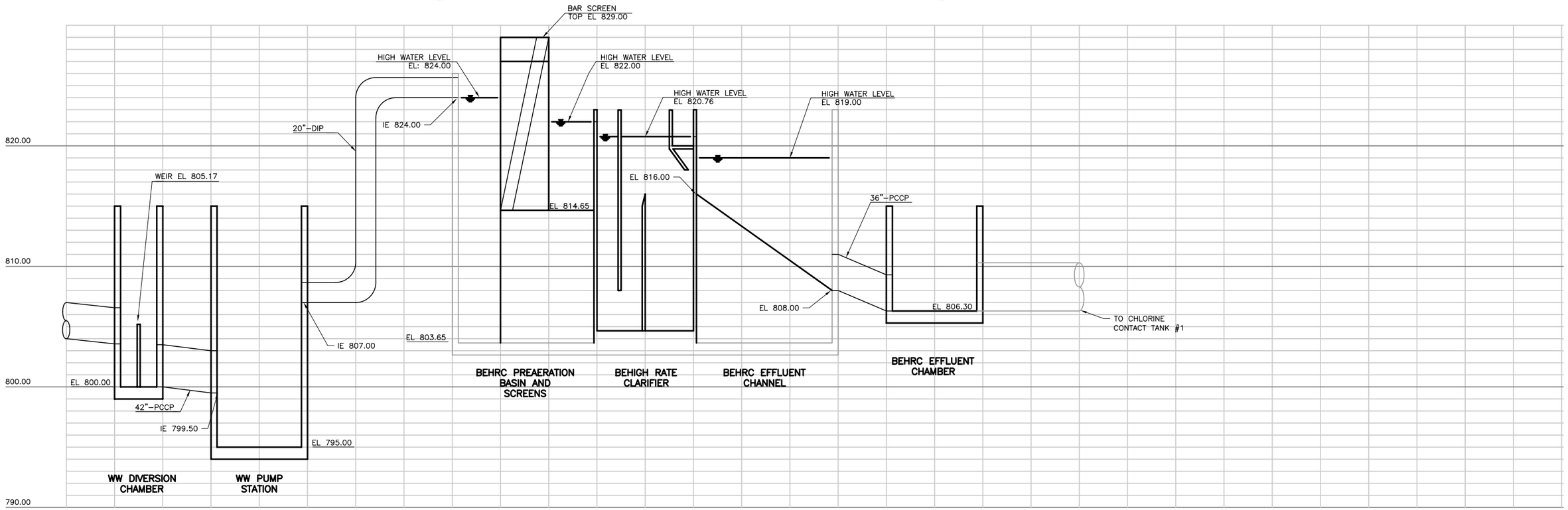



2MGD RAS STATION

**SECTION 1** 4-60

BEHRC SLUDGE RETURN

**SECTION 2** 4-60




BIOLOGICALLY ENHANCED HIGH RATE CLARIFIER

**SECTION 3** 4-60

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**COMPOSITE CORRECTION PLAN**

**FOURTH CREEK WWTP OPTION 3: BEHRC WITH STORAGE PROFILE DETAILS**

PROJECT NO. 10561-54060
FILE NAME: CSTPR460

SHEET NO.

**FIG 4-60**

DWG: G:\KUB\CAD\TM CAD FIGS\CSTPR460.dwg
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2. INSTRUMENTATION, VALVES AND LINE INFORMATION ARE ONLY SHOWN FOR NEW CONSTRUCTION FOR CLARITY.

WW PUMP STATION WET WELL
LAH
LIT
LE
HRC PUMP STATION PUMPS (VFD)
30"–HRCIN–DI
FIT
M
LIT LE LAH
SCREENING CHANNEL
BYPASS CHANNEL
MIXING TANKS
MATURATION TANK
SETTLING AREA
LAMELLA PLATES
10"–DRAIN–DI
FROM PARSHALL FLUME AFTER PRIMARY CLARIFIERS
HRC REJOIN BOX
TO CHLORINE CONTACT BASIN
HRC EFFLUENT CHANNEL
TO PRIMARY CLARIFIERS
10"–HRC SLUDGE–DI
HRC DRAINAGE SUMP
DRAIN PUMPS
10"–HYDROCYCLONE–DI
HYDRO–CYCLONE
HYDROCYCLONE PUMPS
10"–HYDROCYCLONE RETURN–DI
HRC SLUDGE WET WELL
HRC SLUDGE PUMPS
DRAIN–DI
DRAIN PUMP
CHEMICAL INDUCTION VAULT
PLANT WATER
1"–POLYMER–PVC
36"–PRIMARY CLARIFIER INFLUENT–PCCP
METERING PUMPS (VFD)
COAGULENT INDUCTOR INJECTS DIRECTLY TO FORCEMAIN
POLYMER SUPPLY
30"–WET WEATHER PUMP STATION–DI
PLANT INFLUENT
HEADWORKS BYPASS BOX
DIVISION BOX A
STORAGE DIVERSION BOX WITH SCREENING
BAR SCREENS
GRIT CHAMBER
PARSHALL FLUME
HEADWORKS REJOIN BOX
WW PUMP STATION DIVERSION BOX
INFLUENT WET WELL (IN MAIN BUILDING)
RAW SEWAGE PUMPS

**LEGEND**

= PROPOSED PROCESS LINES
= PROPOSED DRAIN LINES
= EXISTING

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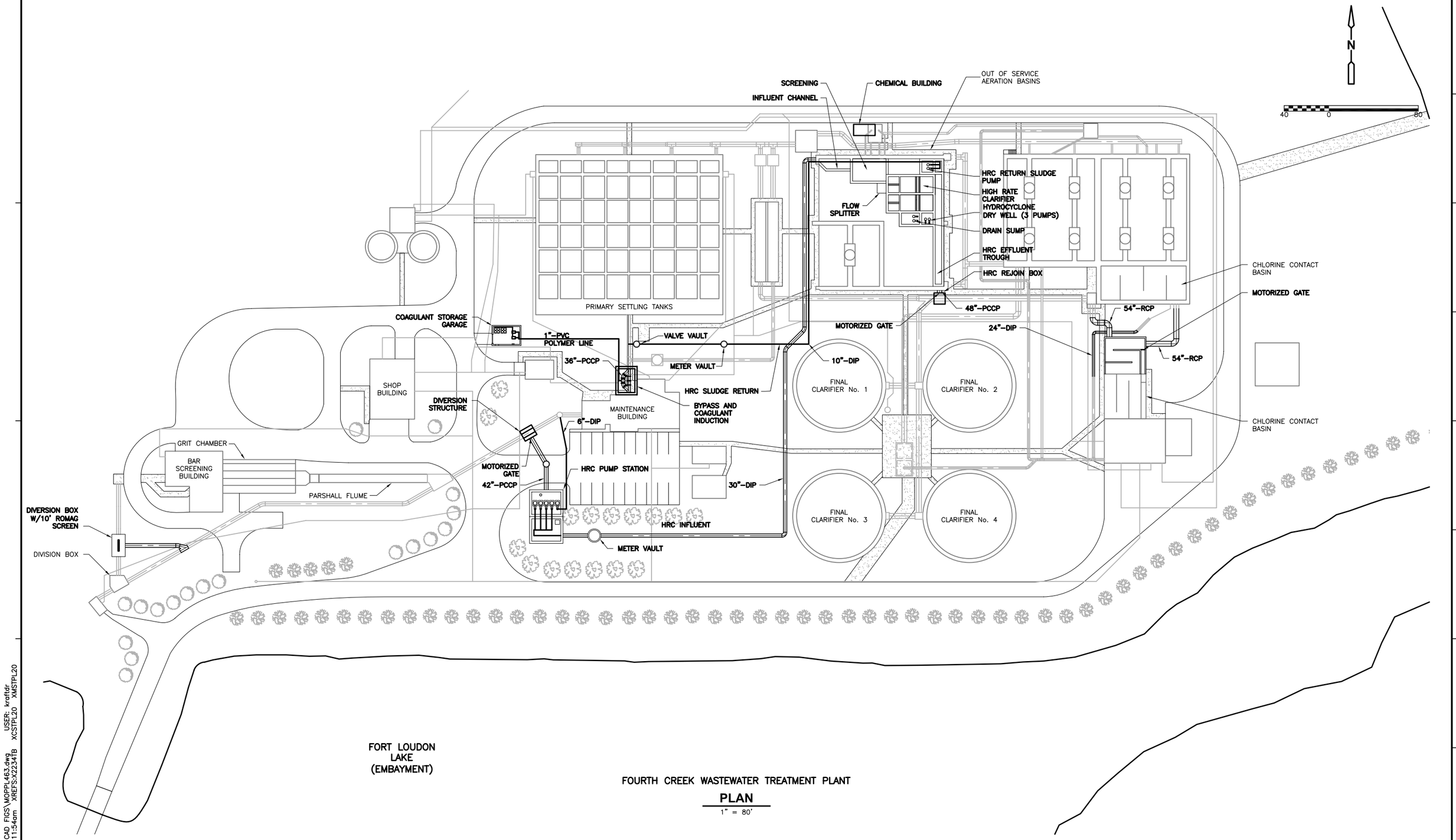
COMPOSITE CORRECTION PLAN

# FOURTH CREEK WWTP OPTION 6: HRC WITHOUT STORAGE PROCESS FLOW DIAGRAM

PROJECT NO. 10561–54060
FILE NAME: IGNDI462

SHEET NO.
FIG 4-62




FOURTH CREEK WASTEWATER TREATMENT PLANT

## PLAN

1" = 80'

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DWG: G:\KUB\CAD\TM CAD FIGS\MOPPL463.dwg
DATE: May 16, 2007 11:54am
XREFS:X2234TB XCSTPL20 XMSTPL20
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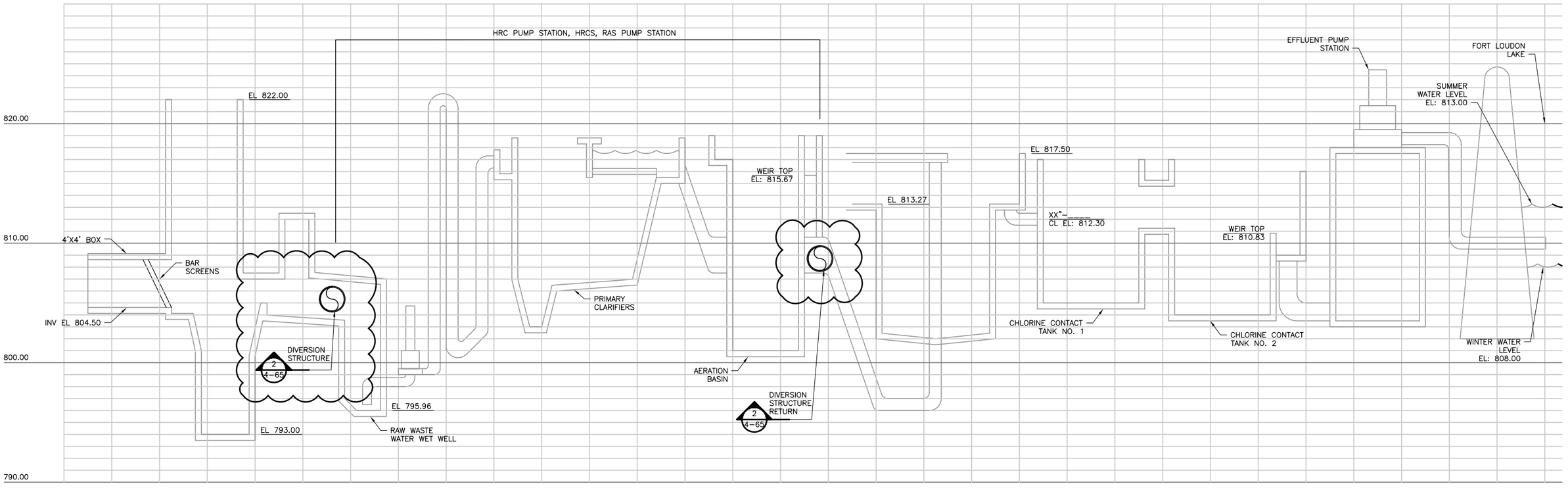
**COMPOSITE CORRECTION PLAN**

**FOURTH CREEK WWTP OPTION 6: HRC WITHOUT STORAGE OVERALL SITE PLAN**

PROJECT NO. 10561-54060
FILE NAME: MOPPL463

SHEET NO.

**FIG 4-63**

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**COMPOSITE CORRECTION PLAN**

# FOURTH CREEK WWTP OPTION 6: HRC WITHOUT STORAGE PLANT WIDE PROFILE

PROJECT NO. 10561-54060
FILE NAME: CSTPR464

SHEET NO.

**FIG 4-64**

DWG: G:\KUB\CAD\TM CAD FIGS\CSTPR464.dwg
DATE: May 16, 2007 11:54am XREFS:X22341B
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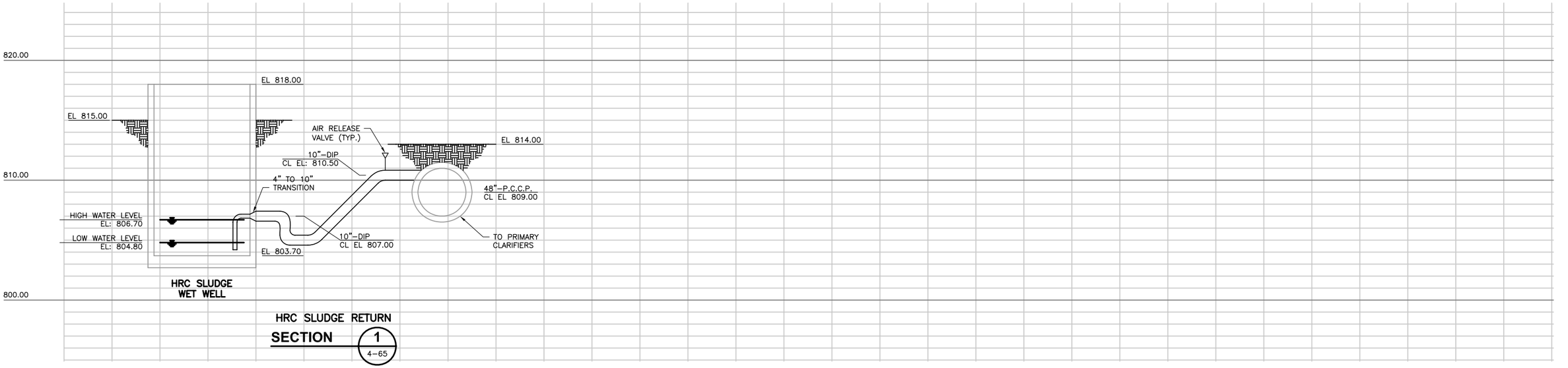
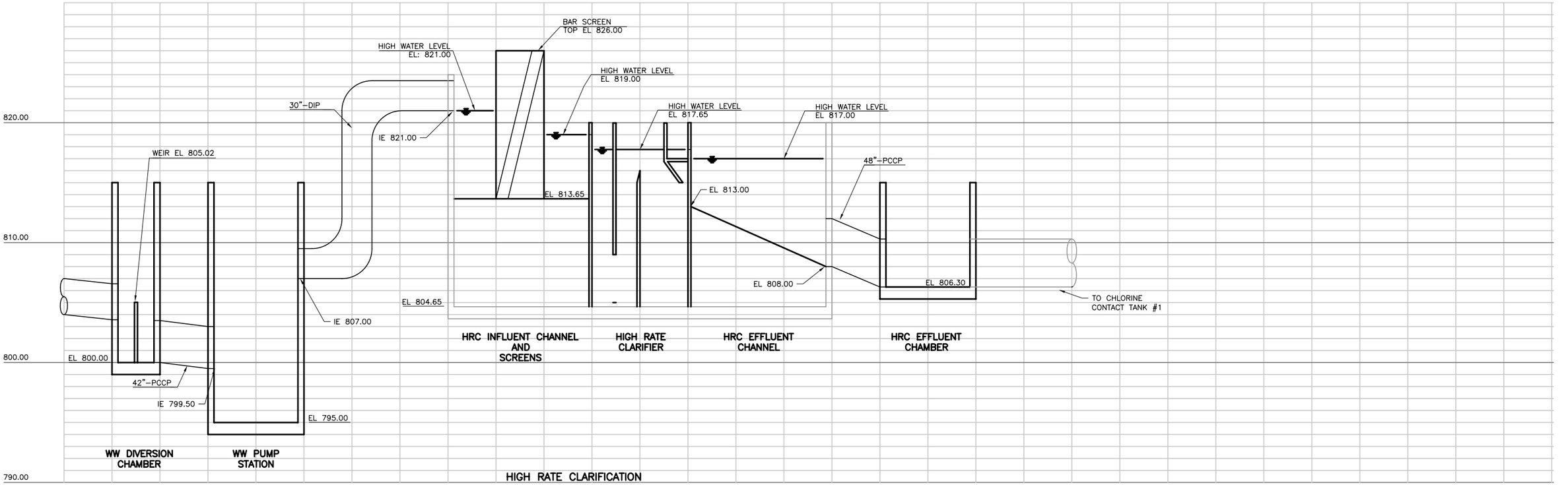



HRC SLUDGE RETURN

**SECTION** 1 (4–65)




HIGH RATE CLARIFICATION

**SECTION** 2 (4–65)

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**COMPOSITE CORRECTION PLAN**

# FOURTH CREEK WWTP: OPTION 6 HRC WITHOUT STORAGE PROFILE DETAILS

PROJECT NO. 10561–54060
FILE NAME: CSTPR465

SHEET NO.

**FIG 4-65**

DWG: G:\KUB\CAD\TM CAD FIGS\CSTPR465.dwg
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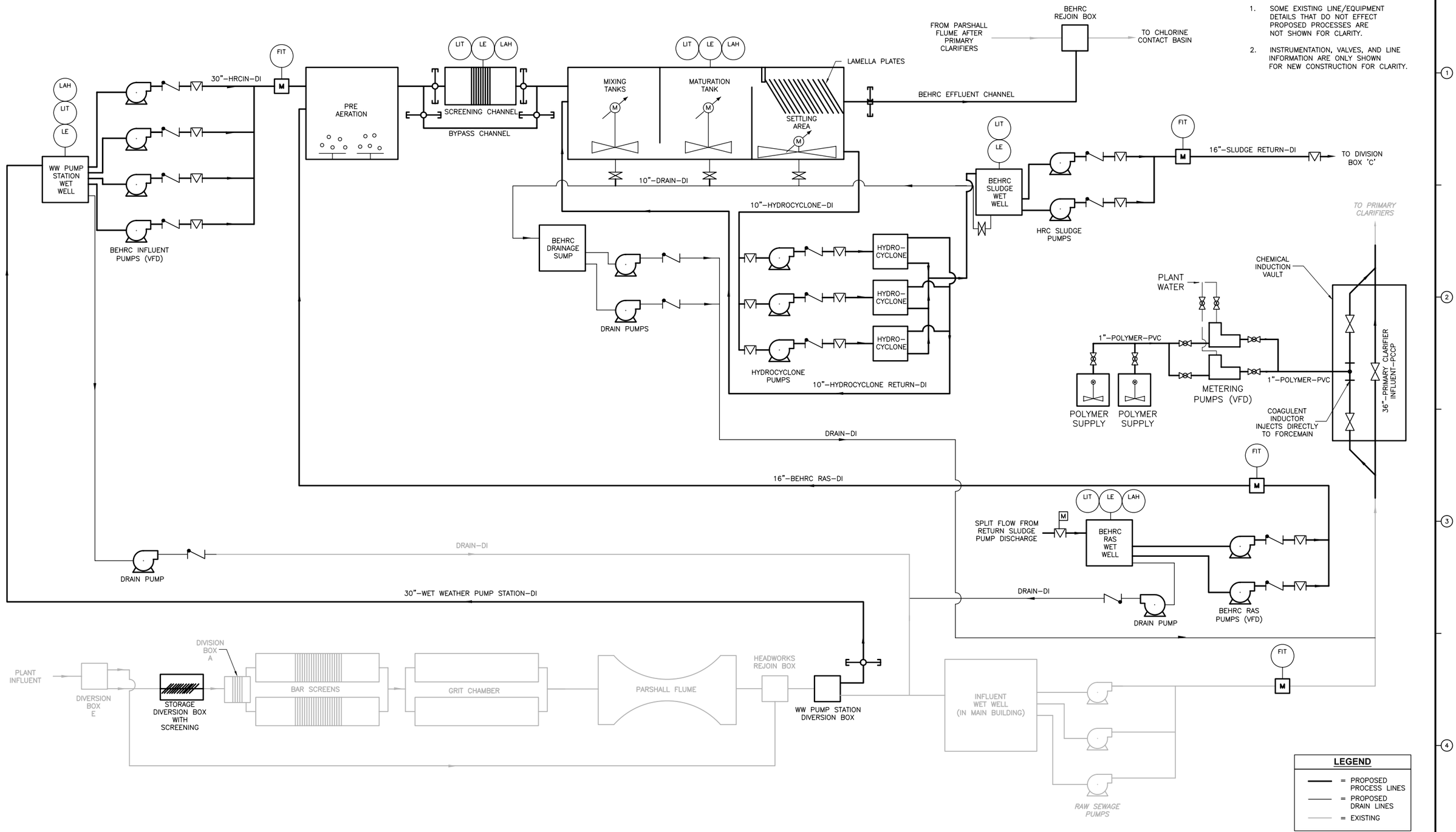
2. INSTRUMENTATION, VALVES, AND LINE INFORMATION ARE ONLY SHOWN FOR NEW CONSTRUCTION FOR CLARITY.

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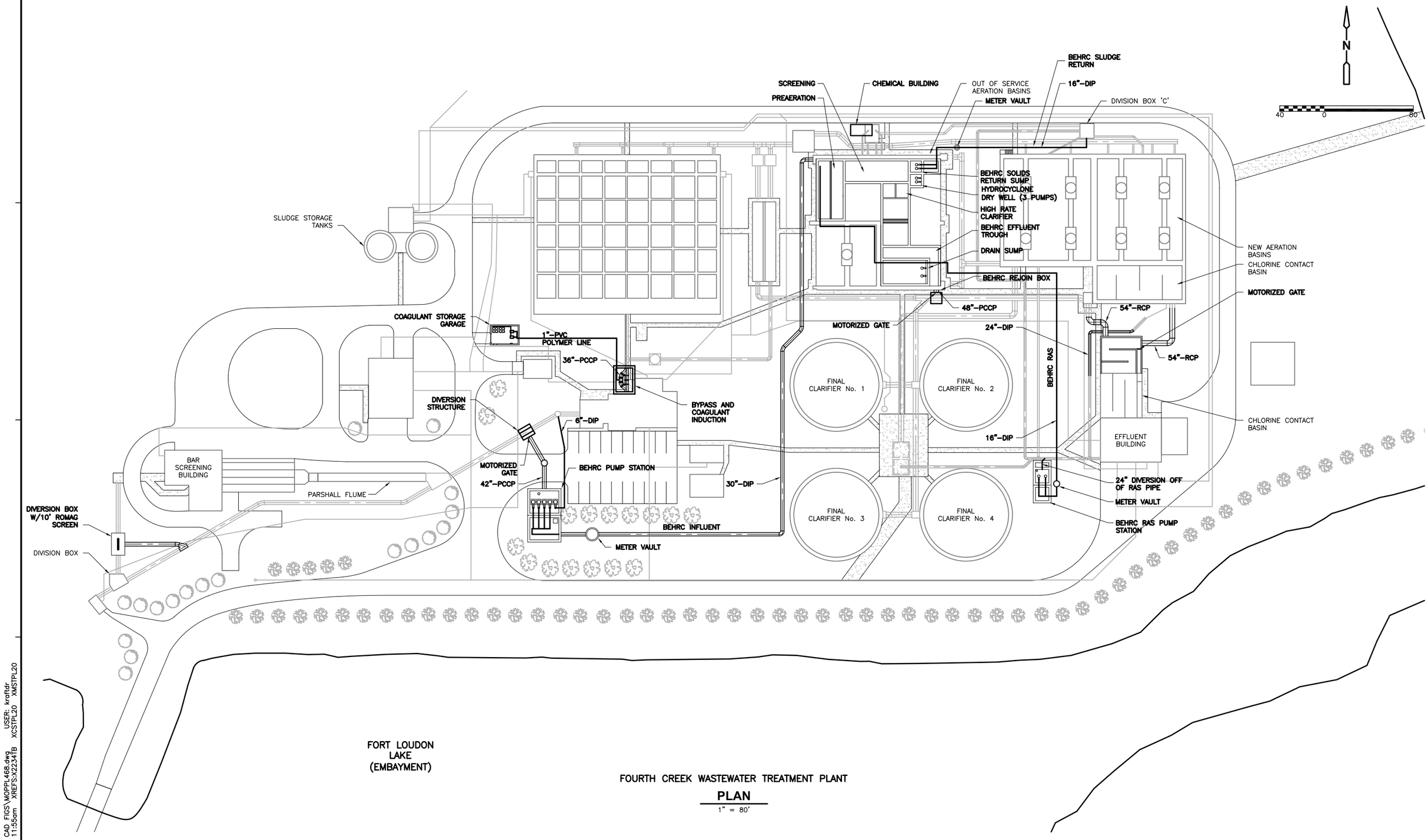
**COMPOSITE CORRECTION PLAN**

# FOURTH CREEK WWTP OPTION 7: BEHRC WITHOUT STORAGE PROCESS FLOW DIAGRAM

PROJECT NO. 10561–54060
FILE NAME: IGNDI467

SHEET NO.
**FIG 4-67**

DWG: G:\KUB\CAD\TM CAD FIGS\IGNDI467.dwg
DATE: May 16, 2007 11:54am XREFS:X2234TB
USER: kraftdr




FOURTH CREEK WASTEWATER TREATMENT PLANT

**PLAN**

1" = 80'

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DWG: G:\KUB\CAD\TM CAD FIGS\MOPPL468.dwg
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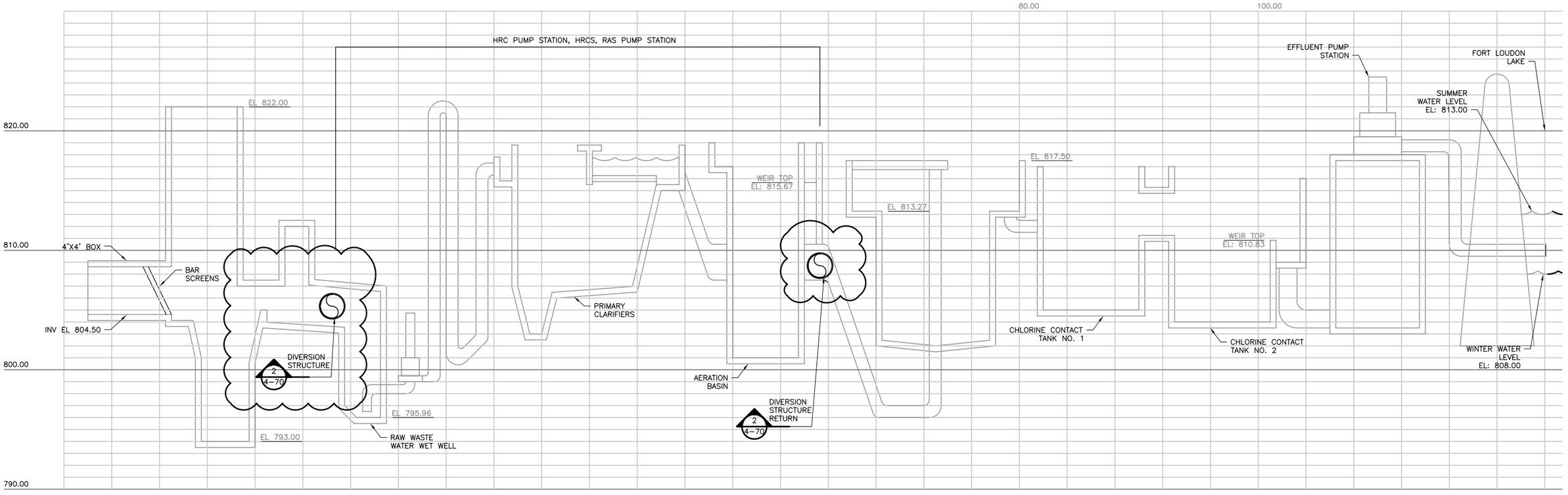
**COMPOSITE CORRECTION PLAN**

**FOURTH CREEK WWTP OPTION 7: BEHRC WITHOUT STORAGE OVERALL SITE PLAN**

PROJECT NO. 10561–54060
FILE NAME: MOPPL468

SHEET NO.

**FIG 4-68**

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**COMPOSITE CORRECTION PLAN**

**FOURTH CREEK WWTP OPTION 7: BEHRC WITHOUT STORAGE PLANT WIDE PROFILE**

PROJECT NO. 10561-54060
FILE NAME: CSTPR469

SHEET NO.
**FIG 4-69**

DWG: G:\KUB\CAD\TM CAD FIGS\CSTPR469.dwg
DATE: May 16, 2007 11:55am XREFS:X22341B
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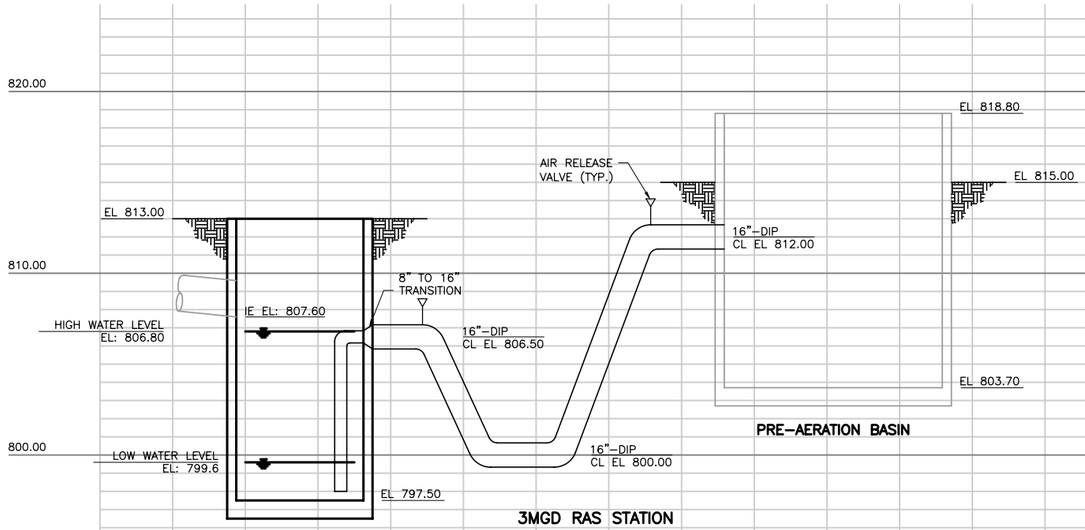
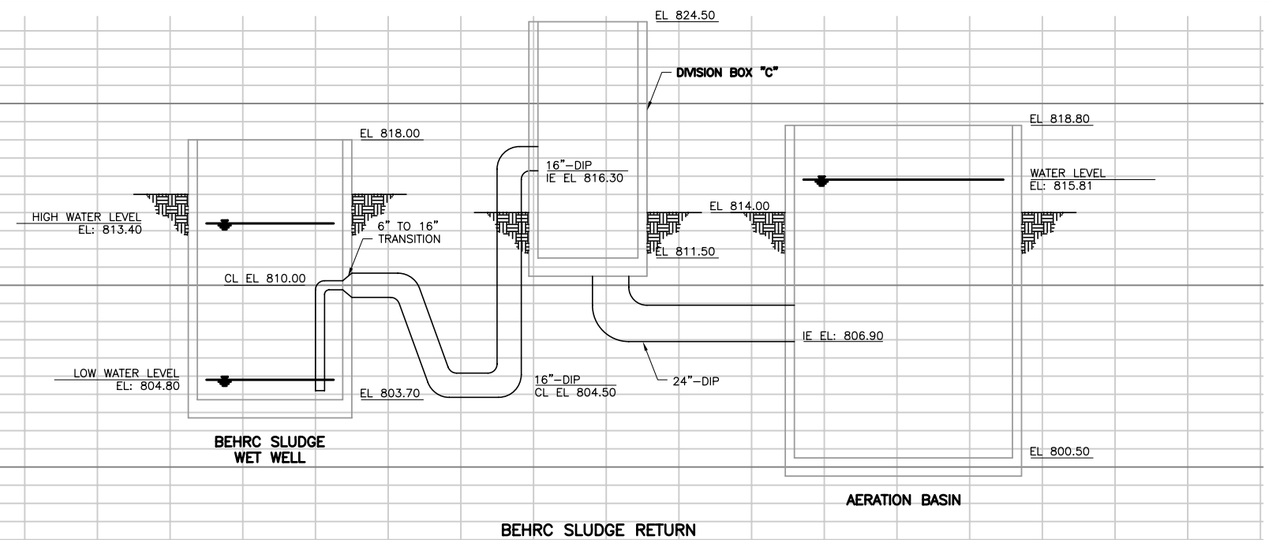
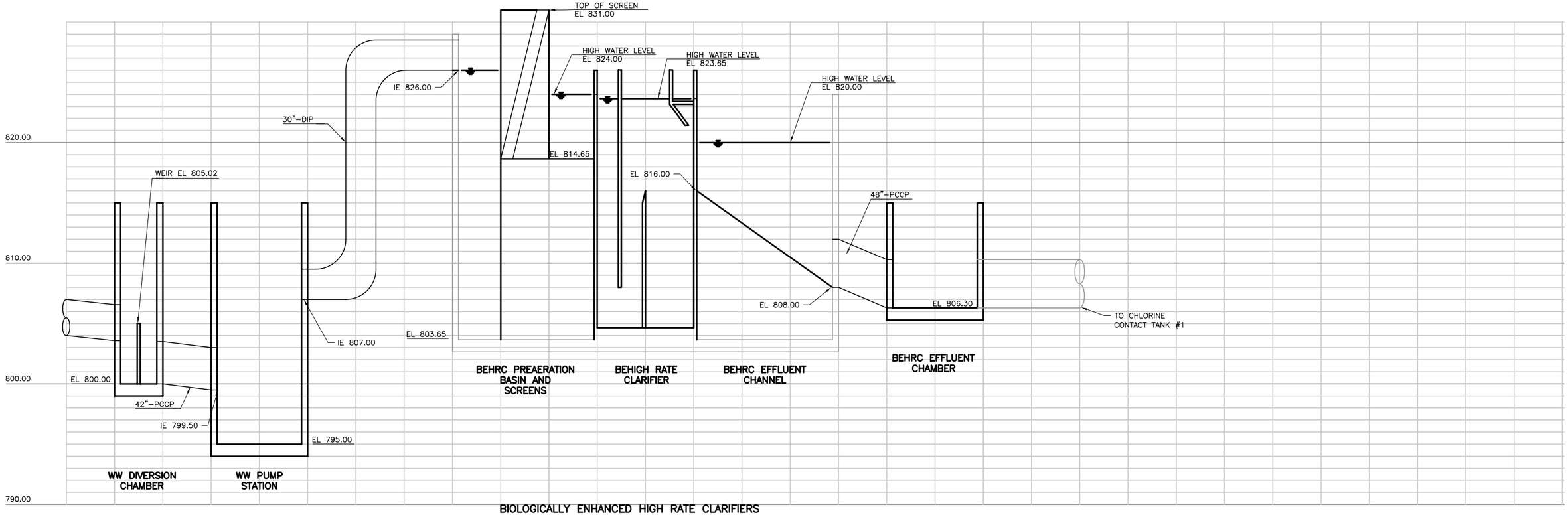



SECTION 1
4-70




SECTION 2
4-70




BIOLOGICALLY ENHANCED HIGH RATE CLARIFIERS

SECTION 3
4-70

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COMPOSITE CORRECTION PLAN

# FOURTH CREEK WWTP OPTION 7: BEHRC WITHOUT STORAGE PROFILE DETAILS

PROJECT NO. 10561-54060
FILE NAME: CSTPR470

SHEET NO.
FIG 4-70

DWG: G:\KUB\CAD\TM CAD FIGS\CSTPR470.dwg
DATE: May 16, 2007 11:55am
USER: kraftar
XREFS:X2234TB

# Section 5
# CCP Implementation Plan

This section presents the CCP implementation plan for the KWWTP and FCWWTP. Based on wastewater process evaluations, cost and non-cost criteria evaluations of the potential CCP improvements, the projected infrequent occurrence of Diversions during implementation of the proposed upgrades, and construction and operational sequencing requirements, a phased implementation to secondary treatment in the form of biologically enhanced high rate clarification is recommended for both WWTPs. A summary of key capacity-related improvements for each plant is summarized below.

### KWWTP CCP Improvements (120 mgd Peak Flow Capacity) – Option 3

***Phase 1***:
- Pilot test chemically-enhanced primary treatment (CEPT)
- Pilot test high rate clarification (HRC) and biologically enhanced high rate clarification (BEHRC)
- Design and construct CCP Storage -12 MG storage (two sites)
- Design and construct Phase I CCP WWTP improvements including:
  - Permanent facilities for CEPT
  - Emergency generators for liquid flow facilities
  - Upgrade existing gravity thickener
  - New gravity thickener
  - Upgrade existing on-site storage

***Phase 2***: Design and construct HRC/BEHRC for flows that exceed 70 mgd.

Other miscellaneous plant and process improvements currently being programmed as part of a comprehensive facility plan upgrade will be included as necessary for each phase.

### FCWWTP CCP Improvements (34 mgd Peak Flow Capacity) – Option 7

***Phase 1***:
- Pilot test chemically-enhanced primary treatment (CEPT)
- Pilot test high rate clarification (HRC) and biologically enhanced high rate clarification (BEHRC)
- Design and construct Phase I CCP WWTP improvements including:
  - Permanent facilities for CEPT
  - Emergency generators for liquid flow facilities
  - Miscellaneous hydraulic improvements
  - HRC for flows that exceed 18 mgd
  - Other miscellaneous process improvements

***Phase 2***: Upgrade HRC to BEHRC for flows that exceed 18 mgd.

A phased implementation approach has been selected for the following reasons:

1. The proposed implementation plan and schedule will have no adverse environmental impact since both plants are expected to be in compliance with all permit effluent limits and capable of avoiding exceedance of CAP surcharge criteria in influent sewers by 2011 at Kuwahee Wastewater Treatment Plant (KWWTP) and 2013 at Fourth Creek Wastewater Treatment Plant (FCWWTP), well before the original CD compliance date of December 31, 2016.

2. Regarding KWWTP, the challenge of constructing new processes and modifying others on a large but already very built-out plant site that is bordered on the west by Third Creek, on the south by the Tennessee River, on the east by a railroad, on the north by a railroad and the University of Tennessee and entirely bisected by a major 4-lane arterial highway requires an extended construction time beyond that which would be acceptable for a less constrained site.

   Previous excavation experience on this site indicates unexpected and variable rock ledges, unexpected underground utility and process piping locations, and the presence of an old petroleum product apparently from a previous site operation. Special consideration will be required to avoid unintentional plant process interruptions and to minimize plant process impacts during scheduled outages to accommodate construction. In addition, the KWWTP improvements will impact traffic on Neyland Drive during construction of pipeline crossings and to accommodate construction traffic and equipment. Neyland Drive is a major arterial road for the University of Tennessee and the City of Knoxville, and serves as:

   - The primary access to the University of Tennessee Agriculture Campus, Neyland Stadium and Thompson-Boling Arena
   - The only access for the University of Tennessee new soccer complex, softball complex, and university warehousing
   - A major arterial providing access to James White Parkway, Interstate 40, downtown Knoxville, South Knoxville, and Alcoa Highway (US 129) to the airport.

   Previous traffic count studies have documented approximately 20,000 vehicles a day past the KWWTP.

3. Providing ample time for coordinating CCP improvements with other plant improvements included in KUB's 5-year and long-term planning is critical to ensuring that "routine" but important and/or significant renewal and replacement projects within the plant don't get delayed or adversely impact treatment processes or operational performance. KUB is currently in the process of programming other KWWTP improvements which are not directly related to the

CCP. These improvement projects will have to be coordinated with the CCP improvements to minimize impacts to operations. Major upgrades currently being considered include replacement of blowers, influent pump upgrade, screen replacement, intermediate pump upgrade, replacement of gaseous chlorine with sodium hypochlorite, and replacement of the dissolved air flotation thickeners. These upgrades are critical to maintaining reliable process performance and consistent permit compliance. These upgrades are related to process equipment that is nearing the end of their predicted service life and can not be deferred.

4. KUB needs an appropriate amount of time to actively engage operators at all levels within the plants in design discussions and to allow them to be "hands-on" in construction related tasks. Doing so will result in fewer process problems during construction and yield a finished project that will be better understood by the operations staff and more efficiently and effectively operated with the likelihood of quicker startup and fewer violations over the life of the plant – significant dividends both short and long term. Plant operators and staff will play a key role in maintaining plant operations during construction. These operators and staff must be concurrently trained to operate new processes and will be involved heavily in construction coordination at both the FCWWTP and KWWTP. New standard operating procedures (SOPs) and interim SOPs must be developed and implemented (including training). In addition, operations staff will be closely involved in the design development and review process. This involvement is critical to the success of the CCP upgrades at both plants and the other necessary KWWTP upgrades described above.

5. Moving forward with and completing the Biologically Enhanced High Rate Clarification (BEHRC) improvements at FCWWTP first with little overlap with the KWWTP BEHRC project will help to identify any unexpected issues or problems and allow them to be resolved at a facility that is more flexible and much less complex than KWWTP and should facilitate a smoother construction and implementation at KWWTP by helping to minimize any potential for problems (and potential permit violations) at that facility.

6. With the added time to complete the CCP improvements provided by the proposed implementation plan and schedule, the impact on KUB's financial plan (and customer rates) should not result in significant changes to the original plan or the timing or magnitude of projected rate increases.

7. At KWWTP, flow diversions and the resulting Total Suspended Solids (TSS) and Carbonaceous Biochemical Oxygen Demand (CBOD) loads have already been significantly reduced by the implementation of the PCP and will be further reduced by Chemically Enhanced Primary Treatment (CEPT) and CCP storage projects.

As evidence of the success of the PCP in eliminating Diversions and related effluent loadings at the KWWTP, the following actual occurrence statistics are provided:

| Year | Actual PCP Initiations | Actual Number of Diversions |
|---|---|---|
| 2006 (Since 3/1/06) | 8 | 6 |
| 2007 | 11 | 0 |
| 2008 (through May) | 11 | 1 |

Prior to PCP implementation, most if not all of the conditions leading to PCP initiation would have resulted in a Diversion.

Based on the reasons above, the proposed CCP implementation schedule includes the completion of construction for CCP required improvements by June 30, 2021.

The implementation plan, along with estimated annual capital costs, is presented in **Figure 5-1**. These estimated annual capital costs are based on the design and construction costs for the phased implementation of the process improvements as presented in Section 4 and detailed in Appendix C of this report, design and construction costs of stand-by emergency generators for KWWTP and FCWWTP, and design and construction costs for CCP storage based on KUB's previous collection system storage incurred program costs.

## CCP Schedule Milestones

Key features of the schedule milestones set forth in Figure 5-1 are summarized below.

### Tasks 1 & 2: Pilot Test CEPT at KWWTP and FCWWTP (July 2008–December 2009)

Preliminary pilot testing facilities have been installed at both plants to determine the effectiveness of polymer addition on primary clarifier performance during peak wet weather flows. Initial results determined that primary clarifier effluent TSS levels without chemical addition cause occasional maximum day TSS violations during Diversion events. Although these are temporary installations, they are full-scale systems capable of treating the entire primary treatment capacity flow. It is expected that use of these facilities will reduce and possibly eliminate occasional TSS violations during Diversion events. Pilot testing will continue for approximately 18 months during wet weather events in order to confirm effectiveness during numerous high flow conditions for each the KWWTP and FCWWTP (Tasks 1 and 2, respectively).

### Task 3: Design and Construct CCP Storage for KWWTP (July 2008–June 2011)

Approximately 12 million gallons of storage will be constructed at or near the KWWTP. The purpose of this storage is to limit peak flows to the plant to 120 mgd or less and to eliminate capacity related SSOs at or near the plant. The storage will also be used to minimize the frequency and volume of Diversions which have already been dramatically reduced by strict adherence to the approved Process Controls Program (PCP).

### Tasks 4 and 5: Pilot Test HRC and Biologically Enhanced High Rate Clarification at Both WWTPs (July 2009–December 2010)

Testing equipment will be procured from a process equipment vendor and tests will be conducted at one plant, and then the other. Due to the current popularity of the HRC process, a long lead time for delivery of pilot test equipment is expected. The primary purpose of pilot testing will be to optimize chemical selection and dosage for the HRC, and to confirm MLSS level and contact time for the BEHRC portion. (Note that the purpose of the pilot testing is not to confirm it will work, but to determine optimum effectiveness and establish design criteria at the KWWTP and FCWWTP, Tasks 4 and 5 respectively, based on wastewater characteristics and existing process performance under various flow and loading conditions.)

### Task 6: Design and Construct KWWTP Phase 1 Improvements (January 2010–December 2012)

Phase 1 improvements at the KWWTP include:

- Permanent facilities for CEPT.
- Emergency generators for entire liquid flow facilities.
- Upgrade existing gravity thickener and construct new gravity thickener.
- Upgrade existing on-site storage.
- Other miscellaneous process improvements (currently being programmed as part of a comprehensive facility plan upgrade).

Note that the full-scale pilot test CEPT facilities will be kept operational until permanent facilities are installed. Therefore, KUB currently has the capability to comply with effluent limits during peak flow conditions, and Diversion solids loadings will be significantly reduced.

### Task 7: Modify KWWTP PCP (July 2012–December 2012)

Upon completion of the KWWTP Phase I facilities, it is anticipated that the PCP will have to be revised to reflect these improvements and the experience gained in operating the new storage facilities.

### Task 8: Design and Construct FCWWTP Phase 1 Improvements (January 2011–December 2013)

Phase 1 improvements at the FCWWTP include:

- Permanent facilities for CEPT.
- Emergency generator(s) for entire liquid flow facilities.
- Miscellaneous hydraulic improvements.
- HRC for flows that exceed 18 mgd.
- Other miscellaneous process improvements.

HRC will be constructed at the FCWWTP prior to the KWWTP because it will be significantly smaller and simpler to construct and operate.

### Task 9: Modify FCWWTP PCP (July 2013–December 2013)

Upon completion of the FCWWTP Phase I facilities, the PCP will be revised to reflect the new wet weather treatment facilities.

### Task 10: Evaluate FCWWTP HRC Performance (January 2014–June 2016)

It is anticipated that there will be many lessons learned from the start-up and operation of the FCWWTP HRC treatment train that will build experience for KUB operations staff and may identify process operability and design considerations that can then be applied to the KWWTP upgrade. The process performance evaluation will be conducted concurrently with Task 11, described below.

### Task 11: Evaluate System Performance Upon Completion of Phase 1 CAP/ER (July 2013–December 2015)

This period will be used to conduct flow monitoring studies to confirm that the CAP/ER projects have resulted in the expected reductions in RDI/I and the related impacts on the plants. It will be critical to confirm peak flows prior to designing KWWTP HRC/BEHRC and FCWWTP BEHRC, since hydraulics and flow rates will have a significant impact on facility sizing.

### Task 12: Design and Construct Phase II Improvements at FCWWTP (January 2016–June 2018)

Phase II improvements will consist of upgrading the HRC facility to BEHRC to enable full secondary treatment of all flows.

### Task 13: Modify FCWWTP PCP (January 2018–June 2018)

Upon completion of the FCWWTP Phase II facilities, the PCP will be revised to reflect these improvements.

### Task 14: Design and Construct Phase II Improvements at KWWTP (January 2018–June 2021)

Phase II improvements will consist of providing HRC/BEHRC facilities for flows that exceed 70 mgd and will enable full secondary treatment of all flows.

### Task 15: Modify KWWTP PCP (January 2021–June 2021)

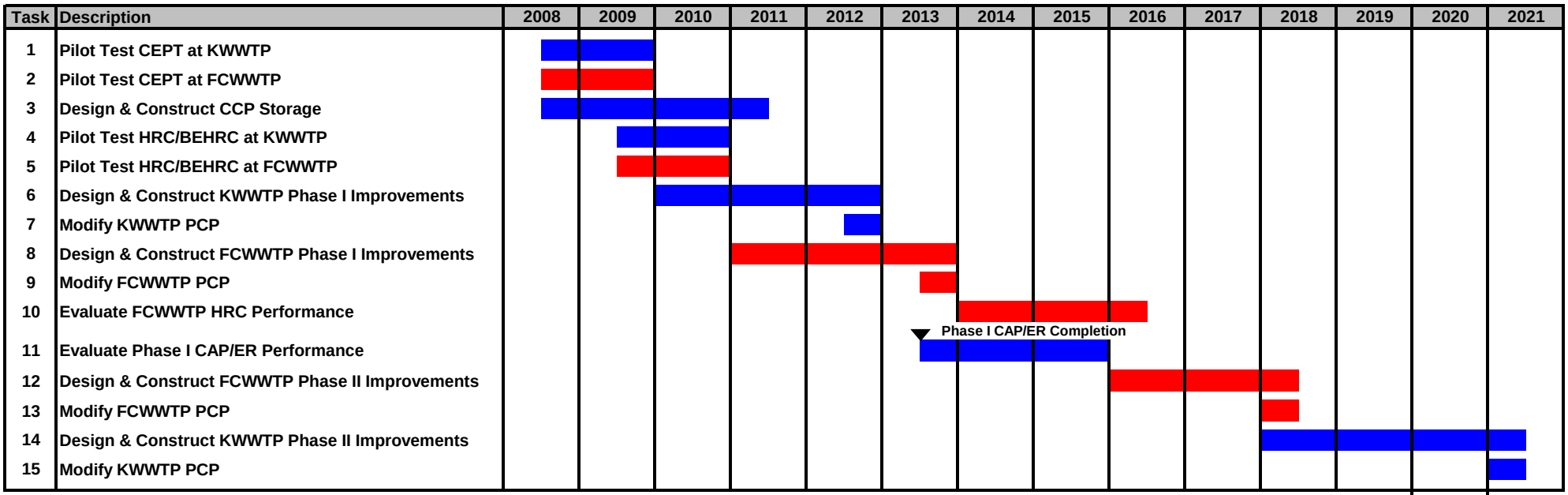
Upon completion of these facilities, the PCP will be revised to reflect the HRC/BEHRC facility improvements.

## CCP Implementation Plan Impacts to the Consent Decree

As shown in Figure 5-1, the proposed CCP implementation plan extends past the original CD compliance completion date of December 31, 2016. Due to the phasing requirements details above, an extension to the CD has been requested for the CCP-related tasks of the Consent Decree. With the exception of the substantial completion dates for the CCP-related tasks above, no other modifications to the provisions or compliance schedule for the non-CCP CD requirements have been requested.

**Figure 5-1**
**Knoxville Utilities Board**
**Composite Correction Plan**

**Proposed Implementation Plan Schedule and Conceptual Annual Expenditures**




| Task | Description | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Pilot Test CEPT at KWWTP | | | | | | | | | | | | | | |
| 2 | Pilot Test CEPT at FCWWTP | | | | | | | | | | | | | | |
| 3 | Design & Construct CCP Storage | | | | | | | | | | | | | | |
| 4 | Pilot Test HRC/BEHRC at KWWTP | | | | | | | | | | | | | | |
| 5 | Pilot Test HRC/BEHRC at FCWWTP | | | | | | | | | | | | | | |
| 6 | Design & Construct KWWTP Phase I Improvements | | | | | | | | | | | | | | |
| 7 | Modify KWWTP PCP | | | | | | | | | | | | | | |
| 8 | Design & Construct FCWWTP Phase I Improvements | | | | | | | | | | | | | | |
| 9 | Modify FCWWTP PCP | | | | | | | | | | | | | | |
| 10 | Evaluate FCWWTP HRC Performance | | | | | | | | | | | | | | |
| 11 | Evaluate Phase I CAP/ER Performance | | | | | | | | | | | | | | |
| 12 | Design & Construct FCWWTP Phase II Improvements | | | | | | | | | | | | | | |
| 13 | Modify FCWWTP PCP | | | | | | | | | | | | | | |
| 14 | Design & Construct KWWTP Phase II Improvements | | | | | | | | | | | | | | |
| 15 | Modify KWWTP PCP | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kuwahee WWTP Improvement Costs = | $98,000,000 | $1,805,000 | $14,340,000 | $19,015,000 | $14,740,000 | $9,450,000 | $0 | $0 | $0 | $0 | $0 | $5,790,000 | $15,440,000 | $11,580,000 | $5,840,000 |
| Fourth Creek WWTP Improvement Costs = | $21,975,000 | $25,000 | $100,000 | $75,000 | $4,000,000 | $8,000,000 | $8,050,000 | $25,000 | $25,000 | $345,000 | $960,000 | $370,000 | $0 | $0 | $0 |
| Total Costs = | $119,975,000 | $1,830,000 | $14,440,000 | $19,090,000 | $18,740,000 | $17,450,000 | $8,050,000 | $25,000 | $25,000 | $345,000 | $960,000 | $6,160,000 | $15,440,000 | $11,580,000 | $5,840,000 |

# Appendix A

# Appendix A

# Kuwahee and Fourth Creek Wastewater Treatment Plants BioWin Simulations

## Overview

This section presents the results of the process modeling of the Kuwahee Wastewater Treatment Plant (KWWTP) and the Fourth Creek Wastewater Treatment Plant (FCWWTP). Included are discussions of the BioWin model used and the results of the process modeling task.

The objective of the modeling task is to assess the approximate effluent quality expected with each of the three proposed upgrade options for managing wet weather flows at both KWWTP and FCWWTP:

1. Chemical addition to existing primary clarifiers only;

2. Diversion of peak wet weather flows prior to primary clarifiers and treatment with high rate clarification (HRC), combined with chemical addition to existing primary clarifiers and biological treatment for the conventional treatment train; and

3. Redirect of peak wet weather flows prior to primary clarifiers and treatment with biologically enhanced high rate clarification (BEHRC), combined with chemical addition to primary clarifiers and biological treatment for the conventional treatment train.

BioWin is a widely-used computer simulation program for evaluating and predicting wastewater treatment plant performance. Calibration of the KWWTP and FCWWTP simulators—required for meaningful model results—was performed previously using the results of intensive sampling performed in June and July of 2005. The same COD influent fractions developed during the previous calibration were used for the simulations described below.

## KWWTP Model Development and Results

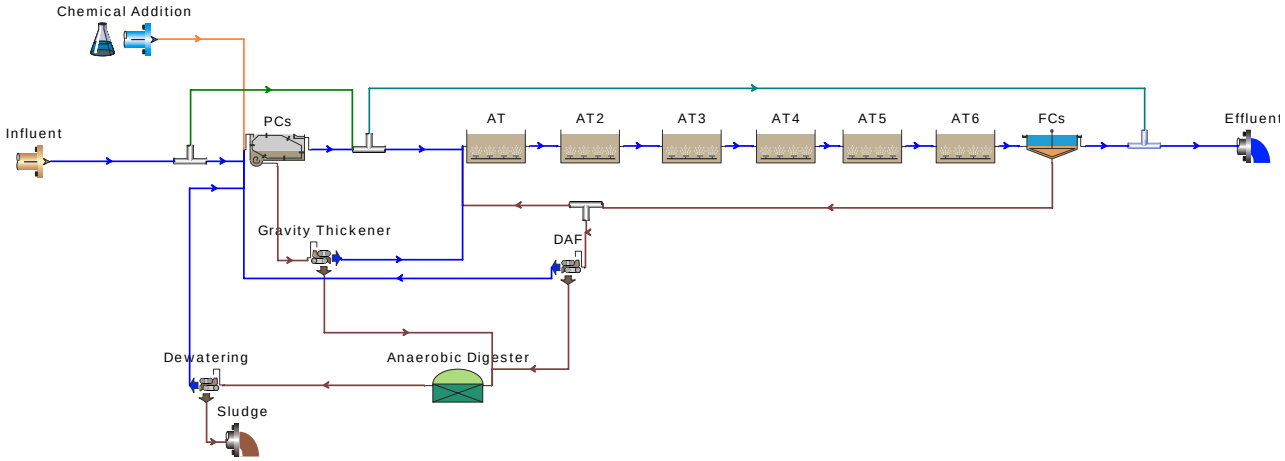
### Model Development

For the KWWTP, the number and size of the various unit processes were input per the unit descriptions in the report entitled "Knoxville Utilities Board Comprehensive Performance Evaluation Program for the WWTPs" prepared by CDM and submitted to the EPA on February 24, 2006.

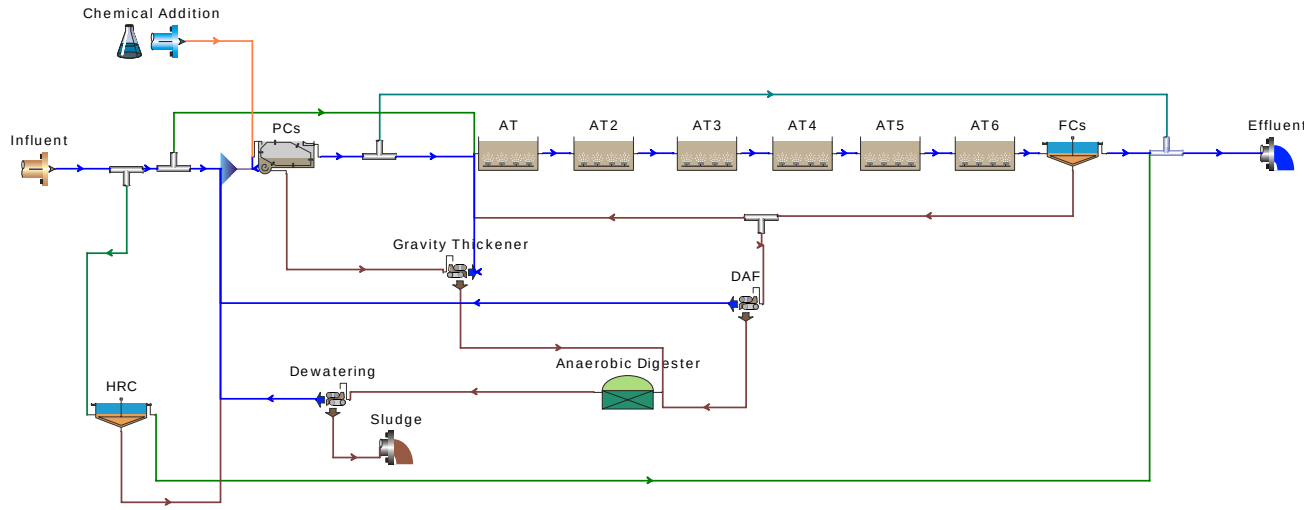
The plant model layouts for the different upgrade options are shown in **Figure 1**. Because the aeration tanks are plug-flow reactors, they were modeled in BioWin as six completely-mixed reactors in series. Up to 70 mgd of flow is sent to the existing primary clarifiers. Note that for the HRC options, the underflow from the high-rate clarifier is returned to the primary clarifiers. For the BEHRC options, the RAS from the HRC clarifier is returned to the existing secondary treatment train aeration basins.

**Figure 1. BioWin Layouts for KWWTP**

**(a) Chemical addition to primary clarifiers**




**(b) Diversion to high rate clarification**




**(c) Redirect to biologically enhanced high rate clarification**

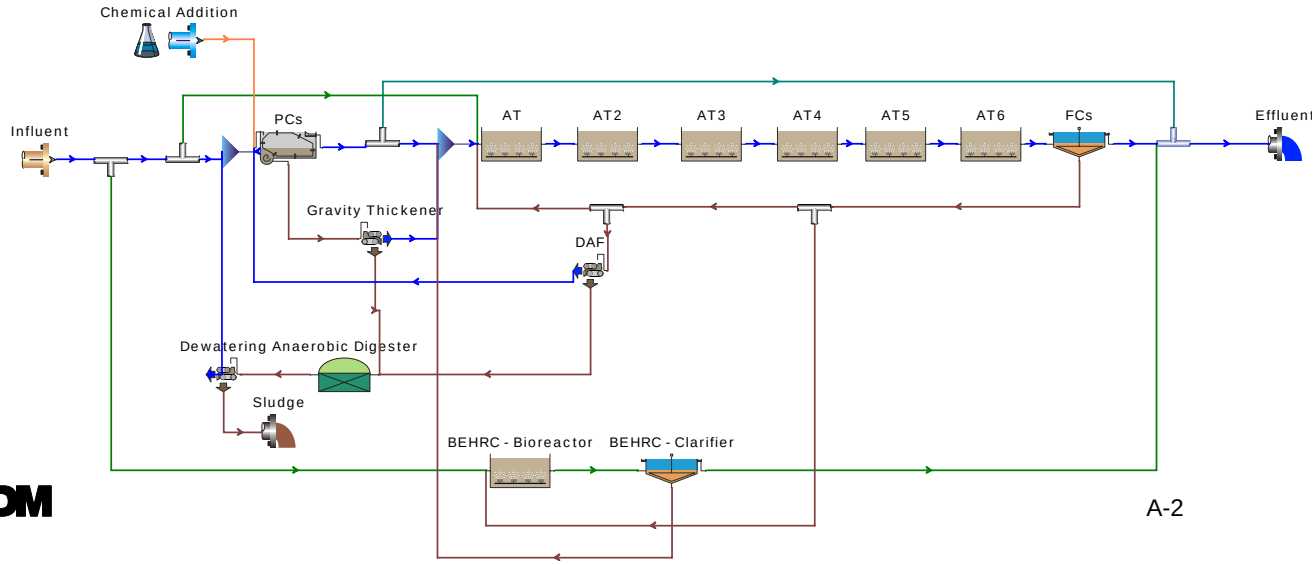


**Table 1** summarizes the different simulations that were performed with BioWin for KWWTP. The BOD, TSS, and TKN influent concentrations for each scenario are shown in **Table 2**; all other influent concentrations were left at BioWin defaults. Note that the BOD, TSS, and TKN influent concentrations used correspond to the 95th percentile daily load (based on 2002 through mid-2005 daily plant data) divided by the wet weather flow (*e.g.*, 120 or 160 mgd) for that scenario.

*Scenario names are shown in highlighted cells for different upgrade options and influent and secondary treatment flows*

**Table 1**
**Summary of BioWin Simulations for KWWTP**

| Influent Flow (mgd) | Flow to Secondary Treatment (mgd) | Upgrade Option | | |
|---|---|---|---|---|
| | | Chemical Addition to Primary Clarifiers | Diversion to High-Rate Clarification | Redirect to Biologically-Enhanced High-Rate Clarification |
| 120 | 60 | 1A - CA | 1A – HRC | 1A – BEHRC |
| 120 | 70 | 1B – CA | 1B – HRC | 1B – BEHRC |
| 160 | 60 | -- | 2A – HRC | 2A – BEHRC |
| 160 | 70 | -- | 2B – HRC | 2B – BEHRC |

**Table 2**
**Summary of Influent BOD, TSS, and TKN Concentrations for KWWTP BioWin Simulations**

| Scenario | Influent Flow (mgd) | Flow to Secondary Treatment (mgd) | Influent Concentrations[1] | | |
|---|---|---|---|---|---|
| | | | CBOD (mg/L)[2] | TSS (mg/L) | TKN (mg N/L)[3] |
| 1A | 120 | 60 | 143 | 268 | 8.8 |
| 1B | 120 | 70 | 143 | 268 | 8.8 |
| 2A | 160 | 60 | 107 | 201 | 6.7 |
| 2B | 160 | 70 | 107 | 201 | 6.7 |

Notes:
(1) Influent concentrations are based on the 95th percentile daily load divided by the influent flow for the scenario. The 95th percentile influent loads are: 143,000 lbs/day for CBOD, 268,000 lbs/day for TSS, and 5,288 lbs/day for $NH_3$-N.
(2) CBOD values listed in table were divided by 0.84 for input into BioWin because BioWin requires the BOD values from uninhibited BOD tests.
(3) TKN is assumed to be 60% $NH_3$-N.

The following operational parameters were set for KWWTP simulations:

- Solids removal in primary clarifiers = 75% for all options;
- Temperature = 15°C;
- Target solids retention time (SRT) = 7 days;

- Maximum MLSS concentrations = 3,500 mg/L for Scenarios 1A and 2A (60 mgd to secondary treatment) and 3,250 mg/L for Scenarios 1B and 2B (70 mgd to secondary treatment)1;
- Dissolved oxygen setpoint in aeration = 2 mg/L;
- Solids removal in secondary clarifiers = 99.6% (to produce a secondary clarifier effluent suspended solids concentration of approximately 15 to 20 mg/L);
- Return activated sludge (RAS) flow = 50% of flow to secondary treatment (note that it was found that the return ratio did not significantly affect clarifier performance);
- Solids removal in HRC = 85% and in BEHRC = 95% (latter found to be necessary for achieving effluent limits);
- BOD removal in BEHRC = 65% (attained by varying the size of the HRC bioreactor) and ammonia removal BEHRC = 20%; and
- HRC underflow and BEHRC RAS influent and effluent = 5% of HRC or BEHRC influent flow.

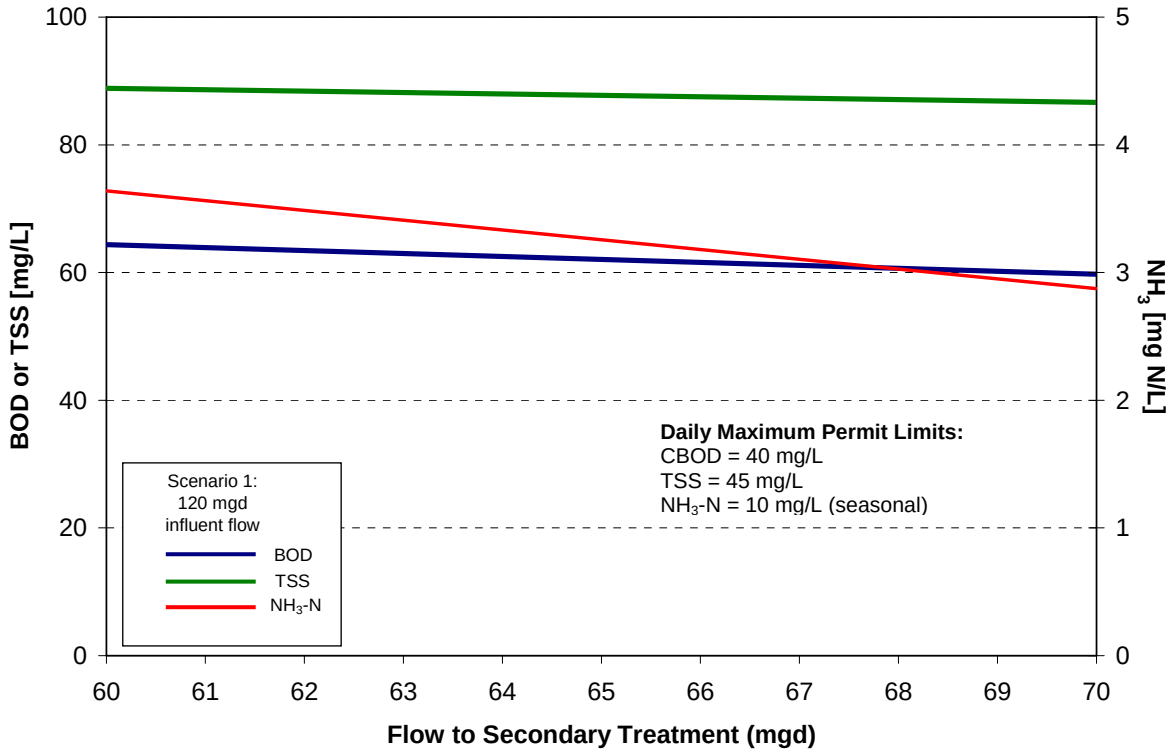
## Results

### *Chemical Addition to Primary Clarifiers*

BioWin simulations for chemical addition to primary clarifiers at KWWTP (**Figure 2**) suggest that the daily maximum TSS effluent limit (45 mg/L) would not be met under any scenario (that is, for any influent flow or any flow to secondary treatment). The daily maximum CBOD effluent limit (40 mg/L) would likely not be met either. Note that while Figure 2 displays effluent BOD values, the effluent CBOD values should be slightly lower than but close to the plotted BOD values. The BioWin simulations suggest that the daily maximum ammonia effluent limit (10 mg/L during May through October) could be met for all flow scenarios. The percentage solids removal required in the primary clarifiers to achieve the effluent TSS limit under the other scenarios would be greater than 99% for all scenarios.

[1] These maximum MLSS values are based on a solids flux analysis done for the existing clarifiers at KWWTP at maximum day flows, assuming a sludge volume index = 150 mL/g and a return ratio = 0.50. Note that increasing the return ratio above 0.5 is not expected to significantly increase the secondary clarifier capacity.

**Figure 2. Predicted Effluent Quality for KWWTP with Chemical Addition to Primary Clarifiers**




***Diversion to High Rate Clarification and Redirect to Biologically Enhanced High Rate Clarification***

BioWin simulations suggest that CBOD (given that CBOD is less than BOD), TSS, and $NH_3$-N effluent limits could be met under all flow scenarios with Diversion to high-rate clarification, assuming 85% solids removal in the clarifiers (**Figure 3**). With redirect to biologically enhanced high rate clarification (**Figure 4**), effluent TSS and $NH_3$-N limits could theoretically be met, although effluent CBOD limits would not (assuming 95% removal in the clarifiers). It should be noted that BioWin predicts that the main liquid process secondary treatment train would be nitrogen-limited under the high-flow (160 mgd influent flow) scenarios with HRC and under all scenarios with BEHRC. Thus, biological growth, and therefore BOD removal and nitrification, would not be optimized in the main treatment train unless nutrient addition is provided. Further analysis indicates that CBOD, TSS and $NH_3$-N effluent limits can be met under all scenarios with BEHRC if nutrient addition is provided for the existing biological process. It should also be noted that when 70 mgd of flow is sent to existing secondary treatment, BioWin predicts that the SRT is slightly lower than the theoretical nitrifier Washout SRT at 15 °C (3.5 days). Although the effluent ammonia limits can be met – primarily due to the low influent TKN concentration and the uptake of ammonia for biological growth, rather than due to nitrification – operating at Washout conditions may adversely affect the nitrification capacity of the plant.

Pilot testing of HRC and BEHRC are recommended to confirm the assumptions stated herein.

**Figure 3. Predicted Effluent Quality for KWWTP with Diversion to High Rate Clarification**

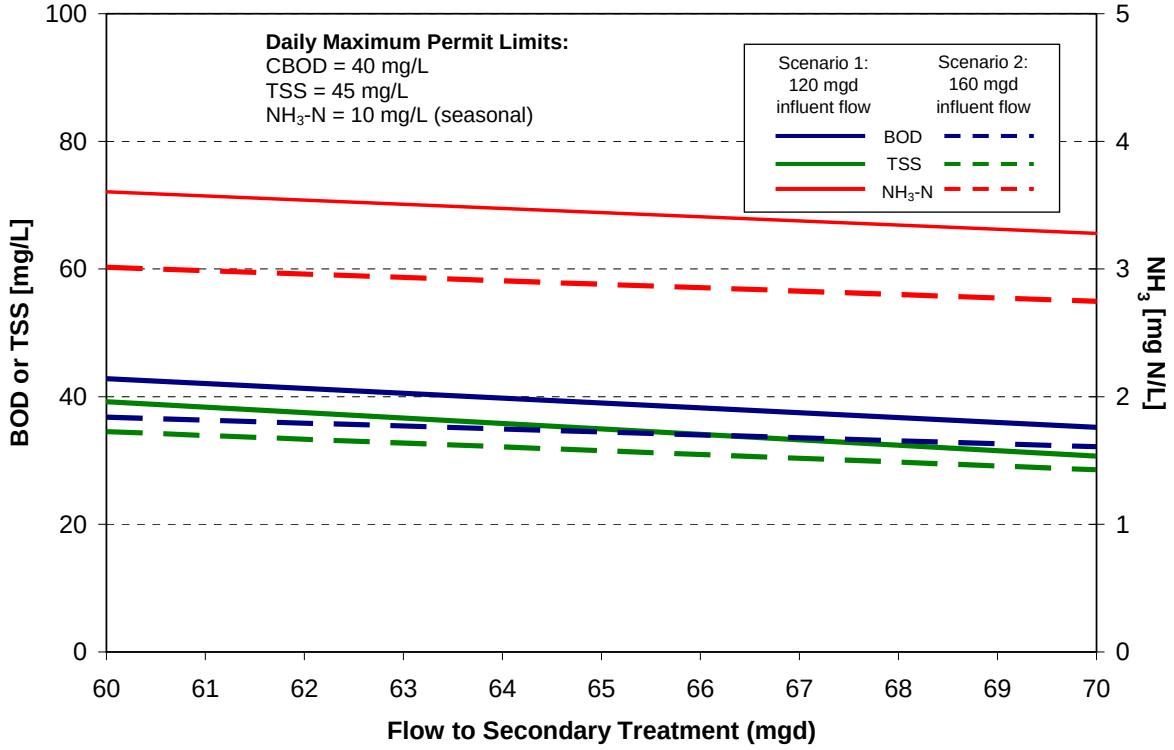
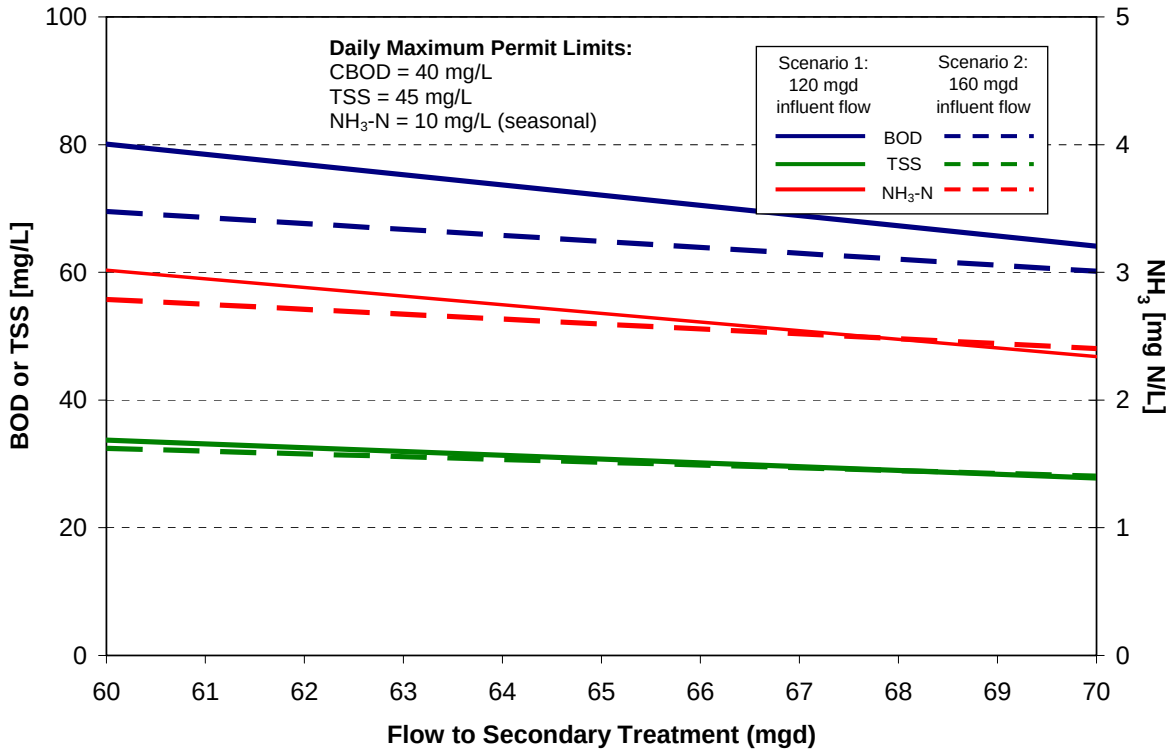


**Figure 4. Predicted Effluent Quality for KWWTP with Redirect to Biologically Enhanced High Rate Clarification**




# FCWWTP Model Development and Results

## Model Development

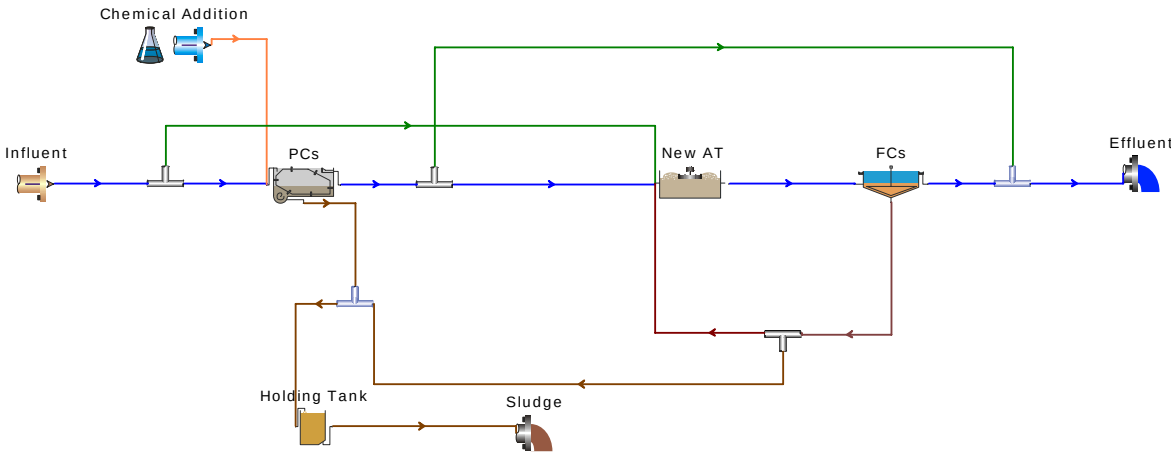
For the FCWWTP, the number and size of the various unit processes were input as described previously (see the report entitled "Knoxville Utilities Board Comprehensive Performance Evaluation Program for the WWTPs", prepared by CDM and submitted to the EPA on February 24, 2006).

The plant model layouts for the different upgrade options are shown in **Figure 5**. Note that for the HRC option, the underflow from the high rate clarifier is returned to the primary clarifiers. For the BEHRC option, the RAS from the HRC clarifier is returned to the existing secondary treatment train.

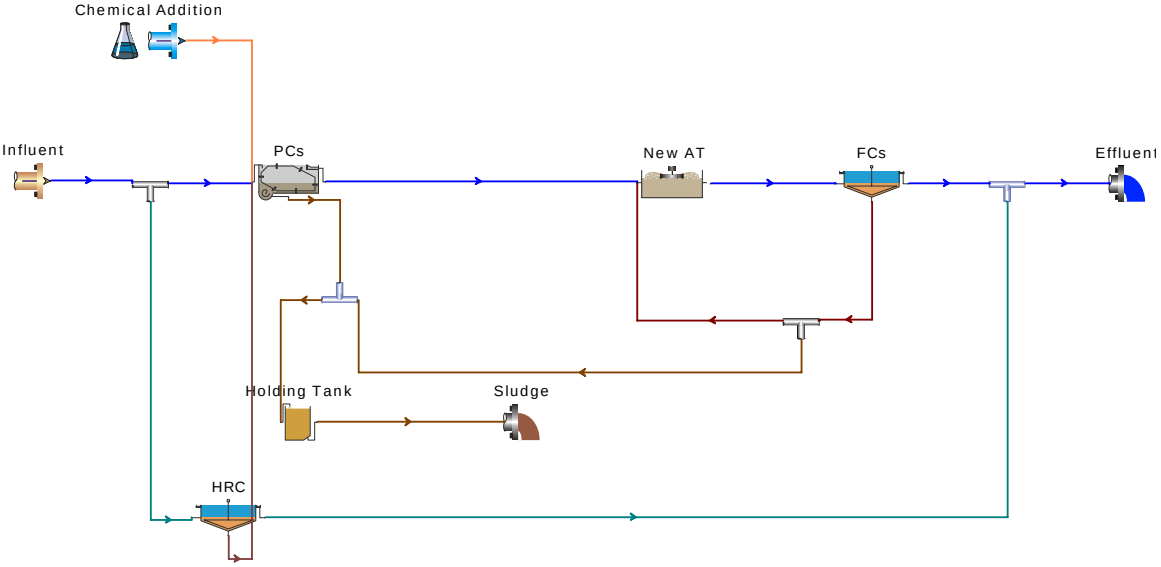
**Table 3** summarizes the different simulations that were performed with BioWin. The BOD, TSS, and TKN influent concentrations for each scenario are shown in **Table 4**; all other influent concentrations were left at BioWin defaults. Note that the BOD, TSS, and TKN influent concentrations used correspond to the 95$^{th}$ percentile daily load (based on 2002 through mid-2005 daily plant data) divided by the wet weather flow (*e.g.*, 27 or 34 mgd) for that scenario.

**Figure 5. BioWin Layouts for FCWWTP**

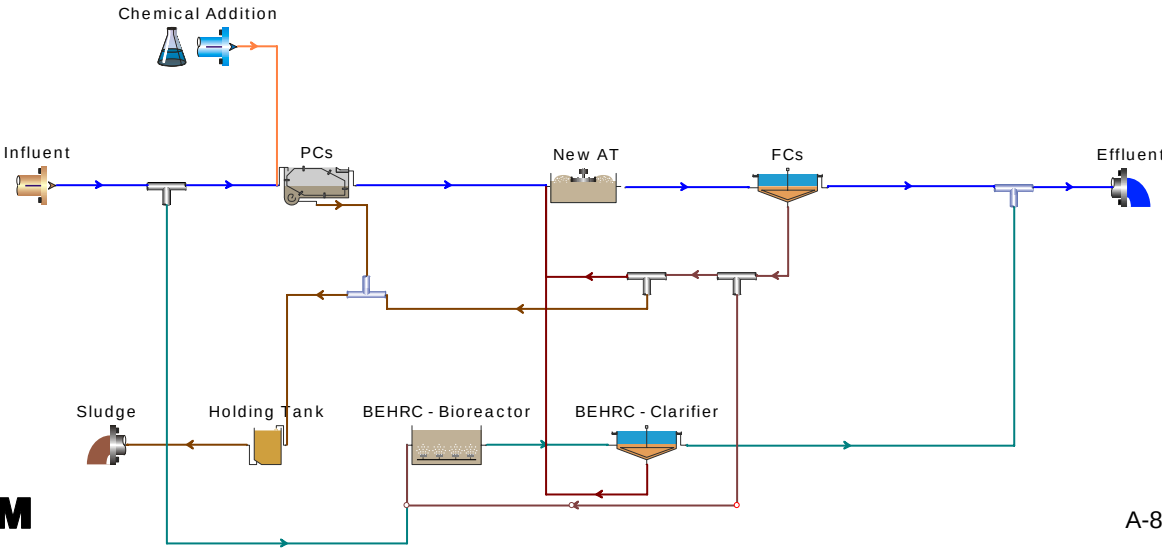
**(a) Chemical addition to primary clarifiers**




**(b) Diversion to high-rate clarification**




**(c) Redirect to biologically enhanced high rate clarification**



*Scenario names are shown in highlighted cells for different upgrade options and influent and secondary treatment flows*

**Table 3**
**Summary of BioWin Simulations for FCWWTP**

| Influent Flow (mgd) | Flow to Secondary Treatment (mgd) | Upgrade Option | | |
|---|---|---|---|---|
| | | Chemical Addition to Primary Clarifiers | Diversion to High Rate Clarification | Redirect to Biologically Enhanced High Rate Clarification |
| 27 | 15 | 1A - CA | 1A – HRC | 1A – BEHRC |
| 27 | 18 | 1B – CA | 1B – HRC | 1B – BEHRC |
| 34 | 15 | 2A – CA | 2A – HRC | 2A – BEHRC |
| 34 | 18 | 2B – CA | 2B – HRC | 2B – BEHRC |

**Table 4**
**Summary of Influent BOD, TSS, and TKN Concentrations for FCWWTP BioWin Simulations**

| Scenario | Influent Flow (mgd) | Flow to Secondary Treatment (mgd) | Influent Concentrations | | |
|---|---|---|---|---|---|
| | | | BOD (mg/L) | TSS (mg/L) | TKN (mg N/L) |
| 1A | 27 | 15 | 80 | 122 | 7.1 |
| 1B | 27 | 18 | 80 | 122 | 7.1 |
| 2A | 34 | 15 | 63 | 97 | 5.6 |
| 2B | 34 | 18 | 63 | 97 | 5.6 |

Note: Influent concentrations are based on the 95$^{th}$ percentile daily load divided by the influent flow for the scenario. The 95$^{th}$ percentile influent loads are: 18,000 lbs/day for BOD, 27,500 lbs/day for TSS, and 955 lbs/day for $NH_3$-N. TKN is assumed to be 60% $NH_3$-N.

The following operational parameters were set for FCWWTP simulations:

- Solids removal in primary clarifiers = 60% for all options;
- Temperature = 15 °C;
- Target solids retention time (SRT) = 2 days;
- Minimum MLSS concentrations = 1,500 mg/L and maximum MLSS = 3,100 mg/L for Scenarios 1A and 2A (15 mgd to secondary treatment) and 2,700 mg/L for Scenarios 1B and 2B (18 mgd to secondary treatment)[2];
- Dissolved oxygen setpoint in aeration = 2 mg/L;
- Solids removal in secondary clarifiers = 99.1% (to achieve a secondary clarifier effluent suspended solids concentration of approximately 15 to 20 mg/L);

[2] These maximum MLSS values are based on a solids flux analysis done for the existing clarifiers at KWWTP at maximum day flows, assuming a sludge volume index = 150 mL/g and a return ratio = 0.50. Note that increasing the return ratio above 0.5 is not expected to significantly increase the secondary clarifier capacity.

- Return activated sludge (RAS) flow = 50% of flow to secondary treatment (note that it was found that the return ratio did not significantly affect clarifier performance);
- Solids removal in HRC = 85% and in BEHRC= 95% (the latter was found to be necessary to achieve effluent limits);
- BOD removal in BEHRC = 65% (attained by varying the size of the HRC bioreactor); and
- HRC underflow and BEHRC RAS influent and effluent = 5% of HRC or BEHRC influent flow.

## Results

Simulations for chemical addition to primary clarifiers at FCWWTP (**Figure 5**), Diversion to high rate clarification with 85%s solids removal in high-rate clarifiers (**Figure 6**), and redirect to biologically enhanced high rate clarification with 95% removal in high-rate clarifiers (**Figure 7**) suggest that the daily maximum TSS (45 mg/L) and BOD (45 mg/L) effluent limits could be met under all flow scenarios. These results are based on maintaining a minimum MLSS of at least 1,500 mg/L for the chemical addition to primary clarifier and high rate clarification options. At this minimum MLSS, the BioWin-predicted SRT was sometimes higher than 2 days.

Pilot testing of HRC and BEHRC are recommended to confirm the assumptions stated herein.

**Figure 5. Predicted Effluent Quality for FCWWTP with Chemical Addition to Primary Clarifiers**

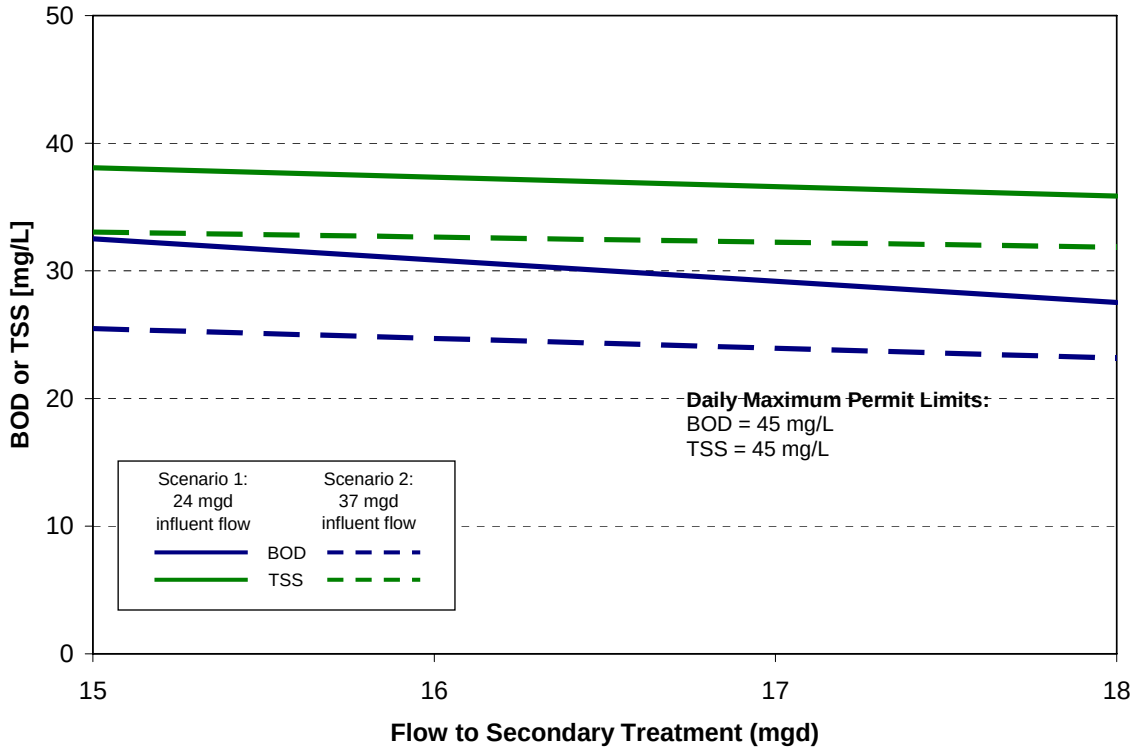


**Figure 6. Predicted Effluent Quality for FCWWTP with Diversion to High Rate Clarification**

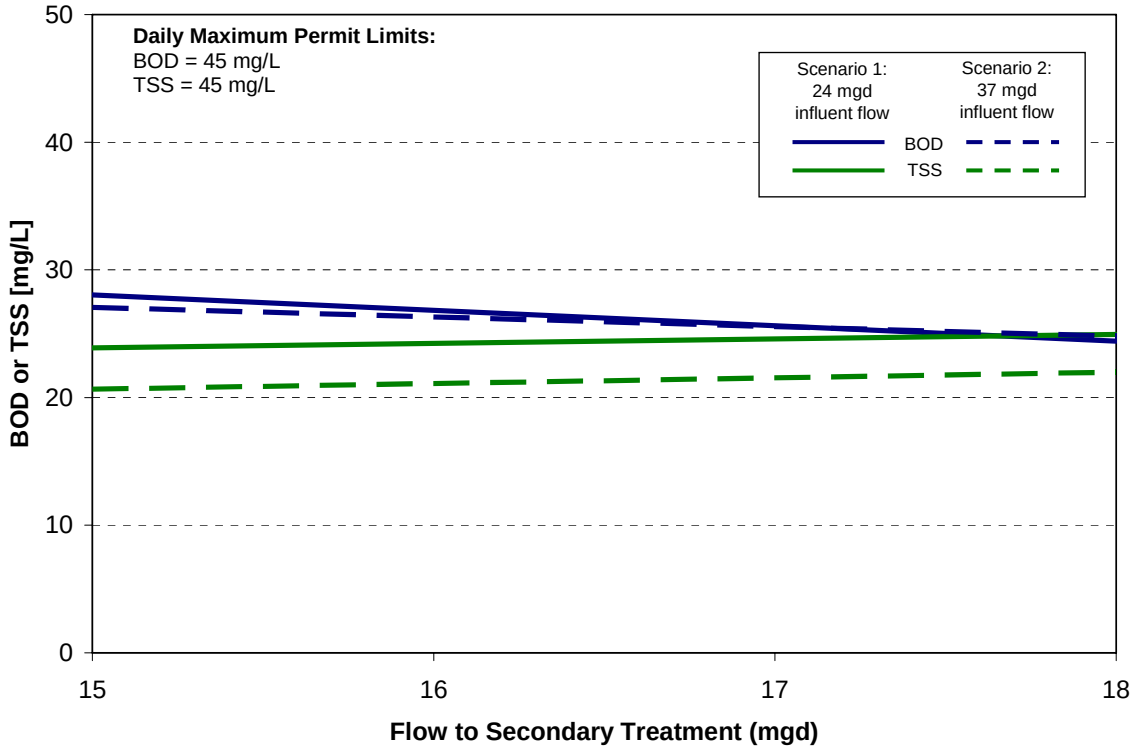
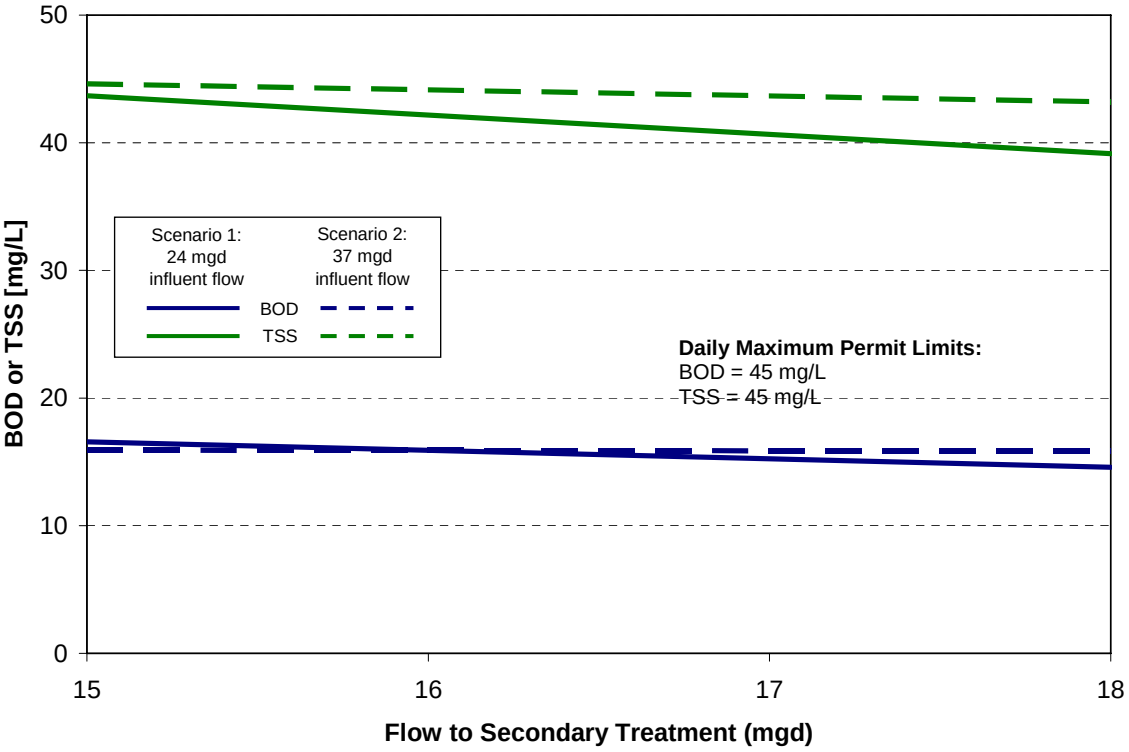



**Figure 7. Predicted Effluent Quality for FCWWTP with Redirect to Biologically Enhanced High Rate Clarification**



## FCWWTP Aerator Capacity

In a separate analysis from the BioWin simulations, the capacity of the FCWWTP aerators was assessed. The aerator horsepower required to treat maximum day loads to the aeration basins at FCWWTP is estimated to be 405 hp. This value was calculated based on the following assumptions:

- Aerators need to have sufficient capacity to treat the maximum day raw influent $BOD_5$ load of 23,350 lbs/day (note this represents an unusually high peak to average ratio of 2.9; 2.0 is a more typical value), corresponding to the 98$^{th}$ percentile value for all available influent daily $BOD_5$ loads during 2002 through mid-2005;
- Thirty percent of $BOD_5$ is removed in primaries;
- $BOD_5$ in plant effluent is approximately 305 lbs/day (based on an average effluent flow of 7.3 mgd and an average effluent $BOD_5$ of 5 mg/L), therefore the total $BOD_5$ removed in aeration is 16,040 lbs/day;
- Oxygen demand is 1.1 pounds of oxygen per pound of $BOD_5$ removed, therefore, total oxygen demand is 17,650 lbs/day;
- The standard aeration efficiency for the two-speed aerators is 3.0 lbs oxygen/hp/hr; and
- The field aeration efficiency for the existing aerators is 1.8 lb oxygen/hp/hr.

With both the new and old aeration tanks in service, the firm capacity (largest aerator out of service) of the existing aerators is 360 hp, which is not sufficient to meet existing maximum day demands. With only the new aeration tanks in service, the total aeration capacity is 240 hp, which is significantly less than existing maximum day demand. Therefore, it will be necessary to increase aeration capacity. If only the newer aeration basins are in service (which have sufficient aeration volume based on BioWin modeling), a firm capacity equivalent to approximately 400 hp will have to be provided to meet current maximum day demands. Future demands must also be considered and the maximum day demand should also be confirmed before selecting the method of upgrade.

# Appendix B

# Appendix B

## Analysis of Gravity Thickener Capacity at KWWTP

The purpose of this analysis is to determine if additional gravity thickener capacity at the Kuwahee WWTP is required to provide capacity for thickening of solids collected in the primary clarifiers and proposed wet weather treatment facilities.

***Solids Sources and Quantities***

Solids are collected in the nine primary clarifiers using chain-and-flight mechanisms that scrape the settled material in each clarifier to a sludge hopper. Periodically (a programmable number of minutes each hour), a valve on the hopper drain pipe is opened and solids flow to a primary clarifier sludge wet well. Pumps within the wet well are used to convey the solids to the gravity thickener influent.

KUB is evaluating options to improve the performance of the Kuwahee WWTP during peak flow events. Several of these options will cause an increase in the amount of solids collected in the primary clarifiers and a consequent increase in solids to the existing gravity thickener. CCP Option 1 being considered for the Kuwahee WWTP requires the addition of a chemical coagulant or flocculant to the wastewater entering the primary clarifiers. It is expected that chemical enhancement of the primary treatment process will increase the amount of primary solids by improving the clarifier efficiency. Options 2 and 6 being considered for the Kuwahee WWTP include chemical enhanced primary treatment plus a side-stream wet weather treatment system. The treatment system (currently proposed as high rate clarification) removes solids from the wastewater stream that currently bypass the primary clarifiers during peak flows. The solids collected from the side-stream treatment system are returned to the primary influent for removal in the primary clarifiers.

The influent TSS loadings for the Kuwahee WWTP is summarized in **Table 1** based on WWTP data from January 2002-August 2005.

**Table 1**
**Kuwahee WWTP Influent TSS Characteristics**
**(January 2002-August 2005)**

| | TSS Loading (lb/day) |
|---|---|
| Average Daily | 121,670 |
| Maximum Daily | 687,191 |
| Maximum Weekly | 287,632 |
| Maximum Monthly | 212,118 |
| 95$^{th}$ Percentile | 268,230 |

Figures 1, 2, and 3 (attached) show the solids balance for Options 1, 2, and 6, respectively. The solids balances are based on influent TSS and BOD loadings based on the 95$^{th}$ percentile. The TSS removal efficiency for the primary clarifier is assumed to be 75% under both Option 1 (chemically enhanced primary treatment) and Options 2 and 6 (chemically enhanced primary treatment with additional high rate clarifier solids in the influent).

The basis of design for the thickening facilities is summarized in the following:

- Option 1: Design thickening facilities to handle primary clarifier solids assuming 75% removal efficiency of TSS at 95th percentile daily loading and daily flow of 120 mgd. Flows up to 70 mgd pass through primary treatment where TSS removal is enhanced by chemical addition. Flows over 70 mgd will bypass the primary clarifiers.

- Option 2: Design thickening facilities to handle primary clarifier solids assuming 75% removal efficiency of TSS at 95th percentile daily loading and daily flow of 120 mgd. Flows up to 70 mgd pass through primary treatment. Flows over 70 mgd are diverted to a high rate clarification peak flow process. Solids from the high rate clarification process (wastewater influent TSS and chemical sludge) are returned to the influent of the primary clarifiers.

- Option 6: Design thickening facilities to handle primary clarifier solids assuming 75% removal efficiency of TSS at 95th percentile daily loading and daily flow of 160 mgd. Flows up to 70 mgd pass through primary treatment. Flows over 70 mgd are diverted to a high rate clarification peak flow process. Solids from the high rate clarification process (wastewater influent TSS and chemical sludge) are returned to the influent of the primary clarifiers.

***Thickening Facility Requirements: Option 1***

From Figure 1, the quantity of primary solids that are sent to the gravity thickening facilities is 121,700 lb/day at 1 percent solids. Under this condition, the volume of primary solids is 1.43 mgd.

Table 2 details the gravity thickener loadings for two scenarios: 1) assuming only the existing gravity thickener is in service, and 2) assuming a new gravity thickener is constructed for a total of two in service. As seen in the table, the solids loading if one gravity thickener remains in service exceeds the loading contained in the TDEC design guidance manual. If two gravity thickeners are in service, the loading is slightly below the design guidance.

In each scenario, the hydraulic loading is below the minimum recommended loading. It is recommended that provisions for adding dilution water (such as primary or secondary effluent) be included to help reduce the occurrence of septic conditions.

**Table 2**
**Summary of Gravity Thickener Loading at Kuwahee WWTP, Option 1**

| | Kuwahee WWTP | TDEC Design Guidance |
|---|---|---|
| One thickener, 70-ft diameter, surface area = 3,848 $ft^2$ | | |
| Solids Loading | 31.6 lb/day/$ft^2$ | 20-30 lb/day/$ft^2$ |
| Hydraulic Loading | 372 gal/day/$ft^2$ | 500-800 gal/day/$ft^2$ |
| Two thickeners, 70-ft diameter each, total surface area = 7,697 $ft^2$ | | |
| Solids Loading | 15.8 lb/day/$ft^2$ | 20-30 lb/day/$ft^2$ |
| Hydraulic Loading | 186 gal/day/$ft^2$ | 500-800 gal/day/$ft^2$ |

***Thickening Facility Requirements: Option 2***

From Figure 2, the quantity of primary solids sent to the gravity thickening facilities is 199,000 lb/day at 1 percent solids. Under this condition, the volume of primary solids is 2.34 mgd.

Table 3 details the gravity thickener loadings for two scenarios: 1) assuming only the existing gravity thickener is in service, and 2) assuming a new gravity thickener is constructed for a total of two in service. As seen in the table, the solids loading if one gravity thickener remains in service exceeds the loading contained in the TDEC design guidance manual. If two gravity thickeners are in service, the loading is within the design guidance.

In each scenario, the hydraulic loading is near or below the minimum recommended loading. It is recommended that provisions for adding dilution water (such as primary or secondary effluent) be included to help reduce the occurrence of septic conditions.

**Table 3**
**Summary of Gravity Thickener Loading at Kuwahee WWTP, Option 2**

| | Kuwahee WWTP | TDEC Design Guidance |
|---|---|---|
| One thickener, 70-ft diameter, surface area = 3,848 $ft^2$ | | |
| Solids Loading | 52 lb/day/$ft^2$ | 20-30 lb/day/$ft^2$ |
| Hydraulic Loading | 608 gal/day/$ft^2$ | 500-800 gal/day/$ft^2$ |
| Two thickeners, 70-ft diameter each, total surface area = 7,697 $ft^2$ | | |
| Solids Loading | 26 lb/day/$ft^2$ | 20-30 lb/day/$ft^2$ |
| Hydraulic Loading | 304 gal/day/$ft^2$ | 500-800 gal/day/$ft^2$ |

***Thickening Facility Requirements: Option 6***

From Figure 3, the quantity of primary solids sent to the gravity thickening facilities is 199,800 lb/day at 1 percent solids. Under this condition, the volume of primary solids is 2.35 mgd.

Table 4 details the gravity thickener loadings for two scenarios: 1) assuming only the existing gravity thickener is in service, and 2) assuming a new gravity thickener is constructed for a total of two in service. As seen in the table, the solids loading if one gravity thickener remains in service exceeds the loading contained in the TDEC design guidance manual. If two gravity thickeners are in service, the loading is within the design guidance.

In each scenario, the hydraulic loading is near or below the minimum recommended loading. It is recommended that provisions for adding dilution water (such as primary or secondary effluent) be included to help reduce the occurrence of septic conditions.

| Table 4<br>Summary of Gravity Thickener Loading at Kuwahee WWTP, Option 6 | | |
|---|---|---|
| | **Kuwahee WWTP** | **TDEC Design Guidance** |
| One thickener, 70-ft diameter, surface area = 3,848 $ft^2$ | | |
| Solids Loading | 52 lb/day/$ft^2$ | 20-30 lb/day/$ft^2$ |
| Hydraulic Loading | 610 gal/day/$ft^2$ | 500-800 gal/day/$ft^2$ |
| Two thickeners, 70-ft diameter each, total surface area = 7,697 $ft^2$ | | |
| Solids Loading | 26 lb/day/$ft^2$ | 20-30 lb/day/$ft^2$ |
| Hydraulic Loading | 305 gal/day/$ft^2$ | 500-800 gal/day/$ft^2$ |

***Recommendations***

An additional 70-ft diameter gravity thickener is recommended to handle additional solids from the primary clarifiers during peak flow events. An evaluation of Options 1, 2, and 6 for wet weather treatment indicate the additional thickener is necessary to handle the increased quantity of primary sludge. Options 3 and 7 are projected to produce less primary sludge than Options 2 and 6 because the solids from the high rate clarification process in these options are not returned to the primary clarifier influent.

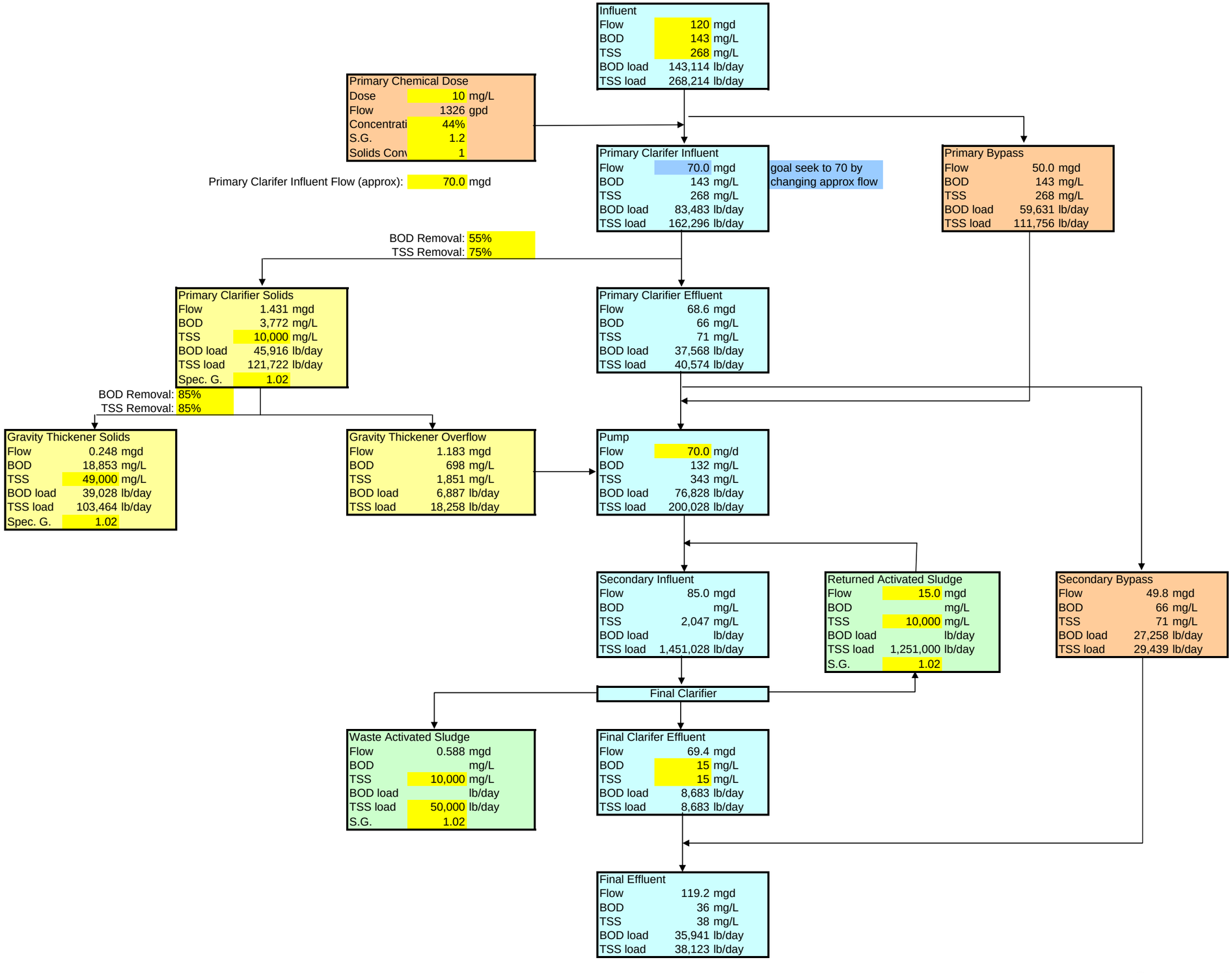



**Figure 1**
**Kuwahee WWTP**
**Flow and Mass Balance**
**Option 1: 120 mgd flow, chemical treatment in primary**

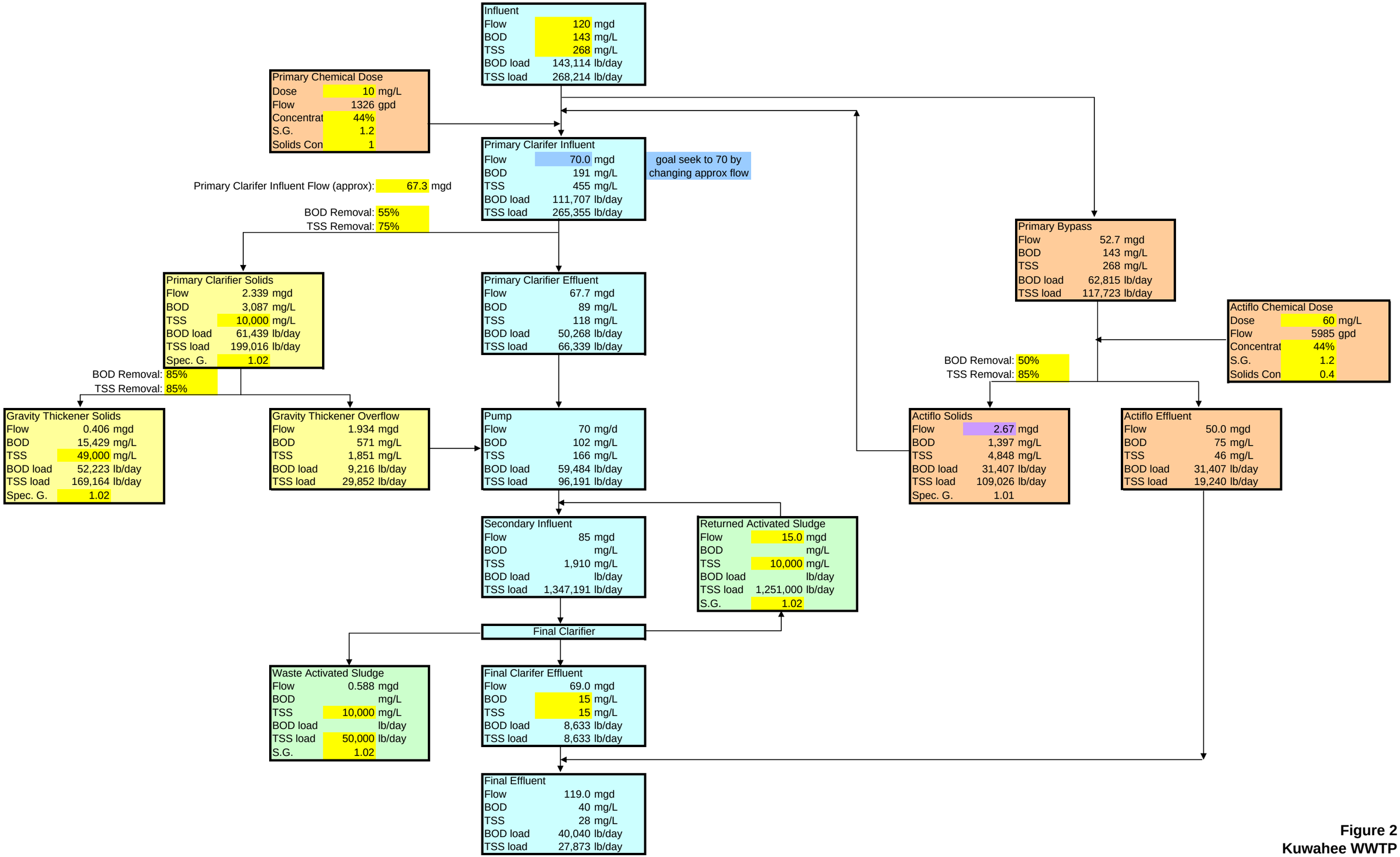



**Figure 2**
**Kuwahee WWTP**
**Flow and Mass Balance**
**Option 2: 120 mgd flow, bypass treatment with Actiflo**

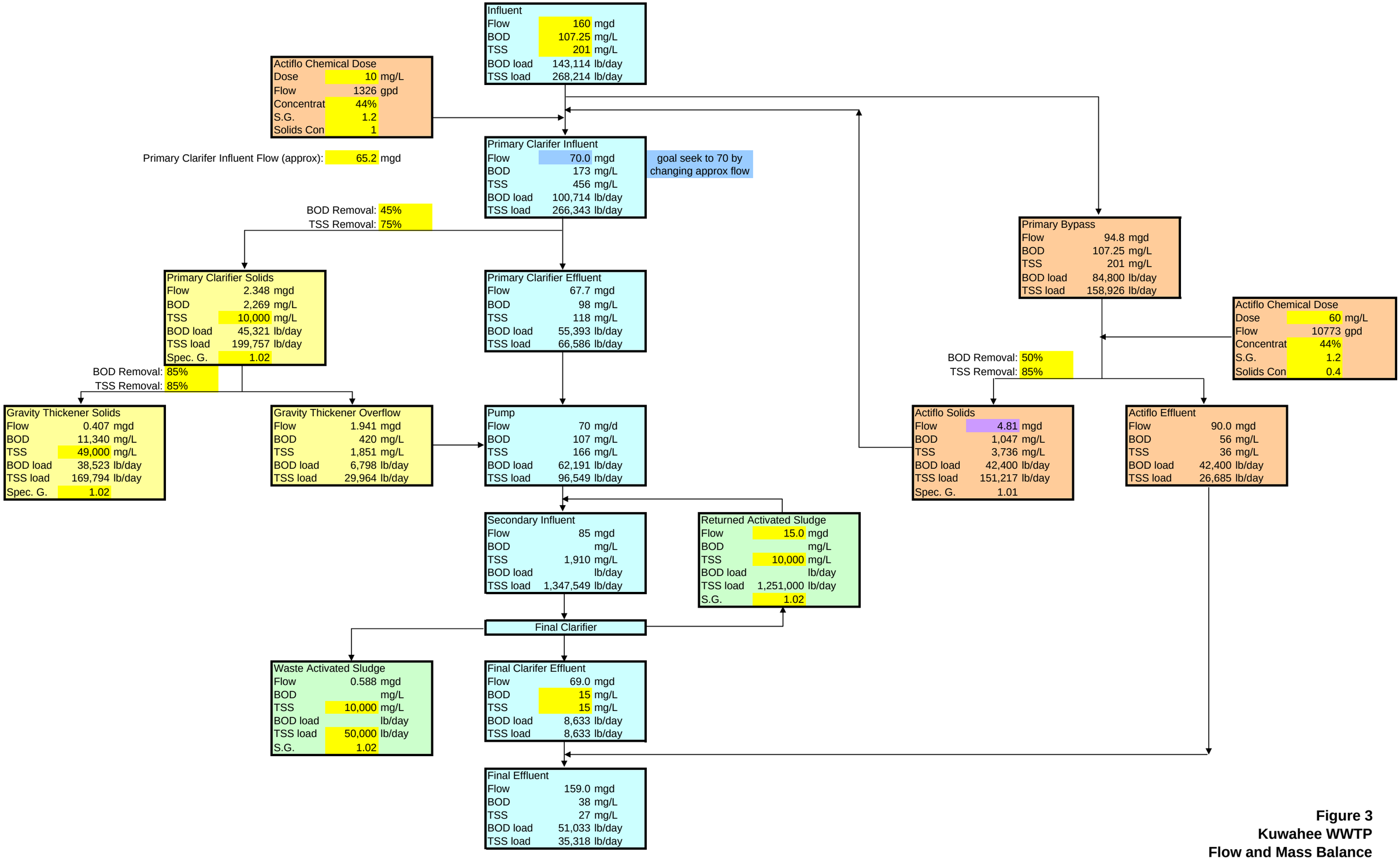



**Figure 3**
**Kuwahee WWTP**
**Flow and Mass Balance**
**Option 6: 160 mgd flow, bypass treatment with Actiflo**

# Appendix C

# Fourth Creek WWTP Options

# *Knoxville, Tennessee*
# *Fourth Creek WWTP - Options 1*
# *Opinion of Probable Construction Cost, Prelim Design, March 2007*

| | |
|---|---|
| **Project name** | TN, Knoxville FCWWTP |
| **Estimator** | MacIsaac |
| **Labor rate table** | TN07 Knoxville |
| **Equipment rate table** | 00 071H Equip Rental |
| **database version:** | V6.0 TES 9.4.22.0 |
| **ENR 20 City CCI** | March 2007: 7856 |
| **Notes** | This is an Opinion of Probable Construction Cost only, as defined by the documents provided at the level of design indicated above. CDM has no control over the cost of labor, materials, equipment, or services furnished, over schedules, over contractor's methods of determining prices, competitive bidding, market or negotiating conditions. CDM does not guarantee that this opinion will not vary from actual cost, or contractor's bids. There are not any costs provided for: Change Orders, Construction Oversight, Land Acquisition or temporary/permanent Easements, Operations, or any other costs associated with this project that are not specifically part of the bidding contractor's proposed scope.<br><br>The total cost shown is valid to only two significant figures<br><br>Assumptions:<br>No rock excavation is required.<br>Only nominal dewatering is needed.<br>No consideration for contaminated soils or hazardous materials (i.e. asbestos, lead)<br>Based on a 40 hour work week with no overtime.<br><br>This job is sales tax exempt.<br>Costs shown in April 2007 dollars. |
| **Report format** | Sorted by 'Proj Area/Phase'<br>'Detail' summary<br>Allocate addons<br>Round unit prices<br>Combine items<br>Paginate |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***01 Equilization*** | | | | | | | | | |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Modifications to Diversion Structure A for new sluice gate | 1.00 | ls | - | - | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | 20 | New Wet-Weather Screenings Diversion Structure | 1.00 | ls | 4,700 | 100,000 | | | - | 104,699.68 /ls | 104,700 |
| | ---- | Assumption of 20% of Excavated Material is Contaiminated | 182.00 | cy | | | 4,550 | | - | 25.00 /cy | 4,550 |
| | | **Sitework Allowance** | | | **4,700** | **100,000** | **14,550** | | | | **119,250** |
| | | 360.00 Labor hours | | | | | | | | | |
| **02240.010** | | **Dewatering** | | | | | | | | | |
| | 20 | Dewatering Centrifugal Pump | 1.00 | ea | 891 | 5,750 | - | | 276 | 6,916.77 /ea | 6,917 |
| | | **Dewatering** | | | **891** | **5,750** | | | **276** | | **6,917** |
| | | 48.00 Labor hours | | | | | | | | | |
| | | 128.00 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 82.593 | cy | 70 | - | - | | 188 | 3.121 /cy | 258 |
| | 461C | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 27.11 | cy | 46 | - | - | | 90 | 5.011 /cy | 136 |
| n | A000 | IMPORT MATERIAL (Summary) | 8.00 | CY | - | - | - | | - | | |
| n | A015 | Import Gravel Fill | 16.371 | cy | - | 246 | 92 | | - | 20.60 /cy | 337 |
| | | **Foundation Excavation** | | | **116** | **246** | **92** | | **278** | | **731** |
| | | 7.66 Labor hours | | | | | | | | | |
| | | 4.371 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 545.00 | lf | 50 | | - | | - | 0.092 /lf | 50 |
| n | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 580.17 | cy | 587 | - | - | | 1,653 | 3.86 /cy | 2,239 |
| n | 3130 | Trench Bedding-Excavator- 130 HP | 47.56 | cy | 96 | - | - | | 280 | 7.901 /cy | 376 |
| n | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 138.31 | cy | 447 | - | - | | 1,301 | 12.642 /cy | 1,748 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 357.123 | cy | 323 | - | - | | 1,016 | 3.751 /cy | 1,339 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 185.863 | cy | - | 6,542 | - | | - | 35.20 /cy | 6,542 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 223.05 | cy | 313 | - | - | | 601 | 4.10 /cy | 914 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 223.05 | cy | 218 | - | - | | 364 | 2.61 /cy | 582 |
| n | 9616 | Trench Shield- 6x16 | 0.53 | u/mo | - | - | - | | 747 | 1,410.00 /u/mo | 747 |
| | A006 | Pipe Test | 545.00 | lf | 403 | 436 | - | | - | 1.54 /lf | 839 |
| | C0G0 | Concrete Thrust Block, 4" | 2.00 | ea | 12 | 5 | - | | - | 8.22 /ea | 16 |
| | C0J0 | Concrete Thrust Block, 6" | 1.00 | ea | 72 | 5 | - | | - | 76.58 /ea | 77 |
| | C0P0 | Concrete Thrust Block, 12" | 4.00 | ea | 363 | 72 | - | | - | 108.67 /ea | 435 |
| | | **Trenching** | | | **2,883** | **7,060** | | | **5,962** | | **15,905** |
| | | 166.943 Labor hours | | | | | | | | | |
| | | 91.435 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 278.53 | cy | - | - | - | | - | | |
| | 40 | Foundation Excavation Spoils (Summary) | 55.481 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 223.05 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 223.05 | cy | 360 | - | - | | 691 | 4.712 /cy | 1,051 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 55.481 | cy | 65 | - | - | | 182 | 4.44 /cy | 246 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 223.05 | cy | 1,004 | - | - | | 1,672 | 12.001 /cy | 2,677 |
| | A0I7 | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 55.481 | cy | 35 | - | - | | 80 | 2.071 /cy | 115 |
| | | **Excavation Spoils** | | | **1,463** | | | | **2,625** | | **4,089** |
| | | 85.941 Labor hours | | | | | | | | | |
| | | 42.97 Equipment hours | | | | | | | | | |
| **02639.010** | | **Catch Basins & Inlets** | | | | | | | | | |
| | II80 | Catch Basin 48" x 72" x 8'-0" Deep | 1.00 | ea | 101 | 6,728 | - | | 255 | 7,083.02 /ea | 7,083 |
| | JJ80 | Catch Basin 72" x 96" x 8'-0" Deep | 1.00 | ea | 101 | 7,590 | - | | 255 | 7,945.52 /ea | 7,946 |
| | | **Catch Basins & Inlets** | | | **202** | **14,318** | | | **509** | | **15,029** |
| | | 12.00 Labor hours | | | | | | | | | |
| | | 4.00 Equipment hours | | | | | | | | | |
| **02639.020** | | **Storm Drainage Manholes** | | | | | | | | | |
| | 0 | Unload Care & Protect Manhole | 3.00 | ea | 53 | - | - | | - | 17.51 /ea | 53 |
| | 7200 | Place & Shape Manhole Base & Inverts- 72" | 1.00 | ea | 210 | - | - | | - | 511.88 /ea | 512 |
| | 7210 | Manhole 72" x 10' Deep | 1.00 | ea | 343 | 4,782 | - | | 496 | 5,621.13 /ea | 5,621 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Storm Drainage Manholes** | | | **606** | **4,782** | | | **496** | | **6,186** |
| | | 35.00 Labor hours | | | | | | | | | |
| | | 4.00 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 110 | Concrete: Slab on Grade | 42.50 | cy | 3,076 | 13,175 | - | | 1,157 | 409.61 /cy | 17,408 |
| n | 140 | Concrete: Wall | 100.00 | cy | 12,409 | 35,000 | - | | 5,043 | 524.52 /cy | 52,452 |
| n | 145 | Concrete: Elevated Slab | 22.00 | cy | 2,502 | 7,920 | - | | 1,109 | 524.18 /cy | 11,532 |
| | | **Concrete in Place** | | | **17,987** | **56,095** | | | **7,310** | | **81,392** |
| | | 869.750 Labor hours | | | | | | | | | |
| | | 144.95 Equipment hours | | | | | | | | | |
| **05510.000** | | **Metal Ladders** | | | | | | | | | |
| | 5 | Straight Ladder Steel | 9.00 | lf | 99 | 351 | - | | - | 50.041 /lf | 450 |
| | | **Metal Ladders** | | | **99** | **351** | | | | | **450** |
| | | 2.79 Labor hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J04 | 36"x 36" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 3.00 | ea | 208 | 2,760 | - | | - | 989.483 /ea | 2,968 |
| n | JD8 | 48"x 72" Aluminum Bilco Floor Hatch, Doule Leaf | 7.00 | ea | 604 | 9,298 | - | | - | 1,414.51 /ea | 9,902 |
| | | **Hatch, Aluminum, 300psf** | | | **812** | **12,058** | | | | | **12,870** |
| | | 33.90 Labor hours | | | | | | | | | |
| **11211.300** | | **Cent. Submersible Pumps** | | | | | | | | | |
| | 50 | Submersible Pump 45 HP | 3.00 | ea | 8,708 | 24,000 | - | | 6,165 | 12,957.92 /ea | 38,874 |
| | | **Cent. Submersible Pumps** | | | **8,708** | **24,000** | | | **6,165** | | **38,874** |
| | | 432.00 Labor hours | | | | | | | | | |
| | | 72.000 Equipment hours | | | | | | | | | |
| **11217.100** | | **Submersible Sump Pumps** | | | | | | | | | |
| | 10 | Sump Pump for Valve and Meter Vaults | 2.00 | ea | 7,741 | 16,000 | - | | 5,480 | 14,610.56 /ea | 29,221 |
| | | **Submersible Sump Pumps** | | | **7,741** | **16,000** | | | **5,480** | | **29,221** |
| | | 384.00 Labor hours | | | | | | | | | |
| | | 64.00 Equipment hours | | | | | | | | | |
| **11220.110** | | **Submersible Mixers** | | | | | | | | | |
| | 05 | Submersible Mixer | 3.00 | ea | 17,895 | 36,000 | - | | - | 17,965.00 /ea | 53,895 |
| | | **Submersible Mixers** | | | **17,895** | **36,000** | | | | | **53,895** |
| | | 750.000 Labor hours | | | | | | | | | |
| **11284.000** | | **Sluice Gates** | | | | | | | | | |
| | 7248 | 72" x 48" Sluice Gate | 1.00 | ea | 14,077 | 28,800 | - | | - | 42,877.40 /ea | 42,877 |
| | | **Sluice Gates** | | | **14,077** | **28,800** | | | | | **42,877** |
| | | 590.00 Labor hours | | | | | | | | | |
| **11330.100** | | **Barscreens** | | | | | | | | | |
| n | A 10 | 10 MGD Romag Screen | 1.00 | ea | 85,896 | 150,000 | - | | - | 235,896.00 /ea | 235,896 |
| | | **Barscreens** | | | **85,896** | **150,000** | | | | | **235,896** |
| | | 3,600.000 Labor hours | | | | | | | | | |
| **13121.000** | | **Pre-Engineered Metal Bldg** | | | | | | | | | |
| | z001 | Pre-Engineered Metal Bldg - Electrical Bldg (20'x10') | 200.00 | sf | | | 15,000 | | | 75.00 /sf | 15,000 |
| | | **Pre-Engineered Metal Bldg** | | | | | **15,000** | | | | **15,000** |
| **13200.005** | | **Storage Tanks** | | | | | | | | | |
| | z001 | Tank Washdown System | 1.00 | ls | 3,603 | 23,000 | - | | | 26,603.09 /ls | 26,603 |
| | z001 | 1MG Crom Tank | 1.00 | ls | 4,451 | 1,150,000 | - | | 3,151 | 1,157,601.95 /ls | 1,157,602 |
| | | **Storage Tanks** | | | **8,054** | **1,173,000** | | | **3,151** | | **1,184,205** |
| | | 432.00 Labor hours | | | | | | | | | |
| | | 112.00 Equipment hours | | | | | | | | | |
| **14600.005** | | **Hoists & Cranes** | | | | | | | | | |
| | 10 | Outdoor Hoist & Rail System | 1.00 | ea | 7,107 | 17,250 | | | - | 24,357.20 /ea | 24,357 |

| | Item | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Hoists & Cranes** | | | **7,107** | **17,250** | | | | | **24,357** |
| | | 200.00 Labor hours | | | | | | | | | |
| | **15111.650** | **Plug Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | 200P | Plug Valve, MJ, 6" | 1.00 | ea | 176 | 425 | - | | - | 601.28 /ea | 601 |
| n | 200S | Plug Valve, MJ, 12" | 4.00 | ea | 1,302 | 4,400 | - | | - | 1,425.62 /ea | 5,702 |
| | | **Plug Valve (CI/DI/IBBM)** | | | **1,479** | **4,825** | | | | | **6,304** |
| | | 46.46 Labor hours | | | | | | | | | |
| | **15114.500** | **Check Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | C20S | Check Valve, Double Disc, MJ, 12" | 3.00 | ea | 979 | 1,800 | - | | - | 926.473 /ea | 2,779 |
| | | **Check Valve (CI/DI/IBBM)** | | | **979** | **1,800** | | | | | **2,779** |
| | | 30.78 Labor hours | | | | | | | | | |
| | **15119.600** | **Air/Vacuum Relief Valve** | | | | | | | | | |
| n | 100J | Air Release Valve | 3.00 | ea | 282 | 600 | - | | - | 293.93 /ea | 882 |
| | | **Air/Vacuum Relief Valve** | | | **282** | **600** | | | | | **882** |
| | | 9.09 Labor hours | | | | | | | | | |
| | **15120.100** | **Pipe Specialties** | | | | | | | | | |
| n | 611Q | 12-0/0" Flanged Coupling Adaptor- 150# Dresser 128 for Steel Pipe | 1.00 | ea | 126 | 506 | - | | - | 631.74 /ea | 632 |
| n | 621Q | 12-0/0" Flanged Coupling Adaptor- 150# Dresser 128 for DIP | 3.00 | ea | 388 | 1,557 | - | | - | 648.27 /ea | 1,945 |
| n | e412 | 12" Magnetic Flow Meter - Flanged | 1.00 | ea | 233 | 6,000 | - | | - | 6,232.78 /ea | 6,233 |
| n | e418 | 18" Magnetic Flow Meter | 1.00 | ea | 361 | 9,000 | - | | - | 9,361.09 /ea | 9,361 |
| | | **Pipe Specialties** | | | **1,107** | **17,063** | | | | | **18,170** |
| | | 46.43 Labor hours | | | | | | | | | |
| | **15210.010** | **DIP Totals** | | | | | | | | | |
| | 0 | Total Weight (Zero Cost Item) | 41,663.300 | lbs | - | - | - | | - | | |
| | 1 | Weight of Pipe (Zero Cost Item) | 35,983.300 | lbs | - | - | - | | - | | |
| | 2 | Weight of Fittings (Zero Cost Item) | 5,680.00 | lbs | - | - | - | | - | | |
| | **15210.200** | **DIP CML Push-On Pipe** | | | | | | | | | |
| | 0 | Unload Care & Protect Push-on DIP & Fittings | 41,663.300 | lbs | 80 | - | - | | 263 | 0.01 /lbs | 343 |
| | 1 | Weight of Push-on Pipe (Zero Cost Item) | 35,983.300 | lbs | - | - | - | | - | | |
| | 2 | Weight of Push-on Fittings (Zero Cost Item) | 5,680.00 | lbs | - | - | - | | - | | |
| | 5 | Layout Push-on DIP & Fitting | 545.00 | lf | 124 | - | - | | - | 0.23 /lf | 124 |
| n | 204 | DIP CML, Push-On, Class 52, 4" | 117.00 | lf | 530 | 1,379 | - | | - | 16.323 /lf | 1,910 |
| n | 206 | DIP CML, Push-On, Class 52, 6" | 11.00 | lf | 58 | 136 | - | | - | 17.632 /lf | 194 |
| n | 208 | DIP CML, Push-On, Class 52, 8" | 30.00 | lf | 179 | 508 | - | | - | 22.90 /lf | 687 |
| n | 212 | DIP CML, Push-On, Class 52, 12" | 102.00 | lf | 754 | 2,841 | - | | - | 35.25 /lf | 3,595 |
| n | 218 | DIP CML, Push-On, Class 52, 18" | 102.00 | lf | 900 | 4,903 | - | | - | 56.90 /lf | 5,803 |
| n | 224 | DIP CML, Push-On, Class 52, 24" | 183.00 | lf | 1,747 | 12,719 | - | | - | 79.05 /lf | 14,465 |
| n | 2AKK | DIP CML, Push-on, 90 Bend, 4" | 2.00 | ea | 79 | 160 | - | | - | 119.36 /ea | 239 |
| n | 2AMM | DIP CML, Push-on, 90 Bend, 6" | 1.00 | ea | 56 | 120 | - | | - | 175.81 /ea | 176 |
| n | 2APP | DIP CML, Push-on, 90 Bend, 12" | 1.00 | ea | 110 | 340 | - | | - | 450.19 /ea | 450 |
| n | 2ASS | DIP CML, Push-on, 90 Bend, 18" | 3.00 | ea | 491 | 4,238 | - | | - | 1,576.18 /ea | 4,729 |
| n | FASS | DIP CML, Push-on, Tee BxB, 12"x 12" | 1.00 | ea | 149 | 510 | - | | - | 658.89 /ea | 659 |
| n | FAVS | DIP CML, Push-on, Tee BxB, 18"x 12" | 2.00 | ea | 433 | 3,450 | - | | - | 1,941.65 /ea | 3,883 |
| n | FAXS | DIP CML, Push-on, Wye BxB, 24"x 12" | 1.00 | ea | 275 | 2,800 | - | | - | 3,075.34 /ea | 3,075 |
| n | KASP | DIP, CML, Push-on, Reducer BxB, 12"x 6" | 1.00 | ea | 94 | 250 | - | | - | 344.49 /ea | 344 |
| n | KASQ | DIP, CML, Push-on, Reducer BxB, 12"x 8" | 3.00 | ea | 283 | 840 | - | | - | 374.49 /ea | 1,123 |
| n | KAVS | DIP, CML, Push-on, Reducer BxB, 18"x 12" | 1.00 | ea | 144 | 938 | - | | - | 1,081.67 /ea | 1,082 |
| n | MBPP | DIP CML, Push-on, Flare 12" | 1.00 | ea | 18 | 126 | - | | - | 144.37 /ea | 144 |
| | | **DIP CML Push-On Pipe** | | | **6,506** | **36,257** | | | **263** | | **43,026** |
| | | 274.18 Labor hours | | | | | | | | | |
| | | 4.583 Equipment hours | | | | | | | | | |
| | | ***01 Equilization*** | | | ***189,592*** | ***1,706,254*** | ***29,642*** | | ***32,515*** | | ***1,958,304*** |
| | | 8,416.92 Labor hours | | | | | | | | | |
| | | 672.31 Equipment hours | | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***02 Chemical Feed*** | | | | | | | | | |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2734 | Remove Asphalt Pavement, sidewalk | 25.00 | sy | 39 | - | - | | 78 | 4.683 /sy | 117 |
| | | **Selective Site Demolition** | | | **39** | | | | **78** | | **117** |
| | | 2.38 Labor hours | | | | | | | | | |
| | | 1.90 Equipment hours | | | | | | | | | |
| **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | 2 | Design Shoring System-Average | 1.00 | ls | - | - | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | 100 | Survey & Layout Shoring | 80.00 | lf | 1 | - | - | | - | 0.02 /lf | 1 |
| | 105 | Mobilize Pile Driving Equipment | 1.00 | ea | - | - | 25,000 | | - | 25,000.00 /ea | 25,000 |
| n | 1025 | Steel Sheeting,15' x 22psf, pulled & salvage | 800.00 | sf | 4,146 | 4,648 | - | | 5,475 | 17.84 /sf | 14,269 |
| | 1045 | Install & Remove Wales/Struts/Connectors | 0.88 | ton | 214 | 810 | - | | 282 | 1,483.74 /ton | 1,306 |
| n | 1050 | Rent Steel Sheet Piling and Wales, first month | 9.68 | ton | - | 2,939 | - | | - | 303.600 /ton | 2,939 |
| | | **Sheet Piling** | | | **4,361** | **8,396** | **35,000** | | **5,758** | | **53,515** |
| | | 143.653 Labor hours | | | | | | | | | |
| | | 35.893 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 337.00 | cy | 284 | - | - | | 768 | 3.121 /cy | 1,052 |
| | 461C | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 162.00 | cy | 276 | - | - | | 536 | 5.011 /cy | 812 |
| n | A000 | IMPORT MATERIAL (Summary) | 2.00 | CY | - | - | - | | - | | |
| n | A015 | Import Gravel Fill | 8.333 | cy | - | 125 | 47 | | - | 20.60 /cy | 172 |
| | | **Foundation Excavation** | | | **560** | **125** | **47** | | **1,304** | | **2,035** |
| | | 37.413 Labor hours | | | | | | | | | |
| | | 21.95 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 231.00 | lf | 21 | | - | | - | 0.092 /lf | 21 |
| n | 2090 | Trenching- Backhoe/Loader 95HP (15 cy/hr-120cy/day) Average Exc. | 111.153 | cy | 208 | - | - | | 399 | 5.463 /cy | 607 |
| n | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 25.833 | cy | 20 | - | - | | 55 | 2.90 /cy | 75 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 26.84 | cy | 14 | - | - | | 59 | 2.72 /cy | 73 |
| n | 3090 | Trench Bedding-Backhoe/Loader 95HP | 15.35 | cy | 41 | - | - | | 62 | 6.74 /cy | 103 |
| n | 3130 | Trench Bedding-Excavator- 130 HP | 2.551 | cy | 5 | - | - | | 15 | 7.903 /cy | 20 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 1.403 | cy | 2 | - | - | | 7 | 6.56 /cy | 9 |
| n | 4090 | Trench Pipe Zone Backfill-Backhoe/Loader 95HP | 25.451 | cy | 82 | - | - | | 124 | 8.09 /cy | 206 |
| n | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 10.113 | cy | 33 | - | - | | 95 | 12.641 /cy | 128 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 5.562 | cy | 13 | - | - | | 45 | 10.49 /cy | 58 |
| n | 5090 | Trench Native Backfill-Backhoe/Loader 95HP | 25.451 | cy | 74 | - | - | | 135 | 8.24 /cy | 210 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 24.00 | cy | 22 | - | - | | 68 | 3.751 /cy | 90 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 60.43 | cy | - | 2,127 | - | | - | 35.20 /cy | 2,127 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 69.541 | cy | 78 | - | - | | 150 | 3.28 /cy | 228 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 69.541 | cy | 68 | - | - | | 113 | 2.61 /cy | 181 |
| n | 9616 | Trench Shield- 6x16 | 0.06 | u/mo | - | - | - | | 85 | 1,410.00 /u/mo | 85 |
| | A002 | Pipe Detectable/Non-Detectable Tape | 200.00 | lf | 18 | 11 | - | | - | 0.15 /lf | 29 |
| | A006 | Pipe Test | 200.00 | lf | 148 | 160 | - | | - | 1.54 /lf | 308 |
| | C0a0 | Concrete Thrust Block, 36" | 2.00 | ea | 262 | 582 | - | | - | 422.23 /ea | 844 |
| | | **Trenching** | | | **1,110** | **2,880** | | | **1,414** | | **5,404** |
| | | 65.81 Labor hours | | | | | | | | | |
| | | 28.633 Equipment hours | | | | | | | | | |
| **02315.400** | | **Drilling & Blasting** | | | | | | | | | |
| | 1008 | Hydraulic Hoe Ram -Medium | 84.00 | cy | | - | 12,600 | | | 150.00 /cy | 12,600 |
| | | **Drilling & Blasting** | | | | | **12,600** | | | | **12,600** |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 244.541 | cy | - | - | - | | - | | |
| | 40 | Foundation Excavation Spoils (Summary) | 175.00 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 69.541 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 69.541 | cy | 90 | - | - | | 173 | 3.772 /cy | 262 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 175.00 | cy | 203 | - | - | | 573 | 4.44 /cy | 777 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 69.541 | cy | 313 | - | - | | 521 | 12.001 /cy | 835 |
| | A0I7 | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 175.00 | cy | 110 | - | - | | 253 | 2.071 /cy | 362 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Excavation Spoils** | | | **716** | | | | **1,520** | | **2,236** |
| | | 41.62 Labor hours | | | | | | | | | |
| | | 20.81 Equipment hours | | | | | | | | | |
| **02720.150** | | **Aggregate Base- Roads** | | | | | | | | | |
| | 1116 | Gravel Base - 6" thick - Driveway | 3.00 | cy | 9 | 27 | - | | 43 | 26.22 /cy | 79 |
| | | **Aggregate Base- Roads** | | | **9** | **27** | | | **43** | | **79** |
| | | 0.48 Labor hours | | | | | | | | | |
| | | 0.48 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| | 20 | Bitum Paving Driveway | 16.00 | sy | - | - | 253 | | - | 15.80 /sy | 253 |
| | 30 | Bitum Paving Sidewalks | 25.00 | sy | - | - | 1,000 | | - | 40.00 /sy | 1,000 |
| | | **Asphalt Paving - Location** | | | | | **1,253** | | | | **1,253** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 89.00 | sy | 7 | 195 | - | | 7 | 2.36 /sy | 210 |
| | | **Lawns & Grasses** | | | **7** | **195** | | | **7** | | **210** |
| | | 0.36 Labor hours | | | | | | | | | |
| | | 0.18 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 110 | Concrete: Slab on Grade | 34.00 | cy | 2,461 | 10,540 | - | | 926 | 409.61 /cy | 13,927 |
| n | 140 | Concrete: Wall | 66.00 | cy | 8,190 | 23,100 | - | | 3,328 | 524.52 /cy | 34,618 |
| n | 145 | Concrete: Elevated Slab | 34.00 | cy | 3,867 | 12,240 | - | | 1,715 | 524.18 /cy | 17,822 |
| | | **Concrete in Place** | | | **14,518** | **45,880** | | | **5,969** | | **66,367** |
| | | 702.000 Labor hours | | | | | | | | | |
| | | 118.36 Equipment hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 4.00 | ea | 307 | 5,106 | - | | - | 1,353.173 /ea | 5,413 |
| | | **Hatch, Aluminum, 300psf** | | | **307** | **5,106** | | | | | **5,413** |
| | | 12.80 Labor hours | | | | | | | | | |
| **08330.020** | | **Rolling Alum Door Manual** | | | | | | | | | |
| | z005 | Roll Door Manual (8'x8') | 64.00 | sf | 518 | 2,397 | - | | - | 45.542 /sf | 2,915 |
| | | **Rolling Alum Door Manual** | | | **518** | **2,397** | | | | | **2,915** |
| | | 10.944 Labor hours | | | | | | | | | |
| **11000.005** | | **Equipment Allowance** | | | | | | | | | |
| | 5 | 36" In Line Chemical Inductor w/ VFD | 1.00 | ea | 26,147 | 45,000 | - | | | 71,146.80 /ea | 71,147 |
| | | **Equipment Allowance** | | | **26,147** | **45,000** | | | | | **71,147** |
| | | 1,080.00 Labor hours | | | | | | | | | |
| | | 0.000 Equipment hours | | | | | | | | | |
| **11220.100** | | **Chemical Mixing Units** | | | | | | | | | |
| | 01 | Chemical Mixer | 8.00 | ea | 1,336 | 3,200 | - | | - | 567.02 /ea | 4,536 |
| | | **Chemical Mixing Units** | | | **1,336** | **3,200** | | | | | **4,536** |
| | | 56.000 Labor hours | | | | | | | | | |
| **11240.400** | | **Polymer Store/Feed Equip** | | | | | | | | | |
| | 0 | Polymer Tote Containment | 2.00 | ea | 1,451 | 1,600 | - | | 1,028 | 2,039.48 /ea | 4,079 |
| | 00 | Metering Pump/Poly Blend and Feed Pump | 2.00 | ea | 11,930 | 28,264 | - | | - | 20,097.00 /ea | 40,194 |
| | ---- | 1st Fill of Polymer or FeCl3 (3 day supply) | 3.00 | day | 600 | 1,800 | - | | - | 800.00 /day | 2,400 |
| | | **Polymer Store/Feed Equip** | | | **13,981** | **31,664** | | | **1,028** | | **46,673** |
| | | 596.000 Labor hours | | | | | | | | | |
| | | 12.00 Equipment hours | | | | | | | | | |
| **13121.000** | | **Pre-Engineered Metal Bldg** | | | | | | | | | |
| | z001 | Pre-Engineered Metal Bldg - Polymer Shed - 14'high | 468.00 | sf | | | 35,100 | | | 75.00 /sf | 35,100 |
| | | **Pre-Engineered Metal Bldg** | | | | | **35,100** | | | | **35,100** |
| **15113.450** | | **GV Knife Gate ValveCI/DI** | | | | | | | | | |
| n | 1249 | Knife Gate Valve, Gear & Wheel Oper, flg, 8" | 1.00 | ea | 190 | 700 | - | | - | 890.28 /ea | 890 |
| n | 160Z | Knife Gate Valve, Motor Oper,36" | 3.00 | ea | 3,343 | 42,750 | - | | - | 15,364.34 /ea | 46,093 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **GV Knife Gate ValveCI/DI** | | | **3,533** | **43,450** | | | | | **46,983** |
| | | 111.040 Labor hours | | | | | | | | | |
| **15115.810** | | **Diaphragm Valve PVC** | | | | | | | | | |
| n | 130I | PVC Diaphragm Valve, 1" | 6.00 | ea | 357 | 5,760 | - | | - | 1,019.522 /ea | 6,117 |
| | | **Diaphragm Valve PVC** | | | **357** | **5,760** | | | | | **6,117** |
| | | 11.22 Labor hours | | | | | | | | | |
| **15230.400** | | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | 0 | Unload Care & Protect PCCP & Fittings | 31.00 | lf | 0 | - | - | | 0 | 0.01 /lf | 0 |
| | 10 | Layout Pipe & Fitting | 31.00 | lf | 7 | - | - | | - | 0.24 /lf | 7 |
| | 325 | PCCP Equipment- Cat 325 Excavator | 2.60 | ch | 50 | - | - | | 288 | 130.092 /ch | 338 |
| n | B036 | Prestressed Concrete Cylinder Pipe (250#) 36 | 31.00 | lf | 1,036 | 3,348 | - | | - | 141.404 /lf | 4,384 |
| n | L036 | PCCP 45 Bend 36 | 2.00 | ea | 517 | 2,400 | - | | - | 1,458.64 /ea | 2,917 |
| n | Q036 | PCCP Wye 36 | 2.00 | ea | 716 | 2,400 | - | | - | 1,558.23 /ea | 3,116 |
| | | **Prestr Conc Cylind-(PCCP)** | | | **2,327** | **8,148** | | | **288** | | **10,763** |
| | | 98.033 Labor hours | | | | | | | | | |
| | | 2.603 Equipment hours | | | | | | | | | |
| **15241.100** | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | 0 | Unload Care & Protect Pipe/Fittings | 360.00 | lf | 1 | - | - | | 2 | 0.01 /lf | 3 |
| | 10 | Layout Pipe & Fitting | 360.00 | lf | 86 | - | - | | - | 0.24 /lf | 86 |
| n | 8080 | PVC Schd. 80 Pipe, 1.00" | 360.00 | lf | 429 | 475 | - | | - | 2.513 /lf | 905 |
| n | 8A80 | PVC Sch 80. 90 Ell , 1.00" | 15.00 | ea | 61 | 66 | - | | - | 8.46 /ea | 127 |
| n | 8F88 | PVC Sch 80. Tee , 1.00" | 3.00 | ea | 16 | 24 | - | | - | 13.38 /ea | 40 |
| | a010 | PVC Joint Primer- Quart | 0.32 | qrt | - | 5 | - | | - | 15.36 /qrt | 5 |
| | a020 | PVC Solvent Cement Low VOC- Quart | 0.32 | qrt | - | 7 | - | | - | 21.90 /qrt | 7 |
| | | **PVC Schd Pipe & Fittings** | | | **593** | **577** | | | **2** | | **1,172** |
| | | 24.88 Labor hours | | | | | | | | | |
| | | 0.04 Equipment hours | | | | | | | | | |
| **15400.005** | | **Plumbing Allowance** | | | | | | | | | |
| | 5 | Plumbing Allowance - hook plant water to poly system | 1.00 | ls | | | 7,500 | | - | 7,500.00 /ls | 7,500 |
| | 5 | Plumbing Allowance - supply wash out sink/potable water connection | 1.00 | ls | | | 7,500 | | - | 7,500.00 /ls | 7,500 |
| | | **Plumbing Allowance** | | | | | **15,000** | | | | **15,000** |
| | | 0.000 Labor hours | | | | | | | | | |
| **15500.001** | | **HVAC Equipment** | | | | | | | | | |
| | 155 | HVAC Allowance - Chem Feed Bldg | 468.00 | sf | - | - | 18,720 | | - | 40.00 /sf | 18,720 |
| | | **HVAC Equipment** | | | | | **18,720** | | | | **18,720** |
| **16000.005** | | **Electrical Allowance** | | | | | | | | | |
| | 5 | Electrical Allowance - light shed and provide power to pumps | 1.00 | ls | | | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | 5 | Electrical Allowance - chemical inductor | 1.00 | ls | | | 20,000 | | - | 20,000.00 /ls | 20,000 |
| | 5 | Electrical & I&C Allowance for Knife Gate Valves | 1.00 | ls | | | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | 5 | Electrical Allowance | 468.00 | sf | | | 9,360 | | - | 20.00 /sf | 9,360 |
| | | **Electrical Allowance** | | | | | **49,360** | | | | **49,360** |
| | | 0.000 Labor hours | | | | | | | | | |
| | | ***02 Chemical Feed*** | | | ***70,419*** | ***202,805*** | ***167,079*** | | ***17,411*** | | ***457,714*** |
| | | 2,994.62 Labor hours | | | | | | | | | |
| | | 242.840 Equipment hours | | | | | | | | | |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | ***03 I&C*** | | | | | | | | |
| **13000.005** | **Special Const Allowance** | | | | | | | | |
| 5 | I&C Allowance | 0.00 ls | 0 | 0 | - | | - | | |
| | ***03 I&C*** | | ***0*** | ***0*** | ***0*** | | ***0*** | | ***0*** |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | ***04 Electrical*** | | | | | | | | |
| **16000.005** | **Electrical Allowance** | | | | | | | | |
| 5 | Electrical Allowance | 0.00 ls | 0 | 0 | - | | - | | |
| | ***04 Electrical*** | | ***0*** | ***0*** | ***0*** | | ***0*** | | ***0*** |

## Estimate Totals

| | Description | Amount | Totals | Hours | Rate |
|---|---|---|---|---|---|
| | Labor | 260,011 | | 11,412 hrs | |
| | Material | 1,909,058 | | | |
| | Subcontract | 196,721 | | | |
| | Equipment | 49,926 | | 915 hrs | |
| | Other | 302 | | | |
| **Subtotal Direct Cost** | | **2,416,018** | **2,416,018** | | |
| | I&C | 241.598 | | | 10.00 % |
| | Electrical | 362.397 | | | 15.00 % |
| | | **603,995** | **3,020,013** | | |
| | Indirect Costs: | | | | |
| | Building Permits(% total cost) | 23.273 | | | 0.40 % |
| | Sales Tax (MEO) | | | | |
| | Builders Risk Ins % total cost | 14.546 | | | 0.25 % |
| | Gen Liability Ins % total cost | 116.364 | | | 2.00 % |
| | GC Bonds (% total cost) | 58.182 | | | 1.00 % |
| **Subtotal Prior to OH&P** | | **212,365** | **3,232,378** | | |
| | GC Field General Conditions | 323.234 | | | 10.00 % |
| | GC Indirects. OH & Profit | 323.234 | | | 10.00 % |
| **Subtotal** | | **646,468** | **3,878,846** | | |
| | Construction Contingency | 969.703 | | | 25.00 % |
| | **Construction Cost Total** | **969,703** | **4,848,549** | | |
| | Engineering, Permitting, Bond Financing, Legal and Administration | 969.703 | | | 20.00 % |
| **Total Program Costs** | | **969,703** | **5,818,252** | | |
| | ***Total*** | | ***5,818,252*** | | |

This is an Opinion of Probable Construction Cost only, as defined by the documents provided at the level of design indicated on the front sheet of this estimate.
There are not any costs provided for: Change Orders, Construction Oversight, land acquisition or temporary/permanent easements, Operations, or any other costs associated with this project that are not specifically part of the bidding contractor's proposed scope.
The total cost shown is valid to only two significant figures.

# *Knoxville, Tennessee*
# *Fourth Creek WWTP - Options 2*
# *Opinion of Probable Construction Cost, Prelim Design, March 2007*

| | |
|---|---|
| **Project name** | TN, Knoxville FCWWTP |
| **Estimator** | MacIsaac |
| **Labor rate table** | TN07 Knoxville |
| **Equipment rate table** | 00 071H Equip Rental |
| **database version:** | V6.0 TES 9.4.22.0 |
| **ENR 20 City CCI** | March 2007: 7856 |
| **Notes** | This is an Opinion of Probable Construction Cost only, as defined by the documents provided at the level of design indicated above. CDM has no control over the cost of labor, materials, equipment, or services furnished, over schedules, over contractor's methods of determining prices, competitive bidding, market or negotiating conditions. CDM does not guarantee that this opinion will not vary from actual cost, or contractor's bids. There are not any costs provided for: Change Orders, Construction Oversight, Land Acquisition or temporary/permanent Easements, Operations, or any other costs associated with this project that are not specifically part of the bidding contractor's proposed scope.<br><br>The total cost shown is valid to only two significant figures<br><br>Assumptions:<br>No rock excavation is required.<br>Only nominal dewatering is needed.<br>No consideration for contaminated soils or hazardous materials (i.e. asbestos, lead)<br>Based on a 40 hour work week with no overtime.<br><br>This job is sales tax exempt.<br>Costs shown in April 2007 dollars. |
| **Report format** | Sorted by 'Proj Area/Phase'<br>'Detail' summary<br>Allocate addons<br>Round unit prices<br>Combine items<br>Paginate |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***01 Wet Weather Pump Station*** | | | | | | | | | |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Connect to Existing 42" Influent Sewer (12'deep) | 2.00 | ea | - | - | 15,000 | | - | 7,500.00 /ea | 15,000 |
| | 20 | Protect Existing Utilities | 1.00 | ls | - | - | 2,500 | | - | 2,500.00 /ls | 2,500 |
| | ---- | Assumption of 20% of Excavated Material is Contaiminated | 830.00 | cy | | | 20,750 | | - | 25.00 /cy | 20,750 |
| | | **Sitework Allowance** | | | | | **38,250** | | | | **38,250** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2502 | Remove 6" DIP City Water Piping 8'deep | 490.00 | lf | 800 | - | - | | 1,519 | 4.731 /lf | 2,318 |
| | 2502 | Abandon in place 6" DIP City Water Piping | 111.00 | lf | 181 | - | - | | 344 | 4.731 /lf | 525 |
| | 2712 | Saw Cut Asphalt Pavement, 5"thk | 134.00 | lf | 39 | 67 | - | | 242 | 2.60 /lf | 348 |
| | 2734 | Remove Asphalt Pavement, 5"thk | 491.00 | sy | 763 | - | - | | 1,537 | 4.684 /sy | 2,300 |
| | 2734 | Remove Asphalt Pavement, Sidewalk | 59.00 | sy | 92 | - | - | | 185 | 4.684 /sy | 276 |
| | | **Selective Site Demolition** | | | **1,874** | **67** | | | **3,827** | | **5,768** |
| | | 114.494 Labor hours | | | | | | | | | |
| | | 76.14 Equipment hours | | | | | | | | | |
| **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | 1 | Design Shoring System-Minor | 5.00 | ls | - | - | 5,000 | | - | 1,000.00 /ls | 5,000 |
| | 100 | Survey & Layout Shoring | 366.00 | lf | 6 | - | - | | - | 0.02 /lf | 6 |
| | 105 | Mobilize Pile Driving Equipment | 1.00 | ea | - | - | 25,000 | | - | 25,000.00 /ea | 25,000 |
| n | 1025 | Steel Sheeting,15' x 22psf, pulled & salvage | 3,000.00 | sf | 15,546 | 17,430 | - | | 20,533 | 17.84 /sf | 53,509 |
| n | 1030 | Steel Sheeting,20' x 27psf, pulled & salvage | 1,600.00 | sf | 8,291 | 12,048 | - | | 10,951 | 19.56 /sf | 31,290 |
| n | 1035 | Steel Sheeting,25' x 38psf, pulled & salvage | 2,150.00 | sf | 11,141 | 22,124 | - | | 14,715 | 22.32 /sf | 47,980 |
| | 1045 | Install & Remove Wales/Struts/Connectors | 9.55 | ton | 2,319 | 8,781 | - | | 3,062 | 1,483.731 /ton | 14,162 |
| n | 1050 | Rent Steel Sheet Piling and Wales, first month | 105.00 | ton | - | 31,877 | - | | - | 303.601 /ton | 31,877 |
| | | **Sheet Piling** | | | **37,303** | **92,260** | **30,000** | | **49,261** | | **208,823** |
| | | 1,228.73 Labor hours | | | | | | | | | |
| | | 307.09 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 649.52 | cy | 547 | - | - | | 1,480 | 3.121 /cy | 2,027 |
| | 461C | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 142.19 | cy | 242 | - | - | | 470 | 5.011 /cy | 713 |
| n | A000 | IMPORT MATERIAL (Summary) | 10.00 | CY | - | - | - | | - | | |
| n | A015 | Import Gravel Fill | 46.56 | cy | - | 698 | 261 | | - | 20.60 /cy | 959 |
| | | **Foundation Excavation** | | | **790** | **698** | **261** | | **1,950** | | **3,699** |
| | | 51.703 Labor hours | | | | | | | | | |
| | | 28.70 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 1,274.00 | lf | 118 | | - | | - | 0.092 /lf | 118 |
| n | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 624.262 | cy | 1,262 | - | - | | 3,556 | 7.72 /cy | 4,818 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 1,008.703 | cy | 510 | - | - | | 2,231 | 2.72 /cy | 2,741 |
| n | 3130 | Trench Bedding-Excavator- 130 HP | 49.34 | cy | 100 | - | - | | 290 | 7.901 /cy | 390 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 61.13 | cy | 93 | - | - | | 308 | 6.56 /cy | 401 |
| n | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 113.123 | cy | 366 | - | - | | 1,064 | 12.641 /cy | 1,430 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 203.53 | cy | 494 | - | - | | 1,642 | 10.492 /cy | 2,135 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 843.981 | cy | 763 | - | - | | 2,402 | 3.75 /cy | 3,165 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 427.112 | cy | - | 15,034 | - | | - | 35.20 /cy | 15,034 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 512.813 | cy | 180 | - | - | | 346 | 1.024 /cy | 525 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 512.813 | cy | 502 | - | - | | 836 | 2.61 /cy | 1,338 |
| n | 9616 | Trench Shield- 6x16 | 2.31 | u/mo | - | - | - | | 3,257 | 1,410.00 /u/mo | 3,257 |
| | A002 | Pipe Detectable/Non-Detectable Tape | 490.00 | lf | 45 | 27 | - | | - | 0.15 /lf | 72 |
| | A006 | Pipe Test | 1,216.00 | lf | 899 | 973 | - | | - | 1.54 /lf | 1,871 |
| | C0J0 | Concrete Thrust Block, 6" | 2.00 | ea | 143 | 10 | - | | - | 76.58 /ea | 153 |
| | C0P0 | Concrete Thrust Block, 12" | 9.00 | ea | 816 | 162 | - | | - | 108.63 /ea | 978 |
| | C0T0 | Concrete Thrust Block, 20" | 5.00 | ea | 537 | 280 | - | | - | 163.37 /ea | 817 |
| | | **Trenching** | | | **6,827** | **16,486** | | | **15,932** | | **39,244** |
| | | 382.57 Labor hours | | | | | | | | | |
| | | 193.08 Equipment hours | | | | | | | | | |
| **02315.400** | | **Drilling & Blasting** | | | | | | | | | |
| | 1008 | Hydraulic Hoe Ram -Medium | 222.00 | cy | | - | 27,750 | | | 125.00 /cy | 27,750 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Drilling & Blasting** | | | | | **27,750** | | | | **27,750** |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 1,020.15 | cy | - | - | - | | - | | |
| | 40 | Foundation Excavation Spoils (Summary) | 507.332 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 512.813 | cy | - | - | - | | - | | |
| | 46 | Bore & Jack Spoils Spoils (Summary) | 3.113 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 515.93 | cy | 832 | - | - | | 1,599 | 4.712 /cy | 2,431 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 507.332 | cy | 590 | - | - | | 1,662 | 4.44 /cy | 2,252 |
| | A0A0 | Haul Spoils/Off Site 10cy Rear Dump 4.00 Hour/Load | 3.113 | cy | 54 | - | - | | 90 | 46.203 /cy | 144 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 512.813 | cy | 2,309 | - | - | | 3,845 | 12.001 /cy | 6,154 |
| | A0I7 | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 507.332 | cy | 318 | - | - | | 733 | 2.071 /cy | 1,051 |
| | | **Excavation Spoils** | | | **4,103** | | | | **7,929** | | **12,031** |
| | | 240.041 Labor hours | | | | | | | | | |
| | | 120.021 Equipment hours | | | | | | | | | |
| **02445.000** | | **Boring & Jack Conduit** | | | | | | | | | |
| | 0 | Mob/Demob Bore & Jack Equipment | 1.00 | ea | - | - | 5,000 | | - | 5,000.00 /ea | 5,000 |
| | 100 | Excavate Jacking Pit | 59.26 | cy | 108 | - | - | | 291 | 6.73 /cy | 399 |
| | 105 | Excavate Recieving Pit | 29.63 | cy | 54 | - | - | | 146 | 6.73 /cy | 199 |
| | 200 | Shore Jacking/Receiving Pits | 920.00 | bsf | - | - | 13,800 | | - | 15.00 /bsf | 13,800 |
| | 300 | Backfill Jacking/Receiving Pits | 88.89 | cy | 435 | - | - | | 909 | 15.12 /cy | 1,344 |
| | 400 | Jacking Slab & Reaction Block | 2.66 | cy | 578 | 612 | - | | - | 447.37 /cy | 1,190 |
| n | 5012 | Bore & Jack Pipe 12 | 107.00 | lf | - | - | 12,840 | | - | 120.00 /lf | 12,840 |
| | 7000 | Grout Casing | 2.334 | cy | 10 | 403 | - | | 11 | 181.44 /cy | 423 |
| | | **Boring & Jack Conduit** | | | **1,184** | **1,014** | **31,640** | | **1,357** | | **35,196** |
| | | 62.74 Labor hours | | | | | | | | | |
| | | 22.42 Equipment hours | | | | | | | | | |
| **02518.810** | | **Fire Hydrants/Valves** | | | | | | | | | |
| | 0 | Salvage & Reinstall Fire Hydrant | 2.00 | ea | 906 | | - | | | 453.22 /ea | 906 |
| | 206 | Salvage & Reinstall Hydrant Valve 6" | 2.00 | ea | 680 | | - | | | 339.92 /ea | 680 |
| n | F606 | Hydrant Tee 6x6 | 1.00 | ea | 99 | 207 | - | | | 306.14 /ea | 306 |
| | | **Fire Hydrants/Valves** | | | **1,685** | **207** | | | | | **1,892** |
| | | 59.50 Labor hours | | | | | | | | | |
| | | 32.00 Equipment hours | | | | | | | | | |
| **02639.020** | | **Storm Drainage Manholes** | | | | | | | | | |
| | 0 | Unload Care & Protect Manhole | 2.00 | ea | 35 | - | - | | - | 17.51 /ea | 35 |
| | 7200 | Place & Shape Manhole Base & Inverts- 72" | 1.00 | ea | 210 | - | - | | - | 511.88 /ea | 512 |
| | 7217 | Manhole 72" x 17' Deep | 1.00 | ea | 412 | 8,134 | - | | 496 | 9,041.93 /ea | 9,042 |
| | 9600 | Place & Shape Manhole Base & Inverts- 96" | 1.00 | ea | 210 | - | - | | - | 694.04 /ea | 694 |
| | 9610 | Manhole 96" x 10' Deep | 1.00 | ea | 343 | 6,249 | - | | 496 | 7,088.53 /ea | 7,089 |
| | | **Storm Drainage Manholes** | | | **1,210** | **14,383** | | | **993** | | **17,371** |
| | | 70.000 Labor hours | | | | | | | | | |
| | | 8.00 Equipment hours | | | | | | | | | |
| **02720.100** | | **Aggregate Base Course** | | | | | | | | | |
| | 1180 | Crushed Rock (1" minus) | 234.00 | cy | 667 | 2,392 | - | | 3,369 | 27.47 /cy | 6,428 |
| | | **Aggregate Base Course** | | | **667** | **2,392** | | | **3,369** | | **6,428** |
| | | 37.44 Labor hours | | | | | | | | | |
| | | 37.44 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| | 20 | Bitum Paving | 491.00 | sy | - | - | 3,928 | | - | 8.00 /sy | 3,928 |
| | 30 | Bitum Paving Sidewalks | 67.00 | sy | - | - | 2,680 | | - | 40.00 /sy | 2,680 |
| | | **Asphalt Paving - Location** | | | | | **6,608** | | | | **6,608** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 5,625.00 | sy | 468 | 12,319 | - | | 470 | 2.36 /sy | 13,257 |
| | | **Lawns & Grasses** | | | **468** | **12,319** | | | **470** | | **13,257** |
| | | 22.50 Labor hours | | | | | | | | | |
| | | 11.25 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 140 | Concrete: Wet Well Concrete | 232.00 | cy | 28,788 | 81,200 | - | | 11,700 | 524.52 /cy | 121,688 |
| n | 140 | Concrete: Valve Vault | 102.00 | cy | 12,657 | 35,700 | - | | 5,144 | 524.52 /cy | 53,501 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 145 | Concrete: Wet Weather Flow Diversion Structure | 53.00 | cy | 6,029 | 19,080 | - | | 2,673 | 524.18 /cy | 27,781 |
| n | 180 | Concrete: Grout Fill - Diversion Chamber | 4.00 | cy | 165 | 400 | - | | 20 | 146.41 /cy | 586 |
| n | 180 | Concrete: Grout Fill - Wetwell | 30.00 | cy | 1,241 | 3,000 | - | | 151 | 146.41 /cy | 4,392 |
| | | **Concrete in Place** | | | **48,880** | **139,380** | | | **19,688** | | **207,947** |
| | | 2,363.500 Labor hours | | | | | | | | | |
| | | 390.40 Equipment hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 6.00 | ea | 460 | 7,659 | - | | - | 1,353.172 /ea | 8,119 |
| n | J08 | 48"x 60" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 5.00 | ea | 431 | 6,641 | - | | - | 1,414.51 /ea | 7,073 |
| | | **Hatch, Aluminum, 300psf** | | | **891** | **14,300** | | | | | **15,192** |
| | | 37.20 Labor hours | | | | | | | | | |
| **06600.110** | | **FRP Weirs & Baffles** | | | | | | | | | |
| | 0 | Aluminum Weirs | 20.00 | lf | 116 | 690 | - | | | 40.30 /lf | 806 |
| | | **FRP Weirs & Baffles** | | | **116** | **690** | | | | | **806** |
| | | 5.00 Labor hours | | | | | | | | | |
| **11210.000** | | **PUMPS** | | | | | | | | | |
| | ---- | Pumps | 4.00 | ea | 67,162 | 126,400 | - | | - | 48,390.60 /ea | 193,562 |
| | ---- | Sludge Pump - 5HP | 1.00 | ea | 12,706 | 20,000 | - | | - | 32,706.40 /ea | 32,706 |
| | | **PUMPS** | | | **79,869** | **146,400** | | | | | **226,269** |
| | | 3,520.000 Labor hours | | | | | | | | | |
| **11217.100** | | **Submersible Sump Pumps** | | | | | | | | | |
| | 10 | Sump Pump | 1.00 | ea | 3,870 | 7,000 | - | | 2,740 | 13,610.56 /ea | 13,611 |
| | 10 | 50gpm Sump Pump | 1.00 | ea | 3,870 | 7,000 | - | | 2,740 | 13,610.56 /ea | 13,611 |
| | | **Submersible Sump Pumps** | | | **7,741** | **14,000** | | | **5,480** | | **27,221** |
| | | 384.00 Labor hours | | | | | | | | | |
| | | 64.00 Equipment hours | | | | | | | | | |
| **11284.000** | | **Sluice Gates** | | | | | | | | | |
| | 4242 | 42" x 42" Sluice Gate, MO | 1.00 | ea | 7,158 | 14,700 | - | | - | 21,858.00 /ea | 21,858 |
| | | **Sluice Gates** | | | **7,158** | **14,700** | | | | | **21,858** |
| | | 300.00 Labor hours | | | | | | | | | |
| **13000.005** | | **Special Const Allowance** | | | | | | | | | |
| | 5 | Level Sensor | 2.00 | ea | 771 | 3,450 | - | | - | 2,110.40 /ea | 4,221 |
| | | **Special Const Allowance** | | | **771** | **3,450** | | | | | **4,221** |
| | | 20.00 Labor hours | | | | | | | | | |
| **13121.000** | | **Pre-Engineered Metal Bldg** | | | | | | | | | |
| | z001 | Brick Bldg - Pump Controls | 600.00 | sf | | | 150,000 | | | 250.00 /sf | 150,000 |
| | | **Pre-Engineered Metal Bldg** | | | | | **150,000** | | | | **150,000** |
| **13420.200** | | **I&C Instruments** | | | | | | | | | |
| n | 05-FE-m020 | 20" Magnetic Flow Meter | 1.00 | ea | 510 | 11,500 | - | | - | 12,010.20 /ea | 12,010 |
| | | **I&C Instruments** | | | **510** | **11,500** | | | | | **12,010** |
| | | 18.60 Labor hours | | | | | | | | | |
| **15111.650** | | **Plug Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | 200P | Plug Valve, MJ, 6" | 1.00 | ea | 176 | 425 | - | | - | 601.28 /ea | 601 |
| n | 200S | Plug Valve, MJ, 12" | 4.00 | ea | 1,302 | 4,400 | - | | - | 1,425.62 /ea | 5,702 |
| | | **Plug Valve (CI/DI/IBBM)** | | | **1,479** | **4,825** | | | | | **6,304** |
| | | 46.46 Labor hours | | | | | | | | | |
| **15114.500** | | **Check Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | C20P | Check Valve, Double Disc, MJ, 6" | 1.00 | ea | 170 | 200 | - | | - | 369.97 /ea | 370 |
| n | C20S | Check Valve, Double Disc, MJ, 12" | 4.00 | ea | 1,306 | 2,400 | - | | - | 926.58 /ea | 3,706 |
| | | **Check Valve (CI/DI/IBBM)** | | | **1,476** | **2,600** | | | | | **4,076** |
| | | 46.38 Labor hours | | | | | | | | | |
| **15210.010** | | **DIP Totals** | | | | | | | | | |
| | 0 | Total Weight (Zero Cost Item) | 67,386.50 | lbs | - | - | - | | - | | |
| | 1 | Weight of Pipe (Zero Cost Item) | 57,836.500 | lbs | - | - | - | | - | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **15210.010** | | **DIP Totals** | | | | | | | | | |
| | 2 | Weight of Fittings (Zero Cost Item) | 9,550.00 | lbs | - | - | - | | - | | |
| **15210.200** | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | 0 | Unload Care & Protect Push-on DIP & Fittings | 67,386.50 | lbs | 130 | - | - | | 425 | 0.01 /lbs | 554 |
| | 1 | Weight of Push-on Pipe (Zero Cost Item) | 57,836.500 | lbs | - | - | - | | - | | |
| | 2 | Weight of Push-on Fittings (Zero Cost Item) | 9,550.00 | lbs | - | - | - | | - | | |
| | 5 | Layout Push-on DIP & Fitting | 726.00 | lf | 165 | - | - | | - | 0.23 /lf | 165 |
| | 11 | DIP Equipment- Cat 325 Excavator | 38.144 | ch | 739 | - | - | | 4,223 | 130.081 /ch | 4,962 |
| n | 206 | DIP CML, Push-On, Class 52, 6" | 65.00 | lf | 341 | 805 | - | | - | 17.632 /lf | 1,146 |
| n | 212 | DIP CML, Push-On, Class 52, 12" | 60.00 | lf | 444 | 1,671 | - | | - | 35.242 /lf | 2,114 |
| n | 216 | DIP CML, Push-On, Class 52, 16" | 5.00 | lf | 42 | 209 | - | | - | 50.20 /lf | 251 |
| n | 220 | DIP CML, Push-On, Class 52, 20" | 596.00 | lf | 5,402 | 32,539 | - | | - | 63.66 /lf | 37,940 |
| n | 2AMM | DIP CML, Push-on, 90 Bend, 6" | 2.00 | ea | 112 | 240 | - | | - | 175.81 /ea | 352 |
| n | 2APP | DIP CML, Push-on, 90 Bend, 12" | 9.00 | ea | 992 | 3,060 | - | | - | 450.19 /ea | 4,052 |
| n | 2ATT | DIP CML, Push-on, 90 Bend, 20" | 5.00 | ea | 919 | 8,500 | - | | - | 1,883.722 /ea | 9,419 |
| n | FAUS | DIP CML, Push-on, Tee BxB, 16"x 12" | 1.00 | ea | 196 | 1,638 | - | | - | 1,833.39 /ea | 1,833 |
| n | FAWP | DIP CML, Push-on, Tee BxB, 20"x 6" | 1.00 | ea | 236 | 1,875 | - | | - | 2,110.74 /ea | 2,111 |
| n | FAWS | DIP CML, Push-on, Tee BxB, 20"x 12" | 2.00 | ea | 471 | 4,025 | - | | - | 2,248.14 /ea | 4,496 |
| n | KASR | DIP, CML, Push-on, Reducer BxB, 12"x 10" | 4.00 | ea | 378 | 1,320 | - | | - | 424.45 /ea | 1,698 |
| n | KAUS | DIP, CML, Push-on, Reducer BxB, 16"x 12" | 1.00 | ea | 129 | 838 | - | | - | 966.34 /ea | 966 |
| n | KAWU | DIP, CML, Push-on, Reducer BxB, 20"x 16" | 1.00 | ea | 161 | 1,225 | - | | - | 1,385.51 /ea | 1,386 |
| | | **DIP CML Push-On Pipe** | | | **10,853** | **57,944** | | | **4,648** | | **73,445** |
| | | 464.53 Labor hours | | | | | | | | | |
| | | 45.56 Equipment hours | | | | | | | | | |
| **15220.302** | | **A53 CW Pipe PE/GE/T&C/SW** | | | | | | | | | |
| n | 300P | A53 CW Standard Pipe PE, 12" | 130.00 | lf | 1,674 | 19,328 | - | | - | 161.56 /lf | 21,003 |
| | | **A53 CW Pipe PE/GE/T&C/SW** | | | **1,674** | **19,328** | | | | | **21,003** |
| | | 70.20 Labor hours | | | | | | | | | |
| **15230.400** | | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | 0 | Unload Care & Protect PCCP & Fittings | 58.00 | lf | 0 | - | - | | 0 | 0.01 /lf | 0 |
| | 10 | Layout Pipe & Fitting | 58.00 | lf | 14 | - | - | | - | 0.24 /lf | 14 |
| | 325 | PCCP Equipment- Cat 325 Excavator | 8.70 | ch | 168 | - | - | | 963 | 130.091 /ch | 1,132 |
| n | B042 | Prestressed Concrete Cylinder Pipe (250#) 42 | 58.00 | lf | 2,282 | 8,120 | - | | - | 179.353 /lf | 10,402 |
| | | **Prestr Conc Cylind-(PCCP)** | | | **2,465** | **8,120** | | | **964** | | **11,549** |
| | | 104.99 Labor hours | | | | | | | | | |
| | | 8.71 Equipment hours | | | | | | | | | |
| **15241.100** | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | 0 | Unload Care & Protect Pipe/Fittings | 490.00 | lf | 1 | - | - | | 3 | 0.01 /lf | 4 |
| | 10 | Layout Pipe & Fitting | 490.00 | lf | 117 | - | - | | - | 0.24 /lf | 117 |
| n | 80J0 | PVC Schd. 80 Pipe, 6" | 620.00 | lf | 2,070 | 10,782 | - | | - | 20.73 /lf | 12,852 |
| | a010 | PVC Joint Primer- Quart | 2.083 | qrt | - | 32 | - | | - | 15.35 /qrt | 32 |
| | a020 | PVC Solvent Cement Low VOC- Quart | 2.083 | qrt | - | 46 | - | | - | 21.90 /qrt | 46 |
| | | **PVC Schd Pipe & Fittings** | | | **2,188** | **10,859** | | | **3** | | **13,051** |
| | | 91.754 Labor hours | | | | | | | | | |
| | | 0.054 Equipment hours | | | | | | | | | |
| **15500.001** | | **HVAC Equipment** | | | | | | | | | |
| | 155 | HVAC Allowance - Pump Control Bldg | 600.00 | sf | - | - | 24,000 | | - | 40.00 /sf | 24,000 |
| | | **HVAC Equipment** | | | | | **24,000** | | | | **24,000** |
| **16000.005** | | **Electrical Allowance** | | | | | | | | | |
| | 5 | Electrical & I&C Allowance | 0.00 | ls | 0 | 0 | - | | - | | |
| | 5 | Electrical Allowance - Pump Control Bldg | 0.00 | sf | 0 | 0 | 0 | | - | | |
| | | ***01 Wet Weather Pump Station*** | | | ***222,181*** | ***587,923*** | ***308,509*** | | ***115,869*** | | ***1,235,267*** |
| | | 9,742.32 Labor hours | | | | | | | | | |
| | | 1,344.844 Equipment hours | | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***02 Equilization*** | | | | | | | | | |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Modifications to Diversion Structure A for new sluice gate | 1.00 | ls | - | - | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | 20 | New Wet-Weather Screenings Diversion Structure | 1.00 | ls | 4,700 | 100,000 | | | - | 104,699.68 /ls | 104,700 |
| | | **Sitework Allowance** | | | **4,700** | **100,000** | **10,000** | | | | **114,700** |
| | | 360.00 Labor hours | | | | | | | | | |
| **02240.010** | | **Dewatering** | | | | | | | | | |
| | 20 | Dewatering Centrifugal Pump | 1.00 | ea | 891 | 5,750 | - | | 276 | 6,916.77 /ea | 6,917 |
| | | **Dewatering** | | | **891** | **5,750** | | | **276** | | **6,917** |
| | | 48.00 Labor hours | | | | | | | | | |
| | | 128.00 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 82.593 | cy | 70 | - | - | | 188 | 3.121 /cy | 258 |
| | 461C | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 27.11 | cy | 46 | - | - | | 90 | 5.011 /cy | 136 |
| n | A000 | IMPORT MATERIAL (Summary) | 8.00 | CY | - | - | - | | - | | |
| n | A015 | Import Gravel Fill | 16.371 | cy | - | 246 | 92 | | - | 20.60 /cy | 337 |
| | | **Foundation Excavation** | | | **116** | **246** | **92** | | **278** | | **731** |
| | | 7.66 Labor hours | | | | | | | | | |
| | | 4.371 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 545.00 | lf | 50 | | - | | - | 0.092 /lf | 50 |
| n | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 580.17 | cy | 1,173 | - | - | | 3,305 | 7.72 /cy | 4,478 |
| n | 3130 | Trench Bedding-Excavator- 130 HP | 47.56 | cy | 96 | - | - | | 280 | 7.901 /cy | 376 |
| n | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 138.31 | cy | 447 | - | - | | 1,301 | 12.642 /cy | 1,748 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 357.123 | cy | 323 | - | - | | 1,016 | 3.751 /cy | 1,339 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 185.863 | cy | - | 6,542 | - | | - | 35.20 /cy | 6,542 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 223.05 | cy | 313 | - | - | | 601 | 4.10 /cy | 914 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 223.05 | cy | 218 | - | - | | 364 | 2.61 /cy | 582 |
| n | 9616 | Trench Shield- 6x16 | 0.53 | u/mo | - | - | - | | 747 | 1,410.00 /u/mo | 747 |
| | A006 | Pipe Test | 545.00 | lf | 403 | 436 | - | | - | 1.54 /lf | 839 |
| | C0G0 | Concrete Thrust Block, 4" | 2.00 | ea | 12 | 5 | - | | - | 8.22 /ea | 16 |
| | C0J0 | Concrete Thrust Block, 6" | 1.00 | ea | 72 | 5 | - | | - | 76.58 /ea | 77 |
| | C0P0 | Concrete Thrust Block, 12" | 4.00 | ea | 363 | 72 | - | | - | 108.67 /ea | 435 |
| | | **Trenching** | | | **3,470** | **7,060** | | | **7,614** | | **18,144** |
| | | 205.62 Labor hours | | | | | | | | | |
| | | 110.774 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 278.53 | cy | - | - | - | | - | | |
| | 40 | Foundation Excavation Spoils (Summary) | 55.481 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 223.05 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 223.05 | cy | 360 | - | - | | 691 | 4.712 /cy | 1,051 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 55.481 | cy | 65 | - | - | | 182 | 4.44 /cy | 246 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 223.05 | cy | 1,004 | - | - | | 1,672 | 12.001 /cy | 2,677 |
| | A0I7 | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 55.481 | cy | 35 | - | - | | 80 | 2.071 /cy | 115 |
| | | **Excavation Spoils** | | | **1,463** | | | | **2,625** | | **4,089** |
| | | 85.941 Labor hours | | | | | | | | | |
| | | 42.97 Equipment hours | | | | | | | | | |
| **02639.010** | | **Catch Basins & Inlets** | | | | | | | | | |
| | II80 | Catch Basin 48" x 72" x 8'-0" Deep | 1.00 | ea | 101 | 6,728 | - | | 255 | 7,083.04 /ea | 7,083 |
| | JJ80 | Catch Basin 72" x 96" x 8'-0" Deep | 1.00 | ea | 101 | 7,590 | - | | 255 | 7,945.52 /ea | 7,946 |
| | | **Catch Basins & Inlets** | | | **202** | **14,318** | | | **509** | | **15,029** |
| | | 12.00 Labor hours | | | | | | | | | |
| | | 4.00 Equipment hours | | | | | | | | | |
| **02639.020** | | **Storm Drainage Manholes** | | | | | | | | | |
| | 0 | Unload Care & Protect Manhole | 3.00 | ea | 53 | - | - | | - | 17.51 /ea | 53 |
| | 7200 | Place & Shape Manhole Base & Inverts- 72" | 1.00 | ea | 210 | - | - | | - | 511.88 /ea | 512 |
| | 7210 | Manhole 72" x 10' Deep | 1.00 | ea | 343 | 4,782 | - | | 496 | 5,621.13 /ea | 5,621 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Storm Drainage Manholes** | | | **606** | **4,782** | | | **496** | | **6,186** |
| | | 35.00 Labor hours | | | | | | | | | |
| | | 4.00 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 110 | Concrete: Slab on Grade | 42.50 | cy | 3,076 | 13,175 | - | | 1,157 | 409.61 /cy | 17,408 |
| n | 140 | Concrete: Wall | 100.00 | cy | 12,409 | 35,000 | - | | 5,043 | 524.52 /cy | 52,452 |
| n | 145 | Concrete: Elevated Slab | 22.00 | cy | 2,502 | 7,920 | - | | 1,109 | 524.18 /cy | 11,532 |
| | | **Concrete in Place** | | | **17,987** | **56,095** | | | **7,310** | | **81,392** |
| | | 869.750 Labor hours | | | | | | | | | |
| | | 144.95 Equipment hours | | | | | | | | | |
| **05510.000** | | **Metal Ladders** | | | | | | | | | |
| | 5 | Straight Ladder Steel | 9.00 | lf | 99 | 421 | - | | - | 57.764 /lf | 520 |
| | | **Metal Ladders** | | | **99** | **421** | | | | | **520** |
| | | 2.79 Labor hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J04 | 36"x 36" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 3.00 | ea | 208 | 2,760 | - | | - | 989.483 /ea | 2,968 |
| n | JD8 | 48"x 72" Aluminum Bilco Floor Hatch, Doule Leaf | 7.00 | ea | 604 | 9,298 | - | | - | 1,414.51 /ea | 9,902 |
| | | **Hatch, Aluminum, 300psf** | | | **812** | **12,058** | | | | | **12,870** |
| | | 33.90 Labor hours | | | | | | | | | |
| **11211.300** | | **Cent. Submersible Pumps** | | | | | | | | | |
| | 50 | Submersible Pump 45 HP | 3.00 | ea | 58,056 | 127,500 | - | | 41,102 | 75,552.80 /ea | 226,658 |
| | | **Cent. Submersible Pumps** | | | **58,056** | **127,500** | | | **41,102** | | **226,658** |
| | | 2,880.00 Labor hours | | | | | | | | | |
| | | 480.00 Equipment hours | | | | | | | | | |
| **11217.100** | | **Submersible Sump Pumps** | | | | | | | | | |
| | 10 | Sump Pump for Valve and Meter Vaults | 2.00 | ea | 7,741 | 16,000 | - | | 5,480 | 14,610.56 /ea | 29,221 |
| | | **Submersible Sump Pumps** | | | **7,741** | **16,000** | | | **5,480** | | **29,221** |
| | | 384.00 Labor hours | | | | | | | | | |
| | | 64.00 Equipment hours | | | | | | | | | |
| **11220.110** | | **Submersible Mixers** | | | | | | | | | |
| | 05 | Submersible Mixer | 3.00 | ea | 11,453 | 36,000 | - | | - | 15,817.60 /ea | 47,453 |
| | | **Submersible Mixers** | | | **11,453** | **36,000** | | | | | **47,453** |
| | | 480.00 Labor hours | | | | | | | | | |
| **11284.000** | | **Sluice Gates** | | | | | | | | | |
| | 7248 | 72" x 48" Sluice Gate | 1.00 | ea | 13,123 | 27,000 | - | | - | 40,123.00 /ea | 40,123 |
| | | **Sluice Gates** | | | **13,123** | **27,000** | | | | | **40,123** |
| | | 550.00 Labor hours | | | | | | | | | |
| **11330.100** | | **Barscreens** | | | | | | | | | |
| n | A 10 | 10 MGD Romag Screen | 1.00 | ea | 57,264 | 150,000 | - | | - | 207,264.00 /ea | 207,264 |
| | | **Barscreens** | | | **57,264** | **150,000** | | | | | **207,264** |
| | | 2,400.00 Labor hours | | | | | | | | | |
| **13121.000** | | **Pre-Engineered Metal Bldg** | | | | | | | | | |
| | z001 | Pre-Engineered Metal Bldg - Electrical Bldg (20'x10') | 200.00 | sf | | | 15,000 | | | 75.00 /sf | 15,000 |
| | | **Pre-Engineered Metal Bldg** | | | | | **15,000** | | | | **15,000** |
| **13200.005** | | **Storage Tanks** | | | | | | | | | |
| | z001 | Tank Washdown System | 1.00 | ls | 3,603 | 23,000 | - | | | 26,603.08 /ls | 26,603 |
| | z001 | 1MG Crom Tank | 1.00 | ls | 4,451 | 1,150,000 | - | | 3,151 | 1,157,601.97 /ls | 1,157,602 |
| | | **Storage Tanks** | | | **8,054** | **1,173,000** | | | **3,151** | | **1,184,205** |
| | | 432.00 Labor hours | | | | | | | | | |
| | | 112.00 Equipment hours | | | | | | | | | |
| **14600.005** | | **Hoists & Cranes** | | | | | | | | | |
| | 10 | Outdoor Hoist & Rail System | 1.00 | ea | 7,107 | 17,250 | | | - | 24,357.20 /ea | 24,357 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Hoists & Cranes** | | | **7,107** | **17,250** | | | | | **24,357** |
| | | 200.00 Labor hours | | | | | | | | | |
| **15111.650** | | **Plug Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | 200P | Plug Valve, MJ, 6" | 1.00 | ea | 176 | 425 | - | | - | 601.28 /ea | 601 |
| n | 200S | Plug Valve, MJ, 12" | 4.00 | ea | 1,302 | 4,400 | - | | - | 1,425.62 /ea | 5,702 |
| | | **Plug Valve (CI/DI/IBBM)** | | | **1,479** | **4,825** | | | | | **6,304** |
| | | 46.46 Labor hours | | | | | | | | | |
| **15114.500** | | **Check Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | C20S | Check Valve, Double Disc, MJ, 12" | 3.00 | ea | 979 | 1,800 | - | | - | 926.473 /ea | 2,779 |
| | | **Check Valve (CI/DI/IBBM)** | | | **979** | **1,800** | | | | | **2,779** |
| | | 30.78 Labor hours | | | | | | | | | |
| **15119.600** | | **Air/Vacuum Relief Valve** | | | | | | | | | |
| n | 100J | Air Release Valve | 3.00 | ea | 282 | 600 | - | | - | 293.93 /ea | 882 |
| | | **Air/Vacuum Relief Valve** | | | **282** | **600** | | | | | **882** |
| | | 9.09 Labor hours | | | | | | | | | |
| **15120.100** | | **Pipe Specialties** | | | | | | | | | |
| n | 611Q | 12-0/0" Flanged Coupling Adaptor- 150# Dresser 128 for Steel Pipe | 1.00 | ea | 126 | 506 | - | | - | 631.74 /ea | 632 |
| n | 621Q | 12-0/0" Flanged Coupling Adaptor- 150# Dresser 128 for DIP | 3.00 | ea | 388 | 1,557 | - | | - | 648.27 /ea | 1,945 |
| n | e412 | 12" Magnetic Flow Meter - Flanged | 1.00 | ea | 233 | 6,000 | - | | - | 6,232.78 /ea | 6,233 |
| n | e418 | 18" Magnetic Flow Meter | 1.00 | ea | 361 | 9,000 | - | | - | 9,361.09 /ea | 9,361 |
| | | **Pipe Specialties** | | | **1,107** | **17,063** | | | | | **18,170** |
| | | 46.43 Labor hours | | | | | | | | | |
| **15210.010** | | **DIP Totals** | | | | | | | | | |
| | 0 | Total Weight (Zero Cost Item) | 41,663.300 | lbs | - | - | - | | - | | |
| | 1 | Weight of Pipe (Zero Cost Item) | 35,983.300 | lbs | - | - | - | | - | | |
| | 2 | Weight of Fittings (Zero Cost Item) | 5,680.00 | lbs | - | - | - | | - | | |
| **15210.200** | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | 0 | Unload Care & Protect Push-on DIP & Fittings | 41,663.300 | lbs | 80 | - | - | | 263 | 0.01 /lbs | 343 |
| | 1 | Weight of Push-on Pipe (Zero Cost Item) | 35,983.300 | lbs | - | - | - | | - | | |
| | 2 | Weight of Push-on Fittings (Zero Cost Item) | 5,680.00 | lbs | - | - | - | | - | | |
| | 5 | Layout Push-on DIP & Fitting | 545.00 | lf | 124 | - | - | | - | 0.23 /lf | 124 |
| n | 204 | DIP CML, Push-On, Class 52, 4" | 117.00 | lf | 530 | 1,379 | - | | - | 16.323 /lf | 1,910 |
| n | 206 | DIP CML, Push-On, Class 52, 6" | 11.00 | lf | 58 | 136 | - | | - | 17.632 /lf | 194 |
| n | 208 | DIP CML, Push-On, Class 52, 8" | 30.00 | lf | 179 | 508 | - | | - | 22.90 /lf | 687 |
| n | 212 | DIP CML, Push-On, Class 52, 12" | 102.00 | lf | 754 | 2,841 | - | | - | 35.25 /lf | 3,595 |
| n | 218 | DIP CML, Push-On, Class 52, 18" | 102.00 | lf | 900 | 4,903 | - | | - | 56.90 /lf | 5,803 |
| n | 224 | DIP CML, Push-On, Class 52, 24" | 183.00 | lf | 1,747 | 12,719 | - | | - | 79.05 /lf | 14,465 |
| n | 2AKK | DIP CML, Push-on, 90 Bend, 4" | 2.00 | ea | 79 | 160 | - | | - | 119.36 /ea | 239 |
| n | 2AMM | DIP CML, Push-on, 90 Bend, 6" | 1.00 | ea | 56 | 120 | - | | - | 175.81 /ea | 176 |
| n | 2APP | DIP CML, Push-on, 90 Bend, 12" | 1.00 | ea | 110 | 340 | - | | - | 450.19 /ea | 450 |
| n | 2ASS | DIP CML, Push-on, 90 Bend, 18" | 3.00 | ea | 491 | 4,238 | - | | - | 1,576.18 /ea | 4,729 |
| n | FASS | DIP CML, Push-on, Tee BxB, 12"x 12" | 1.00 | ea | 149 | 510 | - | | - | 658.89 /ea | 659 |
| n | FAVS | DIP CML, Push-on, Tee BxB, 18"x 12" | 2.00 | ea | 433 | 3,450 | - | | - | 1,941.65 /ea | 3,883 |
| n | FAXS | DIP CML, Push-on, Wye BxB, 24"x 12" | 1.00 | ea | 275 | 2,800 | - | | - | 3,075.34 /ea | 3,075 |
| n | KASP | DIP, CML, Push-on, Reducer BxB, 12"x 6" | 1.00 | ea | 94 | 250 | - | | - | 344.49 /ea | 344 |
| n | KASQ | DIP, CML, Push-on, Reducer BxB, 12"x 8" | 3.00 | ea | 283 | 840 | - | | - | 374.49 /ea | 1,123 |
| n | KAVS | DIP, CML, Push-on, Reducer BxB, 18"x 12" | 1.00 | ea | 144 | 938 | - | | - | 1,081.67 /ea | 1,082 |
| n | MBPP | DIP CML, Push-on, Flare 12" | 1.00 | ea | 18 | 126 | - | | - | 144.37 /ea | 144 |
| | | **DIP CML Push-On Pipe** | | | **6,506** | **36,257** | | | **263** | | **43,026** |
| | | 274.18 Labor hours | | | | | | | | | |
| | | 4.583 Equipment hours | | | | | | | | | |
| | | ***02 Equilization*** | | | ***203,497*** | ***1,808,023*** | ***25,092*** | | ***69,105*** | | ***2,106,019*** |
| | | 9,393.60 Labor hours | | | | | | | | | |
| | | 1,099.65 Equipment hours | | | | | | | | | |

| | | | | | Labor | Material | Subcontract | | Equipment | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Item | | Description | Takeoff Qty | | Amount | Amount | Amount | Name | Amount | Unit Cost | Amount |
| | | ***03 High Rate Clarification*** | | | | | | | | | |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Allowance for passing around 7 existing pipes | 1.00 | ls | - | - | 7,000 | | - | 7,000.00 /ls | 7,000 |
| | | **Sitework Allowance** | | | | | **7,000** | | | | **7,000** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2734 | Remove Asphalt Pavement, Sidewalk | 17.00 | sy | 26 | - | - | | 53 | 4.684 /sy | 80 |
| | | **Selective Site Demolition** | | | **26** | | | | **53** | | **80** |
| | | 1.62 Labor hours | | | | | | | | | |
| | | 1.292 Equipment hours | | | | | | | | | |
| **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | 1 | Design Shoring System-Minor | 2.00 | ls | - | - | 2,000 | | - | 1,000.00 /ls | 2,000 |
| | 100 | Survey & Layout Shoring | 68.00 | lf | 1 | - | - | | - | 0.02 /lf | 1 |
| n | 1025 | Steel Sheeting,15' x 22psf, pulled & salvage | 1,020.00 | sf | 5,286 | 5,926 | - | | 6,981 | 17.84 /sf | 18,193 |
| | 1045 | Install & Remove Wales/Struts/Connectors | 1.122 | ton | 273 | 1,032 | - | | 360 | 1,483.73 /ton | 1,665 |
| n | 1050 | Rent Steel Sheet Piling and Wales, first month | 12.342 | ton | - | 3,747 | - | | - | 303.60 /ton | 3,747 |
| | | **Sheet Piling** | | | **5,559** | **10,705** | **2,000** | | **7,341** | | **25,606** |
| | | 183.124 Labor hours | | | | | | | | | |
| | | 45.764 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 110 | Hand Excavate Foundations | 18.00 | cy | 367 | - | - | | - | 20.37 /cy | 367 |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 38.52 | cy | 32 | - | - | | 88 | 3.121 /cy | 120 |
| | 461C | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 24.26 | cy | 41 | - | - | | 80 | 5.011 /cy | 122 |
| n | A000 | IMPORT MATERIAL (Summary) | 4.00 | CY | - | - | - | | - | | |
| n | A015 | Import Gravel Fill | 4.222 | cy | - | 63 | 24 | | - | 20.60 /cy | 87 |
| | | **Foundation Excavation** | | | **440** | **63** | **24** | | **168** | | **695** |
| | | 33.77 Labor hours | | | | | | | | | |
| | | 2.97 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 875.00 | lf | 81 | | - | | - | 0.092 /lf | 81 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 1,073.32 | cy | 543 | - | - | | 2,374 | 2.72 /cy | 2,916 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 66.80 | cy | 101 | - | - | | 337 | 6.56 /cy | 438 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 171.093 | cy | 415 | - | - | | 1,380 | 10.492 /cy | 1,795 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 813.65 | cy | 736 | - | - | | 2,316 | 3.75 /cy | 3,052 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 237.89 | cy | - | 8,374 | - | | - | 35.20 /cy | 8,374 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 259.67 | cy | 91 | - | - | | 175 | 1.024 /cy | 266 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 259.67 | cy | 254 | - | - | | 423 | 2.61 /cy | 677 |
| n | 9616 | Trench Shield- 6x16 | 4.00 | u/mo | - | - | - | | 5,640 | 1,410.00 /u/mo | 5,640 |
| | A006 | Pipe Test | 875.00 | lf | 647 | 700 | - | | - | 1.54 /lf | 1,347 |
| | C0N0 | Concrete Thrust Block, 10" | 11.00 | ea | 866 | 132 | - | | - | 90.74 /ea | 998 |
| | | **Trenching** | | | **3,733** | **9,206** | | | **12,644** | | **25,584** |
| | | 200.793 Labor hours | | | | | | | | | |
| | | 104.303 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 291.93 | cy | - | - | - | | - | | |
| | 40 | Foundation Excavation Spoils (Summary) | 32.26 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 259.67 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 259.67 | cy | 419 | - | - | | 805 | 4.712 /cy | 1,223 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 32.26 | cy | 38 | - | - | | 106 | 4.44 /cy | 143 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 259.67 | cy | 1,169 | - | - | | 1,947 | 12.001 /cy | 3,116 |
| | A0I7 | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 32.26 | cy | 20 | - | - | | 47 | 2.071 /cy | 67 |
| | | **Excavation Spoils** | | | **1,646** | | | | **2,904** | | **4,550** |
| | | 96.73 Labor hours | | | | | | | | | |
| | | 48.364 Equipment hours | | | | | | | | | |
| **02639.020** | | **Storm Drainage Manholes** | | | | | | | | | |
| | 0 | Unload Care & Protect Manhole | 2.00 | ea | 35 | - | - | | - | 17.51 /ea | 35 |
| | 4800 | Place & Shape Manhole Base & Inverts- 48" | 1.00 | ea | 210 | - | - | | - | 372.04 /ea | 372 |
| | 4805 | Manhole 48" x 5' Deep | 1.00 | ea | 113 | 1,657 | - | | | 1,769.79 /ea | 1,770 |
| | 6000 | Place & Shape Manhole Base & Inverts- 60" | 1.00 | ea | 210 | - | - | | - | 436.44 /ea | 436 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **02639.020** | | **Storm Drainage Manholes** | | | | | | | | | |
| | 6007 | Manhole 60" x 7' Deep | 1.00 | ea | 274 | 2,834 | - | | 496 | 3,604.40 /ea | 3,604 |
| | | **Storm Drainage Manholes** | | | **842** | **4,491** | | | **496** | | **6,218** |
| | | 50.000 Labor hours | | | | | | | | | |
| | | 8.00 Equipment hours | | | | | | | | | |
| **02720.100** | | **Aggregate Base Course** | | | | | | | | | |
| | 1002 | Granular fill | 222.00 | cy | 632 | | - | | 3,196 | 17.25 /cy | 3,829 |
| | 1002 | Granular fill | 319.00 | cy | 813 | | - | | | 2.55 /cy | 813 |
| | | **Aggregate Base Course** | | | **1,445** | | | | **3,196** | | **4,641** |
| | | 80.18 Labor hours | | | | | | | | | |
| | | 48.28 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| | 30 | Bitum Paving Sidewalks | 17.00 | sy | - | - | 680 | | - | 40.00 /sy | 680 |
| | | **Asphalt Paving - Location** | | | | | **680** | | | | **680** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 834.00 | sy | 69 | 1,826 | - | | 70 | 2.36 /sy | 1,966 |
| | | **Lawns & Grasses** | | | **69** | **1,826** | | | **70** | | **1,966** |
| | | 3.34 Labor hours | | | | | | | | | |
| | | 1.67 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 110 | Concrete: Slab on Grade | 112.00 | cy | 8,107 | 34,720 | - | | 3,049 | 409.61 /cy | 45,876 |
| n | 110 | Concrete: Slab on Grade - Pump Support | 1.00 | cy | 72 | 310 | - | | 27 | 409.61 /cy | 410 |
| n | 110 | Concrete: Slab on Grade | 7.00 | cy | 507 | 2,170 | - | | 191 | 409.62 /cy | 2,867 |
| n | 110 | Concrete: Slab on Grade - Pump Support | 1.00 | cy | 72 | 310 | - | | 27 | 409.61 /cy | 410 |
| n | 140 | Concrete | 67.00 | cy | 8,314 | 23,450 | - | | 3,379 | 524.52 /cy | 35,143 |
| n | 140 | Concrete: Wall | 187.00 | cy | 23,204 | 65,450 | - | | 9,430 | 524.52 /cy | 98,084 |
| n | 140 | Concrete: Channel Wall | 48.00 | cy | 5,956 | 16,800 | - | | 2,421 | 524.52 /cy | 25,177 |
| n | 140 | Concrete: Wall | 45.00 | cy | 5,584 | 15,750 | - | | 2,269 | 524.52 /cy | 23,603 |
| n | 140 | Concrete: Wall - Wet Well | 40.00 | cy | 4,963 | 14,000 | - | | 2,017 | 524.52 /cy | 20,981 |
| n | 145 | Concrete: Elevated Slab | 25.00 | cy | 2,844 | 9,000 | - | | 1,261 | 524.18 /cy | 13,104 |
| n | 145 | Concrete: Elevated Slab - Wet Well | 11.00 | cy | 1,251 | 3,960 | - | | 555 | 524.18 /cy | 5,766 |
| n | 180 | Concrete: Grout Fill - avoid grit deposition | 2.00 | cy | 83 | 200 | - | | 10 | 146.41 /cy | 293 |
| n | 180 | Concrete: Grout Fill | 40.00 | cy | 1,654 | 4,000 | - | | 202 | 146.41 /cy | 5,856 |
| | | **Concrete in Place** | | | **62,612** | **190,120** | | | **24,838** | | **277,570** |
| | | 3,027.500 Labor hours | | | | | | | | | |
| | | 492.54 Equipment hours | | | | | | | | | |
| **03150.010** | | **Concrete Core & Saw** | | | | | | | | | |
| | c 60 | Core Drill 6" to 12" depth | 5.00 | ea | 197 | - | - | | | 39.49 /ea | 197 |
| | c100 | Core Drill 10" to 12" depth | 4.00 | ea | 188 | - | - | | | 46.893 /ea | 188 |
| | | **Concrete Core & Saw** | | | **385** | | | | | | **385** |
| | | 31.20 Labor hours | | | | | | | | | |
| **05510.000** | | **Metal Ladders** | | | | | | | | | |
| | 10 | Straight Ladder-Aluminum | 175.00 | lf | 3,110 | 8,028 | - | | - | 63.642 /lf | 11,137 |
| | | **Metal Ladders** | | | **3,110** | **8,028** | | | | | **11,137** |
| | | 87.50 Labor hours | | | | | | | | | |
| **05520.000** | | **Handrail/Railing** | | | | | | | | | |
| | 103 | 3 Rail-Handrail Alum. w/Toe | 100.00 | lf | 888 | 6,900 | - | | - | 77.884 /lf | 7,788 |
| | | **Handrail/Railing** | | | **888** | **6,900** | | | | | **7,788** |
| | | 25.00 Labor hours | | | | | | | | | |
| **05530.200** | | **Alum. Grating-Riveted** | | | | | | | | | |
| | 5 K | 1-1/4x1/8 Riveted Grate-Stnd. | 144.00 | sf | 870 | 6,160 | - | | - | 48.821 /sf | 7,030 |
| | 8 K | 1-1/2x3/16 Riveted Grate-Stnd. | 400.00 | sf | 2,417 | 16,192 | - | | - | 46.521 /sf | 18,609 |
| | | **Alum. Grating-Riveted** | | | **3,287** | **22,352** | | | | | **25,639** |
| | | 92.48 Labor hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 9.00 | ea | 690 | 11,489 | - | | - | 1,353.172 /ea | 12,179 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Hatch, Aluminum, 300psf** | | | **690** | **11,489** | | | | | **12,179** |
| | | 28.80 Labor hours | | | | | | | | | |
| **09910.100** | | **Paint Pipe/Valve/Equip** | | | | | | | | | |
| | 10 | Paint Pipe - Standard Paint | 5.454 | sf | 3 | 2 | - | | - | 0.88 /sf | 5 |
| | | **Paint Pipe/Valve/Equip** | | | **3** | **2** | | | | | **5** |
| | | 0.11 Labor hours | | | | | | | | | |
| **11000.005** | | **Equipment Allowance** | | | | | | | | | |
| | 5 | Equipment Allowance - Kruger Estimate | 1.00 | ls | 464,760 | 1,095,000 | - | | 411,000 | 1,970,760.00 /ls | 1,970,760 |
| | | **Equipment Allowance** | | | **464,760** | **1,095,000** | | | **411,000** | | **1,970,760** |
| | | 19,200.00 Labor hours | | | | | | | | | |
| | | 4,800.00 Equipment hours | | | | | | | | | |
| **11000.015** | | **Equipment Demolition** | | | | | | | | | |
| n | q003 | 20 cy Roll-Off Dumpster | 1.00 | ea | 91 | 2,500 | | | - | 2,590.760 /ea | 2,591 |
| | | **Equipment Demolition** | | | **91** | **2,500** | | | | | **2,591** |
| | | 4.00 Labor hours | | | | | | | | | |
| **11210.000** | | **PUMPS** | | | | | | | | | |
| | ---- | Sludge Pump - 5HP | 1.00 | ea | 12,706 | 20,000 | - | | - | 32,706.40 /ea | 32,706 |
| | | **PUMPS** | | | **12,706** | **20,000** | | | | | **32,706** |
| | | 560.00 Labor hours | | | | | | | | | |
| **11217.100** | | **Submersible Sump Pumps** | | | | | | | | | |
| | 05 | Sump Pump 5 HP | 2.00 | ea | 19,352 | 40,000 | - | | 13,701 | 36,526.40 /ea | 73,053 |
| | 10 | Sump Pump | 2.00 | ea | 7,741 | 16,000 | - | | 5,480 | 14,610.56 /ea | 29,221 |
| | 10 | 50gpm Sump Pump | 1.00 | ea | 3,870 | 7,000 | - | | 2,740 | 13,610.56 /ea | 13,611 |
| | 50 | Sump Pump 50 gpm | 1.00 | ea | 14,514 | 31,500 | - | | 10,276 | 56,289.60 /ea | 56,290 |
| | | **Submersible Sump Pumps** | | | **45,477** | **94,500** | | | **32,197** | | **172,174** |
| | | 2,256.00 Labor hours | | | | | | | | | |
| | | 376.000 Equipment hours | | | | | | | | | |
| **11240.420** | | **Storage Tanks** | | | | | | | | | |
| | a200 | Set VFD Control - Actiflow Maturation Tank | 1.00 | ea | 6,003 | 15,000 | - | | - | 21,003.20 /ea | 21,003 |
| | a200 | Set VFD Control - Actiflow Sellting Tank Scraper | 1.00 | ea | 6,003 | 15,000 | - | | - | 21,003.20 /ea | 21,003 |
| | | **Storage Tanks** | | | **12,006** | **30,000** | | | | | **42,006** |
| | | 560.00 Labor hours | | | | | | | | | |
| **11284.000** | | **Sluice Gates** | | | | | | | | | |
| | 96A8 | 96" x 48" Sluice Gate | 4.00 | ea | 57,264 | 132,000 | - | | - | 47,316.00 /ea | 189,264 |
| | | **Sluice Gates** | | | **57,264** | **132,000** | | | | | **189,264** |
| | | 2,400.00 Labor hours | | | | | | | | | |
| **11330.100** | | **Barscreens** | | | | | | | | | |
| n | A 3 | Screens | 1.00 | ea | 95,440 | 200,000 | - | | - | 295,440.00 /ea | 295,440 |
| | B 5 | Screen Conveyor | 1.00 | ea | 19,088 | 40,000 | - | | - | 59,088.00 /ea | 59,088 |
| | | **Barscreens** | | | **114,528** | **240,000** | | | | | **354,528** |
| | | 4,800.000 Labor hours | | | | | | | | | |
| **13000.005** | | **Special Const Allowance** | | | | | | | | | |
| | 5 | Pressure Sensor | 2.00 | ea | 771 | 3,450 | - | | - | 2,110.40 /ea | 4,221 |
| | 13 | Level Sensor | 1.00 | ea | 357 | 1,725 | | | - | 2,081.50 /ea | 2,082 |
| | | **Special Const Allowance** | | | **1,127** | **5,175** | | | | | **6,302** |
| | | 30.00 Labor hours | | | | | | | | | |
| **13121.000** | | **Pre-Engineered Metal Bldg** | | | | | | | | | |
| | z001 | Pre-Engineered Metal Bldg- Chemical | 625.00 | sf | | | 46,875 | | | 75.00 /sf | 46,875 |
| | z001 | Pre-Engineered Metal Bldg | 600.00 | sf | | | 45,000 | | | 75.00 /sf | 45,000 |
| | | **Pre-Engineered Metal Bldg** | | | | | **91,875** | | | | **91,875** |
| **13420.200** | | **I&C Instruments** | | | | | | | | | |
| n | 05-FE-m006 | Magnetic Flow Meter | 1.00 | ea | 160 | 4,600 | - | | - | 4,759.92 /ea | 4,760 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **I&C Instruments** | | | **160** | **4,600** | | | | | **4,760** |
| | | 5.83 Labor hours | | | | | | | | | |
| **15111.650** | | **Plug Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | 200R | Plug Valve, MJ, 10" | 3.00 | ea | 840 | 2,700 | - | | - | 1,180.103 /ea | 3,540 |
| | | **Plug Valve (CI/DI/IBBM)** | | | **840** | **2,700** | | | | | **3,540** |
| | | 26.40 Labor hours | | | | | | | | | |
| **15113.450** | | **GV Knife Gate ValveCI/DI** | | | | | | | | | |
| n | 160R | Knife Gate Valve, Motor Oper, flg, 10" | 6.00 | ea | 2,424 | 18,900 | - | | - | 3,553.923 /ea | 21,324 |
| | | **GV Knife Gate ValveCI/DI** | | | **2,424** | **18,900** | | | | | **21,324** |
| | | 76.140 Labor hours | | | | | | | | | |
| **15114.500** | | **Check Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | C20R | Check Valve, Double Disc, MJ, 10" | 3.00 | ea | 834 | 1,500 | - | | - | 778.11 /ea | 2,334 |
| | | **Check Valve (CI/DI/IBBM)** | | | **834** | **1,500** | | | | | **2,334** |
| | | 26.22 Labor hours | | | | | | | | | |
| **15120.100** | | **Pipe Specialties** | | | | | | | | | |
| n | K2XS | Tapping Sleeve- CS Epoxy Coated/SS Flange, 30"x 10"dia | 1.00 | ea | 119 | 2,770 | - | | - | 2,889.30 /ea | 2,889 |
| | | **Pipe Specialties** | | | **119** | **2,770** | | | | | **2,889** |
| | | 5.00 Labor hours | | | | | | | | | |
| **15210.010** | | **DIP Totals** | | | | | | | | | |
| | 0 | Total Weight (Zero Cost Item) | 35,832.50 | lbs | - | - | - | | - | | |
| | 1 | Weight of Pipe (Zero Cost Item) | 32,812.50 | lbs | - | - | - | | - | | |
| | 2 | Weight of Fittings (Zero Cost Item) | 3,020.00 | lbs | - | - | - | | - | | |
| **15210.200** | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | 0 | Unload Care & Protect Push-on DIP & Fittings | 35,832.50 | lbs | 69 | - | - | | 226 | 0.01 /lbs | 295 |
| | 1 | Weight of Push-on Pipe (Zero Cost Item) | 32,812.50 | lbs | - | - | - | | - | | |
| | 2 | Weight of Push-on Fittings (Zero Cost Item) | 3,020.00 | lbs | - | - | - | | - | | |
| | 5 | Layout Push-on DIP & Fitting | 875.00 | lf | 199 | - | - | | - | 0.23 /lf | 199 |
| n | 210 | DIP CML, Push-On, Class 52, 10" | 875.00 | lf | 5,846 | 19,359 | - | | - | 28.81 /lf | 25,205 |
| n | 2AOO | DIP CML, Push-on, 90 Bend, 10" | 10.00 | ea | 980 | 2,600 | - | | - | 358.024 /ea | 3,580 |
| n | AAOO | DIP CML, Push-on, 45 Bend, 10" | 2.00 | ea | 181 | 460 | - | | - | 320.67 /ea | 641 |
| n | CAOO | DIP CML, Push-on, 22-1/2 Bend, 10" | 2.00 | ea | 181 | 420 | - | | - | 300.67 /ea | 601 |
| n | FARR | DIP CML, Push-on, Tee BxB, 10"x 10" | 4.00 | ea | 555 | 1,600 | - | | - | 538.81 /ea | 2,155 |
| n | KARQ | DIP, CML, Push-on, Reducer BxB, 10"x 8" | 4.00 | ea | 323 | 960 | - | | - | 320.853 /ea | 1,283 |
| | | **DIP CML Push-On Pipe** | | | **8,335** | **25,399** | | | **226** | | **33,960** |
| | | 350.832 Labor hours | | | | | | | | | |
| | | 3.942 Equipment hours | | | | | | | | | |
| **15221.120** | | **Fab 304L Stainless Pipe** | | | | | | | | | |
| | 0 | Unload Care & Protect Pipe/Fittings | 345.00 | lbs | 1 | - | - | | 2 | 0.01 /lbs | 3 |
| | 1 | Weight of Pipe (Zero Cost Item) | 345.00 | lbs | - | - | - | | - | | |
| | 10 | Layout Pipe & Fitting | 150.00 | lf | 36 | - | - | | - | 0.24 /lf | 36 |
| | 107A | Install Fabricated 304L SS Pipe, 1-1/4" | 150.00 | lf | 286 | - | - | | - | 1.91 /lf | 286 |
| n | 50A0 | 304L Sch 40s Stainless Pipe, 1.25" | 150.00 | lf | - | 1,398 | - | | - | 9.32 /lf | 1,398 |
| | | **Fab 304L Stainless Pipe** | | | **323** | **1,398** | | | **2** | | **1,723** |
| | | 13.54 Labor hours | | | | | | | | | |
| | | 0.04 Equipment hours | | | | | | | | | |
| **15241.100** | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | 0 | Unload Care & Protect Pipe/Fittings | 100.00 | lf | 0 | - | - | | 1 | 0.01 /lf | 1 |
| | 10 | Layout Pipe & Fitting | 100.00 | lf | 24 | - | - | | - | 0.24 /lf | 24 |
| n | 80C0 | PVC Schd. 80 Pipe, 2.00" | 50.00 | lf | 83 | 153 | - | | - | 4.73 /lf | 236 |
| n | 80G0 | PVC Schd. 80 Pipe, 4.00" | 50.00 | lf | 119 | 456 | - | | - | 11.50 /lf | 575 |
| | a010 | PVC Joint Primer- Quart | 0.124 | qrt | - | 2 | - | | - | 15.30 /qrt | 2 |
| | a020 | PVC Solvent Cement Low VOC- Quart | 0.124 | qrt | - | 3 | - | | - | 21.90 /qrt | 3 |
| | | **PVC Schd Pipe & Fittings** | | | **227** | **613** | | | **1** | | **841** |
| | | 9.511 Labor hours | | | | | | | | | |
| | | 0.011 Equipment hours | | | | | | | | | |
| **15500.001** | | **HVAC Equipment** | | | | | | | | | |
| | 155 | HVAC Allowance - Chemical Bldg | 625.00 | sf | - | - | 25,000 | | - | 40.00 /sf | 25,000 |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | **HVAC Equipment** | | | | **25,000** | | | | **25,000** |
| **16000.005** | **Electrical Allowance** | | | | | | | | |
| | 5 Electrical Allowance for pumps | 1.00 ls | | | 15,000 | | - | 15,000.00 /ls | 15,000 |
| | **Electrical Allowance** | | | | **15,000** | | | | **15,000** |
| | 0.000 Labor hours | | | | | | | | |
| | ***03 High Rate Clarification*** | | ***805,958*** | ***1,942,238*** | ***141,579*** | | ***495,136*** | | ***3,385,299*** |
| | 34,265.602 Labor hours | | | | | | | | |
| | 5,933.17 Equipment hours | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***04 Chlorine Effluent*** | | | | | | | | | |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Connect to Existing Aeration Tank | 1.00 | ls | - | - | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | 20 | Connect to Existing PCCP (9'deep) | 1.00 | ls | - | - | 7,500 | | - | 7,500.00 /ls | 7,500 |
| | | **Sitework Allowance** | | | | | **12,500** | | | | **12,500** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2508 | Remove 54"PCCP (9'deep) | 12.00 | lf | 49 | - | - | | 89 | 11.52 /lf | 138 |
| | 2734 | Remove Concrete Walkway | 20.00 | sy | 31 | - | - | | 63 | 4.683 /sy | 94 |
| | | **Selective Site Demolition** | | | **80** | | | | **152** | | **232** |
| | | 4.90 Labor hours | | | | | | | | | |
| | | 2.96 Equipment hours | | | | | | | | | |
| **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | 1 | Design Shoring System-Minor | 1.00 | ls | - | - | 1,000 | | - | 1,000.00 /ls | 1,000 |
| | 100 | Survey & Layout Shoring | 72.00 | lf | 1 | - | - | | - | 0.02 /lf | 1 |
| n | 1025 | Steel Sheeting,15' x 22psf, pulled & salvage | 1,080.00 | sf | 5,597 | 6,275 | - | | 7,392 | 17.84 /sf | 19,263 |
| | 1045 | Install & Remove Wales/Struts/Connectors | 1.19 | ton | 289 | 1,093 | - | | 381 | 1,483.74 /ton | 1,763 |
| n | 1050 | Rent Steel Sheet Piling and Wales, first month | 13.07 | ton | - | 3,968 | - | | - | 303.604 /ton | 3,968 |
| | | **Sheet Piling** | | | **5,886** | **11,335** | **1,000** | | **7,773** | | **25,994** |
| | | 193.90 Labor hours | | | | | | | | | |
| | | 48.46 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 120.00 | cy | 101 | - | - | | 273 | 3.121 /cy | 375 |
| | 461C | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 33.00 | cy | 56 | - | - | | 109 | 5.011 /cy | 165 |
| n | A000 | IMPORT MATERIAL (Summary) | 2.00 | CY | - | - | - | | - | | |
| n | A015 | Import Gravel Fill | 12.00 | cy | - | 180 | 67 | | - | 20.60 /cy | 247 |
| | | **Foundation Excavation** | | | **157** | **180** | **67** | | **383** | | **787** |
| | | 10.36 Labor hours | | | | | | | | | |
| | | 5.84 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 10.00 | lf | 1 | | - | | - | 0.092 /lf | 1 |
| n | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 18.66 | cy | 38 | - | - | | 106 | 7.72 /cy | 144 |
| n | 3130 | Trench Bedding-Excavator- 130 HP | 1.28 | cy | 3 | - | - | | 8 | 7.90 /cy | 10 |
| n | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 5.06 | cy | 16 | - | - | | 48 | 12.642 /cy | 64 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 9.41 | cy | 9 | - | - | | 27 | 3.751 /cy | 35 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 6.332 | cy | - | 223 | - | | - | 35.204 /cy | 223 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 9.25 | cy | 3 | - | - | | 6 | 1.024 /cy | 9 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 9.25 | cy | 9 | - | - | | 15 | 2.61 /cy | 24 |
| n | 9616 | Trench Shield- 6x16 | 0.01 | u/mo | - | - | - | | 14 | 1,410.00 /u/mo | 14 |
| | A008 | Pipe Locates (Pot Hole) | 1.00 | ea | 152 | 50 | - | | 27 | 228.96 /ea | 229 |
| | | **Trenching** | | | **230** | **273** | | | **250** | | **754** |
| | | 13.09 Labor hours | | | | | | | | | |
| | | 3.88 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 96.25 | cy | - | - | - | | - | | |
| | 40 | Foundation Excavation Spoils (Summary) | 87.00 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 9.25 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 9.25 | cy | 15 | - | - | | 29 | 4.712 /cy | 44 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 87.00 | cy | 101 | - | - | | 285 | 4.44 /cy | 386 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 9.25 | cy | 42 | - | - | | 69 | 12.002 /cy | 111 |
| | A0I7 | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 87.00 | cy | 54 | - | - | | 126 | 2.071 /cy | 180 |
| | | **Excavation Spoils** | | | **212** | | | | **509** | | **721** |
| | | 12.27 Labor hours | | | | | | | | | |
| | | 6.134 Equipment hours | | | | | | | | | |
| **02720.100** | | **Aggregate Base Course** | | | | | | | | | |
| | 1180 | Crushed Rock 1" | 6.00 | cy | 17 | 61 | - | | 86 | 27.47 /cy | 165 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Aggregate Base Course** | | | **17** | **61** | | | **86** | | **165** |
| | | 0.96 Labor hours | | | | | | | | | |
| | | 0.96 Equipment hours | | | | | | | | | |
| **02775.100** | | **Concrete Sidewalks** | | | | | | | | | |
| | 4 | 4" Sidewalks | 180.00 | sf | - | - | 1,440 | | - | 8.00 /sf | 1,440 |
| | | **Concrete Sidewalks** | | | | | **1,440** | | | | **1,440** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 278.00 | sy | 23 | 609 | - | | 23 | 2.36 /sy | 655 |
| | | **Lawns & Grasses** | | | **23** | **609** | | | **23** | | **655** |
| | | 1.112 Labor hours | | | | | | | | | |
| | | 0.56 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 140 | Concrete: Junction Structure | 36.00 | cy | 4,467 | 12,600 | - | | 1,815 | 524.52 /cy | 18,883 |
| | | **Concrete in Place** | | | **4,467** | **12,600** | | | **1,815** | | **18,883** |
| | | 216.000 Labor hours | | | | | | | | | |
| | | 36.00 Equipment hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 1.00 | ea | 77 | 1,277 | - | | - | 1,353.20 /ea | 1,353 |
| | | **Hatch, Aluminum, 300psf** | | | **77** | **1,277** | | | | | **1,353** |
| | | 3.20 Labor hours | | | | | | | | | |
| **11284.000** | | **Sluice Gates** | | | | | | | | | |
| | 3636 | 36" x 36" Sluice Gate | 1.00 | ea | 4,772 | 10,800 | - | | - | 15,572.00 /ea | 15,572 |
| | | **Sluice Gates** | | | **4,772** | **10,800** | | | | | **15,572** |
| | | 200.000 Labor hours | | | | | | | | | |
| **15230.400** | | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | 0 | Unload Care & Protect PCCP & Fittings | 10.00 | lf | 0 | - | - | | 0 | 0.01 /lf | 0 |
| | 10 | Layout Pipe & Fitting | 10.00 | lf | 2 | - | - | | - | 0.24 /lf | 2 |
| | 325 | PCCP Equipment- Cat 325 Excavator | 1.30 | ch | 25 | - | - | | 144 | 130.09 /ch | 169 |
| n | B036 | Prestressed Concrete Cylinder Pipe (250#) 36 | 10.00 | lf | 334 | 1,080 | - | | - | 141.404 /lf | 1,414 |
| | | **Prestr Conc Cylind-(PCCP)** | | | **362** | **1,080** | | | **144** | | **1,586** |
| | | 15.401 Labor hours | | | | | | | | | |
| | | 1.301 Equipment hours | | | | | | | | | |
| **16000.005** | | **Electrical Allowance** | | | | | | | | | |
| | 5 | Electrical & SCADA Allowance for Motorized Gate | 0.00 | ls | 0 | 0 | - | | - | | |
| | | ***04 Chlorine Effluent*** | | | ***16,284*** | ***38,215*** | ***15,007*** | | ***11,136*** | | ***80,641*** |
| | | 671.19 Labor hours | | | | | | | | | |
| | | 106.09 Equipment hours | | | | | | | | | |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | ***05 I&C*** | | | | | | | | |
| **13000.005** | **Special Const Allowance** | | | | | | | | |
| 5 | I&C Allowance | 0.00 ls | 0 | 0 | - | | - | | |
| | ***05 I&C*** | | ***0*** | ***0*** | ***0*** | | ***0*** | | ***0*** |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | ***06 Electrical*** | | | | | | | | |
| **16000.005** | **Electrical Allowance** | | | | | | | | |
| | 5 Electrical Allowance | 0.00 ls | 0 | 0 | - | | - | | |
| | ***06 Electrical*** | | ***0*** | ***0*** | ***0*** | | ***0*** | | ***0*** |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***07 Chemical Feed*** | | | | | | | | | |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2734 | Remove Asphalt Pavement, sidewalk | 25.00 | sy | 39 | - | - | | 78 | 4.684 /sy | 117 |
| | | **Selective Site Demolition** | | | **39** | | | | **78** | | **117** |
| | | 2.38 Labor hours | | | | | | | | | |
| | | 1.90 Equipment hours | | | | | | | | | |
| **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | 2 | Design Shoring System-Average | 1.00 | ls | - | - | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | 100 | Survey & Layout Shoring | 80.00 | lf | 1 | - | - | | - | 0.02 /lf | 1 |
| | 105 | Mobilize Pile Driving Equipment | 1.00 | ea | - | - | 25,000 | | - | 25,000.00 /ea | 25,000 |
| n | 1025 | Steel Sheeting,15' x 22psf, pulled & salvage | 800.00 | sf | 4,146 | 4,648 | - | | 5,475 | 17.84 /sf | 14,269 |
| | 1045 | Install & Remove Wales/Struts/Connectors | 0.88 | ton | 214 | 810 | - | | 282 | 1,483.73 /ton | 1,306 |
| n | 1050 | Rent Steel Sheet Piling and Wales, first month | 9.68 | ton | - | 2,939 | - | | - | 303.600 /ton | 2,939 |
| | | **Sheet Piling** | | | **4,361** | **8,396** | **35,000** | | **5,758** | | **53,515** |
| | | 143.653 Labor hours | | | | | | | | | |
| | | 35.893 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 337.00 | cy | 284 | - | - | | 768 | 3.121 /cy | 1,052 |
| | 461C | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 162.00 | cy | 276 | - | - | | 536 | 5.011 /cy | 812 |
| n | A000 | IMPORT MATERIAL (Summary) | 2.00 | CY | - | - | - | | - | | |
| n | A015 | Import Gravel Fill | 8.333 | cy | - | 125 | 47 | | - | 20.60 /cy | 172 |
| | | **Foundation Excavation** | | | **560** | **125** | **47** | | **1,304** | | **2,035** |
| | | 37.413 Labor hours | | | | | | | | | |
| | | 21.95 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 231.00 | lf | 21 | | - | | - | 0.092 /lf | 21 |
| n | 2090 | Trenching- Backhoe/Loader 95HP (15 cy/hr-120cy/day) Average Exc. | 111.153 | cy | 208 | - | - | | 399 | 5.463 /cy | 607 |
| n | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 25.833 | cy | 20 | - | - | | 55 | 2.90 /cy | 75 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 26.84 | cy | 14 | - | - | | 59 | 2.72 /cy | 73 |
| n | 3090 | Trench Bedding-Backhoe/Loader 95HP | 15.35 | cy | 41 | - | - | | 62 | 6.74 /cy | 103 |
| n | 3130 | Trench Bedding-Excavator- 130 HP | 2.551 | cy | 5 | - | - | | 15 | 7.903 /cy | 20 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 1.403 | cy | 2 | - | - | | 7 | 6.56 /cy | 9 |
| n | 4090 | Trench Pipe Zone Backfill-Backhoe/Loader 95HP | 25.451 | cy | 82 | - | - | | 124 | 8.09 /cy | 206 |
| n | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 10.113 | cy | 33 | - | - | | 95 | 12.641 /cy | 128 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 5.562 | cy | 13 | - | - | | 45 | 10.49 /cy | 58 |
| n | 5090 | Trench Native Backfill-Backhoe/Loader 95HP | 25.451 | cy | 74 | - | - | | 135 | 8.24 /cy | 210 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 24.00 | cy | 22 | - | - | | 68 | 3.751 /cy | 90 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 60.43 | cy | - | 2,127 | - | | - | 35.20 /cy | 2,127 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 69.541 | cy | 78 | - | - | | 150 | 3.28 /cy | 228 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 69.541 | cy | 68 | - | - | | 113 | 2.61 /cy | 181 |
| n | 9616 | Trench Shield- 6x16 | 0.06 | u/mo | - | - | - | | 85 | 1,410.00 /u/mo | 85 |
| | A002 | Pipe Detectable/Non-Detectable Tape | 200.00 | lf | 18 | 11 | - | | - | 0.15 /lf | 29 |
| | A006 | Pipe Test | 200.00 | lf | 148 | 160 | - | | - | 1.54 /lf | 308 |
| | C0a0 | Concrete Thrust Block, 36" | 2.00 | ea | 262 | 582 | - | | - | 422.23 /ea | 844 |
| | | **Trenching** | | | **1,110** | **2,880** | | | **1,414** | | **5,404** |
| | | 65.81 Labor hours | | | | | | | | | |
| | | 28.633 Equipment hours | | | | | | | | | |
| **02315.400** | | **Drilling & Blasting** | | | | | | | | | |
| | 1008 | Hydraulic Hoe Ram -Medium | 84.00 | cy | | - | 12,600 | | | 150.00 /cy | 12,600 |
| | | **Drilling & Blasting** | | | | | **12,600** | | | | **12,600** |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 244.541 | cy | - | - | - | | - | | |
| | 40 | Foundation Excavation Spoils (Summary) | 175.00 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 69.541 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 69.541 | cy | 90 | - | - | | 173 | 3.772 /cy | 262 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 175.00 | cy | 203 | - | - | | 573 | 4.44 /cy | 777 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 69.541 | cy | 313 | - | - | | 521 | 12.001 /cy | 835 |
| | A0I7 | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 175.00 | cy | 110 | - | - | | 253 | 2.071 /cy | 362 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Excavation Spoils** | | | **716** | | | | **1,520** | | **2,236** |
| | | 41.62 Labor hours | | | | | | | | | |
| | | 20.81 Equipment hours | | | | | | | | | |
| **02720.150** | | **Aggregate Base- Roads** | | | | | | | | | |
| | 1116 | Gravel Base - 6" thick - Driveway | 3.00 | cy | 9 | 27 | - | | 43 | 26.22 /cy | 79 |
| | | **Aggregate Base- Roads** | | | **9** | **27** | | | **43** | | **79** |
| | | 0.48 Labor hours | | | | | | | | | |
| | | 0.48 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| | 20 | Bitum Paving Driveway | 16.00 | sy | - | - | 253 | | - | 15.80 /sy | 253 |
| | 30 | Bitum Paving Sidewalks | 25.00 | sy | - | - | 1,000 | | - | 40.00 /sy | 1,000 |
| | | **Asphalt Paving - Location** | | | | | **1,253** | | | | **1,253** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 89.00 | sy | 7 | 195 | - | | 7 | 2.36 /sy | 210 |
| | | **Lawns & Grasses** | | | **7** | **195** | | | **7** | | **210** |
| | | 0.36 Labor hours | | | | | | | | | |
| | | 0.18 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 110 | Concrete: Slab on Grade | 34.00 | cy | 2,461 | 10,540 | - | | 926 | 409.61 /cy | 13,927 |
| n | 140 | Concrete: Wall | 66.00 | cy | 8,190 | 23,100 | - | | 3,328 | 524.52 /cy | 34,618 |
| n | 145 | Concrete: Elevated Slab | 34.00 | cy | 3,867 | 12,240 | - | | 1,715 | 524.18 /cy | 17,822 |
| | | **Concrete in Place** | | | **14,518** | **45,880** | | | **5,969** | | **66,367** |
| | | 702.000 Labor hours | | | | | | | | | |
| | | 118.36 Equipment hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 4.00 | ea | 307 | 5,106 | - | | - | 1,353.173 /ea | 5,413 |
| | | **Hatch, Aluminum, 300psf** | | | **307** | **5,106** | | | | | **5,413** |
| | | 12.80 Labor hours | | | | | | | | | |
| **08330.020** | | **Rolling Alum Door Manual** | | | | | | | | | |
| | z005 | Roll Door Manual (8'x8') | 64.00 | sf | 518 | 2,397 | - | | - | 45.542 /sf | 2,915 |
| | | **Rolling Alum Door Manual** | | | **518** | **2,397** | | | | | **2,915** |
| | | 10.944 Labor hours | | | | | | | | | |
| **11000.005** | | **Equipment Allowance** | | | | | | | | | |
| | 5 | 36" In Line Chemical Inductor w/ VFD | 1.00 | ea | 21,789 | 45,000 | - | | | 66,789.00 /ea | 66,789 |
| | | **Equipment Allowance** | | | **21,789** | **45,000** | | | | | **66,789** |
| | | 900.000 Labor hours | | | | | | | | | |
| | | 0.000 Equipment hours | | | | | | | | | |
| **11220.100** | | **Chemical Mixing Units** | | | | | | | | | |
| | 01 | Chemical Mixer | 8.00 | ea | 1,909 | 3,200 | - | | - | 638.60 /ea | 5,109 |
| | | **Chemical Mixing Units** | | | **1,909** | **3,200** | | | | | **5,109** |
| | | 80.00 Labor hours | | | | | | | | | |
| **11240.400** | | **Polymer Store/Feed Equip** | | | | | | | | | |
| | 0 | Polymer Tote Containment | 2.00 | ea | 968 | 1,600 | - | | 685 | 1,626.32 /ea | 3,253 |
| | 00 | Metering Pump/Poly Blend and Feed Pump | 2.00 | ea | 6,681 | 28,264 | - | | - | 17,472.400 /ea | 34,945 |
| | ---- | 1st Fill of Polymer or FeCl3 (3 day supply) | 3.00 | day | 600 | 1,800 | - | | - | 800.00 /day | 2,400 |
| | | **Polymer Store/Feed Equip** | | | **8,248** | **31,664** | | | **685** | | **40,597** |
| | | 352.00 Labor hours | | | | | | | | | |
| | | 8.00 Equipment hours | | | | | | | | | |
| **13121.000** | | **Pre-Engineered Metal Bldg** | | | | | | | | | |
| | z001 | Pre-Engineered Metal Bldg - Polymer Shed - 14'high | 468.00 | sf | | | 35,100 | | | 75.00 /sf | 35,100 |
| | | **Pre-Engineered Metal Bldg** | | | | | **35,100** | | | | **35,100** |
| **15113.450** | | **GV Knife Gate ValveCI/DI** | | | | | | | | | |
| n | 1249 | Knife Gate Valve, Gear & Wheel Oper, flg, 8" | 1.00 | ea | 190 | 700 | - | | - | 890.28 /ea | 890 |
| n | 160Z | Knife Gate Valve, Motor Oper,36" | 3.00 | ea | 3,343 | 42,750 | - | | - | 15,364.34 /ea | 46,093 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **GV Knife Gate ValveCI/DI** | | | **3,533** | **43,450** | | | | | **46,983** |
| | | 111.040 Labor hours | | | | | | | | | |
| **15115.810** | | **Diaphragm Valve PVC** | | | | | | | | | |
| n | 130I | PVC Diaphragm Valve, 1" | 6.00 | ea | 357 | 5,760 | - | | - | 1,019.522 /ea | 6,117 |
| | | **Diaphragm Valve PVC** | | | **357** | **5,760** | | | | | **6,117** |
| | | 11.22 Labor hours | | | | | | | | | |
| **15230.400** | | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | 0 | Unload Care & Protect PCCP & Fittings | 31.00 | lf | 0 | - | - | | 0 | 0.01 /lf | 0 |
| | 10 | Layout Pipe & Fitting | 31.00 | lf | 7 | - | - | | - | 0.24 /lf | 7 |
| | 325 | PCCP Equipment- Cat 325 Excavator | 2.60 | ch | 50 | - | - | | 288 | 130.092 /ch | 338 |
| n | B036 | Prestressed Concrete Cylinder Pipe (250#) 36 | 31.00 | lf | 1,036 | 3,348 | - | | - | 141.404 /lf | 4,384 |
| n | L036 | PCCP 45 Bend 36 | 2.00 | ea | 517 | 2,400 | - | | - | 1,458.64 /ea | 2,917 |
| n | Q036 | PCCP Wye 36 | 2.00 | ea | 716 | 2,400 | - | | - | 1,558.23 /ea | 3,116 |
| | | **Prestr Conc Cylind-(PCCP)** | | | **2,327** | **8,148** | | | **288** | | **10,763** |
| | | 98.033 Labor hours | | | | | | | | | |
| | | 2.603 Equipment hours | | | | | | | | | |
| **15241.100** | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | 0 | Unload Care & Protect Pipe/Fittings | 360.00 | lf | 1 | - | - | | 2 | 0.01 /lf | 3 |
| | 10 | Layout Pipe & Fitting | 360.00 | lf | 86 | - | - | | - | 0.24 /lf | 86 |
| n | 8080 | PVC Schd. 80 Pipe, 1.00" | 360.00 | lf | 429 | 475 | - | | - | 2.513 /lf | 905 |
| n | 8A80 | PVC Sch 80. 90 Ell , 1.00" | 15.00 | ea | 61 | 66 | - | | - | 8.46 /ea | 127 |
| n | 8F88 | PVC Sch 80. Tee , 1.00" | 3.00 | ea | 16 | 24 | - | | - | 13.38 /ea | 40 |
| | a010 | PVC Joint Primer- Quart | 0.32 | qrt | - | 5 | - | | - | 15.36 /qrt | 5 |
| | a020 | PVC Solvent Cement Low VOC- Quart | 0.32 | qrt | - | 7 | - | | - | 21.90 /qrt | 7 |
| | | **PVC Schd Pipe & Fittings** | | | **593** | **577** | | | **2** | | **1,172** |
| | | 24.88 Labor hours | | | | | | | | | |
| | | 0.04 Equipment hours | | | | | | | | | |
| **15400.005** | | **Plumbing Allowance** | | | | | | | | | |
| | 5 | Plumbing Allowance - hook plant water to poly system | 1.00 | ls | | | 7,500 | | - | 7,500.00 /ls | 7,500 |
| | 5 | Plumbing Allowance - supply wash out sink/potable water connection | 1.00 | ls | | | 7,500 | | - | 7,500.00 /ls | 7,500 |
| | | **Plumbing Allowance** | | | | | **15,000** | | | | **15,000** |
| | | 0.000 Labor hours | | | | | | | | | |
| **15500.001** | | **HVAC Equipment** | | | | | | | | | |
| | 155 | HVAC Allowance - Chem Feed Bldg | 468.00 | sf | - | - | 18,720 | | - | 40.00 /sf | 18,720 |
| | | **HVAC Equipment** | | | | | **18,720** | | | | **18,720** |
| **16000.005** | | **Electrical Allowance** | | | | | | | | | |
| | 5 | Electrical Allowance - light shed and provide power to pumps | 1.00 | ls | | | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | 5 | Electrical Allowance - chemical inductor | 1.00 | ls | | | 20,000 | | - | 20,000.00 /ls | 20,000 |
| | 5 | Electrical & I&C Allowance for Knife Gate Valves | 1.00 | ls | | | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | 5 | Electrical Allowance | 468.00 | sf | | | 9,360 | | - | 20.00 /sf | 9,360 |
| | | **Electrical Allowance** | | | | | **49,360** | | | | **49,360** |
| | | 0.000 Labor hours | | | | | | | | | |
| | | ***07 Chemical Feed*** | | | ***60,901*** | ***202,805*** | ***167,079*** | | ***17,068*** | | ***447,853*** |
| | | 2,594.62 Labor hours | | | | | | | | | |
| | | 238.840 Equipment hours | | | | | | | | | |

## Estimate Totals

| | Description | Amount | Totals | Hours | Rate |
|---|---|---|---|---|---|
| | Labor | 1,308,821 | | 56,667 hrs | |
| | Material | 4,579,204 | | | |
| | Subcontract | 657,266 | | | |
| | Equipment | 708,315 | | 8,723 hrs | |
| | Other | 1,476 | | | |
| **Subtotal Direct Cost** | | **7,255,082** | **7,255,082** | | |
| | I&C | 725.502 | | | 10.00 % |
| | Electrical | 1,088.254 | | | 15.00 % |
| | | **1,813,756** | **9,068,838** | | |
| | Indirect Costs: | | | | |
| | Building Permits(% total cost) | 69.887 | | | 0.40 % |
| | Sales Tax (MEO) | | | | |
| | Builders Risk Ins % total cost | 43.679 | | | 0.25 % |
| | Gen Liability Ins % total cost | 349.434 | | | 2.00 % |
| | GC Bonds (% total cost) | 174.717 | | | 1.00 % |
| **Subtotal Prior to OH&P** | | **637,717** | **9,706,555** | | |
| | GC Field General Conditions | 970.650 | | | 10.00 % |
| | GC Indirects. OH & Profit | 970.650 | | | 10.00 % |
| **Subtotal** | | **1,941,300** | **11,647,855** | | |
| | Construction Contingency | 2,911.949 | | | 25.00 % |
| | **Total Construction Cost** | **2,911,949** | **14,559,804** | | |
| | Engineering, Permitting, Bond Financing, Legal and Administration | 2.911.949 | | | 20.00 % |
| **Total Program Cost** | | **2,911,949** | **17,471,753** | | |
| | ***Total*** | | ***17,471,753*** | | |

This is an Opinion of Probable Construction Cost only, as defined by the documents provided at the level of design indicated on the front sheet of this estimate.
There are not any costs provided for: Change Orders, Construction Oversight, land acquisition or temporary/permanent easements, Operations, or any other costs associated with this project that are not specifically part of the bidding contractor's proposed scope.
The total cost shown is valid to only two significant figures.

# *Knoxville, Tennessee*
# *Fourth Creek WWTP - Options 3*
# *Opinion of Probable Construction Cost, Prelim Design, March 2007*

| | |
|---|---|
| **Project name** | TN, Knoxville FCWWTP |
| **Estimator** | MacIsaac |
| **Labor rate table** | TN07 Knoxville |
| **Equipment rate table** | 00 071H Equip Rental |
| **database version:** | V6.0 TES 9.4.22.0 |
| **ENR 20 City CCI** | March 2007: 7856 |
| **Notes** | This is an Opinion of Probable Construction Cost only, as defined by the documents provided at the level of design indicated above. CDM has no control over the cost of labor, materials, equipment, or services furnished, over schedules, over contractor's methods of determining prices, competitive bidding, market or negotiating conditions. CDM does not guarantee that this opinion will not vary from actual cost, or contractor's bids. There are not any costs provided for: Change Orders, Construction Oversight, Land Acquisition or temporary/permanent Easements, Operations, or any other costs associated with this project that are not specifically part of the bidding contractor's proposed scope.<br><br>The total cost shown is valid to only two significant figures<br><br>Assumptions:<br>No rock excavation is required.<br>Only nominal dewatering is needed.<br>No consideration for contaminated soils or hazardous materials (i.e. asbestos, lead)<br>Based on a 40 hour work week with no overtime.<br><br>This job is sales tax exempt.<br>Costs shown in April 2007 dollars. |
| **Report format** | Sorted by 'Proj Area/Phase'<br>'Detail' summary<br>Allocate addons<br>Round unit prices<br>Combine items<br>Paginate |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***01 Wet Weather Pump Station*** | | | | | | | | | |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Connect to Existing 42" Influent Sewer (12'deep) | 2.00 | ea | - | - | 15,000 | | - | 7,500.00 /ea | 15,000 |
| | 20 | Protect Existing Utilities | 1.00 | ls | - | - | 2,500 | | - | 2,500.00 /ls | 2,500 |
| | ---- | Assumption of 20% of Excavated Material is Contaiminated | 830.00 | cy | | | 20,750 | | - | 25.00 /cy | 20,750 |
| | | **Sitework Allowance** | | | | | **38,250** | | | | **38,250** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2502 | Remove 6" DIP City Water Piping 8'deep | 490.00 | lf | 800 | - | - | | 1,519 | 4.731 /lf | 2,318 |
| | 2502 | Abandon in place 6" DIP City Water Piping | 111.00 | lf | 181 | - | - | | 344 | 4.731 /lf | 525 |
| | 2712 | Saw Cut Asphalt Pavement, 5"thk | 134.00 | lf | 39 | 67 | - | | 242 | 2.60 /lf | 348 |
| | 2734 | Remove Asphalt Pavement, 5"thk | 491.00 | sy | 763 | - | - | | 1,537 | 4.684 /sy | 2,300 |
| | 2734 | Remove Asphalt Pavement, Sidewalk | 59.00 | sy | 92 | - | - | | 185 | 4.684 /sy | 276 |
| | | **Selective Site Demolition** | | | **1,874** | **67** | | | **3,827** | | **5,768** |
| | | 114.494 Labor hours | | | | | | | | | |
| | | 76.14 Equipment hours | | | | | | | | | |
| **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | 1 | Design Shoring System-Minor | 5.00 | ls | - | - | 5,000 | | - | 1,000.00 /ls | 5,000 |
| | 100 | Survey & Layout Shoring | 366.00 | lf | 6 | - | - | | - | 0.02 /lf | 6 |
| | 105 | Mobilize Pile Driving Equipment | 1.00 | ea | - | - | 25,000 | | - | 25,000.00 /ea | 25,000 |
| n | 1025 | Steel Sheeting,15' x 22psf, pulled & salvage | 3,000.00 | sf | 15,546 | 17,430 | - | | 20,533 | 17.84 /sf | 53,509 |
| n | 1030 | Steel Sheeting,20' x 27psf, pulled & salvage | 1,600.00 | sf | 8,291 | 12,048 | - | | 10,951 | 19.56 /sf | 31,290 |
| n | 1035 | Steel Sheeting,25' x 38psf, pulled & salvage | 2,150.00 | sf | 11,141 | 22,124 | - | | 14,715 | 22.32 /sf | 47,980 |
| | 1045 | Install & Remove Wales/Struts/Connectors | 9.55 | ton | 2,319 | 8,781 | - | | 3,062 | 1,483.731 /ton | 14,162 |
| n | 1050 | Rent Steel Sheet Piling and Wales, first month | 105.00 | ton | - | 31,877 | - | | - | 303.601 /ton | 31,877 |
| | | **Sheet Piling** | | | **37,303** | **92,260** | **30,000** | | **49,261** | | **208,823** |
| | | 1,228.73 Labor hours | | | | | | | | | |
| | | 307.09 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 649.52 | cy | 547 | - | - | | 1,480 | 3.121 /cy | 2,027 |
| | 461C | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 142.19 | cy | 242 | - | - | | 470 | 5.011 /cy | 713 |
| n | A000 | IMPORT MATERIAL (Summary) | 10.00 | CY | - | - | - | | - | | |
| n | A015 | Import Gravel Fill | 46.56 | cy | - | 698 | 261 | | - | 20.60 /cy | 959 |
| | | **Foundation Excavation** | | | **790** | **698** | **261** | | **1,950** | | **3,699** |
| | | 51.703 Labor hours | | | | | | | | | |
| | | 28.70 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 1,274.00 | lf | 118 | | - | | - | 0.092 /lf | 118 |
| n | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 624.262 | cy | 1,262 | - | - | | 3,556 | 7.72 /cy | 4,818 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 1,008.703 | cy | 510 | - | - | | 2,231 | 2.72 /cy | 2,741 |
| n | 3130 | Trench Bedding-Excavator- 130 HP | 49.34 | cy | 100 | - | - | | 290 | 7.901 /cy | 390 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 61.13 | cy | 93 | - | - | | 308 | 6.56 /cy | 401 |
| n | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 113.123 | cy | 366 | - | - | | 1,064 | 12.641 /cy | 1,430 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 203.53 | cy | 494 | - | - | | 1,642 | 10.492 /cy | 2,135 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 843.981 | cy | 763 | - | - | | 2,402 | 3.75 /cy | 3,165 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 427.112 | cy | - | 15,034 | - | | - | 35.20 /cy | 15,034 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 512.813 | cy | 719 | - | - | | 1,382 | 4.10 /cy | 2,101 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 512.813 | cy | 502 | - | - | | 836 | 2.61 /cy | 1,338 |
| n | 9616 | Trench Shield- 6x16 | 2.31 | u/mo | - | - | - | | 3,257 | 1,410.00 /u/mo | 3,257 |
| | A002 | Pipe Detectable/Non-Detectable Tape | 490.00 | lf | 45 | 27 | - | | - | 0.15 /lf | 72 |
| | A006 | Pipe Test | 1,216.00 | lf | 899 | 973 | - | | - | 1.54 /lf | 1,871 |
| | C0J0 | Concrete Thrust Block, 6" | 2.00 | ea | 143 | 10 | - | | - | 76.58 /ea | 153 |
| | C0P0 | Concrete Thrust Block, 12" | 9.00 | ea | 816 | 162 | - | | - | 108.63 /ea | 978 |
| | C0T0 | Concrete Thrust Block, 20" | 5.00 | ea | 537 | 280 | - | | - | 163.37 /ea | 817 |
| | | **Trenching** | | | **7,366** | **16,486** | | | **16,968** | | **40,820** |
| | | 421.03 Labor hours | | | | | | | | | |
| | | 212.31 Equipment hours | | | | | | | | | |
| **02315.400** | | **Drilling & Blasting** | | | | | | | | | |
| | 1008 | Hydraulic Hoe Ram -Medium | 222.00 | cy | | - | 27,750 | | | 125.00 /cy | 27,750 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Drilling & Blasting** | | | | | **27,750** | | | | **27,750** |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 1,020.15 | cy | - | - | - | | - | | |
| | 40 | Foundation Excavation Spoils (Summary) | 507.332 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 512.813 | cy | - | - | - | | - | | |
| | 46 | Bore & Jack Spoils Spoils (Summary) | 3.113 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 515.93 | cy | 832 | - | - | | 1,599 | 4.712 /cy | 2,431 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 507.332 | cy | 590 | - | - | | 1,662 | 4.44 /cy | 2,252 |
| | A0A0 | Haul Spoils/Off Site 10cy Rear Dump 4.00 Hour/Load | 3.113 | cy | 54 | - | - | | 90 | 46.203 /cy | 144 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 512.813 | cy | 2,309 | - | - | | 3,845 | 12.001 /cy | 6,154 |
| | A0I7 | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 507.332 | cy | 318 | - | - | | 733 | 2.071 /cy | 1,051 |
| | | **Excavation Spoils** | | | **4,103** | | | | **7,929** | | **12,031** |
| | | 240.041 Labor hours | | | | | | | | | |
| | | 120.021 Equipment hours | | | | | | | | | |
| **02445.000** | | **Boring & Jack Conduit** | | | | | | | | | |
| | 0 | Mob/Demob Bore & Jack Equipment | 1.00 | ea | - | - | 5,000 | | - | 5,000.00 /ea | 5,000 |
| | 100 | Excavate Jacking Pit | 59.26 | cy | 108 | - | - | | 291 | 6.73 /cy | 399 |
| | 105 | Excavate Recieving Pit | 29.63 | cy | 54 | - | - | | 146 | 6.73 /cy | 199 |
| | 200 | Shore Jacking/Receiving Pits | 920.00 | bsf | - | - | 13,800 | | - | 15.00 /bsf | 13,800 |
| | 300 | Backfill Jacking/Receiving Pits | 88.89 | cy | 435 | - | - | | 909 | 15.12 /cy | 1,344 |
| | 400 | Jacking Slab & Reaction Block | 2.66 | cy | 578 | 612 | - | | - | 447.372 /cy | 1,190 |
| n | 5012 | Bore & Jack Pipe 12 | 107.00 | lf | - | - | 12,840 | | - | 120.00 /lf | 12,840 |
| | 7000 | Grout Casing | 2.334 | cy | 10 | 403 | - | | 11 | 181.44 /cy | 423 |
| | | **Boring & Jack Conduit** | | | **1,184** | **1,014** | **31,640** | | **1,357** | | **35,196** |
| | | 62.74 Labor hours | | | | | | | | | |
| | | 22.42 Equipment hours | | | | | | | | | |
| **02518.810** | | **Fire Hydrants/Valves** | | | | | | | | | |
| | 0 | Salvage & Reinstall Fire Hydrant | 2.00 | ea | 906 | | - | | | 453.22 /ea | 906 |
| | 206 | Salvage & Reinstall Hydrant Valve 6" | 2.00 | ea | 680 | | - | | | 339.92 /ea | 680 |
| n | F606 | Hydrant Tee 6x6 | 1.00 | ea | 99 | 207 | - | | | 306.14 /ea | 306 |
| | | **Fire Hydrants/Valves** | | | **1,685** | **207** | | | | | **1,892** |
| | | 59.50 Labor hours | | | | | | | | | |
| | | 32.00 Equipment hours | | | | | | | | | |
| **02639.020** | | **Storm Drainage Manholes** | | | | | | | | | |
| | 0 | Unload Care & Protect Manhole | 2.00 | ea | 35 | - | - | | - | 17.51 /ea | 35 |
| | 7200 | Place & Shape Manhole Base & Inverts- 72" | 1.00 | ea | 210 | - | - | | - | 511.88 /ea | 512 |
| | 7217 | Manhole 72" x 17' Deep | 1.00 | ea | 412 | 8,134 | - | | 496 | 9,041.93 /ea | 9,042 |
| | 9600 | Place & Shape Manhole Base & Inverts- 96" | 1.00 | ea | 210 | - | - | | - | 694.04 /ea | 694 |
| | 9610 | Manhole 96" x 10' Deep | 1.00 | ea | 343 | 6,249 | - | | 496 | 7,088.49 /ea | 7,088 |
| | | **Storm Drainage Manholes** | | | **1,210** | **14,383** | | | **993** | | **17,371** |
| | | 70.000 Labor hours | | | | | | | | | |
| | | 8.00 Equipment hours | | | | | | | | | |
| **02720.100** | | **Aggregate Base Course** | | | | | | | | | |
| | 1180 | Crushed Rock (1" minus) | 234.00 | cy | 667 | 2,392 | - | | 3,369 | 27.47 /cy | 6,428 |
| | | **Aggregate Base Course** | | | **667** | **2,392** | | | **3,369** | | **6,428** |
| | | 37.44 Labor hours | | | | | | | | | |
| | | 37.44 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| | 20 | Bitum Paving | 491.00 | sy | - | - | 3,928 | | - | 8.00 /sy | 3,928 |
| | 30 | Bitum Paving Sidewalks | 67.00 | sy | - | - | 2,680 | | - | 40.00 /sy | 2,680 |
| | | **Asphalt Paving - Location** | | | | | **6,608** | | | | **6,608** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 5,625.00 | sy | 468 | 12,319 | - | | 470 | 2.36 /sy | 13,257 |
| | | **Lawns & Grasses** | | | **468** | **12,319** | | | **470** | | **13,257** |
| | | 22.50 Labor hours | | | | | | | | | |
| | | 11.25 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 140 | Concrete: Wet Well Concrete | 232.00 | cy | 28,788 | 81,200 | - | | 11,700 | 524.52 /cy | 121,688 |
| n | 140 | Concrete: Valve Vault | 102.00 | cy | 12,657 | 35,700 | - | | 5,144 | 524.52 /cy | 53,501 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 145 | Concrete: Wet Weather Flow Diversion Structure | 53.00 | cy | 6,029 | 19,080 | - | | 2,673 | 524.18 /cy | 27,781 |
| n | 180 | Concrete: Grout Fill - Diversion Chamber | 4.00 | cy | 165 | 400 | - | | 20 | 146.41 /cy | 586 |
| n | 180 | Concrete: Grout Fill - Wetwell | 30.00 | cy | 1,241 | 3,000 | - | | 151 | 146.41 /cy | 4,392 |
| | | **Concrete in Place** | | | **48,880** | **139,380** | | | **19,688** | | **207,947** |
| | | 2,363.500 Labor hours | | | | | | | | | |
| | | 390.40 Equipment hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 6.00 | ea | 460 | 7,659 | - | | - | 1,353.172 /ea | 8,119 |
| n | J08 | 48"x 60" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 5.00 | ea | 431 | 6,641 | - | | - | 1,414.51 /ea | 7,073 |
| | | **Hatch, Aluminum, 300psf** | | | **891** | **14,300** | | | | | **15,192** |
| | | 37.20 Labor hours | | | | | | | | | |
| **06600.110** | | **FRP Weirs & Baffles** | | | | | | | | | |
| | 0 | Aluminum Weirs | 20.00 | lf | 116 | 690 | - | | | 40.30 /lf | 806 |
| | | **FRP Weirs & Baffles** | | | **116** | **690** | | | | | **806** |
| | | 5.00 Labor hours | | | | | | | | | |
| **11210.000** | | **PUMPS** | | | | | | | | | |
| | ---- | Pumps | 4.00 | ea | 63,532 | 126,400 | - | | - | 47,483.00 /ea | 189,932 |
| | | **PUMPS** | | | **63,532** | **126,400** | | | | | **189,932** |
| | | 2,800.000 Labor hours | | | | | | | | | |
| **11217.100** | | **Submersible Sump Pumps** | | | | | | | | | |
| | 10 | Sump Pump | 1.00 | ea | 3,870 | 8,000 | - | | 2,740 | 14,610.56 /ea | 14,611 |
| | 10 | 50gpm Sump Pump | 1.00 | ea | 3,870 | 8,000 | - | | 2,740 | 14,610.56 /ea | 14,611 |
| | | **Submersible Sump Pumps** | | | **7,741** | **16,000** | | | **5,480** | | **29,221** |
| | | 384.00 Labor hours | | | | | | | | | |
| | | 64.00 Equipment hours | | | | | | | | | |
| **11284.000** | | **Sluice Gates** | | | | | | | | | |
| | 4242 | 42" x 42" Sluice Gate, MO | 1.00 | ea | 7,158 | 14,700 | - | | - | 21,858.00 /ea | 21,858 |
| | | **Sluice Gates** | | | **7,158** | **14,700** | | | | | **21,858** |
| | | 300.00 Labor hours | | | | | | | | | |
| **13000.005** | | **Special Const Allowance** | | | | | | | | | |
| | 5 | Level Sensor | 2.00 | ea | 771 | 3,450 | - | | - | 2,110.40 /ea | 4,221 |
| | | **Special Const Allowance** | | | **771** | **3,450** | | | | | **4,221** |
| | | 20.00 Labor hours | | | | | | | | | |
| **13121.000** | | **Pre-Engineered Metal Bldg** | | | | | | | | | |
| | z001 | Brick Bldg - Pump Controls | 600.00 | sf | | | 150,000 | | | 250.00 /sf | 150,000 |
| | | **Pre-Engineered Metal Bldg** | | | | | **150,000** | | | | **150,000** |
| **13420.200** | | **I&C Instruments** | | | | | | | | | |
| n | 05-FE-m020 | 20" Magnetic Flow Meter | 1.00 | ea | 510 | 11,500 | - | | - | 12,010.20 /ea | 12,010 |
| | | **I&C Instruments** | | | **510** | **11,500** | | | | | **12,010** |
| | | 18.60 Labor hours | | | | | | | | | |
| **15111.650** | | **Plug Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | 200P | Plug Valve, MJ, 6" | 1.00 | ea | 176 | 425 | - | | - | 601.28 /ea | 601 |
| n | 200S | Plug Valve, MJ, 12" | 4.00 | ea | 1,302 | 4,400 | - | | - | 1,425.62 /ea | 5,702 |
| | | **Plug Valve (CI/DI/IBBM)** | | | **1,479** | **4,825** | | | | | **6,304** |
| | | 46.46 Labor hours | | | | | | | | | |
| **15114.500** | | **Check Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | C20P | Check Valve, Double Disc, MJ, 6" | 1.00 | ea | 170 | 200 | - | | - | 369.97 /ea | 370 |
| n | C20S | Check Valve, Double Disc, MJ, 12" | 4.00 | ea | 1,306 | 2,400 | - | | - | 926.58 /ea | 3,706 |
| | | **Check Valve (CI/DI/IBBM)** | | | **1,476** | **2,600** | | | | | **4,076** |
| | | 46.38 Labor hours | | | | | | | | | |
| **15210.010** | | **DIP Totals** | | | | | | | | | |
| | 0 | Total Weight (Zero Cost Item) | 67,386.50 | lbs | - | - | - | | - | | |
| | 1 | Weight of Pipe (Zero Cost Item) | 57,836.500 | lbs | - | - | - | | - | | |
| | 2 | Weight of Fittings (Zero Cost Item) | 9,550.00 | lbs | - | - | - | | - | | |

| | Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **15210.200** | | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | | 0 | Unload Care & Protect Push-on DIP & Fittings | 67,386.50 | lbs | 130 | - | - | | 425 | 0.01 /lbs | 554 |
| | | 1 | Weight of Push-on Pipe (Zero Cost Item) | 57,836.500 | lbs | - | - | - | | - | | |
| | | 2 | Weight of Push-on Fittings (Zero Cost Item) | 9,550.00 | lbs | - | - | - | | - | | |
| | | 5 | Layout Push-on DIP & Fitting | 726.00 | lf | 165 | - | - | | - | 0.23 /lf | 165 |
| | | 11 | DIP Equipment- Cat 325 Excavator | 38.144 | ch | 739 | - | - | | 4,223 | 130.081 /ch | 4,962 |
| n | | 206 | DIP CML, Push-On, Class 52, 6" | 65.00 | lf | 341 | 805 | - | | - | 17.632 /lf | 1,146 |
| n | | 212 | DIP CML, Push-On, Class 52, 12" | 60.00 | lf | 444 | 1,671 | - | | - | 35.242 /lf | 2,114 |
| n | | 216 | DIP CML, Push-On, Class 52, 16" | 5.00 | lf | 42 | 209 | - | | - | 50.20 /lf | 251 |
| n | | 220 | DIP CML, Push-On, Class 52, 20" | 596.00 | lf | 5,402 | 32,539 | - | | - | 63.66 /lf | 37,940 |
| n | 2AMM | | DIP CML, Push-on, 90 Bend, 6" | 2.00 | ea | 112 | 240 | - | | - | 175.81 /ea | 352 |
| n | 2APP | | DIP CML, Push-on, 90 Bend, 12" | 9.00 | ea | 992 | 3,060 | - | | - | 450.19 /ea | 4,052 |
| n | 2ATT | | DIP CML, Push-on, 90 Bend, 20" | 5.00 | ea | 919 | 8,500 | - | | - | 1,883.722 /ea | 9,419 |
| n | FAUS | | DIP CML, Push-on, Tee BxB, 16"x 12" | 1.00 | ea | 196 | 1,638 | - | | - | 1,833.39 /ea | 1,833 |
| n | FAWP | | DIP CML, Push-on, Tee BxB, 20"x 6" | 1.00 | ea | 236 | 1,875 | - | | - | 2,110.74 /ea | 2,111 |
| n | FAWS | | DIP CML, Push-on, Tee BxB, 20"x 12" | 2.00 | ea | 471 | 4,025 | - | | - | 2,248.14 /ea | 4,496 |
| n | KASR | | DIP, CML, Push-on, Reducer BxB, 12"x 10" | 4.00 | ea | 378 | 1,320 | - | | - | 424.45 /ea | 1,698 |
| n | KAUS | | DIP, CML, Push-on, Reducer BxB, 16"x 12" | 1.00 | ea | 129 | 838 | - | | - | 966.34 /ea | 966 |
| n | KAWU | | DIP, CML, Push-on, Reducer BxB, 20"x 16" | 1.00 | ea | 161 | 1,225 | - | | - | 1,385.51 /ea | 1,386 |
| | | | **DIP CML Push-On Pipe** | | | **10,853** | **57,944** | | | **4,648** | | **73,445** |
| | | | 464.53 Labor hours | | | | | | | | | |
| | | | 45.56 Equipment hours | | | | | | | | | |
| **15220.302** | | | **A53 CW Pipe PE/GE/T&C/SW** | | | | | | | | | |
| n | 300P | | A53 CW Standard Pipe PE, 12" | 130.00 | lf | 1,674 | 19,328 | - | | - | 161.56 /lf | 21,003 |
| | | | **A53 CW Pipe PE/GE/T&C/SW** | | | **1,674** | **19,328** | | | | | **21,003** |
| | | | 70.20 Labor hours | | | | | | | | | |
| **15230.400** | | | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | | 0 | Unload Care & Protect PCCP & Fittings | 58.00 | lf | 0 | - | - | | 0 | 0.01 /lf | 0 |
| | | 10 | Layout Pipe & Fitting | 58.00 | lf | 14 | - | - | | - | 0.24 /lf | 14 |
| | | 325 | PCCP Equipment- Cat 325 Excavator | 8.70 | ch | 168 | - | - | | 963 | 130.091 /ch | 1,132 |
| n | B042 | | Prestressed Concrete Cylinder Pipe (250#) 42 | 58.00 | lf | 2,282 | 8,120 | - | | - | 179.353 /lf | 10,402 |
| | | | **Prestr Conc Cylind-(PCCP)** | | | **2,465** | **8,120** | | | **964** | | **11,549** |
| | | | 104.99 Labor hours | | | | | | | | | |
| | | | 8.71 Equipment hours | | | | | | | | | |
| **15241.100** | | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | | 0 | Unload Care & Protect Pipe/Fittings | 490.00 | lf | 1 | - | - | | 3 | 0.01 /lf | 4 |
| | | 10 | Layout Pipe & Fitting | 490.00 | lf | 117 | - | - | | - | 0.24 /lf | 117 |
| n | 80J0 | | PVC Schd. 80 Pipe, 6" | 620.00 | lf | 2,070 | 10,782 | - | | - | 20.73 /lf | 12,852 |
| | a010 | | PVC Joint Primer- Quart | 2.083 | qrt | - | 32 | - | | - | 15.35 /qrt | 32 |
| | a020 | | PVC Solvent Cement Low VOC- Quart | 2.083 | qrt | - | 46 | - | | - | 21.90 /qrt | 46 |
| | | | **PVC Schd Pipe & Fittings** | | | **2,188** | **10,859** | | | **3** | | **13,051** |
| | | | 91.754 Labor hours | | | | | | | | | |
| | | | 0.054 Equipment hours | | | | | | | | | |
| **15500.001** | | | **HVAC Equipment** | | | | | | | | | |
| | | 155 | HVAC Allowance - Pump Control Bldg | 600.00 | sf | - | - | 24,000 | | - | 40.00 /sf | 24,000 |
| | | | **HVAC Equipment** | | | | | **24,000** | | | | **24,000** |
| **16000.005** | | | **Electrical Allowance** | | | | | | | | | |
| | | 5 | Electrical & I&C Allowance | 0.00 | ls | 0 | 0 | - | | - | | |
| | | 5 | Electrical Allowance - Pump Control Bldg | 0.00 | sf | 0 | 0 | 0 | | - | | |
| | | | ***01 Wet Weather Pump Station*** | | | ***206,383*** | ***569,923*** | ***308,509*** | | ***116,906*** | | ***1,202,507*** |
| | | | 9,060.78 Labor hours | | | | | | | | | |
| | | | 1,364.074 Equipment hours | | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***02 Equilization*** | | | | | | | | | |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Modifications to Diversion Structure A for new sluice gate | 1.00 | ls | - | - | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | 20 | New Wet-Weather Screenings Diversion Structure | 1.00 | ls | 4,700 | 100,000 | | | - | 104,699.68 /ls | 104,700 |
| | | **Sitework Allowance** | | | **4,700** | **100,000** | **10,000** | | | | **114,700** |
| | | 360.00 Labor hours | | | | | | | | | |
| **02240.010** | | **Dewatering** | | | | | | | | | |
| | 20 | Dewatering Centrifugal Pump | 1.00 | ea | 891 | 5,750 | - | | 276 | 6,916.77 /ea | 6,917 |
| | | **Dewatering** | | | **891** | **5,750** | | | **276** | | **6,917** |
| | | 48.00 Labor hours | | | | | | | | | |
| | | 128.00 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 82.593 | cy | 70 | - | - | | 188 | 3.121 /cy | 258 |
| | 461C | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 27.11 | cy | 46 | - | - | | 90 | 5.011 /cy | 136 |
| n | A000 | IMPORT MATERIAL (Summary) | 8.00 | CY | - | - | - | | - | | |
| n | A015 | Import Gravel Fill | 16.371 | cy | - | 246 | 92 | | - | 20.60 /cy | 337 |
| | | **Foundation Excavation** | | | **116** | **246** | **92** | | **278** | | **731** |
| | | 7.66 Labor hours | | | | | | | | | |
| | | 4.371 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 545.00 | lf | 50 | | - | | - | 0.092 /lf | 50 |
| n | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 580.17 | cy | 1,173 | - | - | | 3,305 | 7.72 /cy | 4,478 |
| n | 3130 | Trench Bedding-Excavator- 130 HP | 47.56 | cy | 96 | - | - | | 280 | 7.901 /cy | 376 |
| n | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 138.31 | cy | 447 | - | - | | 1,301 | 12.642 /cy | 1,748 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 357.123 | cy | 323 | - | - | | 1,016 | 3.751 /cy | 1,339 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 185.863 | cy | - | 6,542 | - | | - | 35.20 /cy | 6,542 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 223.05 | cy | 313 | - | - | | 601 | 4.10 /cy | 914 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 223.05 | cy | 218 | - | - | | 364 | 2.61 /cy | 582 |
| n | 9616 | Trench Shield- 6x16 | 0.53 | u/mo | - | - | - | | 747 | 1,410.00 /u/mo | 747 |
| | A006 | Pipe Test | 545.00 | lf | 403 | 436 | - | | - | 1.54 /lf | 839 |
| | C0G0 | Concrete Thrust Block, 4" | 2.00 | ea | 12 | 5 | - | | - | 8.22 /ea | 16 |
| | C0J0 | Concrete Thrust Block, 6" | 1.00 | ea | 72 | 5 | - | | - | 76.58 /ea | 77 |
| | C0P0 | Concrete Thrust Block, 12" | 4.00 | ea | 363 | 72 | - | | - | 108.67 /ea | 435 |
| | | **Trenching** | | | **3,470** | **7,060** | | | **7,614** | | **18,144** |
| | | 205.62 Labor hours | | | | | | | | | |
| | | 110.774 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 278.53 | cy | - | - | - | | - | | |
| | 40 | Foundation Excavation Spoils (Summary) | 55.481 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 223.05 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 223.05 | cy | 360 | - | - | | 691 | 4.712 /cy | 1,051 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 55.481 | cy | 65 | - | - | | 182 | 4.44 /cy | 246 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 223.05 | cy | 1,004 | - | - | | 1,672 | 12.001 /cy | 2,677 |
| | A0I7 | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 55.481 | cy | 35 | - | - | | 80 | 2.071 /cy | 115 |
| | | **Excavation Spoils** | | | **1,463** | | | | **2,625** | | **4,089** |
| | | 85.941 Labor hours | | | | | | | | | |
| | | 42.97 Equipment hours | | | | | | | | | |
| **02639.010** | | **Catch Basins & Inlets** | | | | | | | | | |
| | II80 | Catch Basin 48" x 72" x 8'-0" Deep | 1.00 | ea | 101 | 6,728 | - | | 255 | 7,083.02 /ea | 7,083 |
| | JJ80 | Catch Basin 72" x 96" x 8'-0" Deep | 1.00 | ea | 101 | 7,590 | - | | 255 | 7,945.52 /ea | 7,946 |
| | | **Catch Basins & Inlets** | | | **202** | **14,318** | | | **509** | | **15,029** |
| | | 12.00 Labor hours | | | | | | | | | |
| | | 4.00 Equipment hours | | | | | | | | | |
| **02639.020** | | **Storm Drainage Manholes** | | | | | | | | | |
| | 0 | Unload Care & Protect Manhole | 3.00 | ea | 53 | - | - | | - | 17.51 /ea | 53 |
| | 7200 | Place & Shape Manhole Base & Inverts- 72" | 1.00 | ea | 210 | - | - | | - | 511.88 /ea | 512 |
| | 7210 | Manhole 72" x 10' Deep | 1.00 | ea | 343 | 4,782 | - | | 496 | 5,621.13 /ea | 5,621 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Storm Drainage Manholes** | | | **606** | **4,782** | | | **496** | | **6,186** |
| | | 35.00 Labor hours | | | | | | | | | |
| | | 4.00 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 110 | Concrete: Slab on Grade | 42.50 | cy | 3,076 | 13,175 | - | | 1,157 | 409.61 /cy | 17,408 |
| n | 140 | Concrete: Wall | 100.00 | cy | 12,409 | 35,000 | - | | 5,043 | 524.52 /cy | 52,452 |
| n | 145 | Concrete: Elevated Slab | 22.00 | cy | 2,502 | 7,920 | - | | 1,109 | 524.18 /cy | 11,532 |
| | | **Concrete in Place** | | | **17,987** | **56,095** | | | **7,310** | | **81,392** |
| | | 869.750 Labor hours | | | | | | | | | |
| | | 144.95 Equipment hours | | | | | | | | | |
| **05510.000** | | **Metal Ladders** | | | | | | | | | |
| | 5 | Straight Ladder Steel | 9.00 | lf | 99 | 421 | - | | - | 57.764 /lf | 520 |
| | | **Metal Ladders** | | | **99** | **421** | | | | | **520** |
| | | 2.79 Labor hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J04 | 36"x 36" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 3.00 | ea | 208 | 2,760 | - | | - | 989.483 /ea | 2,968 |
| n | JD8 | 48"x 72" Aluminum Bilco Floor Hatch, Doule Leaf | 7.00 | ea | 604 | 9,298 | - | | - | 1,414.51 /ea | 9,902 |
| | | **Hatch, Aluminum, 300psf** | | | **812** | **12,058** | | | | | **12,870** |
| | | 33.90 Labor hours | | | | | | | | | |
| **11211.300** | | **Cent. Submersible Pumps** | | | | | | | | | |
| | 50 | Submersible Pump 45 HP | 3.00 | ea | 69,667 | 127,500 | - | | 49,323 | 82,163.36 /ea | 246,490 |
| | | **Cent. Submersible Pumps** | | | **69,667** | **127,500** | | | **49,323** | | **246,490** |
| | | 3,456.00 Labor hours | | | | | | | | | |
| | | 576.000 Equipment hours | | | | | | | | | |
| **11217.100** | | **Submersible Sump Pumps** | | | | | | | | | |
| | 10 | Sump Pump for Valve and Meter Vaults | 2.00 | ea | 7,741 | 16,000 | - | | 5,480 | 14,610.56 /ea | 29,221 |
| | | **Submersible Sump Pumps** | | | **7,741** | **16,000** | | | **5,480** | | **29,221** |
| | | 384.00 Labor hours | | | | | | | | | |
| | | 64.00 Equipment hours | | | | | | | | | |
| **11220.110** | | **Submersible Mixers** | | | | | | | | | |
| | 05 | Submersible Mixer | 3.00 | ea | 17,179 | 36,000 | - | | - | 17,726.400 /ea | 53,179 |
| | | **Submersible Mixers** | | | **17,179** | **36,000** | | | | | **53,179** |
| | | 720.000 Labor hours | | | | | | | | | |
| **11284.000** | | **Sluice Gates** | | | | | | | | | |
| | 7248 | 72" x 48" Sluice Gate | 1.00 | ea | 14,077 | 27,000 | - | | - | 41,077.40 /ea | 41,077 |
| | | **Sluice Gates** | | | **14,077** | **27,000** | | | | | **41,077** |
| | | 590.00 Labor hours | | | | | | | | | |
| **11330.100** | | **Barscreens** | | | | | | | | | |
| n | A 10 | 10 MGD Romag Screen | 1.00 | ea | 71,580 | 150,000 | - | | - | 221,580.00 /ea | 221,580 |
| | | **Barscreens** | | | **71,580** | **150,000** | | | | | **221,580** |
| | | 3,000.000 Labor hours | | | | | | | | | |
| **13121.000** | | **Pre-Engineered Metal Bldg** | | | | | | | | | |
| | z001 | Pre-Engineered Metal Bldg - Electrical Bldg (20'x10') | 200.00 | sf | | | 15,000 | | | 75.00 /sf | 15,000 |
| | | **Pre-Engineered Metal Bldg** | | | | | **15,000** | | | | **15,000** |
| **13200.005** | | **Storage Tanks** | | | | | | | | | |
| | z001 | Tank Washdown System | 1.00 | ls | 3,603 | 23,000 | - | | | 26,603.09 /ls | 26,603 |
| | z001 | 1MG Crom Tank | 1.00 | ls | 4,451 | 1,150,000 | - | | 3,151 | 1,157,601.96 /ls | 1,157,602 |
| | | **Storage Tanks** | | | **8,054** | **1,173,000** | | | **3,151** | | **1,184,205** |
| | | 432.00 Labor hours | | | | | | | | | |
| | | 112.00 Equipment hours | | | | | | | | | |
| **14600.005** | | **Hoists & Cranes** | | | | | | | | | |
| | 10 | Outdoor Hoist & Rail System | 1.00 | ea | 7,107 | 17,250 | | | - | 24,357.20 /ea | 24,357 |

| | Item | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Hoists & Cranes** | | | **7,107** | **17,250** | | | | | **24,357** |
| | | 200.00 Labor hours | | | | | | | | | |
| | **15111.650** | **Plug Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | 200P | Plug Valve, MJ, 6" | 1.00 | ea | 176 | 425 | - | | - | 601.28 /ea | 601 |
| n | 200S | Plug Valve, MJ, 12" | 4.00 | ea | 1,302 | 4,400 | - | | - | 1,425.62 /ea | 5,702 |
| | | **Plug Valve (CI/DI/IBBM)** | | | **1,479** | **4,825** | | | | | **6,304** |
| | | 46.46 Labor hours | | | | | | | | | |
| | **15114.500** | **Check Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | C20S | Check Valve, Double Disc, MJ, 12" | 3.00 | ea | 979 | 1,800 | - | | - | 926.473 /ea | 2,779 |
| | | **Check Valve (CI/DI/IBBM)** | | | **979** | **1,800** | | | | | **2,779** |
| | | 30.78 Labor hours | | | | | | | | | |
| | **15119.600** | **Air/Vacuum Relief Valve** | | | | | | | | | |
| n | 100J | Air Release Valve | 3.00 | ea | 282 | 600 | - | | - | 293.93 /ea | 882 |
| | | **Air/Vacuum Relief Valve** | | | **282** | **600** | | | | | **882** |
| | | 9.09 Labor hours | | | | | | | | | |
| | **15120.100** | **Pipe Specialties** | | | | | | | | | |
| n | 611Q | 12-0/0" Flanged Coupling Adaptor- 150# Dresser 128 for Steel Pipe | 1.00 | ea | 126 | 506 | - | | - | 631.74 /ea | 632 |
| n | 621Q | 12-0/0" Flanged Coupling Adaptor- 150# Dresser 128 for DIP | 3.00 | ea | 388 | 1,557 | - | | - | 648.27 /ea | 1,945 |
| n | e412 | 12" Magnetic Flow Meter - Flanged | 1.00 | ea | 233 | 6,000 | - | | - | 6,232.78 /ea | 6,233 |
| n | e418 | 18" Magnetic Flow Meter | 1.00 | ea | 361 | 9,000 | - | | - | 9,361.09 /ea | 9,361 |
| | | **Pipe Specialties** | | | **1,107** | **17,063** | | | | | **18,170** |
| | | 46.43 Labor hours | | | | | | | | | |
| | **15210.010** | **DIP Totals** | | | | | | | | | |
| | 0 | Total Weight (Zero Cost Item) | 41,663.300 | lbs | - | - | - | | - | | |
| | 1 | Weight of Pipe (Zero Cost Item) | 35,983.300 | lbs | - | - | - | | - | | |
| | 2 | Weight of Fittings (Zero Cost Item) | 5,680.00 | lbs | - | - | - | | - | | |
| | **15210.200** | **DIP CML Push-On Pipe** | | | | | | | | | |
| | 0 | Unload Care & Protect Push-on DIP & Fittings | 41,663.300 | lbs | 80 | - | - | | 263 | 0.01 /lbs | 343 |
| | 1 | Weight of Push-on Pipe (Zero Cost Item) | 35,983.300 | lbs | - | - | - | | - | | |
| | 2 | Weight of Push-on Fittings (Zero Cost Item) | 5,680.00 | lbs | - | - | - | | - | | |
| | 5 | Layout Push-on DIP & Fitting | 545.00 | lf | 124 | - | - | | - | 0.23 /lf | 124 |
| n | 204 | DIP CML, Push-On, Class 52, 4" | 117.00 | lf | 530 | 1,379 | - | | - | 16.323 /lf | 1,910 |
| n | 206 | DIP CML, Push-On, Class 52, 6" | 11.00 | lf | 58 | 136 | - | | - | 17.632 /lf | 194 |
| n | 208 | DIP CML, Push-On, Class 52, 8" | 30.00 | lf | 179 | 508 | - | | - | 22.90 /lf | 687 |
| n | 212 | DIP CML, Push-On, Class 52, 12" | 102.00 | lf | 754 | 2,841 | - | | - | 35.25 /lf | 3,595 |
| n | 218 | DIP CML, Push-On, Class 52, 18" | 102.00 | lf | 900 | 4,903 | - | | - | 56.90 /lf | 5,803 |
| n | 224 | DIP CML, Push-On, Class 52, 24" | 183.00 | lf | 1,747 | 12,719 | - | | - | 79.05 /lf | 14,465 |
| n | 2AKK | DIP CML, Push-on, 90 Bend, 4" | 2.00 | ea | 79 | 160 | - | | - | 119.36 /ea | 239 |
| n | 2AMM | DIP CML, Push-on, 90 Bend, 6" | 1.00 | ea | 56 | 120 | - | | - | 175.81 /ea | 176 |
| n | 2APP | DIP CML, Push-on, 90 Bend, 12" | 1.00 | ea | 110 | 340 | - | | - | 450.19 /ea | 450 |
| n | 2ASS | DIP CML, Push-on, 90 Bend, 18" | 3.00 | ea | 491 | 4,238 | - | | - | 1,576.18 /ea | 4,729 |
| n | FASS | DIP CML, Push-on, Tee BxB, 12"x 12" | 1.00 | ea | 149 | 510 | - | | - | 658.89 /ea | 659 |
| n | FAVS | DIP CML, Push-on, Tee BxB, 18"x 12" | 2.00 | ea | 433 | 3,450 | - | | - | 1,941.65 /ea | 3,883 |
| n | FAXS | DIP CML, Push-on, Wye BxB, 24"x 12" | 1.00 | ea | 275 | 2,800 | - | | - | 3,075.34 /ea | 3,075 |
| n | KASP | DIP, CML, Push-on, Reducer BxB, 12"x 6" | 1.00 | ea | 94 | 250 | - | | - | 344.49 /ea | 344 |
| n | KASQ | DIP, CML, Push-on, Reducer BxB, 12"x 8" | 3.00 | ea | 283 | 840 | - | | - | 374.49 /ea | 1,123 |
| n | KAVS | DIP, CML, Push-on, Reducer BxB, 18"x 12" | 1.00 | ea | 144 | 938 | - | | - | 1,081.67 /ea | 1,082 |
| n | MBPP | DIP CML, Push-on, Flare 12" | 1.00 | ea | 18 | 126 | - | | - | 144.37 /ea | 144 |
| | | **DIP CML Push-On Pipe** | | | **6,506** | **36,257** | | | **263** | | **43,026** |
| | | 274.18 Labor hours | | | | | | | | | |
| | | 4.583 Equipment hours | | | | | | | | | |
| | | ***02 Equilization*** | | | ***236,105*** | ***1,808,023*** | ***25,092*** | | ***77,326*** | | ***2,146,847*** |
| | | 10,849.60 Labor hours | | | | | | | | | |
| | | 1,195.65 Equipment hours | | | | | | | | | |

| | | | | | Labor | Material | Subcontract | | Equipment | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Item | | Description | Takeoff Qty | | Amount | Amount | Amount | Name | Amount | Unit Cost | Amount |
| | | ***03 Return Activated Sludge Pump Station*** | | | | | | | | | |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Allowance for passing around 5 existing pipes | 1.00 | ls | - | - | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | 20 | Allowance to Install Wye on existing 24"line | 1.00 | ls | - | - | 1,500 | | - | 1,500.00 /ls | 1,500 |
| | | **Sitework Allowance** | | | | | **6,500** | | | | **6,500** |
| **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | 1 | Design Shoring System-Minor | 3.00 | ls | - | - | 3,000 | | - | 1,000.00 /ls | 3,000 |
| | 100 | Survey & Layout Shoring | 172.00 | lf | 3 | - | - | | - | 0.02 /lf | 3 |
| n | 1025 | Steel Sheeting,15' x 22psf, pulled & salvage | 2,580.00 | sf | 13,370 | 14,990 | - | | 17,658 | 17.84 /sf | 46,017 |
| | 1045 | Install & Remove Wales/Struts/Connectors | 2.84 | ton | 689 | 2,611 | - | | 910 | 1,483.73 /ton | 4,211 |
| n | 1050 | Rent Steel Sheet Piling and Wales, first month | 31.22 | ton | - | 9,478 | - | | - | 303.611 /ton | 9,478 |
| | | **Sheet Piling** | | | **14,062** | **27,079** | **3,000** | | **18,568** | | **62,709** |
| | | 463.20 Labor hours | | | | | | | | | |
| | | 115.76 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 287.132 | cy | 242 | - | - | | 654 | 3.121 /cy | 896 |
| | 461C | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 77.722 | cy | 132 | - | - | | 257 | 5.011 /cy | 389 |
| n | A000 | IMPORT MATERIAL (Summary) | 10.55 | CY | - | - | - | | - | | |
| n | A015 | Import Gravel Fill | 25.51 | cy | - | 383 | 143 | | - | 20.60 /cy | 525 |
| n | z000 | Shore Foundation Excavation BSF | 565.49 | bsf | 270 | - | - | | 565 | 1.48 /bsf | 835 |
| | | **Foundation Excavation** | | | **644** | **383** | **143** | | **1,477** | | **2,646** |
| | | 35.951 Labor hours | | | | | | | | | |
| | | 13.875 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 990.00 | lf | 91 | | - | | - | 0.092 /lf | 91 |
| n | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 293.921 | cy | 594 | - | - | | 1,674 | 7.72 /cy | 2,269 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 922.19 | cy | 466 | - | - | | 2,039 | 2.72 /cy | 2,506 |
| n | 3130 | Trench Bedding-Excavator- 130 HP | 24.704 | cy | 50 | - | - | | 145 | 7.901 /cy | 195 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 57.34 | cy | 87 | - | - | | 289 | 6.56 /cy | 376 |
| n | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 73.05 | cy | 236 | - | - | | 687 | 12.642 /cy | 923 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 164.053 | cy | 398 | - | - | | 1,323 | 10.492 /cy | 1,721 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 843.623 | cy | 763 | - | - | | 2,401 | 3.751 /cy | 3,164 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 319.15 | cy | - | 11,234 | - | | - | 35.20 /cy | 11,234 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 372.484 | cy | 522 | - | - | | 1,004 | 4.10 /cy | 1,526 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 372.484 | cy | 365 | - | - | | 607 | 2.61 /cy | 972 |
| n | 9616 | Trench Shield- 6x16 | 0.06 | u/mo | - | - | - | | 85 | 1,410.00 /u/mo | 85 |
| | A006 | Pipe Test | 990.00 | lf | 732 | 792 | - | | - | 1.54 /lf | 1,524 |
| | C0Q0 | Concrete Thrust Block, 14" | 2.00 | ea | 181 | 50 | - | | - | 115.67 /ea | 231 |
| | C0R0 | Concrete Thrust Block, 16" | 2.00 | ea | 191 | 66 | - | | - | 128.44 /ea | 257 |
| | C0V0 | Concrete Thrust Block, 24" | 1.00 | ea | 107 | 86 | - | | - | 193.37 /ea | 193 |
| | | **Trenching** | | | **4,784** | **12,228** | | | **10,255** | | **27,267** |
| | | 279.16 Labor hours | | | | | | | | | |
| | | 158.723 Equipment hours | | | | | | | | | |
| **02315.400** | | **Drilling & Blasting** | | | | | | | | | |
| | 1008 | Hydraulic Hoe Ram -Medium | 185.00 | cy | | - | 23,125 | | | 125.00 /cy | 23,125 |
| | | **Drilling & Blasting** | | | | | **23,125** | | | | **23,125** |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 581.894 | cy | - | - | - | | - | | |
| | 40 | Foundation Excavation Spoils (Summary) | 209.41 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 372.484 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 372.484 | cy | 601 | - | - | | 1,154 | 4.712 /cy | 1,755 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 209.41 | cy | 243 | - | - | | 686 | 4.44 /cy | 929 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 372.484 | cy | 1,677 | - | - | | 2,793 | 12.001 /cy | 4,470 |
| | A0I7 | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 209.41 | cy | 131 | - | - | | 303 | 2.071 /cy | 434 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Excavation Spoils** | | | **2,653** | | | | **4,936** | | **7,588** |
| | | 155.52 Labor hours | | | | | | | | | |
| | | 77.76 Equipment hours | | | | | | | | | |
| **02446.000** | | **Drainage Outflow To Head** | | | | | | | | | |
| n | 0 | Mob/Demob Directional Drilling Equipment | 1.00 | ea | - | - | 2,500 | | - | 2,500.00 /ea | 2,500 |
| n | 1014 | Install 14" Pipe N.O.C. | 170.00 | lf | - | - | 19,550 | | - | 115.00 /lf | 19,550 |
| | | **Drainage Outflow To Head** | | | | | **22,050** | | | | **22,050** |
| **02639.020** | | **Storm Drainage Manholes** | | | | | | | | | |
| | 0 | Unload Care & Protect Manhole | 1.00 | ea | 18 | - | - | | - | 17.52 /ea | 18 |
| | 3600 | Place & Shape Manhole Base & Inverts- 36" | 1.00 | ea | 210 | - | - | | - | 318.68 /ea | 319 |
| | 3610 | Manhole 108" x 10' Deep | 1.00 | ea | 113 | 2,581 | - | | | 2,693.24 /ea | 2,693 |
| | | **Storm Drainage Manholes** | | | **340** | **2,581** | | | | | **3,029** |
| | | 21.00 Labor hours | | | | | | | | | |
| | | 4.00 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| | 30 | Bitum Paving Sidewalks | 14.00 | sy | - | - | 560 | | - | 40.00 /sy | 560 |
| | | **Asphalt Paving - Location** | | | | | **560** | | | | **560** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 350.00 | sy | 29 | 767 | - | | 29 | 2.36 /sy | 825 |
| | | **Lawns & Grasses** | | | **29** | **767** | | | **29** | | **825** |
| | | 1.40 Labor hours | | | | | | | | | |
| | | 0.70 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 110 | Concrete: Slab on Grade | 57.00 | cy | 4,126 | 17,670 | - | | 1,552 | 409.61 /cy | 23,348 |
| n | 110 | Concrete: Pump Support Pad | 1.00 | cy | 72 | 310 | - | | 27 | 409.61 /cy | 410 |
| n | 110 | Concrete: Slab on Grade | 19.00 | cy | 1,375 | 5,890 | - | | 517 | 409.611 /cy | 7,783 |
| n | 140 | Concrete: Wall | 175.00 | cy | 21,715 | 61,250 | - | | 8,825 | 524.52 /cy | 91,790 |
| n | 145 | Concrete: Elevated Slab | 76.00 | cy | 8,645 | 27,360 | - | | 3,833 | 524.18 /cy | 39,837 |
| n | 180 | Concrete: Grout Fill - prevent grit deposition | 1.00 | cy | 41 | 100 | - | | 5 | 146.40 /cy | 146 |
| | | **Concrete in Place** | | | **35,975** | **112,580** | | | **14,759** | | **163,314** |
| | | 1,739.500 Labor hours | | | | | | | | | |
| | | 292.680 Equipment hours | | | | | | | | | |
| **03150.010** | | **Concrete Core & Saw** | | | | | | | | | |
| | c140 | Core Drill 14" to 12" depth | 1.00 | ea | 51 | - | - | | | 50.59 /ea | 51 |
| | | **Concrete Core & Saw** | | | **51** | | | | | | **51** |
| | | 4.10 Labor hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 7.00 | ea | 537 | 8,936 | - | | - | 1,353.171 /ea | 9,472 |
| | | **Hatch, Aluminum, 300psf** | | | **537** | **8,936** | | | | | **9,472** |
| | | 22.40 Labor hours | | | | | | | | | |
| **11000.005** | | **Equipment Allowance** | | | | | | | | | |
| | 5 | Level Sensor | 1.00 | ea | 484 | 1,500 | - | | | 1,984.20 /ea | 1,984 |
| | | **Equipment Allowance** | | | **484** | **1,500** | | | | | **1,984** |
| | | 20.00 Labor hours | | | | | | | | | |
| | | 0.000 Equipment hours | | | | | | | | | |
| **11210.000** | | **PUMPS** | | | | | | | | | |
| | ---- | 10HP Ras Pump | 2.00 | ea | 5,446 | 16,000 | - | | - | 10,722.80 /ea | 21,446 |
| | | **PUMPS** | | | **5,446** | **16,000** | | | | | **21,446** |
| | | 240.000 Labor hours | | | | | | | | | |
| **11217.100** | | **Submersible Sump Pumps** | | | | | | | | | |
| | 50 | Sump Pump 50 gpm | 1.00 | ea | 14,514 | 31,500 | - | | 10,276 | 56,289.60 /ea | 56,290 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Submersible Sump Pumps** | | | **14,514** | **31,500** | | | **10,276** | | **56,290** |
| | | 720.00 Labor hours | | | | | | | | | |
| | | 120.000 Equipment hours | | | | | | | | | |
| **13000.005** | | **Special Const Allowance** | | | | | | | | | |
| | 5 | SCADA Allowance to Operate Motorized Plug Valve | 1.00 | ea | | | 10,000 | | - | 10,000.00 /ea | 10,000 |
| | 5 | SCADA Allowance for Operated Motorized Plug Valve | 1.00 | ls | | | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | | **Special Const Allowance** | | | | | **20,000** | | | | **20,000** |
| **13420.200** | | **I&C Instruments** | | | | | | | | | |
| n 05-FE-m014 | | 14" Magnetic Flow Meter | 1.00 | ea | 333 | 11,500 | - | | - | 11,833.00 /ea | 11,833 |
| | | **I&C Instruments** | | | **333** | **11,500** | | | | | **11,833** |
| | | 12.14 Labor hours | | | | | | | | | |
| **15111.650** | | **Plug Valve (CI/DI/IBBM)** | | | | | | | | | |
| n 200T | | Plug Valve, MJ, 14" | 3.00 | ea | 1,112 | 5,700 | - | | - | 2,270.703 /ea | 6,812 |
| n 200X | | Plug Valve, MJ, 24" | 1.00 | ea | 643 | 4,600 | - | | - | 5,243.40 /ea | 5,243 |
| | | **Plug Valve (CI/DI/IBBM)** | | | **1,756** | **10,300** | | | | | **12,056** |
| | | 55.17 Labor hours | | | | | | | | | |
| **15114.500** | | **Check Valve (CI/DI/IBBM)** | | | | | | | | | |
| n C20T | | Check Valve, Double Disc, MJ, 14" | 2.00 | ea | 777 | 3,800 | - | | - | 2,288.65 /ea | 4,577 |
| | | **Check Valve (CI/DI/IBBM)** | | | **777** | **3,800** | | | | | **4,577** |
| | | 24.42 Labor hours | | | | | | | | | |
| **15119.600** | | **Air/Vacuum Relief Valve** | | | | | | | | | |
| n 100J | | Air Release Valve, 14" | 1.00 | ea | 94 | 200 | - | | - | 293.93 /ea | 294 |
| | | **Air/Vacuum Relief Valve** | | | **94** | **200** | | | | | **294** |
| | | 3.03 Labor hours | | | | | | | | | |
| **15210.010** | | **DIP Totals** | | | | | | | | | |
| | 0 | Total Weight (Zero Cost Item) | 70,863.20 | lbs | - | - | - | | - | | |
| | 1 | Weight of Pipe (Zero Cost Item) | 62,698.200 | lbs | - | - | - | | - | | |
| | 2 | Weight of Fittings (Zero Cost Item) | 8,165.00 | lbs | - | - | - | | - | | |
| **15210.200** | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | 0 | Unload Care & Protect Push-on DIP & Fittings | 70,863.20 | lbs | 137 | - | - | | 446 | 0.01 /lbs | 583 |
| | 1 | Weight of Push-on Pipe (Zero Cost Item) | 62,698.200 | lbs | - | - | - | | - | | |
| | 2 | Weight of Push-on Fittings (Zero Cost Item) | 8,165.00 | lbs | - | - | - | | - | | |
| | 5 | Layout Push-on DIP & Fitting | 990.00 | lf | 225 | - | - | | - | 0.23 /lf | 225 |
| n | 214 | DIP CML, Push-On, Class 52, 14" | 562.00 | lf | 4,557 | 20,124 | - | | - | 43.92 /lf | 24,681 |
| n | 216 | DIP CML, Push-On, Class 52, 16" | 420.00 | lf | 3,507 | 17,575 | - | | - | 50.20 /lf | 21,083 |
| n | 224 | DIP CML, Push-On, Class 52, 24" | 8.00 | lf | 76 | 556 | - | | - | 79.05 /lf | 632 |
| n 2AQQ | | DIP CML, Push-on, 90 Bend, 14" | 6.00 | ea | 751 | 5,625 | - | | - | 1,062.713 /ea | 6,376 |
| n 2ARR | | DIP CML, Push-on, 90 Bend, 16" | 2.00 | ea | 280 | 2,325 | - | | - | 1,302.74 /ea | 2,605 |
| n AAQQ | | DIP CML, Push-on, 45 Bend, 14" | 2.00 | ea | 241 | 1,525 | - | | - | 882.76 /ea | 1,766 |
| n AAUU | | DIP CML, Push-on, 45 Bend, 24" | 1.00 | ea | 213 | 2,000 | - | | - | 2,213.20 /ea | 2,213 |
| n CAQQ | | DIP CML, Push-on, 22-1/2 Bend, 14" | 1.00 | ea | 120 | 775 | - | | - | 895.25 /ea | 895 |
| n FATT | | DIP CML, Push-on, Tee BxB, 14"x 14" | 2.00 | ea | 343 | 2,950 | - | | - | 1,646.72 /ea | 3,293 |
| n FAXX | | DIP CML, Push-on, Tee BxB, 24"x 24" | 1.00 | ea | 275 | 4,125 | - | | - | 4,400.34 /ea | 4,400 |
| n KAUT | | DIP, CML, Push-on, Reducer BxB, 16"x 14" | 2.00 | ea | 258 | 1,850 | - | | - | 1,053.79 /ea | 2,108 |
| | | **DIP CML Push-On Pipe** | | | **10,984** | **59,430** | | | **446** | | **70,861** |
| | | 463.030 Labor hours | | | | | | | | | |
| | | 7.795 Equipment hours | | | | | | | | | |
| **16000.005** | | **Electrical Allowance** | | | | | | | | | |
| | 5 | Electrical Allowance for Pumps | 0.00 | ls | 0 | 0 | - | | - | | |
| | | ***03 Return Activated Sludge Pump Station*** | | | ***93,462*** | ***298,782*** | ***75,378*** | | ***60,747*** | | ***528,477*** |
| | | 4,260.010 Labor hours | | | | | | | | | |
| | | 791.29 Equipment hours | | | | | | | | | |

| | Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ***04 High Rate Clarification*** | | | | | | | | | |
| | **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | | 2734 | Remove Asphalt Pavement,Sidewalk | 150.00 | sy | 233 | - | - | | 470 | 4.684 /sy | 703 |
| | | 3012 | Demo Concrete Stairs | 4.00 | cy | 392 | - | - | | 1,019 | 352.58 /cy | 1,410 |
| | | | **Selective Site Demolition** | | | **625** | | | | **1,488** | | **2,113** |
| | | | 38.25 Labor hours | | | | | | | | | |
| | | | 19.40 Equipment hours | | | | | | | | | |
| | **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | | 1 | Design Shoring System-Minor | 2.00 | ls | - | - | 2,000 | | - | 1,000.00 /ls | 2,000 |
| | | 100 | Survey & Layout Shoring | 102.00 | lf | 2 | - | - | | - | 0.02 /lf | 2 |
| | | 105 | Mobilize Pile Driving Equipment | 1.00 | ea | - | - | 25,000 | | - | 25,000.00 /ea | 25,000 |
| n | | 1025 | Steel Sheeting,15' x 22psf, pulled & salvage | 480.00 | sf | 2,487 | 2,789 | - | | 3,285 | 17.84 /sf | 8,561 |
| n | | 1030 | Steel Sheeting,20' x 27psf, pulled & salvage | 1,400.00 | sf | 7,255 | 10,542 | - | | 9,582 | 19.56 /sf | 27,379 |
| | | 1045 | Install & Remove Wales/Struts/Connectors | 2.42 | ton | 587 | 2,225 | - | | 776 | 1,483.73 /ton | 3,588 |
| n | | 1050 | Rent Steel Sheet Piling and Wales, first month | 26.60 | ton | - | 8,075 | - | | - | 303.602 /ton | 8,075 |
| | | | **Sheet Piling** | | | **10,331** | **23,631** | **27,000** | | **13,643** | | **74,605** |
| | | | 340.30 Labor hours | | | | | | | | | |
| | | | 85.05 Equipment hours | | | | | | | | | |
| | **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | | 110 | Hand Excavate Foundations | 18.00 | cy | 367 | - | - | | - | 20.37 /cy | 367 |
| | | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 159.26 | cy | 134 | - | - | | 363 | 3.121 /cy | 497 |
| | 461C | | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 154.04 | cy | 262 | - | - | | 510 | 5.011 /cy | 772 |
| n | A000 | | IMPORT MATERIAL (Summary) | 2.00 | CY | - | - | - | | - | | |
| n | A015 | | Import Gravel Fill | 1.852 | cy | - | 28 | 10 | | - | 20.60 /cy | 38 |
| | | | **Foundation Excavation** | | | **763** | **28** | **10** | | **873** | | **1,674** |
| | | | 55.78 Labor hours | | | | | | | | | |
| | | | 16.57 Equipment hours | | | | | | | | | |
| | **02315.300** | | **Trenching** | | | | | | | | | |
| | | 0 | Survey & Stake Pipeline | 425.00 | lf | 39 | | - | | - | 0.092 /lf | 39 |
| n | | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 205.57 | cy | 416 | - | - | | 1,171 | 7.72 /cy | 1,587 |
| n | | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 221.852 | cy | 112 | - | - | | 491 | 2.72 /cy | 603 |
| n | | 3130 | Trench Bedding-Excavator- 130 HP | 20.39 | cy | 41 | - | - | | 120 | 7.901 /cy | 161 |
| n | | 3240 | Trench Bedding-Excavator- 240 HP | 13.801 | cy | 21 | - | - | | 70 | 6.56 /cy | 91 |
| n | | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 58.10 | cy | 188 | - | - | | 546 | 12.641 /cy | 734 |
| n | | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 37.04 | cy | 90 | - | - | | 299 | 10.492 /cy | 389 |
| n | | 5130 | Trench Native Backfill- Loader C938 3cy | 279.552 | cy | 253 | - | - | | 796 | 3.75 /cy | 1,048 |
| | | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 129.321 | cy | - | 4,552 | - | | - | 35.20 /cy | 4,552 |
| | | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 147.87 | cy | 207 | - | - | | 399 | 4.10 /cy | 606 |
| | | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 147.87 | cy | 145 | - | - | | 241 | 2.61 /cy | 386 |
| n | | 9616 | Trench Shield- 6x16 | 2.52 | u/mo | - | - | - | | 3,553 | 1,410.00 /u/mo | 3,553 |
| | A006 | | Pipe Test | 425.00 | lf | 314 | 340 | - | | - | 1.54 /lf | 654 |
| | C0N0 | | Concrete Thrust Block, 10" | 5.00 | ea | 394 | 60 | - | | - | 90.74 /ea | 454 |
| | C0Q0 | | Concrete Thrust Block, 14" | 9.00 | ea | 816 | 225 | - | | - | 115.63 /ea | 1,041 |
| | | | **Trenching** | | | **3,035** | **5,177** | | | **7,685** | | **15,897** |
| | | | 161.164 Labor hours | | | | | | | | | |
| | | | 65.992 Equipment hours | | | | | | | | | |
| | **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | | 0 | EXCAVATION SPOILS (Grand Total) | 171.09 | cy | - | - | - | | - | | |
| | | 40 | Foundation Excavation Spoils (Summary) | 23.222 | cy | - | - | - | | - | | |
| | | 45 | Trenching Spoils (Summary) | 147.87 | cy | - | - | - | | - | | |
| | | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 147.87 | cy | 238 | - | - | | 458 | 4.712 /cy | 697 |
| | | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 23.222 | cy | 27 | - | - | | 76 | 4.44 /cy | 103 |
| | A0A4 | | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 147.87 | cy | 666 | - | - | | 1,109 | 12.001 /cy | 1,775 |
| | A0I7 | | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 23.222 | cy | 15 | - | - | | 34 | 2.071 /cy | 48 |
| | | | **Excavation Spoils** | | | **946** | | | | **1,677** | | **2,622** |
| | | | 55.58 Labor hours | | | | | | | | | |
| | | | 27.790 Equipment hours | | | | | | | | | |
| | **02446.000** | | **Drainage Outflow To Head** | | | | | | | | | |
| n | | 0 | Mob/Demob Directional Drilling Equipment | 1.00 | ea | - | - | 2,500 | | - | 2,500.00 /ea | 2,500 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **02446.000** | | **Drainage Outflow To Head** | | | | | | | | | |
| n | 1006 | Install 6" Pipe N.O.C. | 110.00 | lf | - | - | 3,850 | | - | 35.00 /lf | 3,850 |
| | | **Drainage Outflow To Head** | | | | | **6,350** | | | | **6,350** |
| **02639.020** | | **Storm Drainage Manholes** | | | | | | | | | |
| | 0 | Unload Care & Protect Manhole | 1.00 | ea | 18 | - | - | | - | 17.52 /ea | 18 |
| | 4800 | Place & Shape Manhole Base & Inverts- 48" | 1.00 | ea | 210 | - | - | | - | 372.04 /ea | 372 |
| | 4805 | Manhole 48" x 5' Deep | 1.00 | ea | 113 | 1,657 | - | | | 1,769.79 /ea | 1,770 |
| | | **Storm Drainage Manholes** | | | **340** | **1,657** | | | | | **2,159** |
| | | 21.00 Labor hours | | | | | | | | | |
| | | 4.00 Equipment hours | | | | | | | | | |
| **02720.100** | | **Aggregate Base Course** | | | | | | | | | |
| | 1002 | Granular fill | 533.00 | cy | 1,519 | | - | | 7,674 | 17.25 /cy | 9,192 |
| | 1002 | Granular fill | 227.00 | cy | 578 | | - | | | 2.55 /cy | 578 |
| | | **Aggregate Base Course** | | | **2,097** | | | | **7,674** | | **9,770** |
| | | 117.06 Labor hours | | | | | | | | | |
| | | 94.36 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| | 30 | Bitum Paving Sidewalks | 150.00 | sy | - | - | 6,000 | | - | 40.00 /sy | 6,000 |
| | | **Asphalt Paving - Location** | | | | | **6,000** | | | | **6,000** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 667.00 | sy | 55 | 1,461 | - | | 56 | 2.36 /sy | 1,572 |
| | | **Lawns & Grasses** | | | **55** | **1,461** | | | **56** | | **1,572** |
| | | 2.67 Labor hours | | | | | | | | | |
| | | 1.334 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 110 | Concrete: Slab on Grade | 129.00 | cy | 9,337 | 39,990 | - | | 3,513 | 409.62 /cy | 52,840 |
| n | 110 | Concrete: Slab on Grade - Pump Support | 1.00 | cy | 72 | 310 | - | | 27 | 409.61 /cy | 410 |
| n | 110 | Concrete: Slab on Grade | 7.00 | cy | 507 | 2,170 | - | | 191 | 409.62 /cy | 2,867 |
| n | 110 | Concrete: Slab on Grade - Pump Support | 1.00 | cy | 72 | 310 | - | | 27 | 409.61 /cy | 410 |
| n | 140 | Concrete | 67.00 | cy | 8,314 | 23,450 | - | | 3,379 | 524.52 /cy | 35,143 |
| n | 140 | Concrete: Wall | 79.00 | cy | 9,803 | 27,650 | - | | 3,984 | 524.52 /cy | 41,437 |
| n | 140 | Concrete: Baffle | 41.00 | cy | 5,088 | 14,350 | - | | 2,068 | 524.52 /cy | 21,505 |
| n | 140 | Concrete: Wall | 194.00 | cy | 24,073 | 67,900 | - | | 9,783 | 524.52 /cy | 101,756 |
| n | 140 | Concrete: Channel Wall | 63.00 | cy | 7,817 | 22,050 | - | | 3,177 | 524.52 /cy | 33,045 |
| n | 140 | Concrete: Wall | 45.00 | cy | 5,584 | 15,750 | - | | 2,269 | 524.52 /cy | 23,603 |
| n | 140 | Concrete: Wall - Wet Well | 40.00 | cy | 4,963 | 14,000 | - | | 2,017 | 524.52 /cy | 20,981 |
| n | 145 | Concrete: Elevated Slab | 25.00 | cy | 2,844 | 9,000 | - | | 1,261 | 524.18 /cy | 13,104 |
| n | 145 | Concrete: Elevated Slab - Wet Well | 11.00 | cy | 1,251 | 3,960 | - | | 555 | 524.18 /cy | 5,766 |
| n | 165 | Concrete: Stair | 4.00 | cy | 579 | 1,600 | - | | 403 | 645.63 /cy | 2,583 |
| n | 180 | Concrete: Grout Fill - avoid grit deposition | 2.00 | cy | 83 | 200 | - | | 10 | 146.41 /cy | 293 |
| n | 180 | Concrete: Grout Fill | 80.00 | cy | 3,309 | 8,000 | - | | 403 | 146.41 /cy | 11,712 |
| | | **Concrete in Place** | | | **83,696** | **250,690** | | | **33,068** | | **367,454** |
| | | 4,047.000 Labor hours | | | | | | | | | |
| | | 655.72 Equipment hours | | | | | | | | | |
| **03150.010** | | **Concrete Core & Saw** | | | | | | | | | |
| | c 60 | Core Drill 6" to 12" depth | 5.00 | ea | 197 | - | - | | | 39.49 /ea | 197 |
| | c100 | Core Drill 10" to 12" depth | 1.00 | ea | 47 | - | - | | | 46.89 /ea | 47 |
| | c140 | Core Drill 14" to 12" depth | 1.00 | ea | 51 | - | - | | | 50.59 /ea | 51 |
| | | **Concrete Core & Saw** | | | **295** | | | | | | **295** |
| | | 23.90 Labor hours | | | | | | | | | |
| **05510.000** | | **Metal Ladders** | | | | | | | | | |
| | 10 | Straight Ladder-Aluminum | 225.00 | lf | 3,998 | 10,322 | - | | - | 63.642 /lf | 14,320 |
| | | **Metal Ladders** | | | **3,998** | **10,322** | | | | | **14,320** |
| | | 112.50 Labor hours | | | | | | | | | |
| **05520.000** | | **Handrail/Railing** | | | | | | | | | |
| | 103 | 3 Rail-Handrail Alum. w/Toe | 220.00 | lf | 1,955 | 15,180 | - | | - | 77.884 /lf | 17,135 |

| Item | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Handrail/Railing** | | | **1,955** | **15,180** | | | | | **17,135** |
| | 55.00 Labor hours | | | | | | | | | |
| **05530.200** | **Alum. Grating-Riveted** | | | | | | | | | |
| 5 K | 1-1/4x1/8 Riveted Grate-Stnd. | 144.00 | sf | 870 | 6,160 | - | | - | 48.821 /sf | 7,030 |
| 8 K | 1-1/2x3/16 Riveted Grate-Stnd. | 600.00 | sf | 3,625 | 24,288 | - | | - | 46.521 /sf | 27,913 |
| | **Alum. Grating-Riveted** | | | **4,495** | **30,448** | | | | | **34,943** |
| | 126.480 Labor hours | | | | | | | | | |
| **05585.205** | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 8.00 | ea | 613 | 10,212 | - | | - | 1,353.173 /ea | 10,825 |
| | **Hatch, Aluminum, 300psf** | | | **613** | **10,212** | | | | | **10,825** |
| | 25.60 Labor hours | | | | | | | | | |
| **09910.100** | **Paint Pipe/Valve/Equip** | | | | | | | | | |
| 10 | Paint Pipe - Standard Paint | 98.72 | sf | 52 | 34 | - | | - | 0.88 /sf | 86 |
| | **Paint Pipe/Valve/Equip** | | | **52** | **34** | | | | | **86** |
| | 1.974 Labor hours | | | | | | | | | |
| **11000.005** | **Equipment Allowance** | | | | | | | | | |
| 5 | Equipment Allowance - Kruger Estimate | 1.00 | ls | 929,520 | 1,816,000 | - | | 822,000 | 3,567,520.00 /ls | 3,567,520 |
| | **Equipment Allowance** | | | **929,520** | **1,816,000** | | | **822,000** | | **3,567,520** |
| | 38,400.00 Labor hours | | | | | | | | | |
| | 9,600.00 Equipment hours | | | | | | | | | |
| **11000.015** | **Equipment Demolition** | | | | | | | | | |
| n q003 | 20 cy Roll-Off Dumpster | 1.00 | ea | 91 | 2,500 | | | - | 2,590.760 /ea | 2,591 |
| | **Equipment Demolition** | | | **91** | **2,500** | | | | | **2,591** |
| | 4.00 Labor hours | | | | | | | | | |
| **11217.100** | **Submersible Sump Pumps** | | | | | | | | | |
| 05 | Sump Pump 5 HP | 2.00 | ea | 7,741 | 16,000 | - | | 5,480 | 14,610.56 /ea | 29,221 |
| 10 | Sump Pump | 2.00 | ea | 7,741 | 16,000 | - | | 5,480 | 14,610.56 /ea | 29,221 |
| 10 | 50gpm Sump Pump | 1.00 | ea | 3,870 | 8,000 | - | | 2,740 | 14,610.56 /ea | 14,611 |
| 50 | Sump Pump 50 gpm | 1.00 | ea | 14,514 | 31,500 | - | | 10,276 | 56,289.60 /ea | 56,290 |
| | **Submersible Sump Pumps** | | | **33,866** | **71,500** | | | **23,976** | | **129,342** |
| | 1,680.00 Labor hours | | | | | | | | | |
| | 280.000 Equipment hours | | | | | | | | | |
| **11240.420** | **Storage Tanks** | | | | | | | | | |
| a200 | Set VFD Control - Actiflow Maturation Tank | 1.00 | ea | 6,432 | 15,000 | - | | - | 21,432.00 /ea | 21,432 |
| a200 | Set VFD Control - Actiflow Sellting Tank Scraper | 1.00 | ea | 6,432 | 15,000 | - | | - | 21,432.00 /ea | 21,432 |
| | **Storage Tanks** | | | **12,864** | **30,000** | | | | | **42,864** |
| | 600.00 Labor hours | | | | | | | | | |
| **11284.000** | **Sluice Gates** | | | | | | | | | |
| 96A8 | 96" x 48" Sluice Gate | 4.00 | ea | 57,264 | 132,000 | - | | - | 47,316.00 /ea | 189,264 |
| | **Sluice Gates** | | | **57,264** | **132,000** | | | | | **189,264** |
| | 2,400.00 Labor hours | | | | | | | | | |
| **11330.100** | **Barscreens** | | | | | | | | | |
| n A 3 | Screens | 1.00 | ea | 95,440 | 200,000 | - | | - | 295,440.00 /ea | 295,440 |
| B 5 | Screen Conveyor | 1.00 | ea | 19,088 | 40,000 | - | | - | 59,088.00 /ea | 59,088 |
| | **Barscreens** | | | **114,528** | **240,000** | | | | | **354,528** |
| | 4,800.000 Labor hours | | | | | | | | | |
| **13000.005** | **Special Const Allowance** | | | | | | | | | |
| 5 | Pressure Sensor | 2.00 | ea | 771 | 3,450 | - | | - | 2,110.40 /ea | 4,221 |
| 13 | Level Sensor | 1.00 | ea | 4 | 1,725 | | | - | 1,728.57 /ea | 1,729 |
| | **Special Const Allowance** | | | **774** | **5,175** | | | | | **5,949** |
| | 20.10 Labor hours | | | | | | | | | |
| **13121.000** | **Pre-Engineered Metal Bldg** | | | | | | | | | |
| z001 | Pre-Engineered Metal Bldg- Chemical | 625.00 | sf | | | 46,875 | | | 75.00 /sf | 46,875 |
| z001 | Pre-Engineered Metal Bldg | 600.00 | sf | | | 45,000 | | | 75.00 /sf | 45,000 |

| Item | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Pre-Engineered Metal Bldg** | | | | | **91,875** | | | | **91,875** |
| **13420.200** | **I&C Instruments** | | | | | | | | | |
| n 05-FE-m006 | Magnetic Flow Meter | 1.00 | ea | 160 | 4,600 | - | | - | 4,759.92 /ea | 4,760 |
| | **I&C Instruments** | | | **160** | **4,600** | | | | | **4,760** |
| | 5.83 Labor hours | | | | | | | | | |
| **15111.650** | **Plug Valve (CI/DI/IBBM)** | | | | | | | | | |
| n 200R | Plug Valve, MJ, 10" | 2.00 | ea | 560 | 1,800 | - | | - | 1,180.11 /ea | 2,360 |
| n 200T | Plug Valve, MJ, 14" | 3.00 | ea | 1,112 | 5,700 | - | | - | 2,270.703 /ea | 6,812 |
| | **Plug Valve (CI/DI/IBBM)** | | | **1,672** | **7,500** | | | | | **9,172** |
| | 52.55 Labor hours | | | | | | | | | |
| **15113.450** | **GV Knife Gate ValveCI/DI** | | | | | | | | | |
| n 160R | Knife Gate Valve, Motor Oper, flg, 10" | 6.00 | ea | 2,424 | 18,900 | - | | - | 3,553.923 /ea | 21,324 |
| | **GV Knife Gate ValveCI/DI** | | | **2,424** | **18,900** | | | | | **21,324** |
| | 76.140 Labor hours | | | | | | | | | |
| **15114.500** | **Check Valve (CI/DI/IBBM)** | | | | | | | | | |
| n C20R | Check Valve, Double Disc, MJ, 10" | 2.00 | ea | 556 | 1,000 | - | | - | 778.11 /ea | 1,556 |
| n C20T | Check Valve, Double Disc, MJ, 14" | 2.00 | ea | 777 | 3,800 | - | | - | 2,288.65 /ea | 4,577 |
| | **Check Valve (CI/DI/IBBM)** | | | **1,334** | **4,800** | | | | | **6,134** |
| | 41.90 Labor hours | | | | | | | | | |
| **15119.600** | **Air/Vacuum Relief Valve** | | | | | | | | | |
| n 100J | Air Release Valve, 14" | 1.00 | ea | 94 | 200 | - | | - | 293.93 /ea | 294 |
| | **Air/Vacuum Relief Valve** | | | **94** | **200** | | | | | **294** |
| | 3.03 Labor hours | | | | | | | | | |
| **15210.010** | **DIP Totals** | | | | | | | | | |
| 0 | Total Weight (Zero Cost Item) | 29,033.50 | lbs | - | - | - | | - | | |
| 1 | Weight of Pipe (Zero Cost Item) | 23,188.50 | lbs | - | - | - | | - | | |
| 2 | Weight of Fittings (Zero Cost Item) | 5,845.00 | lbs | - | - | - | | - | | |
| **15210.200** | **DIP CML Push-On Pipe** | | | | | | | | | |
| 0 | Unload Care & Protect Push-on DIP & Fittings | 29,033.50 | lbs | 56 | - | - | | 183 | 0.01 /lbs | 239 |
| 1 | Weight of Push-on Pipe (Zero Cost Item) | 23,188.50 | lbs | - | - | - | | - | | |
| 2 | Weight of Push-on Fittings (Zero Cost Item) | 5,845.00 | lbs | - | - | - | | - | | |
| 5 | Layout Push-on DIP & Fitting | 425.00 | lf | 96 | - | - | | - | 0.23 /lf | 96 |
| n 210 | DIP CML, Push-On, Class 52, 10" | 125.00 | lf | 835 | 2,766 | - | | - | 28.81 /lf | 3,601 |
| n 214 | DIP CML, Push-On, Class 52, 14" | 210.00 | lf | 1,704 | 7,519 | - | | - | 43.92 /lf | 9,223 |
| n 216 | DIP CML, Push-On, Class 52, 16" | 200.00 | lf | 1,670 | 8,369 | - | | - | 50.20 /lf | 10,039 |
| n 2AOO | DIP CML, Push-on, 90 Bend, 10" | 6.00 | ea | 588 | 1,560 | - | | - | 358.023 /ea | 2,148 |
| n 2AQQ | DIP CML, Push-on, 90 Bend, 14" | 5.00 | ea | 626 | 4,688 | - | | - | 1,062.712 /ea | 5,314 |
| n AAOO | DIP CML, Push-on, 45 Bend, 10" | 2.00 | ea | 181 | 460 | - | | - | 320.67 /ea | 641 |
| n AAQQ | DIP CML, Push-on, 45 Bend, 14" | 2.00 | ea | 241 | 1,525 | - | | - | 882.76 /ea | 1,766 |
| n CAQQ | DIP CML, Push-on, 22-1/2 Bend, 14" | 1.00 | ea | 120 | 775 | - | | - | 895.25 /ea | 895 |
| n FARR | DIP CML, Push-on, Tee BxB, 10"x 10" | 4.00 | ea | 555 | 1,600 | - | | - | 538.81 /ea | 2,155 |
| n FATT | DIP CML, Push-on, Tee BxB, 14"x 14" | 2.00 | ea | 343 | 2,950 | - | | - | 1,646.72 /ea | 3,293 |
| n KARQ | DIP, CML, Push-on, Reducer BxB, 10"x 8" | 4.00 | ea | 323 | 960 | - | | - | 320.853 /ea | 1,283 |
| | **DIP CML Push-On Pipe** | | | **7,340** | **33,172** | | | **183** | | **40,694** |
| | 308.714 Labor hours | | | | | | | | | |
| | 3.194 Equipment hours | | | | | | | | | |
| **15221.120** | **Fab 304L Stainless Pipe** | | | | | | | | | |
| 0 | Unload Care & Protect Pipe/Fittings | 345.00 | lbs | 1 | - | - | | 2 | 0.01 /lbs | 3 |
| 1 | Weight of Pipe (Zero Cost Item) | 345.00 | lbs | - | - | - | | - | | |
| 10 | Layout Pipe & Fitting | 150.00 | lf | 36 | - | - | | - | 0.24 /lf | 36 |
| 107A | Install Fabricated 304L SS Pipe, 1-1/4" | 150.00 | lf | 286 | - | - | | - | 1.91 /lf | 286 |
| n 50A0 | 304L Sch 40s Stainless Pipe, 1.25" | 150.00 | lf | - | 1,398 | - | | - | 9.32 /lf | 1,398 |
| | **Fab 304L Stainless Pipe** | | | **323** | **1,398** | | | **2** | | **1,723** |
| | 13.54 Labor hours | | | | | | | | | |
| | 0.04 Equipment hours | | | | | | | | | |
| **15241.100** | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| 0 | Unload Care & Protect Pipe/Fittings | 500.00 | lf | 1 | - | - | | 3 | 0.01 /lf | 4 |
| 10 | Layout Pipe & Fitting | 500.00 | lf | 119 | - | - | | - | 0.24 /lf | 119 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **15241.100** | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| n | 80C0 | PVC Schd. 80 Pipe, 2.00" | 50.00 | lf | 83 | 153 | - | | - | 4.73 /lf | 236 |
| n | 80E0 | PVC Schd. 80 Pipe, 3.00" | 300.00 | lf | 573 | 1,872 | - | | - | 8.15 /lf | 2,445 |
| n | 80G0 | PVC Schd. 80 Pipe, 4.00" | 50.00 | lf | 119 | 456 | - | | - | 11.50 /lf | 575 |
| n | 80P0 | PVC Schd. 80 Pipe, 12" | 100.00 | lf | 716 | 5,445 | - | | - | 61.61 /lf | 6,161 |
| | a010 | PVC Joint Primer- Quart | 3.654 | qrt | - | 56 | - | | - | 15.35 /qrt | 56 |
| | a020 | PVC Solvent Cement Low VOC- Quart | 3.654 | qrt | - | 80 | - | | - | 21.90 /qrt | 80 |
| | | **PVC Schd Pipe & Fittings** | | | **1,611** | **8,062** | | | **3** | | **9,676** |
| | | 67.56 Labor hours | | | | | | | | | |
| | | 0.06 Equipment hours | | | | | | | | | |
| **15500.001** | | **HVAC Equipment** | | | | | | | | | |
| | 155 | HVAC Allowance - Chemical Bldg | 625.00 | sf | - | - | 25,000 | | - | 40.00 /sf | 25,000 |
| | | **HVAC Equipment** | | | | | **25,000** | | | | **25,000** |
| **16000.005** | | **Electrical Allowance** | | | | | | | | | |
| | 5 | Electrical Allowance for pumps | 0.00 | ls | 0 | 0 | - | | - | | |
| | | ***04 High Rate Clarification*** | | | ***1,277,161*** | ***2,724,646*** | ***156,235*** | | ***912,327*** | | ***5,070,531*** |
| | | 53,657.610 Labor hours | | | | | | | | | |
| | | 10,853.502 Equipment hours | | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***05 Chlorine Effluent*** | | | | | | | | | |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Connect to Existing Aeration Tank | 1.00 | ls | - | - | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | 20 | Connect to Existing PCCP (9'deep) | 1.00 | ls | - | - | 7,500 | | - | 7,500.00 /ls | 7,500 |
| | | **Sitework Allowance** | | | | | **12,500** | | | | **12,500** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2508 | Remove 54"PCCP (9'deep) | 12.00 | lf | 49 | - | - | | 89 | 11.52 /lf | 138 |
| | 2734 | Remove Concrete Walkway | 20.00 | sy | 31 | - | - | | 63 | 4.683 /sy | 94 |
| | | **Selective Site Demolition** | | | **80** | | | | **152** | | **232** |
| | | 4.90 Labor hours | | | | | | | | | |
| | | 2.96 Equipment hours | | | | | | | | | |
| **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | 1 | Design Shoring System-Minor | 1.00 | ls | - | - | 1,000 | | - | 1,000.00 /ls | 1,000 |
| | 100 | Survey & Layout Shoring | 72.00 | lf | 1 | - | - | | - | 0.02 /lf | 1 |
| n | 1025 | Steel Sheeting,15' x 22psf, pulled & salvage | 1,080.00 | sf | 5,597 | 6,275 | - | | 7,392 | 17.84 /sf | 19,263 |
| | 1045 | Install & Remove Wales/Struts/Connectors | 1.19 | ton | 289 | 1,093 | - | | 381 | 1,483.74 /ton | 1,763 |
| n | 1050 | Rent Steel Sheet Piling and Wales, first month | 13.07 | ton | - | 3,968 | - | | - | 303.604 /ton | 3,968 |
| | | **Sheet Piling** | | | **5,886** | **11,335** | **1,000** | | **7,773** | | **25,994** |
| | | 193.90 Labor hours | | | | | | | | | |
| | | 48.46 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 120.00 | cy | 101 | - | - | | 273 | 3.121 /cy | 375 |
| | 461C | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 33.00 | cy | 56 | - | - | | 109 | 5.011 /cy | 165 |
| n | A000 | IMPORT MATERIAL (Summary) | 2.00 | CY | - | - | - | | - | | |
| n | A015 | Import Gravel Fill | 12.00 | cy | - | 180 | 67 | | - | 20.60 /cy | 247 |
| | | **Foundation Excavation** | | | **157** | **180** | **67** | | **383** | | **787** |
| | | 10.36 Labor hours | | | | | | | | | |
| | | 5.84 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 10.00 | lf | 1 | | - | | - | 0.092 /lf | 1 |
| n | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 18.66 | cy | 38 | - | - | | 106 | 7.72 /cy | 144 |
| n | 3130 | Trench Bedding-Excavator- 130 HP | 1.28 | cy | 3 | - | - | | 8 | 7.90 /cy | 10 |
| n | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 5.06 | cy | 16 | - | - | | 48 | 12.642 /cy | 64 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 9.41 | cy | 9 | - | - | | 27 | 3.751 /cy | 35 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 6.332 | cy | - | 223 | - | | - | 35.204 /cy | 223 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 9.25 | cy | 13 | - | - | | 25 | 4.10 /cy | 38 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 9.25 | cy | 9 | - | - | | 15 | 2.61 /cy | 24 |
| n | 9616 | Trench Shield- 6x16 | 0.01 | u/mo | - | - | - | | 14 | 1,410.00 /u/mo | 14 |
| | A008 | Pipe Locates (Pot Hole) | 1.00 | ea | 152 | 50 | - | | 27 | 228.96 /ea | 229 |
| | | **Trenching** | | | **240** | **273** | | | **269** | | **782** |
| | | 13.783 Labor hours | | | | | | | | | |
| | | 4.23 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 96.25 | cy | - | - | - | | - | | |
| | 40 | Foundation Excavation Spoils (Summary) | 87.00 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 9.25 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 9.25 | cy | 15 | - | - | | 29 | 4.712 /cy | 44 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 87.00 | cy | 101 | - | - | | 285 | 4.44 /cy | 386 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 9.25 | cy | 42 | - | - | | 69 | 12.00 /cy | 111 |
| | A0I7 | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 87.00 | cy | 54 | - | - | | 126 | 2.071 /cy | 180 |
| | | **Excavation Spoils** | | | **212** | | | | **509** | | **721** |
| | | 12.27 Labor hours | | | | | | | | | |
| | | 6.134 Equipment hours | | | | | | | | | |
| **02720.100** | | **Aggregate Base Course** | | | | | | | | | |
| | 1180 | Crushed Rock 1" | 6.00 | cy | 17 | 61 | - | | 86 | 27.47 /cy | 165 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Aggregate Base Course** | | | **17** | **61** | | | **86** | | **165** |
| | | 0.96 Labor hours | | | | | | | | | |
| | | 0.96 Equipment hours | | | | | | | | | |
| **02775.100** | | **Concrete Sidewalks** | | | | | | | | | |
| | 4 | 4" Sidewalks | 180.00 | sf | - | - | 1,440 | | - | 8.00 /sf | 1,440 |
| | | **Concrete Sidewalks** | | | | | **1,440** | | | | **1,440** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 278.00 | sy | 23 | 609 | - | | 23 | 2.36 /sy | 655 |
| | | **Lawns & Grasses** | | | **23** | **609** | | | **23** | | **655** |
| | | 1.112 Labor hours | | | | | | | | | |
| | | 0.56 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 140 | Concrete: Junction Structure | 36.00 | cy | 4,467 | 12,600 | - | | 1,815 | 524.52 /cy | 18,883 |
| | | **Concrete in Place** | | | **4,467** | **12,600** | | | **1,815** | | **18,883** |
| | | 216.000 Labor hours | | | | | | | | | |
| | | 36.00 Equipment hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 1.00 | ea | 77 | 1,277 | - | | - | 1,353.20 /ea | 1,353 |
| | | **Hatch, Aluminum, 300psf** | | | **77** | **1,277** | | | | | **1,353** |
| | | 3.20 Labor hours | | | | | | | | | |
| **11284.000** | | **Sluice Gates** | | | | | | | | | |
| | 3636 | 36" x 36" Sluice Gate | 1.00 | ea | 4,772 | 10,800 | - | | - | 15,572.00 /ea | 15,572 |
| | | **Sluice Gates** | | | **4,772** | **10,800** | | | | | **15,572** |
| | | 200.000 Labor hours | | | | | | | | | |
| **15230.400** | | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | 0 | Unload Care & Protect PCCP & Fittings | 10.00 | lf | 0 | - | - | | 0 | 0.01 /lf | 0 |
| | 10 | Layout Pipe & Fitting | 10.00 | lf | 2 | - | - | | - | 0.24 /lf | 2 |
| | 325 | PCCP Equipment- Cat 325 Excavator | 1.30 | ch | 25 | - | - | | 144 | 130.09 /ch | 169 |
| n | B036 | Prestressed Concrete Cylinder Pipe (250#) 36 | 10.00 | lf | 334 | 1,080 | - | | - | 141.404 /lf | 1,414 |
| | | **Prestr Conc Cylind-(PCCP)** | | | **362** | **1,080** | | | **144** | | **1,586** |
| | | 15.401 Labor hours | | | | | | | | | |
| | | 1.301 Equipment hours | | | | | | | | | |
| **16000.005** | | **Electrical Allowance** | | | | | | | | | |
| | 5 | Electrical & SCADA Allowance for Motorized Gate | 0.00 | ls | 0 | 0 | - | | - | | |
| | | ***05 Chlorine Effluent*** | | | ***16,294*** | ***38,215*** | ***15,007*** | | ***11,154*** | | ***80,670*** |
| | | 671.880 Labor hours | | | | | | | | | |
| | | 106.433 Equipment hours | | | | | | | | | |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | ***06 I&C*** | | | | | | | | |
| **13000.005** | **Special Const Allowance** | | | | | | | | |
| 5 | I&C Allowance | 0.00 ls | 0 | 0 | - | | - | | |
| | ***06 I&C*** | | ***0*** | ***0*** | ***0*** | | ***0*** | | ***0*** |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | ***07 Electrical*** | | | | | | | | |
| **16000.005** | **Electrical Allowance** | | | | | | | | |
| 5 | Electrical Allowance | 0.00 ls | 0 | 0 | - | | - | | |
| | ***07 Electrical*** | | ***0*** | ***0*** | ***0*** | | ***0*** | | ***0*** |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***08 Chemical Feed*** | | | | | | | | | |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2734 | Remove Asphalt Pavement, sidewalk | 25.00 | sy | 39 | - | - | | 78 | 4.684 /sy | 117 |
| | | **Selective Site Demolition** | | | **39** | | | | **78** | | **117** |
| | | 2.38 Labor hours | | | | | | | | | |
| | | 1.90 Equipment hours | | | | | | | | | |
| **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | 2 | Design Shoring System-Average | 1.00 | ls | - | - | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | 100 | Survey & Layout Shoring | 80.00 | lf | 1 | - | - | | - | 0.02 /lf | 1 |
| | 105 | Mobilize Pile Driving Equipment | 1.00 | ea | - | - | 25,000 | | - | 25,000.00 /ea | 25,000 |
| n | 1025 | Steel Sheeting,15' x 22psf, pulled & salvage | 800.00 | sf | 4,146 | 4,648 | - | | 5,475 | 17.84 /sf | 14,269 |
| | 1045 | Install & Remove Wales/Struts/Connectors | 0.88 | ton | 214 | 810 | - | | 282 | 1,483.73 /ton | 1,306 |
| n | 1050 | Rent Steel Sheet Piling and Wales, first month | 9.68 | ton | - | 2,939 | - | | - | 303.600 /ton | 2,939 |
| | | **Sheet Piling** | | | **4,361** | **8,396** | **35,000** | | **5,758** | | **53,515** |
| | | 143.653 Labor hours | | | | | | | | | |
| | | 35.893 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 337.00 | cy | 284 | - | - | | 768 | 3.121 /cy | 1,052 |
| | 461C | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 162.00 | cy | 276 | - | - | | 536 | 5.011 /cy | 812 |
| n | A000 | IMPORT MATERIAL (Summary) | 2.00 | CY | - | - | - | | - | | |
| n | A015 | Import Gravel Fill | 8.333 | cy | - | 125 | 47 | | - | 20.60 /cy | 172 |
| | | **Foundation Excavation** | | | **560** | **125** | **47** | | **1,304** | | **2,035** |
| | | 37.413 Labor hours | | | | | | | | | |
| | | 21.95 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 231.00 | lf | 21 | | - | | - | 0.092 /lf | 21 |
| n | 2090 | Trenching- Backhoe/Loader 95HP (15 cy/hr-120cy/day) Average Exc. | 111.153 | cy | 208 | - | - | | 399 | 5.463 /cy | 607 |
| n | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 25.833 | cy | 20 | - | - | | 55 | 2.90 /cy | 75 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 26.84 | cy | 14 | - | - | | 59 | 2.72 /cy | 73 |
| n | 3090 | Trench Bedding-Backhoe/Loader 95HP | 15.35 | cy | 41 | - | - | | 62 | 6.74 /cy | 103 |
| n | 3130 | Trench Bedding-Excavator- 130 HP | 2.551 | cy | 5 | - | - | | 15 | 7.903 /cy | 20 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 1.403 | cy | 2 | - | - | | 7 | 6.56 /cy | 9 |
| n | 4090 | Trench Pipe Zone Backfill-Backhoe/Loader 95HP | 25.451 | cy | 82 | - | - | | 124 | 8.09 /cy | 206 |
| n | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 10.113 | cy | 33 | - | - | | 95 | 12.641 /cy | 128 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 5.562 | cy | 13 | - | - | | 45 | 10.49 /cy | 58 |
| n | 5090 | Trench Native Backfill-Backhoe/Loader 95HP | 25.451 | cy | 74 | - | - | | 135 | 8.24 /cy | 210 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 24.00 | cy | 22 | - | - | | 68 | 3.751 /cy | 90 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 60.43 | cy | - | 2,127 | - | | - | 35.20 /cy | 2,127 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 69.541 | cy | 78 | - | - | | 150 | 3.28 /cy | 228 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 69.541 | cy | 68 | - | - | | 113 | 2.61 /cy | 181 |
| n | 9616 | Trench Shield- 6x16 | 0.06 | u/mo | - | - | - | | 85 | 1,410.00 /u/mo | 85 |
| | A002 | Pipe Detectable/Non-Detectable Tape | 200.00 | lf | 18 | 11 | - | | - | 0.15 /lf | 29 |
| | A006 | Pipe Test | 200.00 | lf | 148 | 160 | - | | - | 1.54 /lf | 308 |
| | C0a0 | Concrete Thrust Block, 36" | 2.00 | ea | 262 | 582 | - | | - | 422.23 /ea | 844 |
| | | **Trenching** | | | **1,110** | **2,880** | | | **1,414** | | **5,404** |
| | | 65.81 Labor hours | | | | | | | | | |
| | | 28.633 Equipment hours | | | | | | | | | |
| **02315.400** | | **Drilling & Blasting** | | | | | | | | | |
| | 1008 | Hydraulic Hoe Ram -Medium | 84.00 | cy | | - | 12,600 | | | 150.00 /cy | 12,600 |
| | | **Drilling & Blasting** | | | | | **12,600** | | | | **12,600** |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 244.541 | cy | - | - | - | | - | | |
| | 40 | Foundation Excavation Spoils (Summary) | 175.00 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 69.541 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 69.541 | cy | 90 | - | - | | 173 | 3.772 /cy | 262 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 175.00 | cy | 203 | - | - | | 573 | 4.44 /cy | 777 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 69.541 | cy | 313 | - | - | | 521 | 12.001 /cy | 835 |
| | A0I7 | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 175.00 | cy | 110 | - | - | | 253 | 2.071 /cy | 362 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Excavation Spoils** | | | **716** | | | | **1,520** | | **2,236** |
| | | 41.62 Labor hours | | | | | | | | | |
| | | 20.81 Equipment hours | | | | | | | | | |
| **02720.150** | | **Aggregate Base- Roads** | | | | | | | | | |
| | 1116 | Gravel Base - 6" thick - Driveway | 3.00 | cy | 9 | 27 | - | | 43 | 26.22 /cy | 79 |
| | | **Aggregate Base- Roads** | | | **9** | **27** | | | **43** | | **79** |
| | | 0.48 Labor hours | | | | | | | | | |
| | | 0.48 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| | 20 | Bitum Paving Driveway | 16.00 | sy | - | - | 253 | | - | 15.80 /sy | 253 |
| | 30 | Bitum Paving Sidewalks | 25.00 | sy | - | - | 1,000 | | - | 40.00 /sy | 1,000 |
| | | **Asphalt Paving - Location** | | | | | **1,253** | | | | **1,253** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 89.00 | sy | 7 | 195 | - | | 7 | 2.36 /sy | 210 |
| | | **Lawns & Grasses** | | | **7** | **195** | | | **7** | | **210** |
| | | 0.36 Labor hours | | | | | | | | | |
| | | 0.18 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 110 | Concrete: Slab on Grade | 34.00 | cy | 2,461 | 10,540 | - | | 926 | 409.61 /cy | 13,927 |
| n | 140 | Concrete: Wall | 66.00 | cy | 8,190 | 23,100 | - | | 3,328 | 524.52 /cy | 34,618 |
| n | 145 | Concrete: Elevated Slab | 34.00 | cy | 3,867 | 12,240 | - | | 1,715 | 524.18 /cy | 17,822 |
| | | **Concrete in Place** | | | **14,518** | **45,880** | | | **5,969** | | **66,367** |
| | | 702.000 Labor hours | | | | | | | | | |
| | | 118.36 Equipment hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 4.00 | ea | 307 | 5,106 | - | | - | 1,353.173 /ea | 5,413 |
| | | **Hatch, Aluminum, 300psf** | | | **307** | **5,106** | | | | | **5,413** |
| | | 12.80 Labor hours | | | | | | | | | |
| **08330.020** | | **Rolling Alum Door Manual** | | | | | | | | | |
| | z005 | Roll Door Manual (8'x8') | 64.00 | sf | 518 | 2,397 | - | | - | 45.542 /sf | 2,915 |
| | | **Rolling Alum Door Manual** | | | **518** | **2,397** | | | | | **2,915** |
| | | 10.944 Labor hours | | | | | | | | | |
| **11000.005** | | **Equipment Allowance** | | | | | | | | | |
| | 5 | 36" In Line Chemical Inductor w/ VFD | 1.00 | ea | 23,242 | 45,000 | - | | | 68,241.600 /ea | 68,242 |
| | | **Equipment Allowance** | | | **23,242** | **45,000** | | | | | **68,242** |
| | | 960.000 Labor hours | | | | | | | | | |
| | | 0.000 Equipment hours | | | | | | | | | |
| **11220.100** | | **Chemical Mixing Units** | | | | | | | | | |
| | 01 | Chemical Mixer | 8.00 | ea | 1,527 | 3,200 | - | | - | 590.88 /ea | 4,727 |
| | | **Chemical Mixing Units** | | | **1,527** | **3,200** | | | | | **4,727** |
| | | 64.00 Labor hours | | | | | | | | | |
| **11240.400** | | **Polymer Store/Feed Equip** | | | | | | | | | |
| | 0 | Polymer Tote Containment | 2.00 | ea | 968 | 1,600 | - | | 685 | 1,626.32 /ea | 3,253 |
| | 00 | Metering Pump/Poly Blend and Feed Pump | 2.00 | ea | 6,681 | 28,264 | - | | - | 17,472.400 /ea | 34,945 |
| | ---- | 1st Fill of Polymer or FeCl3 (3 day supply) | 3.00 | day | 600 | 1,800 | - | | - | 800.00 /day | 2,400 |
| | | **Polymer Store/Feed Equip** | | | **8,248** | **31,664** | | | **685** | | **40,597** |
| | | 352.00 Labor hours | | | | | | | | | |
| | | 8.00 Equipment hours | | | | | | | | | |
| **13121.000** | | **Pre-Engineered Metal Bldg** | | | | | | | | | |
| | z001 | Pre-Engineered Metal Bldg - Polymer Shed - 14'high | 468.00 | sf | | | 35,100 | | | 75.00 /sf | 35,100 |
| | | **Pre-Engineered Metal Bldg** | | | | | **35,100** | | | | **35,100** |
| **15113.450** | | **GV Knife Gate ValveCI/DI** | | | | | | | | | |
| n | 1249 | Knife Gate Valve, Gear & Wheel Oper, flg, 8" | 1.00 | ea | 190 | 700 | - | | - | 890.28 /ea | 890 |
| n | 160Z | Knife Gate Valve, Motor Oper,36" | 3.00 | ea | 3,343 | 42,750 | - | | - | 15,364.34 /ea | 46,093 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **GV Knife Gate ValveCI/DI** | | | **3,533** | **43,450** | | | | | **46,983** |
| | | 111.040 Labor hours | | | | | | | | | |
| **15115.810** | | **Diaphragm Valve PVC** | | | | | | | | | |
| n | 130I | PVC Diaphragm Valve, 1" | 6.00 | ea | 357 | 5,760 | - | | - | 1,019.522 /ea | 6,117 |
| | | **Diaphragm Valve PVC** | | | **357** | **5,760** | | | | | **6,117** |
| | | 11.22 Labor hours | | | | | | | | | |
| **15230.400** | | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | 0 | Unload Care & Protect PCCP & Fittings | 31.00 | lf | 0 | - | - | | 0 | 0.01 /lf | 0 |
| | 10 | Layout Pipe & Fitting | 31.00 | lf | 7 | - | - | | - | 0.24 /lf | 7 |
| | 325 | PCCP Equipment- Cat 325 Excavator | 2.60 | ch | 50 | - | - | | 288 | 130.092 /ch | 338 |
| n | B036 | Prestressed Concrete Cylinder Pipe (250#) 36 | 31.00 | lf | 1,036 | 3,348 | - | | - | 141.404 /lf | 4,384 |
| n | L036 | PCCP 45 Bend 36 | 2.00 | ea | 517 | 2,400 | - | | - | 1,458.64 /ea | 2,917 |
| n | Q036 | PCCP Wye 36 | 2.00 | ea | 716 | 2,400 | - | | - | 1,558.23 /ea | 3,116 |
| | | **Prestr Conc Cylind-(PCCP)** | | | **2,327** | **8,148** | | | **288** | | **10,763** |
| | | 98.033 Labor hours | | | | | | | | | |
| | | 2.603 Equipment hours | | | | | | | | | |
| **15241.100** | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | 0 | Unload Care & Protect Pipe/Fittings | 360.00 | lf | 1 | - | - | | 2 | 0.01 /lf | 3 |
| | 10 | Layout Pipe & Fitting | 360.00 | lf | 86 | - | - | | - | 0.24 /lf | 86 |
| n | 8080 | PVC Schd. 80 Pipe, 1.00" | 360.00 | lf | 429 | 475 | - | | - | 2.513 /lf | 905 |
| n | 8A80 | PVC Sch 80. 90 Ell , 1.00" | 15.00 | ea | 61 | 66 | - | | - | 8.46 /ea | 127 |
| n | 8F88 | PVC Sch 80. Tee , 1.00" | 3.00 | ea | 16 | 24 | - | | - | 13.38 /ea | 40 |
| | a010 | PVC Joint Primer- Quart | 0.32 | qrt | - | 5 | - | | - | 15.36 /qrt | 5 |
| | a020 | PVC Solvent Cement Low VOC- Quart | 0.32 | qrt | - | 7 | - | | - | 21.90 /qrt | 7 |
| | | **PVC Schd Pipe & Fittings** | | | **593** | **577** | | | **2** | | **1,172** |
| | | 24.88 Labor hours | | | | | | | | | |
| | | 0.04 Equipment hours | | | | | | | | | |
| **15400.005** | | **Plumbing Allowance** | | | | | | | | | |
| | 5 | Plumbing Allowance - hook plant water to poly system | 1.00 | ls | | | 7,500 | | - | 7,500.00 /ls | 7,500 |
| | 5 | Plumbing Allowance - supply wash out sink/potable water connection | 1.00 | ls | | | 7,500 | | - | 7,500.00 /ls | 7,500 |
| | | **Plumbing Allowance** | | | | | **15,000** | | | | **15,000** |
| | | 0.000 Labor hours | | | | | | | | | |
| **15500.001** | | **HVAC Equipment** | | | | | | | | | |
| | 155 | HVAC Allowance - Chem Feed Bldg | 468.00 | sf | - | - | 18,720 | | - | 40.00 /sf | 18,720 |
| | | **HVAC Equipment** | | | | | **18,720** | | | | **18,720** |
| **16000.005** | | **Electrical Allowance** | | | | | | | | | |
| | 5 | Electrical Allowance - light shed and provide power to pumps | 1.00 | ls | | | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | 5 | Electrical Allowance - chemical inductor | 1.00 | ls | | | 20,000 | | - | 20,000.00 /ls | 20,000 |
| | 5 | Electrical & I&C Allowance for Knife Gate Valves | 1.00 | ls | | | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | 5 | Electrical Allowance | 468.00 | sf | | | 9,360 | | - | 20.00 /sf | 9,360 |
| | | **Electrical Allowance** | | | | | **49,360** | | | | **49,360** |
| | | 0.000 Labor hours | | | | | | | | | |
| | | ***08 Chemical Feed*** | | | ***61,972*** | ***202,805*** | ***167,079*** | | ***17,068*** | | ***448,924*** |
| | | 2,638.62 Labor hours | | | | | | | | | |
| | | 238.840 Equipment hours | | | | | | | | | |

## Estimate Totals

| | Description | Amount | Totals | Hours | Rate |
|---|---|---|---|---|---|
| | Labor | 1,891,376 | | 81,138 hrs | |
| | Material | 5,642,394 | | | |
| | Subcontract | 747,300 | | | |
| | Equipment | 1,195,528 | | 14,550 hrs | |
| | Other | 1,358 | | | |
| **Subtotal Direct Cost** | | **9,477,956** | **9,477,956** | | |
| | I&C | 947.789 | | | 10.00 % |
| | Electrical | 1,421.684 | | | 15.00 % |
| | | **2,369,473** | **11,847,429** | | |
| | Indirect Costs: | | | | |
| | Building Permits(% total cost) | 91.299 | | | 0.40 % |
| | Sales Tax (MEO) | | | | |
| | Builders Risk Ins % total cost | 57.062 | | | 0.25 % |
| | Gen Liability Ins % total cost | 456.497 | | | 2.00 % |
| | GC Bonds (% total cost) | 228.249 | | | 1.00 % |
| **Subtotal Prior to OH&P** | | **833,107** | **12,680,536** | | |
| | GC Field General Conditions | 1.268.047 | | | 10.00 % |
| | GC Indirects. OH & Profit | 1.268.047 | | | 10.00 % |
| **Subtotal** | | **2,536,094** | **15,216,630** | | |
| | Construction Contingency | 3.804.142 | | | 25.00 % |
| | **Total Construction Cost** | **3,804,142** | **19,020,772** | | |
| | Engineering, Permitting, Bond Financing, Legal and Adminstration | 3.804.142 | | | 20.00 % |
| **Total Program Cost** | | **3,804,142** | **22,824,914** | | |
| | ***Total*** | | ***22,824,914*** | | |

This is an Opinion of Probable Construction Cost only, as defined by the documents provided at the level of design indicated on the front sheet of this estimate.
There are not any costs provided for: Change Orders, Construction Oversight, land acquisition or temporary/permanent easements, Operations, or any other costs associated with this project that are not specifically part of the bidding contractor's proposed scope.
The total cost shown is valid to only two significant figures.

# *Knoxville, Tennessee*
# *Fourth Creek WWTP - Options 6*
# *Opinion of Probable Construction Cost, Prelim Design, March 2007*

| | |
|---|---|
| **Project name** | TN, Knoxville FCWWTP |
| **Estimator** | MacIsaac |
| **Labor rate table** | TN07 Knoxville |
| **Equipment rate table** | 00 071H Equip Rental |
| **database version:** | V6.0 TES 9.4.22.0 |
| **ENR 20 City CCI** | March 2007: 7856 |
| **Notes** | This is an Opinion of Probable Construction Cost only, as defined by the documents provided at the level of design indicated above. CDM has no control over the cost of labor, materials, equipment, or services furnished, over schedules, over contractor's methods of determining prices, competitive bidding, market or negotiating conditions. CDM does not guarantee that this opinion will not vary from actual cost, or contractor's bids. There are not any costs provided for: Change Orders, Construction Oversight, Land Acquisition or temporary/permanent Easements, Operations, or any other costs associated with this project that are not specifically part of the bidding contractor's proposed scope.<br><br>The total cost shown is valid to only two significant figures<br><br>Assumptions:<br>No rock excavation is required.<br>Only nominal dewatering is needed.<br>No consideration for contaminated soils or hazardous materials (i.e. asbestos, lead)<br>Based on a 40 hour work week with no overtime.<br><br>This job is sales tax exempt.<br>Costs shown in April 2007 dollars. |
| **Report format** | Sorted by 'Proj Area/Phase'<br>'Detail' summary<br>Allocate addons<br>Round unit prices<br>Combine items<br>Paginate |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***01 Headworks Diversion*** | | | | | | | | | |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Modifications to Diversion Structure A for new Sluice Gate | 1.00 | ls | - | - | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | 20 | New Wet-Weather Screenings Diversion Structure | 1.00 | ls | 3,366 | 100,000 | | | - | 103,365.70 /ls | 103,366 |
| | | **Sitework Allowance** | | | **3,366** | **100,000** | **10,000** | | | | **113,366** |
| | | 240.00 Labor hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 63.00 | lf | 6 | | - | | - | 0.092 /lf | 6 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 158.28 | cy | 80 | - | - | | 350 | 2.72 /cy | 430 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 9.593 | cy | 15 | - | - | | 48 | 6.56 /cy | 63 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 42.53 | cy | 103 | - | - | | 343 | 10.492 /cy | 446 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 74.343 | cy | 67 | - | - | | 212 | 3.75 /cy | 279 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 52.12 | cy | - | 1,835 | - | | - | 35.20 /cy | 1,835 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 83.94 | cy | 118 | - | - | | 226 | 4.10 /cy | 344 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 83.94 | cy | 82 | - | - | | 137 | 2.61 /cy | 219 |
| n | 9616 | Trench Shield- 6x16 | 0.10 | u/mo | - | - | - | | 141 | 1,410.00 /u/mo | 141 |
| | A002 | Pipe Detectable/Non-Detectable Tape | 63.00 | lf | 6 | 3 | - | | - | 0.15 /lf | 9 |
| | | **Trenching** | | | **476** | **1,838** | | | **1,457** | | **3,772** |
| | | 31.23 Labor hours | | | | | | | | | |
| | | 21.04 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 83.94 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 83.94 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 83.94 | cy | 135 | - | - | | 260 | 4.712 /cy | 396 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 83.94 | cy | 378 | - | - | | 629 | 12.001 /cy | 1,007 |
| | | **Excavation Spoils** | | | **513** | | | | **889** | | **1,403** |
| | | 30.20 Labor hours | | | | | | | | | |
| | | 15.10 Equipment hours | | | | | | | | | |
| **11284.000** | | **Sluice Gates** | | | | | | | | | |
| | 7248 | 72" x 48" Sluice Gate | 1.00 | ea | 14,316 | 28,800 | - | | - | 43,116.00 /ea | 43,116 |
| | | **Sluice Gates** | | | **14,316** | **28,800** | | | | | **43,116** |
| | | 600.00 Labor hours | | | | | | | | | |
| **11330.100** | | **Barscreens** | | | | | | | | | |
| n | A 1 | 10MGD Romag Screen | 1.00 | ea | 47,720 | 150,000 | - | | - | 197,720.00 /ea | 197,720 |
| | | **Barscreens** | | | **47,720** | **150,000** | | | | | **197,720** |
| | | 2,000.000 Labor hours | | | | | | | | | |
| **15230.100** | | **Concrete Pipe (RCP)** | | | | | | | | | |
| | 0 | Unload Care & Protect RCP & Fittings | 63.00 | lf | 0 | - | - | | 0 | 0.01 /lf | 1 |
| | 10 | Layout Pipe & Fitting | 63.00 | lf | 15 | - | - | | - | 0.24 /lf | 15 |
| | 325 | RCP Equipment- Cat 325 Excavator | 9.45 | ch | 183 | - | - | | 1,046 | 130.080 /ch | 1,229 |
| n | 4042 | RCP Class IV Pipe 42 | 63.00 | lf | 2,480 | 4,851 | - | | - | 116.37 /lf | 7,331 |
| n | G042 | RCP Wye 42 | 1.00 | ea | 418 | 700 | - | | - | 1,118.03 /ea | 1,118 |
| | | **Concrete Pipe (RCP)** | | | **3,096** | **5,551** | | | **1,047** | | **9,694** |
| | | 131.56 Labor hours | | | | | | | | | |
| | | 9.46 Equipment hours | | | | | | | | | |
| | | ***01 Headworks Diversion*** | | | ***69,488*** | ***286,189*** | ***10,000*** | | ***3,393*** | | ***369,070*** |
| | | 3,032.982 Labor hours | | | | | | | | | |
| | | 45.594 Equipment hours | | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***02 Wet Weather Pump Station*** | | | | | | | | | |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Connect to Existing 42" Influent Sewer (12'deep) | 2.00 | ea | - | - | 15,000 | | - | 7,500.00 /ea | 15,000 |
| | 20 | Protect Existing Utilities | 1.00 | ls | - | - | 2,500 | | - | 2,500.00 /ls | 2,500 |
| | ---- | Assumption of 20% of Excavated Material is Contaiminated | 830.00 | cy | | | 20,750 | | - | 25.00 /cy | 20,750 |
| | | **Sitework Allowance** | | | | | **38,250** | | | | **38,250** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2502 | Remove 6" DIP City Water Piping 8'deep | 490.00 | lf | 800 | - | - | | 1,519 | 4.731 /lf | 2,318 |
| | 2502 | Abandon in place 6" DIP City Water Piping | 111.00 | lf | 181 | - | - | | 344 | 4.731 /lf | 525 |
| | 2712 | Saw Cut Asphalt Pavement, 5"thk | 134.00 | lf | 39 | 67 | - | | 242 | 2.60 /lf | 348 |
| | 2734 | Remove Asphalt Pavement, 5"thk | 491.00 | sy | 763 | - | - | | 1,537 | 4.684 /sy | 2,300 |
| | 2734 | Remove Asphalt Pavement, Sidewalk | 59.00 | sy | 92 | - | - | | 185 | 4.684 /sy | 276 |
| | | **Selective Site Demolition** | | | **1,874** | **67** | | | **3,827** | | **5,768** |
| | | 114.494 Labor hours | | | | | | | | | |
| | | 76.14 Equipment hours | | | | | | | | | |
| **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | 1 | Design Shoring System-Minor | 5.00 | ls | - | - | 5,000 | | - | 1,000.00 /ls | 5,000 |
| | 100 | Survey & Layout Shoring | 366.00 | lf | 6 | - | - | | - | 0.02 /lf | 6 |
| | 105 | Mobilize Pile Driving Equipment | 1.00 | ea | - | - | 25,000 | | - | 25,000.00 /ea | 25,000 |
| n | 1025 | Steel Sheeting,15' x 22psf, pulled & salvage | 3,000.00 | sf | 15,546 | 17,430 | - | | 20,533 | 17.84 /sf | 53,509 |
| n | 1030 | Steel Sheeting,20' x 27psf, pulled & salvage | 1,600.00 | sf | 8,291 | 12,048 | - | | 10,951 | 19.56 /sf | 31,290 |
| n | 1035 | Steel Sheeting,25' x 38psf, pulled & salvage | 2,150.00 | sf | 11,141 | 22,124 | - | | 14,715 | 22.32 /sf | 47,980 |
| | 1045 | Install & Remove Wales/Struts/Connectors | 9.55 | ton | 2,319 | 8,781 | - | | 3,062 | 1,483.731 /ton | 14,162 |
| n | 1050 | Rent Steel Sheet Piling and Wales, first month | 105.00 | ton | - | 31,877 | - | | - | 303.601 /ton | 31,877 |
| | | **Sheet Piling** | | | **37,303** | **92,260** | **30,000** | | **49,260** | | **208,823** |
| | | 1,228.73 Labor hours | | | | | | | | | |
| | | 307.09 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 649.52 | cy | 547 | - | - | | 1,480 | 3.121 /cy | 2,027 |
| | 461C | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 142.19 | cy | 242 | - | - | | 470 | 5.011 /cy | 713 |
| n | A000 | IMPORT MATERIAL (Summary) | 10.00 | CY | - | - | - | | - | | |
| n | A015 | Import Gravel Fill | 46.56 | cy | - | 698 | 261 | | - | 20.60 /cy | 959 |
| | | **Foundation Excavation** | | | **790** | **698** | **261** | | **1,950** | | **3,699** |
| | | 51.703 Labor hours | | | | | | | | | |
| | | 28.70 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 1,274.00 | lf | 118 | | - | | - | 0.092 /lf | 118 |
| n | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 624.262 | cy | 1,262 | - | - | | 3,556 | 7.72 /cy | 4,818 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 1,008.703 | cy | 510 | - | - | | 2,231 | 2.72 /cy | 2,741 |
| n | 3130 | Trench Bedding-Excavator- 130 HP | 49.34 | cy | 100 | - | - | | 290 | 7.901 /cy | 390 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 61.13 | cy | 93 | - | - | | 308 | 6.56 /cy | 401 |
| n | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 113.123 | cy | 366 | - | - | | 1,064 | 12.641 /cy | 1,430 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 203.53 | cy | 494 | - | - | | 1,642 | 10.492 /cy | 2,135 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 843.981 | cy | 763 | - | - | | 2,402 | 3.75 /cy | 3,165 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 427.112 | cy | - | 15,034 | - | | - | 35.20 /cy | 15,034 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 512.813 | cy | 719 | - | - | | 1,382 | 4.10 /cy | 2,101 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 512.813 | cy | 502 | - | - | | 836 | 2.61 /cy | 1,338 |
| n | 9616 | Trench Shield- 6x16 | 2.31 | u/mo | - | - | - | | 3,257 | 1,410.00 /u/mo | 3,257 |
| | A002 | Pipe Detectable/Non-Detectable Tape | 490.00 | lf | 45 | 27 | - | | - | 0.15 /lf | 72 |
| | A006 | Pipe Test | 1,216.00 | lf | 899 | 973 | - | | - | 1.54 /lf | 1,871 |
| | C0J0 | Concrete Thrust Block, 6" | 2.00 | ea | 143 | 10 | - | | - | 76.58 /ea | 153 |
| | C0P0 | Concrete Thrust Block, 12" | 9.00 | ea | 816 | 162 | - | | - | 108.63 /ea | 978 |
| | C0T0 | Concrete Thrust Block, 20" | 5.00 | ea | 537 | 280 | - | | - | 163.37 /ea | 817 |
| | | **Trenching** | | | **7,366** | **16,486** | | | **16,968** | | **40,820** |
| | | 421.03 Labor hours | | | | | | | | | |
| | | 212.31 Equipment hours | | | | | | | | | |
| **02315.400** | | **Drilling & Blasting** | | | | | | | | | |
| | 1008 | Hydraulic Hoe Ram -Medium | 222.00 | cy | | - | 27,750 | | | 125.00 /cy | 27,750 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Drilling & Blasting** | | | | | **27,750** | | | | **27,750** |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 1,020.15 | cy | - | - | - | | - | | |
| | 40 | Foundation Excavation Spoils (Summary) | 507.332 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 512.813 | cy | - | - | - | | - | | |
| | 46 | Bore & Jack Spoils Spoils (Summary) | 3.113 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 515.93 | cy | 832 | - | - | | 1,599 | 4.712 /cy | 2,431 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 507.332 | cy | 590 | - | - | | 1,662 | 4.44 /cy | 2,252 |
| | A0A0 | Haul Spoils/Off Site 10cy Rear Dump 4.00 Hour/Load | 3.113 | cy | 54 | - | - | | 90 | 46.203 /cy | 144 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 512.813 | cy | 2,309 | - | - | | 3,845 | 12.001 /cy | 6,154 |
| | A0I7 | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 507.332 | cy | 318 | - | - | | 733 | 2.071 /cy | 1,051 |
| | | **Excavation Spoils** | | | **4,103** | | | | **7,929** | | **12,031** |
| | | 240.041 Labor hours | | | | | | | | | |
| | | 120.021 Equipment hours | | | | | | | | | |
| **02445.000** | | **Boring & Jack Conduit** | | | | | | | | | |
| | 0 | Mob/Demob Bore & Jack Equipment | 1.00 | ea | - | - | 5,000 | | - | 5,000.00 /ea | 5,000 |
| | 100 | Excavate Jacking Pit | 59.26 | cy | 108 | - | - | | 291 | 6.73 /cy | 399 |
| | 105 | Excavate Recieving Pit | 29.63 | cy | 54 | - | - | | 146 | 6.73 /cy | 199 |
| | 200 | Shore Jacking/Receiving Pits | 920.00 | bsf | - | - | 13,800 | | - | 15.00 /bsf | 13,800 |
| | 300 | Backfill Jacking/Receiving Pits | 88.89 | cy | 435 | - | - | | 909 | 15.12 /cy | 1,344 |
| | 400 | Jacking Slab & Reaction Block | 2.66 | cy | 578 | 612 | - | | - | 447.372 /cy | 1,190 |
| n | 5012 | Bore & Jack Pipe 12 | 107.00 | lf | - | - | 12,840 | | - | 120.00 /lf | 12,840 |
| | 7000 | Grout Casing | 2.334 | cy | 10 | 403 | - | | 11 | 181.43 /cy | 423 |
| | | **Boring & Jack Conduit** | | | **1,184** | **1,014** | **31,640** | | **1,357** | | **35,196** |
| | | 62.74 Labor hours | | | | | | | | | |
| | | 22.42 Equipment hours | | | | | | | | | |
| **02518.810** | | **Fire Hydrants/Valves** | | | | | | | | | |
| | 0 | Salvage & Reinstall Fire Hydrant | 2.00 | ea | 906 | | - | | | 453.22 /ea | 906 |
| | 206 | Salvage & Reinstall Hydrant Valve 6" | 2.00 | ea | 680 | | - | | | 339.92 /ea | 680 |
| n | F606 | Hydrant Tee 6x6 | 1.00 | ea | 99 | 207 | - | | | 306.14 /ea | 306 |
| | | **Fire Hydrants/Valves** | | | **1,685** | **207** | | | | | **1,892** |
| | | 59.50 Labor hours | | | | | | | | | |
| | | 32.00 Equipment hours | | | | | | | | | |
| **02639.020** | | **Storm Drainage Manholes** | | | | | | | | | |
| | 0 | Unload Care & Protect Manhole | 2.00 | ea | 35 | - | - | | - | 17.51 /ea | 35 |
| | 7200 | Place & Shape Manhole Base & Inverts- 72" | 1.00 | ea | 210 | - | - | | - | 511.88 /ea | 512 |
| | 7217 | Manhole 72" x 17' Deep | 1.00 | ea | 412 | 8,134 | - | | 496 | 9,041.93 /ea | 9,042 |
| | 9600 | Place & Shape Manhole Base & Inverts- 96" | 1.00 | ea | 210 | - | - | | - | 694.04 /ea | 694 |
| | 9610 | Manhole 96" x 10' Deep | 1.00 | ea | 343 | 6,249 | - | | 496 | 7,088.53 /ea | 7,089 |
| | | **Storm Drainage Manholes** | | | **1,210** | **14,383** | | | **993** | | **17,371** |
| | | 70.000 Labor hours | | | | | | | | | |
| | | 8.00 Equipment hours | | | | | | | | | |
| **02720.100** | | **Aggregate Base Course** | | | | | | | | | |
| | 1180 | Crushed Rock (1" minus) | 234.00 | cy | 667 | 2,392 | - | | 3,369 | 27.47 /cy | 6,428 |
| | | **Aggregate Base Course** | | | **667** | **2,392** | | | **3,369** | | **6,428** |
| | | 37.44 Labor hours | | | | | | | | | |
| | | 37.44 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| | 20 | Bitum Paving | 491.00 | sy | - | - | 3,928 | | - | 8.00 /sy | 3,928 |
| | 30 | Bitum Paving Sidewalks | 67.00 | sy | - | - | 2,680 | | - | 40.00 /sy | 2,680 |
| | | **Asphalt Paving - Location** | | | | | **6,608** | | | | **6,608** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 5,625.00 | sy | 468 | 12,319 | - | | 470 | 2.36 /sy | 13,257 |
| | | **Lawns & Grasses** | | | **468** | **12,319** | | | **470** | | **13,257** |
| | | 22.50 Labor hours | | | | | | | | | |
| | | 11.25 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 140 | Concrete: Wet Well Concrete | 232.00 | cy | 28,788 | 81,200 | - | | 11,700 | 524.52 /cy | 121,688 |
| n | 140 | Concrete: Valve Vault | 102.00 | cy | 12,657 | 35,700 | - | | 5,144 | 524.52 /cy | 53,501 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 145 | Concrete: Wet Weather Flow Diversion Structure | 53.00 | cy | 6,029 | 19,080 | - | | 2,673 | 524.18 /cy | 27,781 |
| n | 180 | Concrete: Grout Fill - Diversion Chamber | 4.00 | cy | 165 | 400 | - | | 20 | 146.41 /cy | 586 |
| n | 180 | Concrete: Grout Fill - Wetwell | 30.00 | cy | 1,241 | 3,000 | - | | 151 | 146.41 /cy | 4,392 |
| | | **Concrete in Place** | | | **48,880** | **139,380** | | | **19,688** | | **207,947** |
| | | 2,363.500 Labor hours | | | | | | | | | |
| | | 390.40 Equipment hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 6.00 | ea | 460 | 7,659 | - | | - | 1,353.172 /ea | 8,119 |
| n | J08 | 48"x 60" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 5.00 | ea | 431 | 6,641 | - | | - | 1,414.51 /ea | 7,073 |
| | | **Hatch, Aluminum, 300psf** | | | **891** | **14,300** | | | | | **15,192** |
| | | 37.20 Labor hours | | | | | | | | | |
| **06600.110** | | **FRP Weirs & Baffles** | | | | | | | | | |
| | 0 | Aluminum Weirs | 20.00 | lf | 116 | 690 | - | | | 40.30 /lf | 806 |
| | | **FRP Weirs & Baffles** | | | **116** | **690** | | | | | **806** |
| | | 5.00 Labor hours | | | | | | | | | |
| **11210.000** | | **PUMPS** | | | | | | | | | |
| | ---- | Pumps | 4.00 | ea | 7,261 | 12,640 | - | | - | 4,975.20 /ea | 19,901 |
| | ---- | Sludge Pump - 5HP | 1.00 | ea | 11,345 | 20,000 | - | | - | 31,345.00 /ea | 31,345 |
| | | **PUMPS** | | | **18,606** | **32,640** | | | | | **51,246** |
| | | 820.000 Labor hours | | | | | | | | | |
| **11217.100** | | **Submersible Sump Pumps** | | | | | | | | | |
| | 10 | Sump Pump | 1.00 | ea | 3,870 | 8,000 | - | | 2,740 | 14,610.56 /ea | 14,611 |
| | | **Submersible Sump Pumps** | | | **3,870** | **8,000** | | | **2,740** | | **14,611** |
| | | 192.00 Labor hours | | | | | | | | | |
| | | 32.00 Equipment hours | | | | | | | | | |
| **11284.000** | | **Sluice Gates** | | | | | | | | | |
| | 4242 | 42" x 42" Sluice Gate, MO | 1.00 | ea | 8,590 | 14,700 | - | | - | 23,289.60 /ea | 23,290 |
| | | **Sluice Gates** | | | **8,590** | **14,700** | | | | | **23,290** |
| | | 360.000 Labor hours | | | | | | | | | |
| **13000.005** | | **Special Const Allowance** | | | | | | | | | |
| | 5 | Level Sensor | 2.00 | ea | 771 | 3,450 | - | | - | 2,110.40 /ea | 4,221 |
| | | **Special Const Allowance** | | | **771** | **3,450** | | | | | **4,221** |
| | | 20.00 Labor hours | | | | | | | | | |
| **13121.000** | | **Pre-Engineered Metal Bldg** | | | | | | | | | |
| | z001 | Brick Bldg - Pump Controls | 600.00 | sf | | | 150,000 | | | 250.00 /sf | 150,000 |
| | | **Pre-Engineered Metal Bldg** | | | | | **150,000** | | | | **150,000** |
| **13420.200** | | **I&C Instruments** | | | | | | | | | |
| n | 05-FE-m020 | 20" Magnetic Flow Meter | 1.00 | ea | 510 | 11,500 | - | | - | 12,010.20 /ea | 12,010 |
| | | **I&C Instruments** | | | **510** | **11,500** | | | | | **12,010** |
| | | 18.60 Labor hours | | | | | | | | | |
| **15111.650** | | **Plug Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | 200P | Plug Valve, MJ, 6" | 1.00 | ea | 176 | 425 | - | | - | 601.28 /ea | 601 |
| n | 200S | Plug Valve, MJ, 12" | 4.00 | ea | 1,302 | 4,400 | - | | - | 1,425.62 /ea | 5,702 |
| | | **Plug Valve (CI/DI/IBBM)** | | | **1,479** | **4,825** | | | | | **6,304** |
| | | 46.46 Labor hours | | | | | | | | | |
| **15114.500** | | **Check Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | C20P | Check Valve, Double Disc, MJ, 6" | 1.00 | ea | 170 | 200 | - | | - | 369.97 /ea | 370 |
| n | C20S | Check Valve, Double Disc, MJ, 12" | 4.00 | ea | 1,306 | 2,400 | - | | - | 926.58 /ea | 3,706 |
| | | **Check Valve (CI/DI/IBBM)** | | | **1,476** | **2,600** | | | | | **4,076** |
| | | 46.38 Labor hours | | | | | | | | | |
| **15210.010** | | **DIP Totals** | | | | | | | | | |
| | 0 | Total Weight (Zero Cost Item) | 67,386.50 | lbs | - | - | - | | - | | |
| | 1 | Weight of Pipe (Zero Cost Item) | 57,836.500 | lbs | - | - | - | | - | | |
| | 2 | Weight of Fittings (Zero Cost Item) | 9,550.00 | lbs | - | - | - | | - | | |

| | Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **15210.200** | | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | | 0 | Unload Care & Protect Push-on DIP & Fittings | 67,386.50 | lbs | 130 | - | - | | 425 | 0.01 /lbs | 554 |
| | | 1 | Weight of Push-on Pipe (Zero Cost Item) | 57,836.500 | lbs | - | - | - | | - | | |
| | | 2 | Weight of Push-on Fittings (Zero Cost Item) | 9,550.00 | lbs | - | - | - | | - | | |
| | | 5 | Layout Push-on DIP & Fitting | 726.00 | lf | 165 | - | - | | - | 0.23 /lf | 165 |
| | | 11 | DIP Equipment- Cat 325 Excavator | 38.144 | ch | 739 | - | - | | 4,223 | 130.081 /ch | 4,962 |
| n | | 206 | DIP CML, Push-On, Class 52, 6" | 65.00 | lf | 341 | 805 | - | | - | 17.632 /lf | 1,146 |
| n | | 212 | DIP CML, Push-On, Class 52, 12" | 60.00 | lf | 444 | 1,671 | - | | - | 35.242 /lf | 2,114 |
| n | | 216 | DIP CML, Push-On, Class 52, 16" | 5.00 | lf | 42 | 209 | - | | - | 50.20 /lf | 251 |
| n | | 220 | DIP CML, Push-On, Class 52, 20" | 596.00 | lf | 5,402 | 32,539 | - | | - | 63.66 /lf | 37,940 |
| n | 2AMM | | DIP CML, Push-on, 90 Bend, 6" | 2.00 | ea | 112 | 240 | - | | - | 175.81 /ea | 352 |
| n | 2APP | | DIP CML, Push-on, 90 Bend, 12" | 9.00 | ea | 992 | 3,060 | - | | - | 450.19 /ea | 4,052 |
| n | 2ATT | | DIP CML, Push-on, 90 Bend, 20" | 5.00 | ea | 919 | 8,500 | - | | - | 1,883.722 /ea | 9,419 |
| n | FAUS | | DIP CML, Push-on, Tee BxB, 16"x 12" | 1.00 | ea | 196 | 1,638 | - | | - | 1,833.39 /ea | 1,833 |
| n | FAWP | | DIP CML, Push-on, Tee BxB, 20"x 6" | 1.00 | ea | 236 | 1,875 | - | | - | 2,110.74 /ea | 2,111 |
| n | FAWS | | DIP CML, Push-on, Tee BxB, 20"x 12" | 2.00 | ea | 471 | 4,025 | - | | - | 2,248.14 /ea | 4,496 |
| n | KASR | | DIP, CML, Push-on, Reducer BxB, 12"x 10" | 4.00 | ea | 378 | 1,320 | - | | - | 424.45 /ea | 1,698 |
| n | KAUS | | DIP, CML, Push-on, Reducer BxB, 16"x 12" | 1.00 | ea | 129 | 838 | - | | - | 966.34 /ea | 966 |
| n | KAWU | | DIP, CML, Push-on, Reducer BxB, 20"x 16" | 1.00 | ea | 161 | 1,225 | - | | - | 1,385.51 /ea | 1,386 |
| | | | **DIP CML Push-On Pipe** | | | **10,853** | **57,944** | | | **4,648** | | **73,445** |
| | | | 464.53 Labor hours | | | | | | | | | |
| | | | 45.56 Equipment hours | | | | | | | | | |
| **15220.302** | | | **A53 CW Pipe PE/GE/T&C/SW** | | | | | | | | | |
| n | 300P | | A53 CW Standard Pipe PE, 12" | 130.00 | lf | 1,674 | 19,328 | - | | - | 161.56 /lf | 21,003 |
| | | | **A53 CW Pipe PE/GE/T&C/SW** | | | **1,674** | **19,328** | | | | | **21,003** |
| | | | 70.20 Labor hours | | | | | | | | | |
| **15230.400** | | | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | | 0 | Unload Care & Protect PCCP & Fittings | 58.00 | lf | 0 | - | - | | 0 | 0.01 /lf | 0 |
| | | 10 | Layout Pipe & Fitting | 58.00 | lf | 14 | - | - | | - | 0.24 /lf | 14 |
| | | 325 | PCCP Equipment- Cat 325 Excavator | 8.70 | ch | 168 | - | - | | 963 | 130.091 /ch | 1,132 |
| n | B042 | | Prestressed Concrete Cylinder Pipe (250#) 42 | 58.00 | lf | 2,282 | 8,120 | - | | - | 179.353 /lf | 10,402 |
| | | | **Prestr Conc Cylind-(PCCP)** | | | **2,465** | **8,120** | | | **964** | | **11,549** |
| | | | 104.99 Labor hours | | | | | | | | | |
| | | | 8.71 Equipment hours | | | | | | | | | |
| **15241.100** | | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | | 0 | Unload Care & Protect Pipe/Fittings | 490.00 | lf | 1 | - | - | | 3 | 0.01 /lf | 4 |
| | | 10 | Layout Pipe & Fitting | 490.00 | lf | 117 | - | - | | - | 0.24 /lf | 117 |
| n | 80J0 | | PVC Schd. 80 Pipe, 6" | 620.00 | lf | 2,070 | 10,782 | - | | - | 20.73 /lf | 12,852 |
| | a010 | | PVC Joint Primer- Quart | 2.083 | qrt | - | 32 | - | | - | 15.35 /qrt | 32 |
| | a020 | | PVC Solvent Cement Low VOC- Quart | 2.083 | qrt | - | 46 | - | | - | 21.90 /qrt | 46 |
| | | | **PVC Schd Pipe & Fittings** | | | **2,188** | **10,859** | | | **3** | | **13,051** |
| | | | 91.754 Labor hours | | | | | | | | | |
| | | | 0.054 Equipment hours | | | | | | | | | |
| **15500.001** | | | **HVAC Equipment** | | | | | | | | | |
| | | 155 | HVAC Allowance - Pump Control Bldg | 600.00 | sf | - | - | 24,000 | | - | 40.00 /sf | 24,000 |
| | | | **HVAC Equipment** | | | | | **24,000** | | | | **24,000** |
| **16000.005** | | | **Electrical Allowance** | | | | | | | | | |
| | | 5 | Electrical & I&C Allowance | 1.00 | ls | | | 0 | | - | | |
| | | 5 | Electrical Allowance - Pump Control Bldg | 0.00 | sf | 0 | 0 | 0 | | - | | |
| | | | **Electrical Allowance** | | | | | | | | | |
| | | | 0.000 Labor hours | | | | | | | | | |
| | | | ***02 Wet Weather Pump Station*** | | | ***159,018*** | ***468,163*** | ***308,509*** | | ***114,166*** | | ***1,050,641*** |
| | | | 6,948.78 Labor hours | | | | | | | | | |
| | | | 1,332.074 Equipment hours | | | | | | | | | |

| | | | | | Labor | Material | Subcontract | | Equipment | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Item | | Description | Takeoff Qty | | Amount | Amount | Amount | Name | Amount | Unit Cost | Amount |
| | | ***03 High Rate Clarification*** | | | | | | | | | |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Allowance for passing around 7 existing pipes | 1.00 | ls | - | - | 7,000 | | - | 7,000.00 /ls | 7,000 |
| | | **Sitework Allowance** | | | | | **7,000** | | | | **7,000** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2734 | Remove Asphalt Pavement, Sidewalk | 150.00 | sy | 233 | - | - | | 470 | 4.684 /sy | 703 |
| | | **Selective Site Demolition** | | | **233** | | | | **470** | | **703** |
| | | 14.25 Labor hours | | | | | | | | | |
| | | 11.40 Equipment hours | | | | | | | | | |
| **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | 1 | Design Shoring System-Minor | 1.00 | ls | - | - | 1,000 | | - | 1,000.00 /ls | 1,000 |
| | 100 | Survey & Layout Shoring | 32.00 | lf | 0 | - | - | | - | 0.02 /lf | 0 |
| n | 1025 | Steel Sheeting,15' x 22psf, pulled & salvage | 480.00 | sf | 2,487 | 2,789 | - | | 3,285 | 17.84 /sf | 8,561 |
| | 1045 | Install & Remove Wales/Struts/Connectors | 0.53 | ton | 128 | 486 | - | | 169 | 1,483.73 /ton | 783 |
| n | 1050 | Rent Steel Sheet Piling and Wales, first month | 5.81 | ton | - | 1,763 | - | | - | 303.61 /ton | 1,763 |
| | | **Sheet Piling** | | | **2,616** | **5,038** | **1,000** | | **3,455** | | **12,109** |
| | | 86.18 Labor hours | | | | | | | | | |
| | | 21.54 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 110 | Hand Excavate Foundations | 18.00 | cy | 367 | - | - | | - | 20.37 /cy | 367 |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 14.82 | cy | 12 | - | - | | 34 | 3.122 /cy | 46 |
| | 461C | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 9.593 | cy | 16 | - | - | | 32 | 5.011 /cy | 48 |
| n | A000 | IMPORT MATERIAL (Summary) | 2.00 | CY | - | - | - | | - | | |
| n | A015 | Import Gravel Fill | 1.852 | cy | - | 28 | 10 | | - | 20.60 /cy | 38 |
| | | **Foundation Excavation** | | | **395** | **28** | **10** | | **66** | | **499** |
| | | 30.741 Labor hours | | | | | | | | | |
| | | 1.162 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 875.00 | lf | 81 | | - | | - | 0.092 /lf | 81 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 1,073.32 | cy | 543 | - | - | | 2,374 | 2.72 /cy | 2,916 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 66.80 | cy | 101 | - | - | | 337 | 6.56 /cy | 438 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 171.093 | cy | 415 | - | - | | 1,380 | 10.492 /cy | 1,795 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 813.65 | cy | 736 | - | - | | 2,316 | 3.75 /cy | 3,052 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 237.89 | cy | - | 8,374 | - | | - | 35.20 /cy | 8,374 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 259.67 | cy | 364 | - | - | | 700 | 4.10 /cy | 1,064 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 259.67 | cy | 254 | - | - | | 423 | 2.61 /cy | 677 |
| n | 9616 | Trench Shield- 6x16 | 3.00 | u/mo | - | - | - | | 4,230 | 1,410.00 /u/mo | 4,230 |
| | A006 | Pipe Test | 875.00 | lf | 647 | 700 | - | | - | 1.54 /lf | 1,347 |
| | C0N0 | Concrete Thrust Block, 10" | 11.00 | ea | 866 | 132 | - | | - | 90.74 /ea | 998 |
| | | **Trenching** | | | **4,007** | **9,206** | | | **11,759** | | **24,972** |
| | | 220.27 Labor hours | | | | | | | | | |
| | | 114.041 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 282.89 | cy | - | - | - | | - | | |
| | 40 | Foundation Excavation Spoils (Summary) | 23.222 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 259.67 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 259.67 | cy | 419 | - | - | | 805 | 4.712 /cy | 1,223 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 23.222 | cy | 27 | - | - | | 76 | 4.44 /cy | 103 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 259.67 | cy | 1,169 | - | - | | 1,947 | 12.001 /cy | 3,116 |
| | A0I7 | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 23.222 | cy | 15 | - | - | | 34 | 2.071 /cy | 48 |
| | | **Excavation Spoils** | | | **1,630** | | | | **2,861** | | **4,491** |
| | | 95.80 Labor hours | | | | | | | | | |
| | | 47.90 Equipment hours | | | | | | | | | |
| **02639.020** | | **Storm Drainage Manholes** | | | | | | | | | |
| | 0 | Unload Care & Protect Manhole | 1.00 | ea | 18 | - | - | | - | 17.51 /ea | 18 |
| | 4800 | Place & Shape Manhole Base & Inverts- 48" | 1.00 | ea | 210 | - | - | | - | 372.04 /ea | 372 |
| | 4805 | Manhole 48" x 5' Deep | 1.00 | ea | 113 | 1,657 | - | | | 1,769.79 /ea | 1,770 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Storm Drainage Manholes** | | | **340** | **1,657** | | | | | **2,159** |
| | | 21.00 Labor hours | | | | | | | | | |
| | | 4.00 Equipment hours | | | | | | | | | |
| **02720.100** | | **Aggregate Base Course** | | | | | | | | | |
| | 1002 | Granular fill | 200.00 | cy | 570 | | - | | 2,879 | 17.25 /cy | 3,449 |
| | 1002 | Granular fill | 342.00 | cy | 871 | | - | | | 2.55 /cy | 871 |
| | | **Aggregate Base Course** | | | **1,441** | | | | **2,879** | | **4,321** |
| | | 79.88 Labor hours | | | | | | | | | |
| | | 45.68 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| | 30 | Bitum Paving Sidewalks | 150.00 | sy | - | - | 6,000 | | - | 40.00 /sy | 6,000 |
| | | **Asphalt Paving - Location** | | | | | **6,000** | | | | **6,000** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 250.00 | sy | 21 | 548 | - | | 21 | 2.36 /sy | 589 |
| | | **Lawns & Grasses** | | | **21** | **548** | | | **21** | | **589** |
| | | 1.00 Labor hours | | | | | | | | | |
| | | 0.50 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 110 | Concrete: Slab on Grade | 122.00 | cy | 8,831 | 37,820 | - | | 3,322 | 409.62 /cy | 49,973 |
| n | 110 | Concrete: Slab on Grade - Pump Support | 1.00 | cy | 72 | 310 | - | | 27 | 409.61 /cy | 410 |
| n | 110 | Concrete: Slab on Grade | 7.00 | cy | 507 | 2,170 | - | | 191 | 409.62 /cy | 2,867 |
| n | 110 | Concrete: Slab on Grade - Pump Support | 1.00 | cy | 72 | 310 | - | | 27 | 409.61 /cy | 410 |
| n | 140 | Concrete | 67.00 | cy | 8,314 | 23,450 | - | | 3,379 | 524.52 /cy | 35,143 |
| n | 140 | Concrete: Wall | 69.00 | cy | 8,562 | 24,150 | - | | 3,480 | 524.52 /cy | 36,192 |
| n | 140 | Concrete: Base | 15.00 | cy | 1,861 | 5,250 | - | | 756 | 524.52 /cy | 7,868 |
| n | 140 | Concrete: Wall | 318.00 | cy | 39,459 | 111,300 | - | | 16,037 | 524.52 /cy | 166,796 |
| n | 140 | Concrete: Channel Wall | 39.00 | cy | 4,839 | 13,650 | - | | 1,967 | 524.52 /cy | 20,456 |
| n | 140 | Concrete: Wall | 45.00 | cy | 5,584 | 15,750 | - | | 2,269 | 524.52 /cy | 23,603 |
| n | 140 | Concrete: Wall - Wet Well | 40.00 | cy | 4,963 | 14,000 | - | | 2,017 | 524.52 /cy | 20,981 |
| n | 145 | Concrete: Elevated Slab | 25.00 | cy | 2,844 | 9,000 | - | | 1,261 | 524.18 /cy | 13,104 |
| n | 145 | Concrete: Elevated Slab - Wet Well | 11.00 | cy | 1,251 | 3,960 | - | | 555 | 524.18 /cy | 5,766 |
| n | 180 | Concrete: Grout Fill - avoid grit deposition | 2.00 | cy | 83 | 200 | - | | 10 | 146.41 /cy | 293 |
| n | 180 | Concrete: Grout Fill | 80.00 | cy | 3,309 | 8,000 | - | | 403 | 146.41 /cy | 11,712 |
| | | **Concrete in Place** | | | **90,552** | **269,320** | | | **35,701** | | **395,573** |
| | | 4,378.500 Labor hours | | | | | | | | | |
| | | 707.94 Equipment hours | | | | | | | | | |
| **03150.010** | | **Concrete Core & Saw** | | | | | | | | | |
| | c 60 | Core Drill 6" to 12" depth | 5.00 | ea | 197 | - | - | | | 39.49 /ea | 197 |
| | c100 | Core Drill 10" to 12" depth | 4.00 | ea | 188 | - | - | | | 46.893 /ea | 188 |
| | | **Concrete Core & Saw** | | | **385** | | | | | | **385** |
| | | 31.20 Labor hours | | | | | | | | | |
| **05510.000** | | **Metal Ladders** | | | | | | | | | |
| | 10 | Straight Ladder-Aluminum | 175.00 | lf | 3,110 | 8,028 | - | | - | 63.642 /lf | 11,137 |
| | | **Metal Ladders** | | | **3,110** | **8,028** | | | | | **11,137** |
| | | 87.50 Labor hours | | | | | | | | | |
| **05520.000** | | **Handrail/Railing** | | | | | | | | | |
| | 103 | 3 Rail-Handrail Alum. w/Toe | 280.00 | lf | 2,488 | 19,320 | - | | - | 77.884 /lf | 21,808 |
| | | **Handrail/Railing** | | | **2,488** | **19,320** | | | | | **21,808** |
| | | 70.00 Labor hours | | | | | | | | | |
| **05530.200** | | **Alum. Grating-Riveted** | | | | | | | | | |
| | 5 K | 1-1/4x1/8 Riveted Grate-Stnd. | 144.00 | sf | 870 | 6,160 | - | | - | 48.821 /sf | 7,030 |
| | 8 K | 1-1/2x3/16 Riveted Grate-Stnd. | 1,400.00 | sf | 8,458 | 56,672 | - | | - | 46.521 /sf | 65,130 |
| | | **Alum. Grating-Riveted** | | | **9,328** | **62,832** | | | | | **72,160** |
| | | 262.48 Labor hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 8.00 | ea | 613 | 10,212 | - | | - | 1,353.173 /ea | 10,825 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Hatch, Aluminum, 300psf** | | | **613** | **10,212** | | | | | **10,825** |
| | | 25.60 Labor hours | | | | | | | | | |
| **06600.110** | | **FRP Weirs & Baffles** | | | | | | | | | |
| | 10 | Aluminum Weir | 20.00 | lf | 120 | 690 | - | | - | 40.52 /lf | 810 |
| | | **FRP Weirs & Baffles** | | | **120** | **690** | | | | | **810** |
| | | 5.00 Labor hours | | | | | | | | | |
| **09910.100** | | **Paint Pipe/Valve/Equip** | | | | | | | | | |
| | 10 | Paint Pipe - Standard Paint | 10.91 | sf | 6 | 4 | - | | - | 0.88 /sf | 10 |
| | | **Paint Pipe/Valve/Equip** | | | **6** | **4** | | | | | **10** |
| | | 0.22 Labor hours | | | | | | | | | |
| **11000.005** | | **Equipment Allowance** | | | | | | | | | |
| | 5 | Equipment Allowance - Kruger Estimate | 1.00 | ls | 464,760 | 1,485,000 | - | | 411,000 | 2,360,760.00 /ls | 2,360,760 |
| | | **Equipment Allowance** | | | **464,760** | **1,485,000** | | | **411,000** | | **2,360,760** |
| | | 19,200.00 Labor hours | | | | | | | | | |
| | | 4,800.00 Equipment hours | | | | | | | | | |
| **11000.015** | | **Equipment Demolition** | | | | | | | | | |
| n | q003 | 20 cy Roll-Off Dumpster | 1.00 | ea | 91 | 2,500 | | | - | 2,590.760 /ea | 2,591 |
| | | **Equipment Demolition** | | | **91** | **2,500** | | | | | **2,591** |
| | | 4.00 Labor hours | | | | | | | | | |
| **11210.000** | | **PUMPS** | | | | | | | | | |
| | ---- | Sludge Pump - 5HP | 1.00 | ea | 11,345 | 20,000 | - | | - | 31,345.00 /ea | 31,345 |
| | | **PUMPS** | | | **11,345** | **20,000** | | | | | **31,345** |
| | | 500.000 Labor hours | | | | | | | | | |
| **11217.100** | | **Submersible Sump Pumps** | | | | | | | | | |
| | 05 | Sump Pump 5 HP | 2.00 | ea | 7,741 | 16,000 | - | | 5,480 | 14,610.56 /ea | 29,221 |
| | 10 | Sump Pump | 2.00 | ea | 7,741 | 16,000 | - | | 5,480 | 14,610.56 /ea | 29,221 |
| | 50 | Sump Pump 50 gpm | 1.00 | ea | 1,451 | 3,150 | - | | 1,028 | 5,628.96 /ea | 5,629 |
| | | **Submersible Sump Pumps** | | | **16,933** | **35,150** | | | **11,988** | | **64,071** |
| | | 840.00 Labor hours | | | | | | | | | |
| | | 140.00 Equipment hours | | | | | | | | | |
| **11240.420** | | **Storage Tanks** | | | | | | | | | |
| | a200 | Set VFD Control - Actiflow Maturation Tank | 2.00 | ea | 6,003 | 30,000 | - | | - | 18,001.60 /ea | 36,003 |
| | a200 | Set VFD Control - Actiflow Sellting Tank Scraper | 2.00 | ea | 6,003 | 30,000 | - | | - | 18,001.60 /ea | 36,003 |
| | | **Storage Tanks** | | | **12,006** | **60,000** | | | | | **72,006** |
| | | 560.00 Labor hours | | | | | | | | | |
| **11284.000** | | **Sluice Gates** | | | | | | | | | |
| | 3636 | 36" x 36" Sluice Gate | 2.00 | ea | 9,544 | 21,600 | - | | - | 15,572.00 /ea | 31,144 |
| | 96A8 | 96" x 48" Sluice Gate | 4.00 | ea | 57,264 | 132,000 | - | | - | 47,316.00 /ea | 189,264 |
| | | **Sluice Gates** | | | **66,808** | **153,600** | | | | | **220,408** |
| | | 2,800.00 Labor hours | | | | | | | | | |
| **11330.100** | | **Barscreens** | | | | | | | | | |
| n | A 3 | Screens | 1.00 | ea | 95,440 | 200,000 | - | | - | 295,440.00 /ea | 295,440 |
| | B 5 | Screen Conveyor | 1.00 | ea | 19,088 | 40,000 | - | | - | 59,088.00 /ea | 59,088 |
| | | **Barscreens** | | | **114,528** | **240,000** | | | | | **354,528** |
| | | 4,800.000 Labor hours | | | | | | | | | |
| **13000.005** | | **Special Const Allowance** | | | | | | | | | |
| | 5 | Pressure Sensor | 2.00 | ea | 771 | 3,450 | - | | - | 2,110.40 /ea | 4,221 |
| | 13 | Level Sensor | 1.00 | ea | 4 | 1,725 | | | - | 1,728.56 /ea | 1,729 |
| | | **Special Const Allowance** | | | **774** | **5,175** | | | | | **5,949** |
| | | 20.10 Labor hours | | | | | | | | | |
| **13121.000** | | **Pre-Engineered Metal Bldg** | | | | | | | | | |
| | z001 | Pre-Engineered Metal Bldg- Chemical | 625.00 | sf | | | 46,875 | | | 75.00 /sf | 46,875 |
| | z001 | Pre-Engineered Metal Bldg | 600.00 | sf | | | 45,000 | | | 75.00 /sf | 45,000 |

| Item | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Pre-Engineered Metal Bldg** | | | | | **91,875** | | | | **91,875** |
| **13420.200** | **I&C Instruments** | | | | | | | | | |
| n 05-FE-m006 | Magnetic Flow Meter | 1.00 | ea | 160 | 4,600 | - | | - | 4,759.92 /ea | 4,760 |
| | **I&C Instruments** | | | **160** | **4,600** | | | | | **4,760** |
| | 5.83 Labor hours | | | | | | | | | |
| **15111.650** | **Plug Valve (CI/DI/IBBM)** | | | | | | | | | |
| n 200R | Plug Valve, MJ, 10" | 2.00 | ea | 560 | 1,800 | - | | - | 1,180.11 /ea | 2,360 |
| | **Plug Valve (CI/DI/IBBM)** | | | **560** | **1,800** | | | | | **2,360** |
| | 17.60 Labor hours | | | | | | | | | |
| **15113.450** | **GV Knife Gate ValveCI/DI** | | | | | | | | | |
| n 160R | Knife Gate Valve, Motor Oper, flg, 10" | 6.00 | ea | 2,424 | 18,900 | - | | - | 3,553.923 /ea | 21,324 |
| | **GV Knife Gate ValveCI/DI** | | | **2,424** | **18,900** | | | | | **21,324** |
| | 76.140 Labor hours | | | | | | | | | |
| **15114.500** | **Check Valve (CI/DI/IBBM)** | | | | | | | | | |
| n C20R | Check Valve, Double Disc, MJ, 10" | 2.00 | ea | 556 | 1,000 | - | | - | 778.11 /ea | 1,556 |
| | **Check Valve (CI/DI/IBBM)** | | | **556** | **1,000** | | | | | **1,556** |
| | 17.48 Labor hours | | | | | | | | | |
| **15119.600** | **Air/Vacuum Relief Valve** | | | | | | | | | |
| n 100J | Air Release Valve, 10" | 1.00 | ea | 94 | 200 | - | | - | 293.93 /ea | 294 |
| | **Air/Vacuum Relief Valve** | | | **94** | **200** | | | | | **294** |
| | 3.03 Labor hours | | | | | | | | | |
| **15120.100** | **Pipe Specialties** | | | | | | | | | |
| n K2XS | Tapping Sleeve- CS Epoxy Coated/SS Flange, 30"x 10"dia | 1.00 | ea | 119 | 2,770 | - | | - | 2,889.30 /ea | 2,889 |
| | **Pipe Specialties** | | | **119** | **2,770** | | | | | **2,889** |
| | 5.00 Labor hours | | | | | | | | | |
| **15210.010** | **DIP Totals** | | | | | | | | | |
| 0 | Total Weight (Zero Cost Item) | 35,572.50 | lbs | - | - | - | | - | | |
| 1 | Weight of Pipe (Zero Cost Item) | 32,812.50 | lbs | - | - | - | | - | | |
| 2 | Weight of Fittings (Zero Cost Item) | 2,760.00 | lbs | - | - | - | | - | | |
| **15210.200** | **DIP CML Push-On Pipe** | | | | | | | | | |
| 0 | Unload Care & Protect Push-on DIP & Fittings | 35,572.50 | lbs | 69 | - | - | | 224 | 0.01 /lbs | 293 |
| 1 | Weight of Push-on Pipe (Zero Cost Item) | 32,812.50 | lbs | - | - | - | | - | | |
| 2 | Weight of Push-on Fittings (Zero Cost Item) | 2,760.00 | lbs | - | - | - | | - | | |
| 5 | Layout Push-on DIP & Fitting | 875.00 | lf | 199 | - | - | | - | 0.23 /lf | 199 |
| n 210 | DIP CML, Push-On, Class 52, 10" | 875.00 | lf | 5,846 | 19,359 | - | | - | 28.81 /lf | 25,205 |
| n 2AOO | DIP CML, Push-on, 90 Bend, 10" | 8.00 | ea | 784 | 2,080 | - | | - | 358.024 /ea | 2,864 |
| n AAOO | DIP CML, Push-on, 45 Bend, 10" | 2.00 | ea | 181 | 460 | - | | - | 320.67 /ea | 641 |
| n CAOO | DIP CML, Push-on, 22-1/2 Bend, 10" | 2.00 | ea | 181 | 420 | - | | - | 300.67 /ea | 601 |
| n FARR | DIP CML, Push-on, Tee BxB, 10"x 10" | 4.00 | ea | 555 | 1,600 | - | | - | 538.81 /ea | 2,155 |
| n KARQ | DIP, CML, Push-on, Reducer BxB, 10"x 8" | 4.00 | ea | 323 | 960 | - | | - | 320.853 /ea | 1,283 |
| | **DIP CML Push-On Pipe** | | | **8,138** | **24,879** | | | **224** | | **33,242** |
| | 342.583 Labor hours | | | | | | | | | |
| | 3.913 Equipment hours | | | | | | | | | |
| **15221.120** | **Fab 304L Stainless Pipe** | | | | | | | | | |
| 0 | Unload Care & Protect Pipe/Fittings | 690.00 | lbs | 1 | - | - | | 4 | 0.01 /lbs | 6 |
| 1 | Weight of Pipe (Zero Cost Item) | 690.00 | lbs | - | - | - | | - | | |
| 10 | Layout Pipe & Fitting | 300.00 | lf | 72 | - | - | | - | 0.24 /lf | 72 |
| 107A | Install Fabricated 304L SS Pipe, 1-1/4" | 300.00 | lf | 573 | - | - | | - | 1.91 /lf | 573 |
| n 50A0 | 304L Sch 40s Stainless Pipe, 1.25" | 300.00 | lf | - | 2,796 | - | | - | 9.32 /lf | 2,796 |
| | **Fab 304L Stainless Pipe** | | | **646** | **2,796** | | | **4** | | **3,446** |
| | 27.08 Labor hours | | | | | | | | | |
| | 0.08 Equipment hours | | | | | | | | | |
| **15241.100** | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| 0 | Unload Care & Protect Pipe/Fittings | 200.00 | lf | 0 | - | - | | 1 | 0.01 /lf | 2 |
| 10 | Layout Pipe & Fitting | 200.00 | lf | 48 | - | - | | - | 0.24 /lf | 48 |
| n 80C0 | PVC Schd. 80 Pipe, 2.00" | 100.00 | lf | 167 | 306 | - | | - | 4.73 /lf | 473 |
| n 80G0 | PVC Schd. 80 Pipe, 4.00" | 100.00 | lf | 239 | 911 | - | | - | 11.50 /lf | 1,150 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **15241.100** | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| a010 | | PVC Joint Primer- Quart | 0.21 | qrt | - | 3 | - | | - | 15.36 /qrt | 3 |
| a020 | | PVC Solvent Cement Low VOC- Quart | 0.21 | qrt | - | 5 | - | | - | 21.90 /qrt | 5 |
| | | **PVC Schd Pipe & Fittings** | | | **454** | **1,225** | | | **1** | | **1,680** |
| | | 19.022 Labor hours | | | | | | | | | |
| | | 0.022 Equipment hours | | | | | | | | | |
| **15500.001** | | **HVAC Equipment** | | | | | | | | | |
| | 155 | HVAC Allowance - Chemical Bldg | 625.00 | sf | - | - | 25,000 | | - | 40.00 /sf | 25,000 |
| | | **HVAC Equipment** | | | | | **25,000** | | | | **25,000** |
| **16000.005** | | **Electrical Allowance** | | | | | | | | | |
| | 5 | Electrical Allowance for pumps | 1.00 | ls | | | 15,000 | | - | 15,000.00 /ls | 15,000 |
| | | **Electrical Allowance** | | | | | **15,000** | | | | **15,000** |
| | | 0.000 Labor hours | | | | | | | | | |
| | | ***03 High Rate Clarification*** | | | ***817,681*** | ***2,446,477*** | ***145,885*** | | ***480,430*** | | ***3,890,635*** |
| | | 34,647.473 Labor hours | | | | | | | | | |
| | | 5,898.17 Equipment hours | | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***04 Chlorine Contact Tank No. 2*** | | | | | | | | | |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2502 | Remove Influent Junction Box | 1.00 | ea | 261 | - | - | | 124 | 385.09 /ea | 385 |
| | 2502 | Remove 48" Motor Operated Timber Gate | 1.00 | ea | 65 | - | - | | 62 | 127.27 /ea | 127 |
| | 2502 | Remove Redwood Baffle | 1.00 | ea | 131 | - | - | | 124 | 254.53 /ea | 255 |
| | 2508 | Remove 36" Concrete Influent Pipe & Gate | 24.00 | lf | 98 | - | - | | 179 | 11.52 /lf | 276 |
| | 2508 | Remove 54" RCP & Reducer | 7.50 | lf | 31 | - | - | | 56 | 11.52 /lf | 86 |
| | 2508 | Remove 24" Scum Drain for Rerouting | 5.70 | lf | 23 | - | - | | 42 | 11.52 /lf | 66 |
| | 2508 | Remove 48"x36" Cross | 1.00 | ea | 4 | - | - | | 7 | 11.53 /ea | 12 |
| | 3006 | Remove Influent Junction Box | 6.70 | cy | 66 | - | - | | 171 | 35.26 /cy | 236 |
| | | **Selective Site Demolition** | | | **678** | | | | **765** | | **1,443** |
| | | 41.57 Labor hours | | | | | | | | | |
| | | 10.924 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 80.00 | lf | 7 | | - | | - | 0.092 /lf | 7 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 132.083 | cy | 67 | - | - | | 292 | 2.72 /cy | 359 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 8.20 | cy | 12 | - | - | | 41 | 6.56 /cy | 54 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 27.98 | cy | 68 | - | - | | 226 | 10.492 /cy | 294 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 85.152 | cy | 77 | - | - | | 242 | 3.75 /cy | 319 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 36.174 | cy | - | 1,273 | - | | - | 35.20 /cy | 1,273 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 46.931 | cy | 66 | - | - | | 126 | 4.10 /cy | 192 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 46.931 | cy | 46 | - | - | | 76 | 2.61 /cy | 122 |
| n | 9616 | Trench Shield- 6x16 | 0.15 | u/mo | - | - | - | | 212 | 1,410.00 /u/mo | 212 |
| | A006 | Pipe Test | 80.00 | lf | 59 | 64 | - | | - | 1.54 /lf | 123 |
| | C0V0 | Concrete Thrust Block, 24" | 2.00 | ea | 215 | 172 | - | | - | 193.37 /ea | 387 |
| | C0e0 | Concrete Thrust Block, 54" | 2.00 | ea | 668 | 1,840 | - | | - | 1,254.04 /ea | 2,508 |
| | | **Trenching** | | | **1,285** | **3,349** | | | **1,216** | | **5,850** |
| | | 61.50 Labor hours | | | | | | | | | |
| | | 15.63 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 46.931 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 46.931 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 46.931 | cy | 76 | - | - | | 145 | 4.712 /cy | 221 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 46.931 | cy | 211 | - | - | | 352 | 12.001 /cy | 563 |
| | | **Excavation Spoils** | | | **287** | | | | **497** | | **784** |
| | | 16.883 Labor hours | | | | | | | | | |
| | | 8.441 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 140 | Concrete: Wall | 89.50 | cy | 11,106 | 31,325 | - | | 4,513 | 524.52 /cy | 46,944 |
| | | **Concrete in Place** | | | **11,106** | **31,325** | | | **4,513** | | **46,944** |
| | | 537.000 Labor hours | | | | | | | | | |
| | | 89.50 Equipment hours | | | | | | | | | |
| **11284.000** | | **Sluice Gates** | | | | | | | | | |
| | 4848 | 48" x 48" Sluice Gate | 1.00 | ea | 9,544 | 16,134 | - | | - | 25,678.00 /ea | 25,678 |
| | | **Sluice Gates** | | | **9,544** | **16,134** | | | | | **25,678** |
| | | 400.000 Labor hours | | | | | | | | | |
| **15210.010** | | **DIP Totals** | | | | | | | | | |
| | 0 | Total Weight (Zero Cost Item) | 10,833.00 | lbs | - | - | - | | - | | |
| | 1 | Weight of Pipe (Zero Cost Item) | 8,968.00 | lbs | - | - | - | | - | | |
| | 2 | Weight of Fittings (Zero Cost Item) | 1,865.00 | lbs | - | - | - | | - | | |
| **15210.200** | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | 0 | Unload Care & Protect Push-on DIP & Fittings | 10,833.00 | lbs | 21 | - | - | | 68 | 0.01 /lbs | 89 |
| | 1 | Weight of Push-on Pipe (Zero Cost Item) | 8,968.00 | lbs | - | - | - | | - | | |
| | 2 | Weight of Push-on Fittings (Zero Cost Item) | 1,865.00 | lbs | - | - | - | | - | | |
| | 5 | Layout Push-on DIP & Fitting | 80.00 | lf | 18 | - | - | | - | 0.23 /lf | 18 |
| n | 224 | DIP CML, Push-On, Class 52, 24" | 80.00 | lf | 764 | 5,560 | - | | - | 79.05 /lf | 6,324 |
| n | 2AUU | DIP CML, Push-on, 90 Bend, 24" | 1.00 | ea | 217 | 2,663 | - | | - | 2,879.30 /ea | 2,879 |
| n | AAUU | DIP CML, Push-on, 45 Bend, 24" | 1.00 | ea | 213 | 2,000 | - | | - | 2,213.20 /ea | 2,213 |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | **DIP CML Push-On Pipe** | | **1,233** | **10,223** | | | **68** | | **11,523** |
| | 52.02 Labor hours | | | | | | | | |
| | 1.192 Equipment hours | | | | | | | | |
| **15230.100** | **Concrete Pipe (RCP)** | | | | | | | | |
| n A054 | RCP 90 Bend 54 | 1.00 ea | 388 | 750 | - | | - | 1,137.80 /ea | 1,138 |
| n B054 | RCP 45 Bend 54 | 1.00 ea | 388 | 750 | - | | - | 1,137.80 /ea | 1,138 |
| | **Concrete Pipe (RCP)** | | **776** | **1,500** | | | | | **2,276** |
| | 32.52 Labor hours | | | | | | | | |
| | ***04 Chlorine Contact Tank No. 2*** | | ***24,908*** | ***62,531*** | ***0*** | | ***7,060*** | | ***94,499*** |
| | 1,141.49 Labor hours | | | | | | | | |
| | 125.683 Equipment hours | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***05 Chlorine Effluent*** | | | | | | | | | |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Connect to Existing Aeration Tank | 1.00 | ls | - | - | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | 20 | Connect to Existing PCCP (9'deep) | 1.00 | ls | - | - | 7,500 | | - | 7,500.00 /ls | 7,500 |
| | | **Sitework Allowance** | | | | | **12,500** | | | | **12,500** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2508 | Remove 54"PCCP (9'deep) | 12.00 | lf | 49 | - | - | | 89 | 11.52 /lf | 138 |
| | 2734 | Remove Concrete Walkway | 20.00 | sy | 31 | - | - | | 63 | 4.684 /sy | 94 |
| | | **Selective Site Demolition** | | | **80** | | | | **152** | | **232** |
| | | 4.90 Labor hours | | | | | | | | | |
| | | 2.96 Equipment hours | | | | | | | | | |
| **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | 1 | Design Shoring System-Minor | 1.00 | ls | - | - | 1,000 | | - | 1,000.00 /ls | 1,000 |
| | 100 | Survey & Layout Shoring | 72.00 | lf | 1 | - | - | | - | 0.02 /lf | 1 |
| n | 1025 | Steel Sheeting,15' x 22psf, pulled & salvage | 1,080.00 | sf | 5,597 | 6,275 | - | | 7,392 | 17.84 /sf | 19,263 |
| | 1045 | Install & Remove Wales/Struts/Connectors | 1.19 | ton | 289 | 1,093 | - | | 381 | 1,483.73 /ton | 1,763 |
| n | 1050 | Rent Steel Sheet Piling and Wales, first month | 13.07 | ton | - | 3,968 | - | | - | 303.604 /ton | 3,968 |
| | | **Sheet Piling** | | | **5,886** | **11,335** | **1,000** | | **7,773** | | **25,994** |
| | | 193.90 Labor hours | | | | | | | | | |
| | | 48.46 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 120.00 | cy | 101 | - | - | | 273 | 3.121 /cy | 375 |
| | 461C | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 33.00 | cy | 56 | - | - | | 109 | 5.011 /cy | 165 |
| n | A000 | IMPORT MATERIAL (Summary) | 2.00 | CY | - | - | - | | - | | |
| n | A015 | Import Gravel Fill | 12.00 | cy | - | 180 | 67 | | - | 20.60 /cy | 247 |
| | | **Foundation Excavation** | | | **157** | **180** | **67** | | **383** | | **787** |
| | | 10.36 Labor hours | | | | | | | | | |
| | | 5.84 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 10.00 | lf | 1 | | - | | - | 0.092 /lf | 1 |
| n | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 18.66 | cy | 38 | - | - | | 106 | 7.72 /cy | 144 |
| n | 3130 | Trench Bedding-Excavator- 130 HP | 1.28 | cy | 3 | - | - | | 8 | 7.90 /cy | 10 |
| n | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 5.06 | cy | 16 | - | - | | 48 | 12.642 /cy | 64 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 9.41 | cy | 9 | - | - | | 27 | 3.751 /cy | 35 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 6.332 | cy | - | 223 | - | | - | 35.204 /cy | 223 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 9.25 | cy | 13 | - | - | | 25 | 4.10 /cy | 38 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 9.25 | cy | 9 | - | - | | 15 | 2.61 /cy | 24 |
| n | 9616 | Trench Shield- 6x16 | 0.01 | u/mo | - | - | - | | 14 | 1,410.00 /u/mo | 14 |
| | A008 | Pipe Locates (Pot Hole) | 1.00 | ea | 152 | 50 | - | | 27 | 228.96 /ea | 229 |
| | | **Trenching** | | | **240** | **273** | | | **269** | | **782** |
| | | 13.783 Labor hours | | | | | | | | | |
| | | 4.23 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 96.25 | cy | - | - | - | | - | | |
| | 40 | Foundation Excavation Spoils (Summary) | 87.00 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 9.25 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 9.25 | cy | 15 | - | - | | 29 | 4.713 /cy | 44 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 87.00 | cy | 101 | - | - | | 285 | 4.44 /cy | 386 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 9.25 | cy | 42 | - | - | | 69 | 12.001 /cy | 111 |
| | A0I7 | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 87.00 | cy | 54 | - | - | | 126 | 2.071 /cy | 180 |
| | | **Excavation Spoils** | | | **212** | | | | **509** | | **721** |
| | | 12.27 Labor hours | | | | | | | | | |
| | | 6.134 Equipment hours | | | | | | | | | |
| **02720.100** | | **Aggregate Base Course** | | | | | | | | | |
| | 1180 | Crushed Rock 1" | 6.00 | cy | 17 | 61 | - | | 86 | 27.47 /cy | 165 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Aggregate Base Course** | | | **17** | **61** | | | **86** | | **165** |
| | | 0.96 Labor hours | | | | | | | | | |
| | | 0.96 Equipment hours | | | | | | | | | |
| **02775.100** | | **Concrete Sidewalks** | | | | | | | | | |
| | 4 | 4" Sidewalks | 180.00 | sf | - | - | 1,440 | | - | 8.00 /sf | 1,440 |
| | | **Concrete Sidewalks** | | | | | **1,440** | | | | **1,440** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 278.00 | sy | 23 | 609 | - | | 23 | 2.36 /sy | 655 |
| | | **Lawns & Grasses** | | | **23** | **609** | | | **23** | | **655** |
| | | 1.112 Labor hours | | | | | | | | | |
| | | 0.56 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 140 | Concrete: Junction Structure | 36.00 | cy | 4,467 | 12,600 | - | | 1,815 | 524.52 /cy | 18,883 |
| | | **Concrete in Place** | | | **4,467** | **12,600** | | | **1,815** | | **18,883** |
| | | 216.000 Labor hours | | | | | | | | | |
| | | 36.00 Equipment hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 1.00 | ea | 77 | 1,277 | - | | - | 1,353.17 /ea | 1,353 |
| | | **Hatch, Aluminum, 300psf** | | | **77** | **1,277** | | | | | **1,353** |
| | | 3.20 Labor hours | | | | | | | | | |
| **11284.000** | | **Sluice Gates** | | | | | | | | | |
| | 3636 | 36" x 36" Sluice Gate | 1.00 | ea | 4,772 | 10,800 | - | | - | 15,572.00 /ea | 15,572 |
| | | **Sluice Gates** | | | **4,772** | **10,800** | | | | | **15,572** |
| | | 200.000 Labor hours | | | | | | | | | |
| **15230.400** | | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | 0 | Unload Care & Protect PCCP & Fittings | 10.00 | lf | 0 | - | - | | 0 | 0.01 /lf | 0 |
| | 10 | Layout Pipe & Fitting | 10.00 | lf | 2 | - | - | | - | 0.24 /lf | 2 |
| | 325 | PCCP Equipment- Cat 325 Excavator | 1.30 | ch | 25 | - | - | | 144 | 130.09 /ch | 169 |
| n | B036 | Prestressed Concrete Cylinder Pipe (250#) 36 | 10.00 | lf | 334 | 1,080 | - | | - | 141.404 /lf | 1,414 |
| | | **Prestr Conc Cylind-(PCCP)** | | | **362** | **1,080** | | | **144** | | **1,586** |
| | | 15.401 Labor hours | | | | | | | | | |
| | | 1.301 Equipment hours | | | | | | | | | |
| **16000.005** | | **Electrical Allowance** | | | | | | | | | |
| | 5 | Electrical & SCADA Allowance for Motorized Gate | 0.00 | ls | 0 | 0 | - | | - | | |
| | | ***05 Chlorine Effluent*** | | | ***16,294*** | ***38,215*** | ***15,007*** | | ***11,154*** | | ***80,670*** |
| | | 671.880 Labor hours | | | | | | | | | |
| | | 106.433 Equipment hours | | | | | | | | | |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | ***06 I&C*** | | | | | | | | |
| **13000.005** | **Special Const Allowance** | | | | | | | | |
| 5 | I&C Allowance | 0.00 ls | 0 | 0 | - | | - | | |
| | ***06 I&C*** | | ***0*** | ***0*** | ***0*** | | ***0*** | | ***0*** |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | ***07 Electrical*** | | | | | | | | |
| **16000.005** | **Electrical Allowance** | | | | | | | | |
| 5 | Electrical Allowance | 0.00 ls | 0 | 0 | - | | - | | |
| | ***07 Electrical*** | | ***0*** | ***0*** | ***0*** | | ***0*** | | ***0*** |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***08 Chemical Feed*** | | | | | | | | | |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2734 | Remove Asphalt Pavement, sidewalk | 25.00 | sy | 39 | - | - | | 78 | 4.683 /sy | 117 |
| | | **Selective Site Demolition** | | | **39** | | | | **78** | | **117** |
| | | 2.38 Labor hours | | | | | | | | | |
| | | 1.90 Equipment hours | | | | | | | | | |
| **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | 2 | Design Shoring System-Average | 1.00 | ls | - | - | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | 100 | Survey & Layout Shoring | 80.00 | lf | 1 | - | - | | - | 0.02 /lf | 1 |
| | 105 | Mobilize Pile Driving Equipment | 1.00 | ea | - | - | 25,000 | | - | 25,000.00 /ea | 25,000 |
| n | 1025 | Steel Sheeting,15' x 22psf, pulled & salvage | 800.00 | sf | 4,146 | 4,648 | - | | 5,475 | 17.84 /sf | 14,269 |
| | 1045 | Install & Remove Wales/Struts/Connectors | 0.88 | ton | 214 | 810 | - | | 282 | 1,483.74 /ton | 1,306 |
| n | 1050 | Rent Steel Sheet Piling and Wales, first month | 9.68 | ton | - | 2,939 | - | | - | 303.600 /ton | 2,939 |
| | | **Sheet Piling** | | | **4,361** | **8,396** | **35,000** | | **5,758** | | **53,515** |
| | | 143.653 Labor hours | | | | | | | | | |
| | | 35.893 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 337.00 | cy | 284 | - | - | | 768 | 3.121 /cy | 1,052 |
| | 461C | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 162.00 | cy | 276 | - | - | | 536 | 5.011 /cy | 812 |
| n | A000 | IMPORT MATERIAL (Summary) | 2.00 | CY | - | - | - | | - | | |
| n | A015 | Import Gravel Fill | 8.333 | cy | - | 125 | 47 | | - | 20.60 /cy | 172 |
| | | **Foundation Excavation** | | | **560** | **125** | **47** | | **1,304** | | **2,035** |
| | | 37.413 Labor hours | | | | | | | | | |
| | | 21.95 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 231.00 | lf | 21 | | - | | - | 0.092 /lf | 21 |
| n | 2090 | Trenching- Backhoe/Loader 95HP (15 cy/hr-120cy/day) Average Exc. | 111.153 | cy | 208 | - | - | | 399 | 5.463 /cy | 607 |
| n | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 25.833 | cy | 20 | - | - | | 55 | 2.90 /cy | 75 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 26.84 | cy | 14 | - | - | | 59 | 2.72 /cy | 73 |
| n | 3090 | Trench Bedding-Backhoe/Loader 95HP | 15.35 | cy | 41 | - | - | | 62 | 6.74 /cy | 103 |
| n | 3130 | Trench Bedding-Excavator- 130 HP | 2.551 | cy | 5 | - | - | | 15 | 7.903 /cy | 20 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 1.403 | cy | 2 | - | - | | 7 | 6.56 /cy | 9 |
| n | 4090 | Trench Pipe Zone Backfill-Backhoe/Loader 95HP | 25.451 | cy | 82 | - | - | | 124 | 8.09 /cy | 206 |
| n | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 10.113 | cy | 33 | - | - | | 95 | 12.641 /cy | 128 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 5.562 | cy | 13 | - | - | | 45 | 10.49 /cy | 58 |
| n | 5090 | Trench Native Backfill-Backhoe/Loader 95HP | 25.451 | cy | 74 | - | - | | 135 | 8.24 /cy | 210 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 24.00 | cy | 22 | - | - | | 68 | 3.751 /cy | 90 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 60.43 | cy | - | 2,127 | - | | - | 35.20 /cy | 2,127 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 69.541 | cy | 78 | - | - | | 150 | 3.28 /cy | 228 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 69.541 | cy | 68 | - | - | | 113 | 2.61 /cy | 181 |
| n | 9616 | Trench Shield- 6x16 | 0.06 | u/mo | - | - | - | | 85 | 1,410.00 /u/mo | 85 |
| | A002 | Pipe Detectable/Non-Detectable Tape | 200.00 | lf | 18 | 11 | - | | - | 0.15 /lf | 29 |
| | A006 | Pipe Test | 200.00 | lf | 148 | 160 | - | | - | 1.54 /lf | 308 |
| | C0a0 | Concrete Thrust Block, 36" | 2.00 | ea | 262 | 582 | - | | - | 422.23 /ea | 844 |
| | | **Trenching** | | | **1,110** | **2,880** | | | **1,414** | | **5,404** |
| | | 65.81 Labor hours | | | | | | | | | |
| | | 28.633 Equipment hours | | | | | | | | | |
| **02315.400** | | **Drilling & Blasting** | | | | | | | | | |
| | 1008 | Hydraulic Hoe Ram -Medium | 84.00 | cy | | - | 12,600 | | | 150.00 /cy | 12,600 |
| | | **Drilling & Blasting** | | | | | **12,600** | | | | **12,600** |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 244.541 | cy | - | - | - | | - | | |
| | 40 | Foundation Excavation Spoils (Summary) | 175.00 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 69.541 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 69.541 | cy | 90 | - | - | | 173 | 3.772 /cy | 262 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 175.00 | cy | 203 | - | - | | 573 | 4.44 /cy | 777 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 69.541 | cy | 313 | - | - | | 521 | 12.001 /cy | 835 |
| | A0I7 | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 175.00 | cy | 110 | - | - | | 253 | 2.071 /cy | 362 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Excavation Spoils** | | | **716** | | | | **1,520** | | **2,236** |
| | | 41.62 Labor hours | | | | | | | | | |
| | | 20.81 Equipment hours | | | | | | | | | |
| **02720.150** | | **Aggregate Base- Roads** | | | | | | | | | |
| | 1116 | Gravel Base - 6" thick - Driveway | 3.00 | cy | 9 | 27 | - | | 43 | 26.22 /cy | 79 |
| | | **Aggregate Base- Roads** | | | **9** | **27** | | | **43** | | **79** |
| | | 0.48 Labor hours | | | | | | | | | |
| | | 0.48 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| | 20 | Bitum Paving Driveway | 16.00 | sy | - | - | 253 | | - | 15.80 /sy | 253 |
| | 30 | Bitum Paving Sidewalks | 25.00 | sy | - | - | 1,000 | | - | 40.00 /sy | 1,000 |
| | | **Asphalt Paving - Location** | | | | | **1,253** | | | | **1,253** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 89.00 | sy | 7 | 195 | - | | 7 | 2.36 /sy | 210 |
| | | **Lawns & Grasses** | | | **7** | **195** | | | **7** | | **210** |
| | | 0.36 Labor hours | | | | | | | | | |
| | | 0.18 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 110 | Concrete: Slab on Grade | 34.00 | cy | 2,461 | 10,540 | - | | 926 | 409.61 /cy | 13,927 |
| n | 140 | Concrete: Wall | 66.00 | cy | 8,190 | 23,100 | - | | 3,328 | 524.52 /cy | 34,618 |
| n | 145 | Concrete: Elevated Slab | 34.00 | cy | 3,867 | 12,240 | - | | 1,715 | 524.18 /cy | 17,822 |
| | | **Concrete in Place** | | | **14,518** | **45,880** | | | **5,969** | | **66,367** |
| | | 702.000 Labor hours | | | | | | | | | |
| | | 118.36 Equipment hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 4.00 | ea | 307 | 5,106 | - | | - | 1,353.173 /ea | 5,413 |
| | | **Hatch, Aluminum, 300psf** | | | **307** | **5,106** | | | | | **5,413** |
| | | 12.80 Labor hours | | | | | | | | | |
| **08330.020** | | **Rolling Alum Door Manual** | | | | | | | | | |
| | z005 | Roll Door Manual (8'x8') | 64.00 | sf | 518 | 2,397 | - | | - | 45.542 /sf | 2,915 |
| | | **Rolling Alum Door Manual** | | | **518** | **2,397** | | | | | **2,915** |
| | | 10.944 Labor hours | | | | | | | | | |
| **11000.005** | | **Equipment Allowance** | | | | | | | | | |
| | 5 | 36" In Line Chemical Inductor w/ VFD | 1.00 | ea | 19,368 | 45,000 | - | | | 64,368.00 /ea | 64,368 |
| | | **Equipment Allowance** | | | **19,368** | **45,000** | | | | | **64,368** |
| | | 800.000 Labor hours | | | | | | | | | |
| | | 0.000 Equipment hours | | | | | | | | | |
| **11220.100** | | **Chemical Mixing Units** | | | | | | | | | |
| | 01 | Chemical Mixer | 8.00 | ea | 1,527 | 3,200 | - | | - | 590.88 /ea | 4,727 |
| | | **Chemical Mixing Units** | | | **1,527** | **3,200** | | | | | **4,727** |
| | | 64.00 Labor hours | | | | | | | | | |
| **11240.400** | | **Polymer Store/Feed Equip** | | | | | | | | | |
| | 0 | Polymer Tote Containment | 2.00 | ea | 968 | 1,600 | - | | 685 | 1,626.32 /ea | 3,253 |
| | 00 | Metering Pump/Poly Blend and Feed Pump | 2.00 | ea | 9,544 | 28,264 | - | | - | 18,904.00 /ea | 37,808 |
| | ---- | 1st Fill of Polymer or FeCl3 (3 day supply) | 3.00 | day | 600 | 1,800 | - | | - | 800.00 /day | 2,400 |
| | | **Polymer Store/Feed Equip** | | | **11,112** | **31,664** | | | **685** | | **43,461** |
| | | 472.000 Labor hours | | | | | | | | | |
| | | 8.00 Equipment hours | | | | | | | | | |
| **13121.000** | | **Pre-Engineered Metal Bldg** | | | | | | | | | |
| | z001 | Pre-Engineered Metal Bldg - Polymer Shed - 14'high | 468.00 | sf | | | 35,100 | | | 75.00 /sf | 35,100 |
| | | **Pre-Engineered Metal Bldg** | | | | | **35,100** | | | | **35,100** |
| **15113.450** | | **GV Knife Gate ValveCI/DI** | | | | | | | | | |
| n | 1249 | Knife Gate Valve, Gear & Wheel Oper, flg, 8" | 1.00 | ea | 190 | 700 | - | | - | 890.28 /ea | 890 |
| n | 160Z | Knife Gate Valve, Motor Oper,36" | 3.00 | ea | 3,343 | 42,750 | - | | - | 15,364.34 /ea | 46,093 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **GV Knife Gate ValveCI/DI** | | | **3,533** | **43,450** | | | | | **46,983** |
| | | 111.040 Labor hours | | | | | | | | | |
| **15115.810** | | **Diaphragm Valve PVC** | | | | | | | | | |
| n | 130I | PVC Diaphragm Valve, 1" | 6.00 | ea | 357 | 5,760 | - | | - | 1,019.522 /ea | 6,117 |
| | | **Diaphragm Valve PVC** | | | **357** | **5,760** | | | | | **6,117** |
| | | 11.22 Labor hours | | | | | | | | | |
| **15230.400** | | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | 0 | Unload Care & Protect PCCP & Fittings | 31.00 | lf | 0 | - | - | | 0 | 0.01 /lf | 0 |
| | 10 | Layout Pipe & Fitting | 31.00 | lf | 7 | - | - | | - | 0.24 /lf | 7 |
| | 325 | PCCP Equipment- Cat 325 Excavator | 2.60 | ch | 50 | - | - | | 288 | 130.092 /ch | 338 |
| n | B036 | Prestressed Concrete Cylinder Pipe (250#) 36 | 31.00 | lf | 1,036 | 3,348 | - | | - | 141.404 /lf | 4,384 |
| n | L036 | PCCP 45 Bend 36 | 2.00 | ea | 517 | 2,400 | - | | - | 1,458.64 /ea | 2,917 |
| n | Q036 | PCCP Wye 36 | 2.00 | ea | 716 | 2,400 | - | | - | 1,558.23 /ea | 3,116 |
| | | **Prestr Conc Cylind-(PCCP)** | | | **2,327** | **8,148** | | | **288** | | **10,763** |
| | | 98.033 Labor hours | | | | | | | | | |
| | | 2.603 Equipment hours | | | | | | | | | |
| **15241.100** | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | 0 | Unload Care & Protect Pipe/Fittings | 360.00 | lf | 1 | - | - | | 2 | 0.01 /lf | 3 |
| | 10 | Layout Pipe & Fitting | 360.00 | lf | 86 | - | - | | - | 0.24 /lf | 86 |
| n | 8080 | PVC Schd. 80 Pipe, 1.00" | 360.00 | lf | 429 | 475 | - | | - | 2.513 /lf | 905 |
| n | 8A80 | PVC Sch 80. 90 Ell , 1.00" | 15.00 | ea | 61 | 66 | - | | - | 8.46 /ea | 127 |
| n | 8F88 | PVC Sch 80. Tee , 1.00" | 3.00 | ea | 16 | 24 | - | | - | 13.38 /ea | 40 |
| | a010 | PVC Joint Primer- Quart | 0.32 | qrt | - | 5 | - | | - | 15.36 /qrt | 5 |
| | a020 | PVC Solvent Cement Low VOC- Quart | 0.32 | qrt | - | 7 | - | | - | 21.90 /qrt | 7 |
| | | **PVC Schd Pipe & Fittings** | | | **593** | **577** | | | **2** | | **1,172** |
| | | 24.88 Labor hours | | | | | | | | | |
| | | 0.04 Equipment hours | | | | | | | | | |
| **15400.005** | | **Plumbing Allowance** | | | | | | | | | |
| | 5 | Plumbing Allowance - hook plant water to poly system | 1.00 | ls | | | 7,500 | | - | 7,500.00 /ls | 7,500 |
| | 5 | Plumbing Allowance - supply wash out sink/potable water connection | 1.00 | ls | | | 7,500 | | - | 7,500.00 /ls | 7,500 |
| | | **Plumbing Allowance** | | | | | **15,000** | | | | **15,000** |
| | | 0.000 Labor hours | | | | | | | | | |
| **15500.001** | | **HVAC Equipment** | | | | | | | | | |
| | 155 | HVAC Allowance - Chem Feed Bldg | 468.00 | sf | - | - | 18,720 | | - | 40.00 /sf | 18,720 |
| | | **HVAC Equipment** | | | | | **18,720** | | | | **18,720** |
| **16000.005** | | **Electrical Allowance** | | | | | | | | | |
| | 5 | Electrical Allowance - light shed and provide power to pumps | 1.00 | ls | | | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | 5 | Electrical Allowance - chemical inductor | 1.00 | ls | | | 20,000 | | - | 20,000.00 /ls | 20,000 |
| | 5 | Electrical & I&C Allowance for Knife Gate Valves | 1.00 | ls | | | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | 5 | Electrical Allowance | 468.00 | sf | | | 9,360 | | - | 20.00 /sf | 9,360 |
| | | **Electrical Allowance** | | | | | **49,360** | | | | **49,360** |
| | | 0.000 Labor hours | | | | | | | | | |
| | | ***08 Chemical Feed*** | | | ***60,961*** | ***202,805*** | ***167,079*** | | ***17,068*** | | ***447,914*** |
| | | 2,598.62 Labor hours | | | | | | | | | |
| | | 238.840 Equipment hours | | | | | | | | | |

## Estimate Totals

| | Description | Amount | Totals | Hours | Rate |
|---|---|---|---|---|---|
| | Labor | 1,148,350 | | 49,041 hrs | |
| | Material | 3,504,380 | | | |
| | Subcontract | 646,481 | | | |
| | Equipment | 633,271 | | 7,747 hrs | |
| | Other | 948 | | | |
| **Subtotal Direct Cost** | | **5,933,430** | **5,933,430** | | |
| | I&C | 593.337 | | | 10.00 % |
| | Electrical | 890.006 | | | 15.00 % |
| | | **1,483,343** | **7,416,773** | | |
| | Indirect Costs: | | | | |
| | Building Permits(% total cost) | 57.155 | | | 0.40 % |
| | Sales Tax (MEO) | | | | |
| | Builders Risk Ins % total cost | 35.722 | | | 0.25 % |
| | Gen Liability Ins % total cost | 285.777 | | | 2.00 % |
| | GC Bonds (% total cost) | 142.889 | | | 1.00 % |
| **Subtotal Prior to OH&P** | | **521,543** | **7,938,316** | | |
| | GC Field General Conditions | 793.826 | | | 10.00 % |
| | GC Indirects. OH & Profit | 793.826 | | | 10.00 % |
| **Subtotal** | | **1,587,652** | **9,525,968** | | |
| | Construction Contingency | 2,381,479 | | | 25.00 % |
| | **Total Constructio Cost** | **2,381,479** | **11,907,447** | | |
| | Engineering, Permitting, Bond Financing, Legal and Administration | 2.381.479 | | | 20.00 % |
| **Total Program Cost** | | **2,381,479** | **14,288,926** | | |
| | ***Total*** | | ***14,288,926*** | | |

This is an Opinion of Probable Construction Cost only, as defined by the documents provided at the level of design indicated on the front sheet of this estimate.
There are not any costs provided for: Change Orders, Construction Oversight, land acquisition or temporary/permanent easements, Operations, or any other costs associated with this project that are not specifically part of the bidding contractor's proposed scope.
The total cost shown is valid to only two significant figures.

# *Knoxville, Tennessee*
# *Fourth Creek WWTP - Options 7*
# *Opinion of Probable Construction Cost, Prelim Design, March 2007*

| | |
|---|---|
| **Project name** | TN, Knoxville FCWWTP |
| **Estimator** | MacIsaac |
| **Labor rate table** | TN07 Knoxville |
| **Equipment rate table** | 00 071H Equip Rental |
| **database version:** | V6.0 TES 9.4.22.0 |
| **ENR 20 City CCI** | March 2007: 7856 |
| **Notes** | This is an Opinion of Probable Construction Cost only, as defined by the documents provided at the level of design indicated above. CDM has no control over the cost of labor, materials, equipment, or services furnished, over schedules, over contractor's methods of determining prices, competitive bidding, market or negotiating conditions. CDM does not guarantee that this opinion will not vary from actual cost, or contractor's bids. There are not any costs provided for: Change Orders, Construction Oversight, Land Acquisition or temporary/permanent Easements, Operations, or any other costs associated with this project that are not specifically part of the bidding contractor's proposed scope.<br><br>The total cost shown is valid to only two significant figures<br><br>Assumptions:<br>No rock excavation is required.<br>Only nominal dewatering is needed.<br>No consideration for contaminated soils or hazardous materials (i.e. asbestos, lead)<br>Based on a 40 hour work week with no overtime.<br><br>This job is sales tax exempt.<br>Costs shown in April 2007 dollars. |
| **Report format** | Sorted by 'Proj Area/Phase'<br>'Detail' summary<br>Allocate addons<br>Round unit prices<br>Combine items<br>Paginate |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***01 Headworks Diversion*** | | | | | | | | | |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Modifications to Diversion Structure A for new Sluice Gate | 1.00 | ls | - | - | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | 20 | New Wet-Weather Screenings Diversion Structure | 1.00 | ls | 3,366 | 100,000 | | | - | 103,365.70 /ls | 103,366 |
| | | **Sitework Allowance** | | | **3,366** | **100,000** | **10,000** | | | | **113,366** |
| | | 240.00 Labor hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 63.00 | lf | 6 | | - | | - | 0.092 /lf | 6 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 158.28 | cy | 80 | - | - | | 350 | 2.72 /cy | 430 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 9.593 | cy | 15 | - | - | | 48 | 6.56 /cy | 63 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 42.53 | cy | 103 | - | - | | 343 | 10.492 /cy | 446 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 74.343 | cy | 67 | - | - | | 212 | 3.75 /cy | 279 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 52.12 | cy | - | 1,835 | - | | - | 35.20 /cy | 1,835 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 83.94 | cy | 118 | - | - | | 226 | 4.10 /cy | 344 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 83.94 | cy | 82 | - | - | | 137 | 2.61 /cy | 219 |
| n | 9616 | Trench Shield- 6x16 | 0.10 | u/mo | - | - | - | | 141 | 1,410.00 /u/mo | 141 |
| | A002 | Pipe Detectable/Non-Detectable Tape | 63.00 | lf | 6 | 3 | - | | - | 0.15 /lf | 9 |
| | | **Trenching** | | | **476** | **1,838** | | | **1,457** | | **3,772** |
| | | 31.23 Labor hours | | | | | | | | | |
| | | 21.04 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 83.94 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 83.94 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 83.94 | cy | 135 | - | - | | 260 | 4.712 /cy | 396 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 83.94 | cy | 378 | - | - | | 629 | 12.001 /cy | 1,007 |
| | | **Excavation Spoils** | | | **513** | | | | **889** | | **1,403** |
| | | 30.20 Labor hours | | | | | | | | | |
| | | 15.10 Equipment hours | | | | | | | | | |
| **11284.000** | | **Sluice Gates** | | | | | | | | | |
| | 7248 | 72" x 48" Sluice Gate | 1.00 | ea | 14,316 | 28,800 | - | | - | 43,116.00 /ea | 43,116 |
| | | **Sluice Gates** | | | **14,316** | **28,800** | | | | | **43,116** |
| | | 600.00 Labor hours | | | | | | | | | |
| **11330.100** | | **Barscreens** | | | | | | | | | |
| n | A 1 | 10MGD Romag Screen | 1.00 | ea | 57,264 | 150,000 | - | | - | 207,264.00 /ea | 207,264 |
| | | **Barscreens** | | | **57,264** | **150,000** | | | | | **207,264** |
| | | 2,400.00 Labor hours | | | | | | | | | |
| **15230.100** | | **Concrete Pipe (RCP)** | | | | | | | | | |
| | 0 | Unload Care & Protect RCP & Fittings | 63.00 | lf | 0 | - | - | | 0 | 0.01 /lf | 1 |
| | 10 | Layout Pipe & Fitting | 63.00 | lf | 15 | - | - | | - | 0.24 /lf | 15 |
| | 325 | RCP Equipment- Cat 325 Excavator | 9.45 | ch | 183 | - | - | | 1,046 | 130.080 /ch | 1,229 |
| n | 4042 | RCP Class IV Pipe 42 | 63.00 | lf | 2,480 | 4,851 | - | | - | 116.37 /lf | 7,331 |
| n | G042 | RCP Wye 42 | 1.00 | ea | 418 | 700 | - | | - | 1,118.03 /ea | 1,118 |
| | | **Concrete Pipe (RCP)** | | | **3,096** | **5,551** | | | **1,047** | | **9,694** |
| | | 131.56 Labor hours | | | | | | | | | |
| | | 9.46 Equipment hours | | | | | | | | | |
| | | ***01 Headworks Diversion*** | | | ***79,032*** | ***286,189*** | ***10,000*** | | ***3,393*** | | ***378,614*** |
| | | 3,432.982 Labor hours | | | | | | | | | |
| | | 45.594 Equipment hours | | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***02 Wet Weather Pump Station*** | | | | | | | | | |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Connect to Existing 42" Influent Sewer (12'deep) | 2.00 | ea | - | - | 15,000 | | - | 7,500.00 /ea | 15,000 |
| | 20 | Protect Existing Utilities | 1.00 | ls | - | - | 2,500 | | - | 2,500.00 /ls | 2,500 |
| | ---- | Assumption of 20% of Excavated Material is Contaiminated | 830.00 | cy | | | 20,750 | | - | 25.00 /cy | 20,750 |
| | | **Sitework Allowance** | | | | | **38,250** | | | | **38,250** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2502 | Remove 6" DIP City Water Piping 8'deep | 490.00 | lf | 800 | - | - | | 1,519 | 4.731 /lf | 2,318 |
| | 2502 | Abandon in place 6" DIP City Water Piping | 111.00 | lf | 181 | - | - | | 344 | 4.731 /lf | 525 |
| | 2712 | Saw Cut Asphalt Pavement, 5"thk | 134.00 | lf | 39 | 67 | - | | 242 | 2.60 /lf | 348 |
| | 2734 | Remove Asphalt Pavement, 5"thk | 491.00 | sy | 763 | - | - | | 1,537 | 4.684 /sy | 2,300 |
| | 2734 | Remove Asphalt Pavement, Sidewalk | 59.00 | sy | 92 | - | - | | 185 | 4.684 /sy | 276 |
| | | **Selective Site Demolition** | | | **1,874** | **67** | | | **3,827** | | **5,768** |
| | | 114.494 Labor hours | | | | | | | | | |
| | | 76.14 Equipment hours | | | | | | | | | |
| **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | 1 | Design Shoring System-Minor | 5.00 | ls | - | - | 5,000 | | - | 1,000.00 /ls | 5,000 |
| | 100 | Survey & Layout Shoring | 366.00 | lf | 6 | - | - | | - | 0.02 /lf | 6 |
| | 105 | Mobilize Pile Driving Equipment | 1.00 | ea | - | - | 25,000 | | - | 25,000.00 /ea | 25,000 |
| n | 1025 | Steel Sheeting,15' x 22psf, pulled & salvage | 3,000.00 | sf | 15,546 | 17,430 | - | | 20,533 | 17.84 /sf | 53,509 |
| n | 1030 | Steel Sheeting,20' x 27psf, pulled & salvage | 1,600.00 | sf | 8,291 | 12,048 | - | | 10,951 | 19.56 /sf | 31,290 |
| n | 1035 | Steel Sheeting,25' x 38psf, pulled & salvage | 2,150.00 | sf | 11,141 | 22,124 | - | | 14,715 | 22.32 /sf | 47,980 |
| | 1045 | Install & Remove Wales/Struts/Connectors | 9.55 | ton | 2,319 | 8,781 | - | | 3,062 | 1,483.731 /ton | 14,162 |
| n | 1050 | Rent Steel Sheet Piling and Wales, first month | 105.00 | ton | - | 31,877 | - | | - | 303.601 /ton | 31,877 |
| | | **Sheet Piling** | | | **37,303** | **92,260** | **30,000** | | **49,261** | | **208,823** |
| | | 1,228.73 Labor hours | | | | | | | | | |
| | | 307.09 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 649.52 | cy | 547 | - | - | | 1,480 | 3.121 /cy | 2,027 |
| | 461C | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 142.19 | cy | 242 | - | - | | 470 | 5.011 /cy | 713 |
| n | A000 | IMPORT MATERIAL (Summary) | 10.00 | CY | - | - | - | | - | | |
| n | A015 | Import Gravel Fill | 46.56 | cy | - | 698 | 261 | | - | 20.60 /cy | 959 |
| | | **Foundation Excavation** | | | **790** | **698** | **261** | | **1,950** | | **3,699** |
| | | 51.703 Labor hours | | | | | | | | | |
| | | 28.70 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 1,274.00 | lf | 118 | | - | | - | 0.092 /lf | 118 |
| n | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 624.262 | cy | 1,262 | - | - | | 3,556 | 7.72 /cy | 4,818 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 1,008.703 | cy | 510 | - | - | | 2,231 | 2.72 /cy | 2,741 |
| n | 3130 | Trench Bedding-Excavator- 130 HP | 49.34 | cy | 100 | - | - | | 290 | 7.901 /cy | 390 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 61.13 | cy | 93 | - | - | | 308 | 6.56 /cy | 401 |
| n | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 113.123 | cy | 366 | - | - | | 1,064 | 12.641 /cy | 1,430 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 203.53 | cy | 494 | - | - | | 1,642 | 10.492 /cy | 2,135 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 843.981 | cy | 763 | - | - | | 2,402 | 3.75 /cy | 3,165 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 427.112 | cy | - | 15,034 | - | | - | 35.20 /cy | 15,034 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 512.813 | cy | 719 | - | - | | 1,382 | 4.10 /cy | 2,101 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 512.813 | cy | 502 | - | - | | 836 | 2.61 /cy | 1,338 |
| n | 9616 | Trench Shield- 6x16 | 2.31 | u/mo | - | - | - | | 3,257 | 1,410.00 /u/mo | 3,257 |
| | A002 | Pipe Detectable/Non-Detectable Tape | 490.00 | lf | 45 | 27 | - | | - | 0.15 /lf | 72 |
| | A006 | Pipe Test | 1,216.00 | lf | 899 | 973 | - | | - | 1.54 /lf | 1,871 |
| | C0J0 | Concrete Thrust Block, 6" | 2.00 | ea | 143 | 10 | - | | - | 76.58 /ea | 153 |
| | C0P0 | Concrete Thrust Block, 12" | 9.00 | ea | 816 | 162 | - | | - | 108.63 /ea | 978 |
| | C0T0 | Concrete Thrust Block, 20" | 5.00 | ea | 537 | 280 | - | | - | 163.37 /ea | 817 |
| | | **Trenching** | | | **7,366** | **16,486** | | | **16,968** | | **40,820** |
| | | 421.03 Labor hours | | | | | | | | | |
| | | 212.31 Equipment hours | | | | | | | | | |
| **02315.400** | | **Drilling & Blasting** | | | | | | | | | |
| | 1008 | Hydraulic Hoe Ram -Medium | 222.00 | cy | | - | 27,750 | | | 125.00 /cy | 27,750 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Drilling & Blasting** | | | | | **27,750** | | | | **27,750** |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 1,020.15 | cy | - | - | - | | - | | |
| | 40 | Foundation Excavation Spoils (Summary) | 507.332 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 512.813 | cy | - | - | - | | - | | |
| | 46 | Bore & Jack Spoils Spoils (Summary) | 3.113 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 515.93 | cy | 832 | - | - | | 1,599 | 4.712 /cy | 2,431 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 507.332 | cy | 590 | - | - | | 1,662 | 4.44 /cy | 2,252 |
| | A0A0 | Haul Spoils/Off Site 10cy Rear Dump 4.00 Hour/Load | 3.113 | cy | 54 | - | - | | 90 | 46.203 /cy | 144 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 512.813 | cy | 2,309 | - | - | | 3,845 | 12.001 /cy | 6,154 |
| | A0I7 | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 507.332 | cy | 318 | - | - | | 733 | 2.071 /cy | 1,051 |
| | | **Excavation Spoils** | | | **4,103** | | | | **7,929** | | **12,031** |
| | | 240.041 Labor hours | | | | | | | | | |
| | | 120.021 Equipment hours | | | | | | | | | |
| **02445.000** | | **Boring & Jack Conduit** | | | | | | | | | |
| | 0 | Mob/Demob Bore & Jack Equipment | 1.00 | ea | - | - | 5,000 | | - | 5,000.00 /ea | 5,000 |
| | 100 | Excavate Jacking Pit | 59.26 | cy | 108 | - | - | | 291 | 6.73 /cy | 399 |
| | 105 | Excavate Recieving Pit | 29.63 | cy | 54 | - | - | | 146 | 6.73 /cy | 199 |
| | 200 | Shore Jacking/Receiving Pits | 920.00 | bsf | - | - | 13,800 | | - | 15.00 /bsf | 13,800 |
| | 300 | Backfill Jacking/Receiving Pits | 88.89 | cy | 435 | - | - | | 909 | 15.12 /cy | 1,344 |
| | 400 | Jacking Slab & Reaction Block | 2.66 | cy | 578 | 612 | - | | - | 447.37 /cy | 1,190 |
| n | 5012 | Bore & Jack Pipe 12 | 107.00 | lf | - | - | 12,840 | | - | 120.00 /lf | 12,840 |
| | 7000 | Grout Casing | 2.334 | cy | 10 | 403 | - | | 11 | 181.44 /cy | 423 |
| | | **Boring & Jack Conduit** | | | **1,184** | **1,014** | **31,640** | | **1,357** | | **35,196** |
| | | 62.74 Labor hours | | | | | | | | | |
| | | 22.42 Equipment hours | | | | | | | | | |
| **02518.810** | | **Fire Hydrants/Valves** | | | | | | | | | |
| | 0 | Salvage & Reinstall Fire Hydrant | 2.00 | ea | 906 | | - | | | 453.22 /ea | 906 |
| | 206 | Salvage & Reinstall Hydrant Valve 6" | 2.00 | ea | 680 | | - | | | 339.92 /ea | 680 |
| n | F606 | Hydrant Tee 6x6 | 1.00 | ea | 99 | 207 | - | | | 306.14 /ea | 306 |
| | | **Fire Hydrants/Valves** | | | **1,685** | **207** | | | | | **1,892** |
| | | 59.50 Labor hours | | | | | | | | | |
| | | 32.00 Equipment hours | | | | | | | | | |
| **02639.020** | | **Storm Drainage Manholes** | | | | | | | | | |
| | 0 | Unload Care & Protect Manhole | 2.00 | ea | 35 | - | - | | - | 17.51 /ea | 35 |
| | 7200 | Place & Shape Manhole Base & Inverts- 72" | 1.00 | ea | 210 | - | - | | - | 511.88 /ea | 512 |
| | 7217 | Manhole 72" x 17' Deep | 1.00 | ea | 412 | 8,134 | - | | 496 | 9,041.93 /ea | 9,042 |
| | 9600 | Place & Shape Manhole Base & Inverts- 96" | 1.00 | ea | 210 | - | - | | - | 694.04 /ea | 694 |
| | 9610 | Manhole 96" x 10' Deep | 1.00 | ea | 343 | 6,249 | - | | 496 | 7,088.49 /ea | 7,088 |
| | | **Storm Drainage Manholes** | | | **1,210** | **14,383** | | | **993** | | **17,371** |
| | | 70.000 Labor hours | | | | | | | | | |
| | | 8.00 Equipment hours | | | | | | | | | |
| **02720.100** | | **Aggregate Base Course** | | | | | | | | | |
| | 1180 | Crushed Rock (1" minus) | 234.00 | cy | 667 | 2,392 | - | | 3,369 | 27.47 /cy | 6,428 |
| | | **Aggregate Base Course** | | | **667** | **2,392** | | | **3,369** | | **6,428** |
| | | 37.44 Labor hours | | | | | | | | | |
| | | 37.44 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| | 20 | Bitum Paving | 491.00 | sy | - | - | 3,928 | | - | 8.00 /sy | 3,928 |
| | 30 | Bitum Paving Sidewalks | 67.00 | sy | - | - | 2,680 | | - | 40.00 /sy | 2,680 |
| | | **Asphalt Paving - Location** | | | | | **6,608** | | | | **6,608** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 5,625.00 | sy | 468 | 12,319 | - | | 470 | 2.36 /sy | 13,257 |
| | | **Lawns & Grasses** | | | **468** | **12,319** | | | **470** | | **13,257** |
| | | 22.50 Labor hours | | | | | | | | | |
| | | 11.25 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 140 | Concrete: Wet Well Concrete | 232.00 | cy | 28,788 | 81,200 | - | | 11,700 | 524.52 /cy | 121,688 |
| n | 140 | Concrete: Valve Vault | 102.00 | cy | 12,657 | 35,700 | - | | 5,144 | 524.52 /cy | 53,501 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 145 | Concrete: Wet Weather Flow Diversion Structure | 53.00 | cy | 6,029 | 19,080 | - | | 2,673 | 524.18 /cy | 27,781 |
| n | 180 | Concrete: Grout Fill - Diversion Chamber | 4.00 | cy | 165 | 400 | - | | 20 | 146.41 /cy | 586 |
| n | 180 | Concrete: Grout Fill - Wetwell | 30.00 | cy | 1,241 | 3,000 | - | | 151 | 146.41 /cy | 4,392 |
| | | **Concrete in Place** | | | **48,880** | **139,380** | | | **19,688** | | **207,947** |
| | | 2,363.500 Labor hours | | | | | | | | | |
| | | 390.40 Equipment hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 6.00 | ea | 460 | 7,659 | - | | - | 1,353.172 /ea | 8,119 |
| n | J08 | 48"x 60" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 5.00 | ea | 431 | 6,641 | - | | - | 1,414.51 /ea | 7,073 |
| | | **Hatch, Aluminum, 300psf** | | | **891** | **14,300** | | | | | **15,192** |
| | | 37.20 Labor hours | | | | | | | | | |
| **06600.110** | | **FRP Weirs & Baffles** | | | | | | | | | |
| | 0 | Aluminum Weirs | 20.00 | lf | 116 | 690 | - | | | 40.30 /lf | 806 |
| | | **FRP Weirs & Baffles** | | | **116** | **690** | | | | | **806** |
| | | 5.00 Labor hours | | | | | | | | | |
| **11210.000** | | **PUMPS** | | | | | | | | | |
| | ---- | Pumps | 4.00 | ea | 7,261 | 12,640 | - | | - | 4,975.20 /ea | 19,901 |
| | ---- | Sludge Pump - 5HP | 1.00 | ea | 11,345 | 20,000 | - | | - | 31,345.00 /ea | 31,345 |
| | | **PUMPS** | | | **18,606** | **32,640** | | | | | **51,246** |
| | | 820.000 Labor hours | | | | | | | | | |
| **11217.100** | | **Submersible Sump Pumps** | | | | | | | | | |
| | 10 | Sump Pump | 1.00 | ea | 3,870 | 8,000 | | | 2,740 | 14,610.56 /ea | 14,611 |
| | | **Submersible Sump Pumps** | | | **3,870** | **8,000** | | | **2,740** | | **14,611** |
| | | 192.00 Labor hours | | | | | | | | | |
| | | 32.00 Equipment hours | | | | | | | | | |
| **11284.000** | | **Sluice Gates** | | | | | | | | | |
| | 4242 | 42" x 42" Sluice Gate, MO | 1.00 | ea | 8,590 | 14,700 | - | | - | 23,289.60 /ea | 23,290 |
| | | **Sluice Gates** | | | **8,590** | **14,700** | | | | | **23,290** |
| | | 360.000 Labor hours | | | | | | | | | |
| **13000.005** | | **Special Const Allowance** | | | | | | | | | |
| | 5 | Level Sensor | 2.00 | ea | 771 | 3,450 | - | | - | 2,110.40 /ea | 4,221 |
| | | **Special Const Allowance** | | | **771** | **3,450** | | | | | **4,221** |
| | | 20.00 Labor hours | | | | | | | | | |
| **13121.000** | | **Pre-Engineered Metal Bldg** | | | | | | | | | |
| | z001 | Brick Bldg - Pump Controls | 600.00 | sf | | | 150,000 | | | 250.00 /sf | 150,000 |
| | | **Pre-Engineered Metal Bldg** | | | | | **150,000** | | | | **150,000** |
| **13420.200** | | **I&C Instruments** | | | | | | | | | |
| n | 05-FE-m020 | 20" Magnetic Flow Meter | 1.00 | ea | 510 | 11,500 | - | | - | 12,010.20 /ea | 12,010 |
| | | **I&C Instruments** | | | **510** | **11,500** | | | | | **12,010** |
| | | 18.60 Labor hours | | | | | | | | | |
| **15111.650** | | **Plug Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | 200P | Plug Valve, MJ, 6" | 1.00 | ea | 176 | 425 | - | | - | 601.28 /ea | 601 |
| n | 200S | Plug Valve, MJ, 12" | 4.00 | ea | 1,302 | 4,400 | - | | - | 1,425.62 /ea | 5,702 |
| | | **Plug Valve (CI/DI/IBBM)** | | | **1,479** | **4,825** | | | | | **6,304** |
| | | 46.46 Labor hours | | | | | | | | | |
| **15114.500** | | **Check Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | C20P | Check Valve, Double Disc, MJ, 6" | 1.00 | ea | 170 | 200 | - | | - | 369.97 /ea | 370 |
| n | C20S | Check Valve, Double Disc, MJ, 12" | 4.00 | ea | 1,306 | 2,400 | - | | - | 926.58 /ea | 3,706 |
| | | **Check Valve (CI/DI/IBBM)** | | | **1,476** | **2,600** | | | | | **4,076** |
| | | 46.38 Labor hours | | | | | | | | | |
| **15210.010** | | **DIP Totals** | | | | | | | | | |
| | 0 | Total Weight (Zero Cost Item) | 67,386.50 | lbs | - | - | - | | - | | |
| | 1 | Weight of Pipe (Zero Cost Item) | 57,836.500 | lbs | - | - | - | | - | | |
| | 2 | Weight of Fittings (Zero Cost Item) | 9,550.00 | lbs | - | - | - | | - | | |

| | Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **15210.200** | | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | | 0 | Unload Care & Protect Push-on DIP & Fittings | 67,386.50 | lbs | 130 | - | - | | 425 | 0.01 /lbs | 554 |
| | | 1 | Weight of Push-on Pipe (Zero Cost Item) | 57,836.500 | lbs | - | - | - | | - | | |
| | | 2 | Weight of Push-on Fittings (Zero Cost Item) | 9,550.00 | lbs | - | - | - | | - | | |
| | | 5 | Layout Push-on DIP & Fitting | 726.00 | lf | 165 | - | - | | - | 0.23 /lf | 165 |
| | | 11 | DIP Equipment- Cat 325 Excavator | 38.144 | ch | 739 | - | - | | 4,223 | 130.081 /ch | 4,962 |
| n | | 206 | DIP CML, Push-On, Class 52, 6" | 65.00 | lf | 341 | 805 | - | | - | 17.632 /lf | 1,146 |
| n | | 212 | DIP CML, Push-On, Class 52, 12" | 60.00 | lf | 444 | 1,671 | - | | - | 35.242 /lf | 2,114 |
| n | | 216 | DIP CML, Push-On, Class 52, 16" | 5.00 | lf | 42 | 209 | - | | - | 50.20 /lf | 251 |
| n | | 220 | DIP CML, Push-On, Class 52, 20" | 596.00 | lf | 5,402 | 32,539 | - | | - | 63.66 /lf | 37,940 |
| n | 2AMM | | DIP CML, Push-on, 90 Bend, 6" | 2.00 | ea | 112 | 240 | - | | - | 175.81 /ea | 352 |
| n | 2APP | | DIP CML, Push-on, 90 Bend, 12" | 9.00 | ea | 992 | 3,060 | - | | - | 450.19 /ea | 4,052 |
| n | 2ATT | | DIP CML, Push-on, 90 Bend, 20" | 5.00 | ea | 919 | 8,500 | - | | - | 1,883.722 /ea | 9,419 |
| n | FAUS | | DIP CML, Push-on, Tee BxB, 16"x 12" | 1.00 | ea | 196 | 1,638 | - | | - | 1,833.39 /ea | 1,833 |
| n | FAWP | | DIP CML, Push-on, Tee BxB, 20"x 6" | 1.00 | ea | 236 | 1,875 | - | | - | 2,110.74 /ea | 2,111 |
| n | FAWS | | DIP CML, Push-on, Tee BxB, 20"x 12" | 2.00 | ea | 471 | 4,025 | - | | - | 2,248.14 /ea | 4,496 |
| n | KASR | | DIP, CML, Push-on, Reducer BxB, 12"x 10" | 4.00 | ea | 378 | 1,320 | - | | - | 424.45 /ea | 1,698 |
| n | KAUS | | DIP, CML, Push-on, Reducer BxB, 16"x 12" | 1.00 | ea | 129 | 838 | - | | - | 966.34 /ea | 966 |
| n | KAWU | | DIP, CML, Push-on, Reducer BxB, 20"x 16" | 1.00 | ea | 161 | 1,225 | - | | - | 1,385.51 /ea | 1,386 |
| | | | **DIP CML Push-On Pipe** | | | **10,853** | **57,944** | | | **4,648** | | **73,445** |
| | | | 464.53 Labor hours | | | | | | | | | |
| | | | 45.56 Equipment hours | | | | | | | | | |
| **15220.302** | | | **A53 CW Pipe PE/GE/T&C/SW** | | | | | | | | | |
| n | 300P | | A53 CW Standard Pipe PE, 12" | 130.00 | lf | 1,674 | 19,328 | - | | - | 161.56 /lf | 21,003 |
| | | | **A53 CW Pipe PE/GE/T&C/SW** | | | **1,674** | **19,328** | | | | | **21,003** |
| | | | 70.20 Labor hours | | | | | | | | | |
| **15230.400** | | | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | | 0 | Unload Care & Protect PCCP & Fittings | 58.00 | lf | 0 | - | - | | 0 | 0.01 /lf | 0 |
| | | 10 | Layout Pipe & Fitting | 58.00 | lf | 14 | - | - | | - | 0.24 /lf | 14 |
| | | 325 | PCCP Equipment- Cat 325 Excavator | 8.70 | ch | 168 | - | - | | 963 | 130.091 /ch | 1,132 |
| n | B042 | | Prestressed Concrete Cylinder Pipe (250#) 42 | 58.00 | lf | 2,282 | 8,120 | - | | - | 179.353 /lf | 10,402 |
| | | | **Prestr Conc Cylind-(PCCP)** | | | **2,465** | **8,120** | | | **964** | | **11,549** |
| | | | 104.99 Labor hours | | | | | | | | | |
| | | | 8.71 Equipment hours | | | | | | | | | |
| **15241.100** | | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | | 0 | Unload Care & Protect Pipe/Fittings | 490.00 | lf | 1 | - | - | | 3 | 0.01 /lf | 4 |
| | | 10 | Layout Pipe & Fitting | 490.00 | lf | 117 | - | - | | - | 0.24 /lf | 117 |
| n | 80J0 | | PVC Schd. 80 Pipe, 6" | 620.00 | lf | 2,070 | 10,782 | - | | - | 20.73 /lf | 12,852 |
| | a010 | | PVC Joint Primer- Quart | 2.083 | qrt | - | 32 | - | | - | 15.35 /qrt | 32 |
| | a020 | | PVC Solvent Cement Low VOC- Quart | 2.083 | qrt | - | 46 | - | | - | 21.90 /qrt | 46 |
| | | | **PVC Schd Pipe & Fittings** | | | **2,188** | **10,859** | | | **3** | | **13,051** |
| | | | 91.754 Labor hours | | | | | | | | | |
| | | | 0.054 Equipment hours | | | | | | | | | |
| **15500.001** | | | **HVAC Equipment** | | | | | | | | | |
| | | 155 | HVAC Allowance - Pump Control Bldg | 600.00 | sf | - | - | 24,000 | | - | 40.00 /sf | 24,000 |
| | | | **HVAC Equipment** | | | | | **24,000** | | | | **24,000** |
| **16000.005** | | | **Electrical Allowance** | | | | | | | | | |
| | | 5 | Electrical & I&C Allowance | 0.00 | ls | 0 | 0 | - | | - | | |
| | | 5 | Electrical Allowance - Pump Control Bldg | 0.00 | sf | 0 | 0 | 0 | | - | | |
| | | | ***02 Wet Weather Pump Station*** | | | ***159,018*** | ***468,163*** | ***308,509*** | | ***114,166*** | | ***1,050,641*** |
| | | | 6,948.78 Labor hours | | | | | | | | | |
| | | | 1,332.074 Equipment hours | | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***03 High Rate Clarification*** | | | | | | | | | |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2734 | Remove Asphalt Pavement,Sidewalk | 150.00 | sy | 233 | - | - | | 470 | 4.684 /sy | 703 |
| | 3012 | Demo Concrete Stairs | 4.00 | cy | 392 | - | - | | 1,019 | 352.58 /cy | 1,410 |
| | | **Selective Site Demolition** | | | **625** | | | | **1,488** | | **2,113** |
| | | 38.25 Labor hours | | | | | | | | | |
| | | 19.40 Equipment hours | | | | | | | | | |
| **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | 1 | Design Shoring System-Minor | 1.00 | ls | - | - | 1,000 | | - | 1,000.00 /ls | 1,000 |
| | 100 | Survey & Layout Shoring | 32.00 | lf | 0 | - | - | | - | 0.02 /lf | 0 |
| n | 1025 | Steel Sheeting,15' x 22psf, pulled & salvage | 480.00 | sf | 2,487 | 2,789 | - | | 3,285 | 17.84 /sf | 8,561 |
| | 1045 | Install & Remove Wales/Struts/Connectors | 0.53 | ton | 128 | 486 | - | | 169 | 1,483.73 /ton | 783 |
| n | 1050 | Rent Steel Sheet Piling and Wales, first month | 5.81 | ton | - | 1,763 | - | | - | 303.61 /ton | 1,763 |
| | | **Sheet Piling** | | | **2,616** | **5,038** | **1,000** | | **3,455** | | **12,109** |
| | | 86.18 Labor hours | | | | | | | | | |
| | | 21.54 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 110 | Hand Excavate Foundations | 18.00 | cy | 367 | - | - | | - | 20.37 /cy | 367 |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 14.82 | cy | 12 | - | - | | 34 | 3.122 /cy | 46 |
| | 461C | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 9.593 | cy | 16 | - | - | | 32 | 5.011 /cy | 48 |
| n | A000 | IMPORT MATERIAL (Summary) | 2.00 | CY | - | - | - | | - | | |
| n | A015 | Import Gravel Fill | 1.852 | cy | - | 28 | 10 | | - | 20.60 /cy | 38 |
| | | **Foundation Excavation** | | | **395** | **28** | **10** | | **66** | | **499** |
| | | 30.741 Labor hours | | | | | | | | | |
| | | 1.162 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 125.00 | lf | 12 | | - | | - | 0.092 /lf | 12 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 153.331 | cy | 78 | - | - | | 339 | 2.72 /cy | 417 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 9.542 | cy | 14 | - | - | | 48 | 6.56 /cy | 63 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 24.442 | cy | 59 | - | - | | 197 | 10.492 /cy | 256 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 116.24 | cy | 105 | - | - | | 331 | 3.751 /cy | 436 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 33.984 | cy | - | 1,196 | - | | - | 35.20 /cy | 1,196 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 37.10 | cy | 52 | - | - | | 100 | 4.10 /cy | 152 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 37.10 | cy | 36 | - | - | | 60 | 2.61 /cy | 97 |
| n | 9616 | Trench Shield- 6x16 | 2.00 | u/mo | - | - | - | | 2,820 | 1,410.00 /u/mo | 2,820 |
| | A006 | Pipe Test | 125.00 | lf | 92 | 100 | - | | - | 1.54 /lf | 192 |
| | C0N0 | Concrete Thrust Block, 10" | 5.00 | ea | 394 | 60 | - | | - | 90.74 /ea | 454 |
| | | **Trenching** | | | **842** | **1,356** | | | **3,896** | | **6,094** |
| | | 42.782 Labor hours | | | | | | | | | |
| | | 16.292 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 60.32 | cy | - | - | - | | - | | |
| | 40 | Foundation Excavation Spoils (Summary) | 23.222 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 37.10 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 37.10 | cy | 60 | - | - | | 115 | 4.712 /cy | 175 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 23.222 | cy | 27 | - | - | | 76 | 4.44 /cy | 103 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 37.10 | cy | 167 | - | - | | 278 | 12.001 /cy | 445 |
| | A0I7 | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 23.222 | cy | 15 | - | - | | 34 | 2.071 /cy | 48 |
| | | **Excavation Spoils** | | | **268** | | | | **503** | | **771** |
| | | 15.731 Labor hours | | | | | | | | | |
| | | 7.87 Equipment hours | | | | | | | | | |
| **02639.020** | | **Storm Drainage Manholes** | | | | | | | | | |
| | 0 | Unload Care & Protect Manhole | 1.00 | ea | 18 | - | - | | - | 17.51 /ea | 18 |
| | 4800 | Place & Shape Manhole Base & Inverts- 48" | 1.00 | ea | 210 | - | - | | - | 372.04 /ea | 372 |
| | 4805 | Manhole 48" x 5' Deep | 1.00 | ea | 113 | 1,657 | - | | | 1,769.79 /ea | 1,770 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Storm Drainage Manholes** | | | **340** | **1,657** | | | | | **2,159** |
| | | 21.00 Labor hours | | | | | | | | | |
| | | 4.00 Equipment hours | | | | | | | | | |
| **02720.100** | | **Aggregate Base Course** | | | | | | | | | |
| | 1002 | Granular fill | 622.00 | cy | 1,772 | | - | | 8,955 | 17.25 /cy | 10,727 |
| | 1002 | Granular fill | 207.00 | cy | 527 | | - | | | 2.55 /cy | 527 |
| | | **Aggregate Base Course** | | | **2,300** | | | | **8,955** | | **11,254** |
| | | 128.50 Labor hours | | | | | | | | | |
| | | 107.80 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| | 30 | Bitum Paving Sidewalks | 150.00 | sy | - | - | 6,000 | | - | 40.00 /sy | 6,000 |
| | | **Asphalt Paving - Location** | | | | | **6,000** | | | | **6,000** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 667.00 | sy | 55 | 1,461 | - | | 56 | 2.36 /sy | 1,572 |
| | | **Lawns & Grasses** | | | **55** | **1,461** | | | **56** | | **1,572** |
| | | 2.67 Labor hours | | | | | | | | | |
| | | 1.334 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 110 | Concrete: Slab on Grade | 151.00 | cy | 10,930 | 46,810 | - | | 4,111 | 409.61 /cy | 61,851 |
| n | 110 | Concrete: Slab on Grade - Pump Support | 1.00 | cy | 72 | 310 | - | | 27 | 409.61 /cy | 410 |
| n | 110 | Concrete: Slab on Grade | 7.00 | cy | 507 | 2,170 | - | | 191 | 409.62 /cy | 2,867 |
| n | 110 | Concrete: Slab on Grade - Pump Support | 1.00 | cy | 72 | 310 | - | | 27 | 409.61 /cy | 410 |
| n | 140 | Concrete | 67.00 | cy | 8,314 | 23,450 | - | | 3,379 | 524.52 /cy | 35,143 |
| n | 140 | Concrete: Wall | 91.00 | cy | 11,292 | 31,850 | - | | 4,589 | 524.52 /cy | 47,731 |
| n | 140 | Concrete: Baffle | 45.00 | cy | 5,584 | 15,750 | - | | 2,269 | 524.52 /cy | 23,603 |
| n | 140 | Concrete: Wall | 267.00 | cy | 33,131 | 93,450 | - | | 13,465 | 524.52 /cy | 140,046 |
| n | 140 | Concrete: Channel Wall | 78.00 | cy | 9,679 | 27,300 | - | | 3,934 | 524.52 /cy | 40,912 |
| n | 140 | Concrete: Wall | 45.00 | cy | 5,584 | 15,750 | - | | 2,269 | 524.52 /cy | 23,603 |
| n | 140 | Concrete: Wall - Wet Well | 40.00 | cy | 4,963 | 14,000 | - | | 2,017 | 524.52 /cy | 20,981 |
| n | 145 | Concrete: Elevated Slab | 25.00 | cy | 2,844 | 9,000 | - | | 1,261 | 524.18 /cy | 13,104 |
| n | 145 | Concrete: Elevated Slab - Wet Well | 11.00 | cy | 1,251 | 3,960 | - | | 555 | 524.18 /cy | 5,766 |
| n | 165 | Concrete: Stair | 4.00 | cy | 579 | 1,600 | - | | 403 | 645.63 /cy | 2,583 |
| n | 180 | Concrete: Grout Fill - avoid grit deposition | 2.00 | cy | 83 | 200 | - | | 10 | 146.41 /cy | 293 |
| n | 180 | Concrete: Grout Fill | 80.00 | cy | 3,309 | 8,000 | - | | 403 | 146.41 /cy | 11,712 |
| | | **Concrete in Place** | | | **98,193** | **293,910** | | | **38,911** | | **431,014** |
| | | 4,748.000 Labor hours | | | | | | | | | |
| | | 771.600 Equipment hours | | | | | | | | | |
| **03150.010** | | **Concrete Core & Saw** | | | | | | | | | |
| c 60 | | Core Drill 6" to 12" depth | 5.00 | ea | 197 | - | - | | | 39.49 /ea | 197 |
| | | **Concrete Core & Saw** | | | **197** | | | | | | **197** |
| | | 16.00 Labor hours | | | | | | | | | |
| **05510.000** | | **Metal Ladders** | | | | | | | | | |
| | 10 | Straight Ladder-Aluminum | 225.00 | lf | 3,998 | 10,322 | - | | - | 63.642 /lf | 14,320 |
| | | **Metal Ladders** | | | **3,998** | **10,322** | | | | | **14,320** |
| | | 112.50 Labor hours | | | | | | | | | |
| **05520.000** | | **Handrail/Railing** | | | | | | | | | |
| | 103 | 3 Rail-Handrail Alum. w/Toe | 220.00 | lf | 1,955 | 15,180 | - | | - | 77.884 /lf | 17,135 |
| | | **Handrail/Railing** | | | **1,955** | **15,180** | | | | | **17,135** |
| | | 55.00 Labor hours | | | | | | | | | |
| **05530.200** | | **Alum. Grating-Riveted** | | | | | | | | | |
| 5 K | | 1-1/4x1/8 Riveted Grate-Stnd. | 144.00 | sf | 870 | 6,160 | - | | - | 48.821 /sf | 7,030 |
| 8 K | | 1-1/2x3/16 Riveted Grate-Stnd. | 600.00 | sf | 3,625 | 24,288 | - | | - | 46.521 /sf | 27,913 |
| | | **Alum. Grating-Riveted** | | | **4,495** | **30,448** | | | | | **34,943** |
| | | 126.480 Labor hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 8.00 | ea | 613 | 10,212 | - | | - | 1,353.173 /ea | 10,825 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Hatch, Aluminum, 300psf** | | | **613** | **10,212** | | | | | **10,825** |
| | | 25.60 Labor hours | | | | | | | | | |
| **09910.100** | | **Paint Pipe/Valve/Equip** | | | | | | | | | |
| | 10 | Paint Pipe - Standard Paint | 98.72 | sf | 52 | 34 | - | | - | 0.88 /sf | 86 |
| | | **Paint Pipe/Valve/Equip** | | | **52** | **34** | | | | | **86** |
| | | 1.974 Labor hours | | | | | | | | | |
| **11000.005** | | **Equipment Allowance** | | | | | | | | | |
| | 5 | Equipment Allowance - Kruger Estimate | 1.00 | ls | 748,623 | 2,392,000 | - | | 662,028 | 3,802,650.85 /ls | 3,802,651 |
| | | **Equipment Allowance** | | | **748,623** | **2,392,000** | | | **662,028** | | **3,802,651** |
| | | 30,926.85 Labor hours | | | | | | | | | |
| | | 7,731.712 Equipment hours | | | | | | | | | |
| **11000.015** | | **Equipment Demolition** | | | | | | | | | |
| n | q003 | 20 cy Roll-Off Dumpster | 1.00 | ea | 91 | 2,500 | | | - | 2,590.760 /ea | 2,591 |
| | | **Equipment Demolition** | | | **91** | **2,500** | | | | | **2,591** |
| | | 4.00 Labor hours | | | | | | | | | |
| **11210.000** | | **PUMPS** | | | | | | | | | |
| | ---- | Sludge Pump - 5HP | 1.00 | ea | 9,076 | 20,000 | - | | - | 29,076.00 /ea | 29,076 |
| | | **PUMPS** | | | **9,076** | **20,000** | | | | | **29,076** |
| | | 400.000 Labor hours | | | | | | | | | |
| **11217.100** | | **Submersible Sump Pumps** | | | | | | | | | |
| | 05 | Sump Pump 5 HP | 2.00 | ea | 7,741 | 16,000 | - | | 5,480 | 14,610.56 /ea | 29,221 |
| | 10 | Sump Pump | 2.00 | ea | 8,708 | 16,000 | - | | 6,165 | 15,436.88 /ea | 30,874 |
| | 10 | 50gpm Sump Pump | 1.00 | ea | 4,354 | 8,000 | - | | 3,083 | 15,436.88 /ea | 15,437 |
| | 50 | Sump Pump 50 gpm | 1.00 | ea | 1,451 | 3,150 | - | | 1,028 | 5,628.96 /ea | 5,629 |
| | | **Submersible Sump Pumps** | | | **22,255** | **43,150** | | | **15,756** | | **81,161** |
| | | 1,104.00 Labor hours | | | | | | | | | |
| | | 184.00 Equipment hours | | | | | | | | | |
| **11240.420** | | **Storage Tanks** | | | | | | | | | |
| | a200 | Set VFD Control - Actiflow Maturation Tank | 1.00 | ea | 8,576 | 15,000 | - | | - | 23,576.00 /ea | 23,576 |
| | a200 | Set VFD Control - Actiflow Sellting Tank Scraper | 1.00 | ea | 8,576 | 15,000 | - | | - | 23,576.00 /ea | 23,576 |
| | | **Storage Tanks** | | | **17,152** | **30,000** | | | | | **47,152** |
| | | 800.000 Labor hours | | | | | | | | | |
| **11284.000** | | **Sluice Gates** | | | | | | | | | |
| | 96A8 | 96" x 48" Sluice Gate | 4.00 | ea | 57,264 | 132,000 | - | | - | 47,316.00 /ea | 189,264 |
| | | **Sluice Gates** | | | **57,264** | **132,000** | | | | | **189,264** |
| | | 2,400.00 Labor hours | | | | | | | | | |
| **11330.100** | | **Barscreens** | | | | | | | | | |
| n | A 3 | Screens | 1.00 | ea | 95,440 | 200,000 | - | | - | 295,440.00 /ea | 295,440 |
| | B 5 | Screen Conveyor | 1.00 | ea | 19,088 | 40,000 | - | | - | 59,088.00 /ea | 59,088 |
| | | **Barscreens** | | | **114,528** | **240,000** | | | | | **354,528** |
| | | 4,800.000 Labor hours | | | | | | | | | |
| **13000.005** | | **Special Const Allowance** | | | | | | | | | |
| | 5 | Pressure Sensor | 2.00 | ea | 771 | 3,450 | - | | - | 2,110.40 /ea | 4,221 |
| | 13 | Level Sensor | 1.00 | ea | 4 | 1,725 | | | - | 1,728.57 /ea | 1,729 |
| | | **Special Const Allowance** | | | **774** | **5,175** | | | | | **5,949** |
| | | 20.10 Labor hours | | | | | | | | | |
| **13121.000** | | **Pre-Engineered Metal Bldg** | | | | | | | | | |
| | z001 | Pre-Engineered Metal Bldg- Chemical | 625.00 | sf | | | 46,875 | | | 75.00 /sf | 46,875 |
| | z001 | Pre-Engineered Metal Bldg | 600.00 | sf | | | 45,000 | | | 75.00 /sf | 45,000 |
| | | **Pre-Engineered Metal Bldg** | | | | | **91,875** | | | | **91,875** |
| **13420.200** | | **I&C Instruments** | | | | | | | | | |
| n | 05-FE-m006 | Magnetic Flow Meter | 1.00 | ea | 160 | 4,600 | - | | - | 4,759.92 /ea | 4,760 |

| | Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **I&C Instruments** | | | **160** | **4,600** | | | | | **4,760** |
| | | | 5.83 Labor hours | | | | | | | | | |
| | **15111.650** | | **Plug Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | 200R | | Plug Valve, MJ, 10" | 2.00 | ea | 560 | 1,800 | - | | - | 1,180.11 /ea | 2,360 |
| | | | **Plug Valve (CI/DI/IBBM)** | | | **560** | **1,800** | | | | | **2,360** |
| | | | 17.60 Labor hours | | | | | | | | | |
| | **15113.450** | | **GV Knife Gate ValveCI/DI** | | | | | | | | | |
| n | 160R | | Knife Gate Valve, Motor Oper, flg, 10" | 6.00 | ea | 2,424 | 18,900 | - | | - | 3,553.923 /ea | 21,324 |
| | | | **GV Knife Gate ValveCI/DI** | | | **2,424** | **18,900** | | | | | **21,324** |
| | | | 76.140 Labor hours | | | | | | | | | |
| | **15114.500** | | **Check Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | C20R | | Check Valve, Double Disc, MJ, 10" | 2.00 | ea | 556 | 1,000 | - | | - | 778.11 /ea | 1,556 |
| | | | **Check Valve (CI/DI/IBBM)** | | | **556** | **1,000** | | | | | **1,556** |
| | | | 17.48 Labor hours | | | | | | | | | |
| | **15120.100** | | **Pipe Specialties** | | | | | | | | | |
| n | K2XS | | Tapping Sleeve- CS Epoxy Coated/SS Flange, 30"x 10"dia | 1.00 | ea | 119 | 2,770 | - | | - | 2,889.30 /ea | 2,889 |
| | | | **Pipe Specialties** | | | **119** | **2,770** | | | | | **2,889** |
| | | | 5.00 Labor hours | | | | | | | | | |
| | **15210.010** | | **DIP Totals** | | | | | | | | | |
| | | 0 | Total Weight (Zero Cost Item) | 6,862.50 | lbs | - | - | - | | - | | |
| | | 1 | Weight of Pipe (Zero Cost Item) | 4,687.50 | lbs | - | - | - | | - | | |
| | | 2 | Weight of Fittings (Zero Cost Item) | 2,175.00 | lbs | - | - | - | | - | | |
| | **15210.200** | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | | 0 | Unload Care & Protect Push-on DIP & Fittings | 6,862.50 | lbs | 13 | - | - | | 43 | 0.01 /lbs | 56 |
| | | 1 | Weight of Push-on Pipe (Zero Cost Item) | 4,687.50 | lbs | - | - | - | | - | | |
| | | 2 | Weight of Push-on Fittings (Zero Cost Item) | 2,175.00 | lbs | - | - | - | | - | | |
| | | 5 | Layout Push-on DIP & Fitting | 125.00 | lf | 28 | - | - | | - | 0.23 /lf | 28 |
| n | | 210 | DIP CML, Push-On, Class 52, 10" | 125.00 | lf | 835 | 2,766 | - | | - | 28.81 /lf | 3,601 |
| n | 2AOO | | DIP CML, Push-on, 90 Bend, 10" | 6.00 | ea | 588 | 1,560 | - | | - | 358.023 /ea | 2,148 |
| n | AAOO | | DIP CML, Push-on, 45 Bend, 10" | 2.00 | ea | 181 | 460 | - | | - | 320.67 /ea | 641 |
| n | FARR | | DIP CML, Push-on, Tee BxB, 10"x 10" | 4.00 | ea | 555 | 1,600 | - | | - | 538.81 /ea | 2,155 |
| n | KARQ | | DIP, CML, Push-on, Reducer BxB, 10"x 8" | 4.00 | ea | 323 | 960 | - | | - | 320.853 /ea | 1,283 |
| | | | **DIP CML Push-On Pipe** | | | **2,525** | **7,346** | | | **43** | | **9,914** |
| | | | 106.105 Labor hours | | | | | | | | | |
| | | | 0.755 Equipment hours | | | | | | | | | |
| | **15221.120** | | **Fab 304L Stainless Pipe** | | | | | | | | | |
| | | 0 | Unload Care & Protect Pipe/Fittings | 345.00 | lbs | 1 | - | - | | 2 | 0.01 /lbs | 3 |
| | | 1 | Weight of Pipe (Zero Cost Item) | 345.00 | lbs | - | - | - | | - | | |
| | | 10 | Layout Pipe & Fitting | 150.00 | lf | 36 | - | - | | - | 0.24 /lf | 36 |
| | 107A | | Install Fabricated 304L SS Pipe, 1-1/4" | 150.00 | lf | 286 | - | - | | - | 1.91 /lf | 286 |
| n | 50A0 | | 304L Sch 40s Stainless Pipe, 1.25" | 150.00 | lf | - | 1,398 | - | | - | 9.32 /lf | 1,398 |
| | | | **Fab 304L Stainless Pipe** | | | **323** | **1,398** | | | **2** | | **1,723** |
| | | | 13.54 Labor hours | | | | | | | | | |
| | | | 0.04 Equipment hours | | | | | | | | | |
| | **15241.100** | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | | 0 | Unload Care & Protect Pipe/Fittings | 500.00 | lf | 1 | - | - | | 3 | 0.01 /lf | 4 |
| | | 10 | Layout Pipe & Fitting | 500.00 | lf | 119 | - | - | | - | 0.24 /lf | 119 |
| n | 80C0 | | PVC Schd. 80 Pipe, 2.00" | 50.00 | lf | 83 | 153 | - | | - | 4.73 /lf | 236 |
| n | 80E0 | | PVC Schd. 80 Pipe, 3.00" | 300.00 | lf | 573 | 1,872 | - | | - | 8.15 /lf | 2,445 |
| n | 80G0 | | PVC Schd. 80 Pipe, 4.00" | 50.00 | lf | 119 | 456 | - | | - | 11.50 /lf | 575 |
| n | 80P0 | | PVC Schd. 80 Pipe, 12" | 100.00 | lf | 716 | 5,445 | - | | - | 61.61 /lf | 6,161 |
| | a010 | | PVC Joint Primer- Quart | 3.654 | qrt | - | 56 | - | | - | 15.35 /qrt | 56 |
| | a020 | | PVC Solvent Cement Low VOC- Quart | 3.654 | qrt | - | 80 | - | | - | 21.90 /qrt | 80 |
| | | | **PVC Schd Pipe & Fittings** | | | **1,611** | **8,062** | | | **3** | | **9,676** |
| | | | 67.56 Labor hours | | | | | | | | | |
| | | | 0.06 Equipment hours | | | | | | | | | |
| | **15500.001** | | **HVAC Equipment** | | | | | | | | | |
| | | 155 | HVAC Allowance - Chemical Bldg | 625.00 | sf | - | - | 25,000 | | - | 40.00 /sf | 25,000 |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | **HVAC Equipment** | | | | **25,000** | | | | **25,000** |
| **16000.005** | **Electrical Allowance** | | | | | | | | |
| 5 | Electrical Allowance for pumps | 0.00 ls | 0 | 0 | - | | - | | |
| | ***03 High Rate Clarification*** | | ***1,094,987*** | ***3,280,346*** | ***123,885*** | | ***735,161*** | | ***5,234,541*** |
| | 46,215.60 Labor hours | | | | | | | | |
| | 8,867.55 Equipment hours | | | | | | | | |

| | Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ***04 Chlorine Contact Tank No. 2*** | | | | | | | | | | |
| | **02220.030** | | **Selective Site Demolition** | | | | | | | | | | |
| | | 2502 | Remove Influent Junction Box | 1.00 | ea | 261 | - | - | | 124 | 385.09 | /ea | 385 |
| | | 2502 | Remove 48" Motor Operated Timber Gate | 1.00 | ea | 65 | - | - | | 62 | 127.26 | /ea | 127 |
| | | 2502 | Remove Redwood Baffle | 1.00 | ea | 131 | - | - | | 124 | 254.53 | /ea | 255 |
| | | 2508 | Remove 36" Concrete Influent Pipe & Gate | 24.00 | lf | 98 | - | - | | 179 | 11.52 | /lf | 276 |
| | | 2508 | Remove 54" RCP & Reducer | 7.50 | lf | 31 | - | - | | 56 | 11.52 | /lf | 86 |
| | | 2508 | Remove 24" Scum Drain for Rerouting | 5.70 | lf | 23 | - | - | | 42 | 11.52 | /lf | 66 |
| | | 2508 | Remove 48"x36" Cross | 1.00 | ea | 4 | - | - | | 7 | 11.52 | /ea | 12 |
| | | 3006 | Remove Influent Junction Box | 6.70 | cy | 66 | - | - | | 171 | 35.26 | /cy | 236 |
| | | | **Selective Site Demolition** | | | **678** | | | | **765** | | | **1,443** |
| | | | 41.57 Labor hours | | | | | | | | | | |
| | | | 10.924 Equipment hours | | | | | | | | | | |
| | **02315.300** | | **Trenching** | | | | | | | | | | |
| | | 0 | Survey & Stake Pipeline | 80.00 | lf | 7 | | - | | - | 0.092 | /lf | 7 |
| n | | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 132.083 | cy | 67 | - | - | | 292 | 2.72 | /cy | 359 |
| n | | 3240 | Trench Bedding-Excavator- 240 HP | 8.20 | cy | 12 | - | - | | 41 | 6.56 | /cy | 54 |
| n | | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 27.98 | cy | 68 | - | - | | 226 | 10.492 | /cy | 294 |
| n | | 5130 | Trench Native Backfill- Loader C938 3cy | 85.152 | cy | 77 | - | - | | 242 | 3.75 | /cy | 319 |
| | | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 36.174 | cy | - | 1,273 | - | | - | 35.20 | /cy | 1,273 |
| | | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 46.931 | cy | 66 | - | - | | 126 | 4.10 | /cy | 192 |
| | | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 46.931 | cy | 46 | - | - | | 76 | 2.61 | /cy | 122 |
| n | | 9616 | Trench Shield- 6x16 | 0.15 | u/mo | - | - | - | | 212 | 1,410.00 | /u/mo | 212 |
| | A006 | | Pipe Test | 80.00 | lf | 59 | 64 | - | | - | 1.54 | /lf | 123 |
| | C0V0 | | Concrete Thrust Block, 24" | 2.00 | ea | 215 | 172 | - | | - | 193.37 | /ea | 387 |
| | C0e0 | | Concrete Thrust Block, 54" | 2.00 | ea | 668 | 1,840 | - | | - | 1,254.04 | /ea | 2,508 |
| | | | **Trenching** | | | **1,285** | **3,349** | | | **1,216** | | | **5,850** |
| | | | 61.50 Labor hours | | | | | | | | | | |
| | | | 15.63 Equipment hours | | | | | | | | | | |
| | **02315.500** | | **Excavation Spoils** | | | | | | | | | | |
| | | 0 | EXCAVATION SPOILS (Grand Total) | 46.931 | cy | - | - | - | | - | | | |
| | | 45 | Trenching Spoils (Summary) | 46.931 | cy | - | - | - | | - | | | |
| | | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 46.931 | cy | 76 | - | - | | 145 | 4.712 | /cy | 221 |
| | A0A4 | | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 46.931 | cy | 211 | - | - | | 352 | 12.001 | /cy | 563 |
| | | | **Excavation Spoils** | | | **287** | | | | **497** | | | **784** |
| | | | 16.883 Labor hours | | | | | | | | | | |
| | | | 8.441 Equipment hours | | | | | | | | | | |
| | **03000.005** | | **Concrete in Place** | | | | | | | | | | |
| n | | 140 | Concrete: Wall | 89.50 | cy | 11,106 | 31,325 | - | | 4,513 | 524.52 | /cy | 46,944 |
| | | | **Concrete in Place** | | | **11,106** | **31,325** | | | **4,513** | | | **46,944** |
| | | | 537.000 Labor hours | | | | | | | | | | |
| | | | 89.50 Equipment hours | | | | | | | | | | |
| | **11284.000** | | **Sluice Gates** | | | | | | | | | | |
| | | 4848 | 48" x 48" Sluice Gate | 1.00 | ea | 9,544 | 16,134 | - | | - | 25,678.00 | /ea | 25,678 |
| | | | **Sluice Gates** | | | **9,544** | **16,134** | | | | | | **25,678** |
| | | | 400.000 Labor hours | | | | | | | | | | |
| | **15210.010** | | **DIP Totals** | | | | | | | | | | |
| | | 0 | Total Weight (Zero Cost Item) | 10,833.00 | lbs | - | - | - | | - | | | |
| | | 1 | Weight of Pipe (Zero Cost Item) | 8,968.00 | lbs | - | - | - | | - | | | |
| | | 2 | Weight of Fittings (Zero Cost Item) | 1,865.00 | lbs | - | - | - | | - | | | |
| | **15210.200** | | **DIP CML Push-On Pipe** | | | | | | | | | | |
| | | 0 | Unload Care & Protect Push-on DIP & Fittings | 10,833.00 | lbs | 21 | - | - | | 68 | 0.01 | /lbs | 89 |
| | | 1 | Weight of Push-on Pipe (Zero Cost Item) | 8,968.00 | lbs | - | - | - | | - | | | |
| | | 2 | Weight of Push-on Fittings (Zero Cost Item) | 1,865.00 | lbs | - | - | - | | - | | | |
| | | 5 | Layout Push-on DIP & Fitting | 80.00 | lf | 18 | - | - | | - | 0.23 | /lf | 18 |
| n | | 224 | DIP CML, Push-On, Class 52, 24" | 80.00 | lf | 764 | 5,560 | - | | - | 79.05 | /lf | 6,324 |
| n | 2AUU | | DIP CML, Push-on, 90 Bend, 24" | 1.00 | ea | 217 | 2,663 | - | | - | 2,879.30 | /ea | 2,879 |
| n | AAUU | | DIP CML, Push-on, 45 Bend, 24" | 1.00 | ea | 213 | 2,000 | - | | - | 2,213.20 | /ea | 2,213 |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | **DIP CML Push-On Pipe** | | **1,233** | **10,223** | | | **68** | | **11,523** |
| | 52.02 Labor hours | | | | | | | | |
| | 1.192 Equipment hours | | | | | | | | |
| **15230.100** | **Concrete Pipe (RCP)** | | | | | | | | |
| n A054 | RCP 90 Bend 54 | 1.00 ea | 388 | 750 | - | | - | 1,137.80 /ea | 1,138 |
| n B054 | RCP 45 Bend 54 | 1.00 ea | 388 | 750 | - | | - | 1,137.80 /ea | 1,138 |
| | **Concrete Pipe (RCP)** | | **776** | **1,500** | | | | | **2,276** |
| | 32.52 Labor hours | | | | | | | | |
| | ***04 Chlorine Contact Tank No. 2*** | | ***24,908*** | ***62,531*** | ***0*** | | ***7,060*** | | ***94,499*** |
| | 1,141.49 Labor hours | | | | | | | | |
| | 125.683 Equipment hours | | | | | | | | |

| | Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ***05 Return Activated Sludge Pump Station*** | | | | | | | | | |
| | **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | | 20 | Allowance for passing around 5 existing pipes | 1.00 | ls | - | - | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | | 20 | Allowance to Install Wye on existing 24"line | 1.00 | ls | - | - | 1,500 | | - | 1,500.00 /ls | 1,500 |
| | | | **Sitework Allowance** | | | | | **6,500** | | | | **6,500** |
| | **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | | 1 | Design Shoring System-Minor | 3.00 | ls | - | - | 3,000 | | - | 1,000.00 /ls | 3,000 |
| | | 100 | Survey & Layout Shoring | 172.00 | lf | 3 | - | - | | - | 0.02 /lf | 3 |
| n | | 1025 | Steel Sheeting,15' x 22psf, pulled & salvage | 2,580.00 | sf | 13,370 | 14,990 | - | | 17,658 | 17.84 /sf | 46,017 |
| | | 1045 | Install & Remove Wales/Struts/Connectors | 2.84 | ton | 689 | 2,611 | - | | 910 | 1,483.73 /ton | 4,211 |
| n | | 1050 | Rent Steel Sheet Piling and Wales, first month | 31.22 | ton | - | 9,478 | - | | - | 303.611 /ton | 9,478 |
| | | | **Sheet Piling** | | | **14,062** | **27,079** | **3,000** | | **18,568** | | **62,709** |
| | | | 463.20 Labor hours | | | | | | | | | |
| | | | 115.76 Equipment hours | | | | | | | | | |
| | **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 287.132 | cy | 242 | - | - | | 654 | 3.121 /cy | 896 |
| | 461C | | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 77.722 | cy | 132 | - | - | | 257 | 5.011 /cy | 389 |
| n | A000 | | IMPORT MATERIAL (Summary) | 10.55 | CY | - | - | - | | - | | |
| n | A015 | | Import Gravel Fill | 25.51 | cy | - | 383 | 143 | | - | 20.60 /cy | 525 |
| n | z000 | | Shore Foundation Excavation BSF | 565.49 | bsf | 270 | - | - | | 565 | 1.48 /bsf | 835 |
| | | | **Foundation Excavation** | | | **644** | **383** | **143** | | **1,477** | | **2,646** |
| | | | 35.951 Labor hours | | | | | | | | | |
| | | | 13.875 Equipment hours | | | | | | | | | |
| | **02315.300** | | **Trenching** | | | | | | | | | |
| | | 0 | Survey & Stake Pipeline | 1,290.00 | lf | 119 | | - | | - | 0.092 /lf | 119 |
| n | | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 508.75 | cy | 1,029 | - | - | | 2,898 | 7.72 /cy | 3,927 |
| n | | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 990.71 | cy | 501 | - | - | | 2,191 | 2.72 /cy | 2,692 |
| n | | 3130 | Trench Bedding-Excavator- 130 HP | 46.00 | cy | 93 | - | - | | 270 | 7.901 /cy | 363 |
| n | | 3240 | Trench Bedding-Excavator- 240 HP | 61.60 | cy | 93 | - | - | | 311 | 6.56 /cy | 404 |
| n | | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 136.024 | cy | 440 | - | - | | 1,280 | 12.641 /cy | 1,720 |
| n | | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 176.65 | cy | 429 | - | - | | 1,425 | 10.492 /cy | 1,853 |
| n | | 5130 | Trench Native Backfill- Loader C938 3cy | 1,007.50 | cy | 911 | - | - | | 2,868 | 3.75 /cy | 3,779 |
| | | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 420.271 | cy | - | 14,794 | - | | - | 35.20 /cy | 14,794 |
| | | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 491.96 | cy | 690 | - | - | | 1,326 | 4.10 /cy | 2,016 |
| | | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 491.96 | cy | 482 | - | - | | 802 | 2.61 /cy | 1,283 |
| n | | 9616 | Trench Shield- 6x16 | 3.06 | u/mo | - | - | - | | 4,315 | 1,410.00 /u/mo | 4,315 |
| | A006 | | Pipe Test | 1,290.00 | lf | 953 | 1,032 | - | | - | 1.54 /lf | 1,985 |
| | C0Q0 | | Concrete Thrust Block, 14" | 2.00 | ea | 181 | 50 | - | | - | 115.67 /ea | 231 |
| | C0R0 | | Concrete Thrust Block, 16" | 10.00 | ea | 954 | 330 | - | | - | 128.44 /ea | 1,284 |
| | C0V0 | | Concrete Thrust Block, 24" | 1.00 | ea | 107 | 86 | - | | - | 193.37 /ea | 193 |
| | | | **Trenching** | | | **6,983** | **16,292** | | | **17,684** | | **40,958** |
| | | | 399.20 Labor hours | | | | | | | | | |
| | | | 210.95 Equipment hours | | | | | | | | | |
| | **02315.400** | | **Drilling & Blasting** | | | | | | | | | |
| | | 1008 | Hydraulic Hoe Ram -Medium | 185.00 | cy | | - | 23,125 | | | 125.00 /cy | 23,125 |
| | | | **Drilling & Blasting** | | | | | **23,125** | | | | **23,125** |
| | **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | | 0 | EXCAVATION SPOILS (Grand Total) | 701.37 | cy | - | - | - | | - | | |
| | | 40 | Foundation Excavation Spoils (Summary) | 209.41 | cy | - | - | - | | - | | |
| | | 45 | Trenching Spoils (Summary) | 491.96 | cy | - | - | - | | - | | |
| | | 46 | Bore & Jack Spoils Spoils (Summary) | 12.80 | cy | - | - | - | | - | | |
| | | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 504.76 | cy | 814 | - | - | | 1,564 | 4.712 /cy | 2,378 |
| | | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 209.41 | cy | 243 | - | - | | 686 | 4.44 /cy | 929 |
| | A0A0 | | Haul Spoils/Off Site 10cy Rear Dump 4.00 Hour/Load | 12.80 | cy | 222 | - | - | | 369 | 46.203 /cy | 591 |
| | A0A4 | | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 491.96 | cy | 2,215 | - | - | | 3,688 | 12.001 /cy | 5,904 |
| | A0I7 | | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 209.41 | cy | 131 | - | - | | 303 | 2.071 /cy | 434 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Excavation Spoils** | | | **3,626** | | | | **6,611** | | **10,237** |
| | | 212.58 Labor hours | | | | | | | | | |
| | | 106.29 Equipment hours | | | | | | | | | |
| **02445.000** | | **Boring & Jack Conduit** | | | | | | | | | |
| | 0 | Mob/Demob Bore & Jack Equipment | 1.00 | ea | - | - | 5,000 | | - | 5,000.00 /ea | 5,000 |
| | 100 | Excavate Jacking Pit | 71.111 | cy | 129 | - | - | | 349 | 6.731 /cy | 479 |
| | 105 | Excavate Recieving Pit | 35.56 | cy | 65 | - | - | | 175 | 6.731 /cy | 239 |
| | 200 | Shore Jacking/Receiving Pits | 1,104.00 | bsf | - | - | 16,560 | | - | 15.00 /bsf | 16,560 |
| | 300 | Backfill Jacking/Receiving Pits | 106.67 | cy | 522 | - | - | | 1,091 | 15.12 /cy | 1,613 |
| | 400 | Jacking Slab & Reaction Block | 2.66 | cy | 578 | 612 | - | | - | 447.372 /cy | 1,190 |
| n | 5024 | Bore & Jack Pipe 24 | 110.00 | lf | - | - | 26,400 | | - | 240.00 /lf | 26,400 |
| | 7000 | Grout Casing | 7.111 | cy | 29 | 1,227 | - | | 34 | 181.44 /cy | 1,290 |
| | | **Boring & Jack Conduit** | | | **1,323** | **1,838** | **47,960** | | **1,649** | | **52,771** |
| | | 71.05 Labor hours | | | | | | | | | |
| | | 27.26 Equipment hours | | | | | | | | | |
| **02446.000** | | **Drainage Outflow To Head** | | | | | | | | | |
| n | 0 | Mob/Demob Directional Drilling Equipment | 1.00 | ea | - | - | 2,500 | | - | 2,500.00 /ea | 2,500 |
| n | 1016 | Install 16" Pipe N.O.C. | 170.00 | lf | - | - | 19,550 | | - | 115.00 /lf | 19,550 |
| | | **Drainage Outflow To Head** | | | | | **22,050** | | | | **22,050** |
| **02639.020** | | **Storm Drainage Manholes** | | | | | | | | | |
| | 0 | Unload Care & Protect Manhole | 1.00 | ea | 18 | - | - | | - | 17.51 /ea | 18 |
| | 3600 | Place & Shape Manhole Base & Inverts- 36" | 1.00 | ea | 210 | - | - | | - | 318.68 /ea | 319 |
| | 3610 | Manhole 108" x 10' Deep | 1.00 | ea | 113 | 2,581 | - | | | 2,693.24 /ea | 2,693 |
| | | **Storm Drainage Manholes** | | | **340** | **2,581** | | | | | **3,029** |
| | | 21.00 Labor hours | | | | | | | | | |
| | | 4.00 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| | 30 | Bitum Paving Sidewalks | 14.00 | sy | - | - | 560 | | - | 40.00 /sy | 560 |
| | | **Asphalt Paving - Location** | | | | | **560** | | | | **560** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 350.00 | sy | 29 | 767 | - | | 29 | 2.36 /sy | 825 |
| | | **Lawns & Grasses** | | | **29** | **767** | | | **29** | | **825** |
| | | 1.40 Labor hours | | | | | | | | | |
| | | 0.70 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 110 | Concrete: Slab on Grade | 57.00 | cy | 4,126 | 17,670 | - | | 1,552 | 409.61 /cy | 23,348 |
| n | 110 | Concrete: Pump Support Pad | 1.00 | cy | 72 | 310 | - | | 27 | 409.61 /cy | 410 |
| n | 110 | Concrete: Slab on Grade | 19.00 | cy | 1,375 | 5,890 | - | | 517 | 409.611 /cy | 7,783 |
| n | 140 | Concrete: Wall | 175.00 | cy | 21,715 | 61,250 | - | | 8,825 | 524.52 /cy | 91,790 |
| n | 145 | Concrete: Elevated Slab | 76.00 | cy | 8,645 | 27,360 | - | | 3,833 | 524.18 /cy | 39,837 |
| n | 180 | Concrete: Grout Fill - prevent grit deposition | 1.00 | cy | 41 | 100 | - | | 5 | 146.40 /cy | 146 |
| | | **Concrete in Place** | | | **35,975** | **112,580** | | | **14,759** | | **163,314** |
| | | 1,739.500 Labor hours | | | | | | | | | |
| | | 292.680 Equipment hours | | | | | | | | | |
| **03150.010** | | **Concrete Core & Saw** | | | | | | | | | |
| | c140 | Core Drill 14" to 12" depth | 1.00 | ea | 51 | - | - | | | 50.59 /ea | 51 |
| | c160 | Core Drill 16" to 12" depth | 2.00 | ea | 101 | - | - | | | 50.60 /ea | 101 |
| | | **Concrete Core & Saw** | | | **152** | | | | | | **152** |
| | | 12.30 Labor hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 7.00 | ea | 537 | 8,936 | - | | - | 1,353.171 /ea | 9,472 |
| | | **Hatch, Aluminum, 300psf** | | | **537** | **8,936** | | | | | **9,472** |
| | | 22.40 Labor hours | | | | | | | | | |
| **11000.005** | | **Equipment Allowance** | | | | | | | | | |
| | 5 | Level Sensor | 1.00 | ea | 484 | 1,500 | - | | | 1,984.20 /ea | 1,984 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Equipment Allowance** | | | **484** | **1,500** | | | | | **1,984** |
| | | 20.00 Labor hours | | | | | | | | | |
| | | 0.000 Equipment hours | | | | | | | | | |
| **11210.000** | | **PUMPS** | | | | | | | | | |
| ---- | | 10HP Ras Pump | 2.00 | ea | 5,446 | 16,000 | - | | - | 10,722.80 /ea | 21,446 |
| | | **PUMPS** | | | **5,446** | **16,000** | | | | | **21,446** |
| | | 240.000 Labor hours | | | | | | | | | |
| **11217.100** | | **Submersible Sump Pumps** | | | | | | | | | |
| | 50 | Sump Pump 50 gpm | 1.00 | ea | 1,451 | 3,150 | - | | 1,028 | 5,628.96 /ea | 5,629 |
| | | **Submersible Sump Pumps** | | | **1,451** | **3,150** | | | **1,028** | | **5,629** |
| | | 72.00 Labor hours | | | | | | | | | |
| | | 12.00 Equipment hours | | | | | | | | | |
| **13000.005** | | **Special Const Allowance** | | | | | | | | | |
| | 5 | SCADA Allowance to Operate Motorized Plug Valve | 1.00 | ea | | | 10,000 | | - | 10,000.00 /ea | 10,000 |
| | 5 | SCADA Allowance for Operated Motorized Plug Valve | 1.00 | ls | | | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | | **Special Const Allowance** | | | | | **20,000** | | | | **20,000** |
| **13420.200** | | **I&C Instruments** | | | | | | | | | |
| n | 05-FE-m014 | 14" Magnetic Flow Meter | 1.00 | ea | 333 | 11,500 | - | | - | 11,833.00 /ea | 11,833 |
| | | **I&C Instruments** | | | **333** | **11,500** | | | | | **11,833** |
| | | 12.14 Labor hours | | | | | | | | | |
| **15111.650** | | **Plug Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | 200T | Plug Valve, MJ, 14" | 3.00 | ea | 1,112 | 5,700 | - | | - | 2,270.703 /ea | 6,812 |
| n | 200U | Plug Valve, MJ, 16" | 3.00 | ea | 1,270 | 9,300 | - | | - | 3,523.34 /ea | 10,570 |
| n | 200X | Plug Valve, MJ, 24" | 1.00 | ea | 643 | 4,600 | - | | - | 5,243.40 /ea | 5,243 |
| | | **Plug Valve (CI/DI/IBBM)** | | | **3,026** | **19,600** | | | | | **22,626** |
| | | 95.07 Labor hours | | | | | | | | | |
| **15114.500** | | **Check Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | C20T | Check Valve, Double Disc, MJ, 14" | 2.00 | ea | 777 | 3,800 | - | | - | 2,288.65 /ea | 4,577 |
| n | C20U | Check Valve, Double Disc, MJ, 16" | 2.00 | ea | 932 | 7,600 | - | | - | 4,265.99 /ea | 8,532 |
| | | **Check Valve (CI/DI/IBBM)** | | | **1,709** | **11,400** | | | | | **13,109** |
| | | 53.70 Labor hours | | | | | | | | | |
| **15119.600** | | **Air/Vacuum Relief Valve** | | | | | | | | | |
| n | 100J | Air Release Valve, 14" | 1.00 | ea | 94 | 200 | - | | - | 293.93 /ea | 294 |
| n | 100J | Air Release Valve, 16" | 1.00 | ea | 94 | 200 | - | | - | 293.93 /ea | 294 |
| | | **Air/Vacuum Relief Valve** | | | **188** | **400** | | | | | **588** |
| | | 6.06 Labor hours | | | | | | | | | |
| **15210.010** | | **DIP Totals** | | | | | | | | | |
| | 0 | Total Weight (Zero Cost Item) | 95,263.20 | lbs | - | - | - | | - | | |
| | 1 | Weight of Pipe (Zero Cost Item) | 83,278.200 | lbs | - | - | - | | - | | |
| | 2 | Weight of Fittings (Zero Cost Item) | 11,985.00 | lbs | - | - | - | | - | | |
| **15210.200** | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | 0 | Unload Care & Protect Push-on DIP & Fittings | 95,263.20 | lbs | 184 | - | - | | 600 | 0.01 /lbs | 784 |
| | 1 | Weight of Push-on Pipe (Zero Cost Item) | 83,278.200 | lbs | - | - | - | | - | | |
| | 2 | Weight of Push-on Fittings (Zero Cost Item) | 11,985.00 | lbs | - | - | - | | - | | |
| | 5 | Layout Push-on DIP & Fitting | 1,290.00 | lf | 293 | - | - | | - | 0.23 /lf | 293 |
| n | 214 | DIP CML, Push-On, Class 52, 14" | 562.00 | lf | 4,557 | 20,124 | - | | - | 43.92 /lf | 24,681 |
| n | 216 | DIP CML, Push-On, Class 52, 16" | 830.00 | lf | 6,931 | 34,732 | - | | - | 50.20 /lf | 41,664 |
| n | 224 | DIP CML, Push-On, Class 52, 24" | 118.00 | lf | 1,126 | 8,201 | - | | - | 79.05 /lf | 9,327 |
| n | 2AQQ | DIP CML, Push-on, 90 Bend, 14" | 6.00 | ea | 751 | 5,625 | - | | - | 1,062.713 /ea | 6,376 |
| n | 2ARR | DIP CML, Push-on, 90 Bend, 16" | 7.00 | ea | 982 | 8,138 | - | | - | 1,302.74 /ea | 9,119 |
| n | AAQQ | DIP CML, Push-on, 45 Bend, 14" | 2.00 | ea | 241 | 1,525 | - | | - | 882.76 /ea | 1,766 |
| n | AARR | DIP CML, Push-on, 45 Bend, 16" | 1.00 | ea | 134 | 950 | - | | - | 1,083.62 /ea | 1,084 |
| n | AAUU | DIP CML, Push-on, 45 Bend, 24" | 1.00 | ea | 213 | 2,000 | - | | - | 2,213.20 /ea | 2,213 |
| n | CAQQ | DIP CML, Push-on, 22-1/2 Bend, 14" | 1.00 | ea | 120 | 775 | - | | - | 895.25 /ea | 895 |
| n | CARR | DIP CML, Push-on, 22-1/2 Bend, 16" | 1.00 | ea | 134 | 963 | - | | - | 1,096.12 /ea | 1,096 |
| n | FATT | DIP CML, Push-on, Tee BxB, 14"x 14" | 2.00 | ea | 343 | 2,950 | - | | - | 1,646.72 /ea | 3,293 |
| n | FAUU | DIP CML, Push-on, Tee BxB, 16"x 16" | 1.00 | ea | 196 | 1,825 | - | | - | 2,020.89 /ea | 2,021 |
| n | FAXX | DIP CML, Push-on, Tee BxB, 24"x 24" | 1.00 | ea | 275 | 4,125 | - | | - | 4,400.34 /ea | 4,400 |

| Item | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|
| **15210.200** | **DIP CML Push-On Pipe** | | | | | | | | | |
| n KAUT | DIP, CML, Push-on, Reducer BxB, 16"x 14" | 2.00 | ea | 258 | 1,850 | - | | - | 1,053.79 /ea | 2,108 |
| | **DIP CML Push-On Pipe** | | | **16,738** | **93,782** | | | **600** | | **111,120** |
| | 705.024 Labor hours | | | | | | | | | |
| | 10.48 Equipment hours | | | | | | | | | |
| **16000.005** | **Electrical Allowance** | | | | | | | | | |
| 5 | Electrical Allowance for Pumps | 0.00 | ls | 0 | 0 | 0 | | - | | |
| | ***05 Return Activated Sludge Pump Station*** | | | ***93,044*** | ***327,786*** | ***123,338*** | | ***62,406*** | | ***606,683*** |
| | 4,182.561 Labor hours | | | | | | | | | |
| | 793.99 Equipment hours | | | | | | | | | |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | ***06 I&C*** | | | | | | | | |
| **13000.005** | **Special Const Allowance** | | | | | | | | |
| 5 | I&C Allowance | 0.00 ls | 0 | 0 | - | | - | | |
| | ***06 I&C*** | | ***0*** | ***0*** | ***0*** | | ***0*** | | ***0*** |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | ***07 Electrical*** | | | | | | | | |
| **16000.005** | **Electrical Allowance** | | | | | | | | |
| 5 | Electrical Allowance | 0.00 ls | 0 | 0 | - | | - | | |
| | ***07 Electrical*** | | ***0*** | ***0*** | ***0*** | | ***0*** | | ***0*** |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***08 Chemical Feed*** | | | | | | | | | |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2734 | Remove Asphalt Pavement, sidewalk | 25.00 | sy | 39 | - | - | | 78 | 4.684 /sy | 117 |
| | | **Selective Site Demolition** | | | **39** | | | | **78** | | **117** |
| | | 2.38 Labor hours | | | | | | | | | |
| | | 1.90 Equipment hours | | | | | | | | | |
| **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | 2 | Design Shoring System-Average | 1.00 | ls | - | - | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | 100 | Survey & Layout Shoring | 80.00 | lf | 1 | - | - | | - | 0.02 /lf | 1 |
| | 105 | Mobilize Pile Driving Equipment | 1.00 | ea | - | - | 25,000 | | - | 25,000.00 /ea | 25,000 |
| n | 1025 | Steel Sheeting,15' x 22psf, pulled & salvage | 800.00 | sf | 4,146 | 4,648 | - | | 5,475 | 17.84 /sf | 14,269 |
| | 1045 | Install & Remove Wales/Struts/Connectors | 0.88 | ton | 214 | 810 | - | | 282 | 1,483.74 /ton | 1,306 |
| n | 1050 | Rent Steel Sheet Piling and Wales, first month | 9.68 | ton | - | 2,939 | - | | - | 303.600 /ton | 2,939 |
| | | **Sheet Piling** | | | **4,361** | **8,396** | **35,000** | | **5,758** | | **53,515** |
| | | 143.653 Labor hours | | | | | | | | | |
| | | 35.893 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 337.00 | cy | 284 | - | - | | 768 | 3.121 /cy | 1,052 |
| | 461C | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 162.00 | cy | 276 | - | - | | 536 | 5.011 /cy | 812 |
| n | A000 | IMPORT MATERIAL (Summary) | 2.00 | CY | - | - | - | | - | | |
| n | A015 | Import Gravel Fill | 8.333 | cy | - | 125 | 47 | | - | 20.60 /cy | 172 |
| | | **Foundation Excavation** | | | **560** | **125** | **47** | | **1,304** | | **2,035** |
| | | 37.413 Labor hours | | | | | | | | | |
| | | 21.95 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 231.00 | lf | 21 | | - | | - | 0.092 /lf | 21 |
| n | 2090 | Trenching- Backhoe/Loader 95HP (15 cy/hr-120cy/day) Average Exc. | 111.153 | cy | 208 | - | - | | 399 | 5.463 /cy | 607 |
| n | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 25.833 | cy | 20 | - | - | | 55 | 2.90 /cy | 75 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 26.84 | cy | 14 | - | - | | 59 | 2.72 /cy | 73 |
| n | 3090 | Trench Bedding-Backhoe/Loader 95HP | 15.35 | cy | 41 | - | - | | 62 | 6.74 /cy | 103 |
| n | 3130 | Trench Bedding-Excavator- 130 HP | 2.551 | cy | 5 | - | - | | 15 | 7.903 /cy | 20 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 1.403 | cy | 2 | - | - | | 7 | 6.56 /cy | 9 |
| n | 4090 | Trench Pipe Zone Backfill-Backhoe/Loader 95HP | 25.451 | cy | 82 | - | - | | 124 | 8.09 /cy | 206 |
| n | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 10.113 | cy | 33 | - | - | | 95 | 12.641 /cy | 128 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 5.562 | cy | 13 | - | - | | 45 | 10.49 /cy | 58 |
| n | 5090 | Trench Native Backfill-Backhoe/Loader 95HP | 25.451 | cy | 74 | - | - | | 135 | 8.24 /cy | 210 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 24.00 | cy | 22 | - | - | | 68 | 3.751 /cy | 90 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 60.43 | cy | - | 2,127 | - | | - | 35.20 /cy | 2,127 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 69.541 | cy | 78 | - | - | | 150 | 3.28 /cy | 228 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 69.541 | cy | 68 | - | - | | 113 | 2.61 /cy | 181 |
| n | 9616 | Trench Shield- 6x16 | 0.06 | u/mo | - | - | - | | 85 | 1,410.00 /u/mo | 85 |
| | A002 | Pipe Detectable/Non-Detectable Tape | 200.00 | lf | 18 | 11 | - | | - | 0.15 /lf | 29 |
| | A006 | Pipe Test | 200.00 | lf | 148 | 160 | - | | - | 1.54 /lf | 308 |
| | C0a0 | Concrete Thrust Block, 36" | 2.00 | ea | 262 | 582 | - | | - | 422.23 /ea | 844 |
| | | **Trenching** | | | **1,110** | **2,880** | | | **1,414** | | **5,404** |
| | | 65.81 Labor hours | | | | | | | | | |
| | | 28.633 Equipment hours | | | | | | | | | |
| **02315.400** | | **Drilling & Blasting** | | | | | | | | | |
| | 1008 | Hydraulic Hoe Ram -Medium | 84.00 | cy | | - | 12,600 | | | 150.00 /cy | 12,600 |
| | | **Drilling & Blasting** | | | | | **12,600** | | | | **12,600** |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 244.541 | cy | - | - | - | | - | | |
| | 40 | Foundation Excavation Spoils (Summary) | 175.00 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 69.541 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 69.541 | cy | 90 | - | - | | 173 | 3.772 /cy | 262 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 175.00 | cy | 203 | - | - | | 573 | 4.44 /cy | 777 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 69.541 | cy | 313 | - | - | | 521 | 12.001 /cy | 835 |
| | A0I7 | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 175.00 | cy | 110 | - | - | | 253 | 2.071 /cy | 362 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Excavation Spoils** | | | **716** | | | | **1,520** | | **2,236** |
| | | 41.62 Labor hours | | | | | | | | | |
| | | 20.81 Equipment hours | | | | | | | | | |
| **02720.150** | | **Aggregate Base- Roads** | | | | | | | | | |
| | 1116 | Gravel Base - 6" thick - Driveway | 3.00 | cy | 9 | 27 | - | | 43 | 26.22 /cy | 79 |
| | | **Aggregate Base- Roads** | | | **9** | **27** | | | **43** | | **79** |
| | | 0.48 Labor hours | | | | | | | | | |
| | | 0.48 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| | 20 | Bitum Paving Driveway | 16.00 | sy | - | - | 253 | | - | 15.80 /sy | 253 |
| | 30 | Bitum Paving Sidewalks | 25.00 | sy | - | - | 1,000 | | - | 40.00 /sy | 1,000 |
| | | **Asphalt Paving - Location** | | | | | **1,253** | | | | **1,253** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 89.00 | sy | 7 | 195 | - | | 7 | 2.36 /sy | 210 |
| | | **Lawns & Grasses** | | | **7** | **195** | | | **7** | | **210** |
| | | 0.36 Labor hours | | | | | | | | | |
| | | 0.18 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 110 | Concrete: Slab on Grade | 34.00 | cy | 2,461 | 10,540 | - | | 926 | 409.61 /cy | 13,927 |
| n | 140 | Concrete: Wall | 66.00 | cy | 8,190 | 23,100 | - | | 3,328 | 524.52 /cy | 34,618 |
| n | 145 | Concrete: Elevated Slab | 34.00 | cy | 3,867 | 12,240 | - | | 1,715 | 524.18 /cy | 17,822 |
| | | **Concrete in Place** | | | **14,518** | **45,880** | | | **5,969** | | **66,367** |
| | | 702.000 Labor hours | | | | | | | | | |
| | | 118.36 Equipment hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 4.00 | ea | 307 | 5,106 | - | | - | 1,353.173 /ea | 5,413 |
| | | **Hatch, Aluminum, 300psf** | | | **307** | **5,106** | | | | | **5,413** |
| | | 12.80 Labor hours | | | | | | | | | |
| **08330.020** | | **Rolling Alum Door Manual** | | | | | | | | | |
| | z005 | Roll Door Manual (8'x8') | 64.00 | sf | 518 | 2,397 | - | | - | 45.542 /sf | 2,915 |
| | | **Rolling Alum Door Manual** | | | **518** | **2,397** | | | | | **2,915** |
| | | 10.944 Labor hours | | | | | | | | | |
| **11000.005** | | **Equipment Allowance** | | | | | | | | | |
| | 5 | 36" In Line Chemical Inductor w/ VFD | 1.00 | ea | 9,684 | 45,000 | - | | | 54,684.00 /ea | 54,684 |
| | | **Equipment Allowance** | | | **9,684** | **45,000** | | | | | **54,684** |
| | | 400.000 Labor hours | | | | | | | | | |
| | | 0.000 Equipment hours | | | | | | | | | |
| **11220.100** | | **Chemical Mixing Units** | | | | | | | | | |
| | 01 | Chemical Mixer | 8.00 | ea | 1,527 | 3,200 | - | | - | 590.88 /ea | 4,727 |
| | | **Chemical Mixing Units** | | | **1,527** | **3,200** | | | | | **4,727** |
| | | 64.00 Labor hours | | | | | | | | | |
| **11240.400** | | **Polymer Store/Feed Equip** | | | | | | | | | |
| | 0 | Polymer Tote Containment | 2.00 | ea | 968 | 1,600 | - | | 685 | 1,626.32 /ea | 3,253 |
| | 00 | Metering Pump/Poly Blend and Feed Pump | 2.00 | ea | 12,407 | 28,264 | - | | - | 20,335.60 /ea | 40,671 |
| | ---- | 1st Fill of Polymer or FeCl3 (3 day supply) | 3.00 | day | 600 | 1,800 | - | | - | 800.00 /day | 2,400 |
| | | **Polymer Store/Feed Equip** | | | **13,975** | **31,664** | | | **685** | | **46,324** |
| | | 592.00 Labor hours | | | | | | | | | |
| | | 8.00 Equipment hours | | | | | | | | | |
| **13121.000** | | **Pre-Engineered Metal Bldg** | | | | | | | | | |
| | z001 | Pre-Engineered Metal Bldg - Polymer Shed - 14'high | 468.00 | sf | | | 35,100 | | | 75.00 /sf | 35,100 |
| | | **Pre-Engineered Metal Bldg** | | | | | **35,100** | | | | **35,100** |
| **15113.450** | | **GV Knife Gate ValveCI/DI** | | | | | | | | | |
| n | 1249 | Knife Gate Valve, Gear & Wheel Oper, flg, 8" | 1.00 | ea | 190 | 700 | - | | - | 890.28 /ea | 890 |
| n | 160Z | Knife Gate Valve, Motor Oper,36" | 3.00 | ea | 3,343 | 42,750 | - | | - | 15,364.34 /ea | 46,093 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **GV Knife Gate ValveCI/DI** | | | **3,533** | **43,450** | | | | | **46,983** |
| | | 111.040 Labor hours | | | | | | | | | |
| **15115.810** | | **Diaphragm Valve PVC** | | | | | | | | | |
| n | 130I | PVC Diaphragm Valve, 1" | 6.00 | ea | 357 | 5,760 | - | | - | 1,019.522 /ea | 6,117 |
| | | **Diaphragm Valve PVC** | | | **357** | **5,760** | | | | | **6,117** |
| | | 11.22 Labor hours | | | | | | | | | |
| **15230.400** | | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | 0 | Unload Care & Protect PCCP & Fittings | 31.00 | lf | 0 | - | - | | 0 | 0.01 /lf | 0 |
| | 10 | Layout Pipe & Fitting | 31.00 | lf | 7 | - | - | | - | 0.24 /lf | 7 |
| | 325 | PCCP Equipment- Cat 325 Excavator | 2.60 | ch | 50 | - | - | | 288 | 130.092 /ch | 338 |
| n | B036 | Prestressed Concrete Cylinder Pipe (250#) 36 | 31.00 | lf | 1,036 | 3,348 | - | | - | 141.404 /lf | 4,384 |
| n | L036 | PCCP 45 Bend 36 | 2.00 | ea | 517 | 2,400 | - | | - | 1,458.64 /ea | 2,917 |
| n | Q036 | PCCP Wye 36 | 2.00 | ea | 716 | 2,400 | - | | - | 1,558.23 /ea | 3,116 |
| | | **Prestr Conc Cylind-(PCCP)** | | | **2,327** | **8,148** | | | **288** | | **10,763** |
| | | 98.033 Labor hours | | | | | | | | | |
| | | 2.603 Equipment hours | | | | | | | | | |
| **15241.100** | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | 0 | Unload Care & Protect Pipe/Fittings | 360.00 | lf | 1 | - | - | | 2 | 0.01 /lf | 3 |
| | 10 | Layout Pipe & Fitting | 360.00 | lf | 86 | - | - | | - | 0.24 /lf | 86 |
| n | 8080 | PVC Schd. 80 Pipe, 1.00" | 360.00 | lf | 429 | 475 | - | | - | 2.513 /lf | 905 |
| n | 8A80 | PVC Sch 80. 90 Ell , 1.00" | 15.00 | ea | 61 | 66 | - | | - | 8.46 /ea | 127 |
| n | 8F88 | PVC Sch 80. Tee , 1.00" | 3.00 | ea | 16 | 24 | - | | - | 13.38 /ea | 40 |
| | a010 | PVC Joint Primer- Quart | 0.32 | qrt | - | 5 | - | | - | 15.36 /qrt | 5 |
| | a020 | PVC Solvent Cement Low VOC- Quart | 0.32 | qrt | - | 7 | - | | - | 21.90 /qrt | 7 |
| | | **PVC Schd Pipe & Fittings** | | | **593** | **577** | | | **2** | | **1,172** |
| | | 24.88 Labor hours | | | | | | | | | |
| | | 0.04 Equipment hours | | | | | | | | | |
| **15400.005** | | **Plumbing Allowance** | | | | | | | | | |
| | 5 | Plumbing Allowance - hook plant water to poly system | 1.00 | ls | | | 7,500 | | - | 7,500.00 /ls | 7,500 |
| | 5 | Plumbing Allowance - supply wash out sink/potable water connection | 1.00 | ls | | | 7,500 | | - | 7,500.00 /ls | 7,500 |
| | | **Plumbing Allowance** | | | | | **15,000** | | | | **15,000** |
| | | 0.000 Labor hours | | | | | | | | | |
| **15500.001** | | **HVAC Equipment** | | | | | | | | | |
| | 155 | HVAC Allowance - Chem Feed Bldg | 468.00 | sf | - | - | 18,720 | | - | 40.00 /sf | 18,720 |
| | | **HVAC Equipment** | | | | | **18,720** | | | | **18,720** |
| **16000.005** | | **Electrical Allowance** | | | | | | | | | |
| | 5 | Electrical Allowance - light shed and provide power to pumps | 1.00 | ls | | | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | 5 | Electrical Allowance - chemical inductor | 1.00 | ls | | | 20,000 | | - | 20,000.00 /ls | 20,000 |
| | 5 | Electrical & I&C Allowance for Knife Gate Valves | 1.00 | ls | | | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | 5 | Electrical Allowance | 468.00 | sf | | | 9,360 | | - | 20.00 /sf | 9,360 |
| | | **Electrical Allowance** | | | | | **49,360** | | | | **49,360** |
| | | 0.000 Labor hours | | | | | | | | | |
| | | ***08 Chemical Feed*** | | | ***54,141*** | ***202,805*** | ***167,079*** | | ***17,068*** | | ***441,093*** |
| | | 2,318.62 Labor hours | | | | | | | | | |
| | | 238.840 Equipment hours | | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***09 Chlorine Effluent*** | | | | | | | | | |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Connect to Existing Aeration Tank | 1.00 | ls | - | - | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | 20 | Connect to Existing PCCP (9'deep) | 1.00 | ls | - | - | 7,500 | | - | 7,500.00 /ls | 7,500 |
| | | **Sitework Allowance** | | | | | **12,500** | | | | **12,500** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2508 | Remove 54"PCCP (9'deep) | 12.00 | lf | 49 | - | - | | 89 | 11.52 /lf | 138 |
| | 2734 | Remove Concrete Walkway | 20.00 | sy | 31 | - | - | | 63 | 4.683 /sy | 94 |
| | | **Selective Site Demolition** | | | **80** | | | | **152** | | **232** |
| | | 4.90 Labor hours | | | | | | | | | |
| | | 2.96 Equipment hours | | | | | | | | | |
| **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | 1 | Design Shoring System-Minor | 1.00 | ls | - | - | 1,000 | | - | 1,000.00 /ls | 1,000 |
| | 100 | Survey & Layout Shoring | 72.00 | lf | 1 | - | - | | - | 0.02 /lf | 1 |
| n | 1025 | Steel Sheeting,15' x 22psf, pulled & salvage | 1,080.00 | sf | 5,597 | 6,275 | - | | 7,392 | 17.84 /sf | 19,263 |
| | 1045 | Install & Remove Wales/Struts/Connectors | 1.19 | ton | 289 | 1,093 | - | | 381 | 1,483.74 /ton | 1,763 |
| n | 1050 | Rent Steel Sheet Piling and Wales, first month | 13.07 | ton | - | 3,968 | - | | - | 303.604 /ton | 3,968 |
| | | **Sheet Piling** | | | **5,886** | **11,335** | **1,000** | | **7,773** | | **25,994** |
| | | 193.90 Labor hours | | | | | | | | | |
| | | 48.46 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 120.00 | cy | 101 | - | - | | 273 | 3.121 /cy | 375 |
| | 461C | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 33.00 | cy | 56 | - | - | | 109 | 5.011 /cy | 165 |
| n | A000 | IMPORT MATERIAL (Summary) | 2.00 | CY | - | - | - | | - | | |
| n | A015 | Import Gravel Fill | 12.00 | cy | - | 180 | 67 | | - | 20.60 /cy | 247 |
| | | **Foundation Excavation** | | | **157** | **180** | **67** | | **383** | | **787** |
| | | 10.36 Labor hours | | | | | | | | | |
| | | 5.84 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 10.00 | lf | 1 | | - | | - | 0.092 /lf | 1 |
| n | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 18.66 | cy | 38 | - | - | | 106 | 7.72 /cy | 144 |
| n | 3130 | Trench Bedding-Excavator- 130 HP | 1.28 | cy | 3 | - | - | | 8 | 7.90 /cy | 10 |
| n | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 5.06 | cy | 16 | - | - | | 48 | 12.642 /cy | 64 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 9.41 | cy | 9 | - | - | | 27 | 3.751 /cy | 35 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 6.332 | cy | - | 223 | - | | - | 35.204 /cy | 223 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 9.25 | cy | 13 | - | - | | 25 | 4.10 /cy | 38 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 9.25 | cy | 9 | - | - | | 15 | 2.61 /cy | 24 |
| n | 9616 | Trench Shield- 6x16 | 0.01 | u/mo | - | - | - | | 14 | 1,410.00 /u/mo | 14 |
| | A008 | Pipe Locates (Pot Hole) | 1.00 | ea | 152 | 50 | - | | 27 | 228.96 /ea | 229 |
| | | **Trenching** | | | **240** | **273** | | | **269** | | **782** |
| | | 13.783 Labor hours | | | | | | | | | |
| | | 4.23 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 96.25 | cy | - | - | - | | - | | |
| | 40 | Foundation Excavation Spoils (Summary) | 87.00 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 9.25 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 9.25 | cy | 15 | - | - | | 29 | 4.712 /cy | 44 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 87.00 | cy | 101 | - | - | | 285 | 4.44 /cy | 386 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 9.25 | cy | 42 | - | - | | 69 | 12.00 /cy | 111 |
| | A0I7 | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 87.00 | cy | 54 | - | - | | 126 | 2.071 /cy | 180 |
| | | **Excavation Spoils** | | | **212** | | | | **509** | | **721** |
| | | 12.27 Labor hours | | | | | | | | | |
| | | 6.134 Equipment hours | | | | | | | | | |
| **02720.100** | | **Aggregate Base Course** | | | | | | | | | |
| | 1180 | Crushed Rock 1" | 6.00 | cy | 17 | 61 | - | | 86 | 27.47 /cy | 165 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Aggregate Base Course** | | | **17** | **61** | | | **86** | | **165** |
| | | 0.96 Labor hours | | | | | | | | | |
| | | 0.96 Equipment hours | | | | | | | | | |
| **02775.100** | | **Concrete Sidewalks** | | | | | | | | | |
| | 4 | 4" Sidewalks | 180.00 | sf | - | - | 1,440 | | - | 8.00 /sf | 1,440 |
| | | **Concrete Sidewalks** | | | | | **1,440** | | | | **1,440** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 278.00 | sy | 23 | 609 | - | | 23 | 2.36 /sy | 655 |
| | | **Lawns & Grasses** | | | **23** | **609** | | | **23** | | **655** |
| | | 1.112 Labor hours | | | | | | | | | |
| | | 0.56 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 140 | Concrete: Junction Structure | 36.00 | cy | 4,467 | 12,600 | - | | 1,815 | 524.52 /cy | 18,883 |
| | | **Concrete in Place** | | | **4,467** | **12,600** | | | **1,815** | | **18,883** |
| | | 216.000 Labor hours | | | | | | | | | |
| | | 36.00 Equipment hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 1.00 | ea | 77 | 1,277 | - | | - | 1,353.20 /ea | 1,353 |
| | | **Hatch, Aluminum, 300psf** | | | **77** | **1,277** | | | | | **1,353** |
| | | 3.20 Labor hours | | | | | | | | | |
| **11284.000** | | **Sluice Gates** | | | | | | | | | |
| | 3636 | 36" x 36" Sluice Gate | 1.00 | ea | 4,772 | 10,800 | - | | - | 15,572.00 /ea | 15,572 |
| | | **Sluice Gates** | | | **4,772** | **10,800** | | | | | **15,572** |
| | | 200.000 Labor hours | | | | | | | | | |
| **15230.400** | | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | 0 | Unload Care & Protect PCCP & Fittings | 10.00 | lf | 0 | - | - | | 0 | 0.01 /lf | 0 |
| | 10 | Layout Pipe & Fitting | 10.00 | lf | 2 | - | - | | - | 0.24 /lf | 2 |
| | 325 | PCCP Equipment- Cat 325 Excavator | 1.30 | ch | 25 | - | - | | 144 | 130.09 /ch | 169 |
| n | B036 | Prestressed Concrete Cylinder Pipe (250#) 36 | 10.00 | lf | 334 | 1,080 | - | | - | 141.404 /lf | 1,414 |
| | | **Prestr Conc Cylind-(PCCP)** | | | **362** | **1,080** | | | **144** | | **1,586** |
| | | 15.401 Labor hours | | | | | | | | | |
| | | 1.301 Equipment hours | | | | | | | | | |
| **16000.005** | | **Electrical Allowance** | | | | | | | | | |
| | 5 | Electrical & SCADA Allowance for Motorized Gate | 1.00 | ls | | | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | | **Electrical Allowance** | | | | | **10,000** | | | | **10,000** |
| | | 0.000 Labor hours | | | | | | | | | |
| | | ***09 Chlorine Effluent*** | | | ***16,294*** | ***38,215*** | ***25,007*** | | ***11,154*** | | ***90,670*** |
| | | 671.880 Labor hours | | | | | | | | | |
| | | 106.433 Equipment hours | | | | | | | | | |

## Estimate Totals

| | Description | Amount | Totals | Hours | Rate |
|---|---|---|---|---|---|
| | Labor | 1,521,424 | | 64,912 hrs | |
| | Material | 4,666,035 | | | |
| | Subcontract | 757,819 | | | |
| | Equipment | 950,407 | | 11,510 hrs | |
| | Other | 1,056 | | | |
| **Subtotal Direct Cost** | | **7,896,741** | **7,896,741** | | |
| | I&C | 789.668 | | | 10.00 % |
| | Electrical | 1,184.502 | | | 15.00 % |
| | | **1,974,170** | **9,870,911** | | |
| | Indirect Costs: | | | | |
| | Building Permits(% total cost) | 76.068 | | | 0.40 % |
| | Sales Tax (MEO) | | | | |
| | Builders Risk Ins % total cost | 47.542 | | | 0.25 % |
| | Gen Liability Ins % total cost | 380.339 | | | 2.00 % |
| | GC Bonds (% total cost) | 190.170 | | | 1.00 % |
| **Subtotal Prior to OH&P** | | **694,119** | **10,565,030** | | |
| | GC Field General Conditions | 1.056.497 | | | 10.00 % |
| | GC Indirects. OH & Profit | 1.056.497 | | | 10.00 % |
| **Subtotal** | | **2,112,994** | **12,678,024** | | |
| | Construction Contingency | 3,169.492 | | | 25.00 % |
| | **Total Construction Cost** | **3,169,492** | **15,847,516** | | |
| | Engineering, Permitting, Bond Financing, Legal and Administration | 3.169.492 | | | 20.00 % |
| **Total Program Cost** | | **3,169,492** | **19,017,008** | | |
| | ***Total*** | | ***19,017,008*** | | |

This is an Opinion of Probable Construction Cost only, as defined by the documents provided at the level of design indicated on the front sheet of this estimate.
There are not any costs provided for: Change Orders, Construction Oversight, land acquisition or temporary/permanent easements, Operations, or any other costs associated with this project that are not specifically part of the bidding contractor's proposed scope.
The total cost shown is valid to only two significant figures.

# Kuwahee Options

***Knoxville, Tennessee***
***Kuwahee WWTP - Options 1***
***Opinion of Probable Construction Cost, Prelim Design, March 2007***

| | |
|---|---|
| **Project name** | TN, Knoxville KWWTP |
| **Estimator** | MacIsaac |
| **Labor rate table** | SC07 Charleston Mean |
| **Equipment rate table** | 00 071H Equip Rental |
| **database version:** | V6.0 TES 9.4.22.0 |
| **ENR 20 City CCI** | March 2007: 7856 |
| **Notes** | This is an Opinion of Probable Construction Cost only, as defined by the documents provided at the level of design indicated above. CDM has no control over the cost of labor, materials, equipment, or services furnished, over schedules, over contractor's methods of determining prices, competitive bidding, market or negotiating conditions. CDM does not guarantee that this opinion will not vary from actual cost, or contractor's bids. There are not any costs provided for: Change Orders, Construction Oversight, Land Acquisition or temporary/permanent Easements, Operations, or any other costs associated with this project that are not specifically part of the bidding contractor's proposed scope.<br><br>The total cost shown is valid to only two significant figures<br><br>Assumptions:<br>Only nominal dewatering is needed.<br>No finishes are included.<br>Based on a 40 hour work week with no overtime.<br><br>This job is sales tax exempt. |
| **Report format** | Sorted by 'Proj Area/Phase'<br>'Detail' summary<br>Allocate addons<br>Round unit prices<br>Combine items<br>Paginate |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***01 UNOX Bypass*** | | | | | | | | | |
| **01010.000** | | **General Conditions** | | | | | | | | | |
| | 5 | Assumption of 20% of Excavated Material is Contaminated | 1,865.00 | cy | - | - | 46,625 | | - | 25.00 /cy | 46,625 |
| | | **General Conditions** | | | | | **46,625** | | | | **46,625** |
| **01590.000** | | **Traffic/Pollution Control** | | | | | | | | | |
| ---- | | Traffic Control | 1.00 | ls | | | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | | **Traffic/Pollution Control** | | | | | **10,000** | | | | **10,000** |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Protect Utilities (6"pw, 4"cw, 16" sludge, duct) | 1.00 | ls | - | - | 2,500 | | - | 2,500.00 /ls | 2,500 |
| | | **Sitework Allowance** | | | | | **2,500** | | | | **2,500** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2508 | Remove 48" DIP - 11' deep | 70.00 | lf | 200 | - | - | | 217 | 5.96 /lf | 417 |
| | 2512 | Demo Existing Secondary Aeratio Influent Structure (86cy concrete) | 1.00 | ea | | - | 21,500 | | | 21,500.00 /ea | 21,500 |
| | 2734 | Remove Pavement/Concrete Walk | 312.00 | sy | 855 | - | - | | 977 | 5.87 /sy | 1,832 |
| | | **Selective Site Demolition** | | | **1,055** | | **21,500** | | **1,194** | | **23,749** |
| | | 36.64 Labor hours | | | | | | | | | |
| | | 27.212 Equipment hours | | | | | | | | | |
| **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | 2 | Design Shoring System-Average | 1.00 | ls | - | - | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | 100 | Survey & Layout Shoring | 70.00 | lf | 2 | - | - | | - | 0.03 /lf | 2 |
| | 105 | Mobilize Pile Driving Equipment | 1.00 | ea | - | - | 25,000 | | - | 25,000.00 /ea | 25,000 |
| | 1030 | Steel Sheeting,20' x 27psf, pulled & salvage | 1,400.00 | sf | 8,641 | 9,016 | - | | 9,582 | 19.46 /sf | 27,239 |
| | 1045 | Install & Remove Wales/Struts/Connectors | 1.89 | ton | 547 | 1,739 | - | | 606 | 1,530.13 /ton | 2,892 |
| n | 1050 | Rent Steel Sheet Piling and Wales, first month | 20.79 | ton | - | 5,418 | - | | - | 260.59 /ton | 5,418 |
| | | **Sheet Piling** | | | **9,189** | **16,172** | **35,000** | | **10,188** | | **70,550** |
| | | 254.123 Labor hours | | | | | | | | | |
| | | 63.513 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 636.00 | cy | 916 | - | - | | 1,449 | 3.72 /cy | 2,366 |
| | | **Foundation Excavation** | | | **916** | | | | **1,449** | | **2,366** |
| | | 33.92 Labor hours | | | | | | | | | |
| | | 16.96 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 264.00 | lf | 30 | | - | | - | 0.12 /lf | 30 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 1,180.67 | cy | 2,031 | - | - | | 5,222 | 6.143 /cy | 7,253 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 49.98 | cy | 129 | - | - | | 252 | 7.622 /cy | 381 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 253.16 | cy | 1,045 | - | - | | 2,042 | 12.20 /cy | 3,087 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 630.94 | cy | 903 | - | - | | 1,796 | 4.28 /cy | 2,699 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 303.132 | cy | - | 10,670 | - | | - | 35.20 /cy | 10,670 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 549.73 | cy | 1,388 | - | - | | 1,482 | 5.22 /cy | 2,869 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 549.73 | cy | 1,096 | - | - | | 896 | 3.624 /cy | 1,992 |
| n | 8367 | Trench Shores- Aluminum Hydraulic 36" width x 7' Rail | 1.00 | u/mo | | - | - | | 76 | 76.00 /u/mo | 76 |
| | | **Trenching** | | | **6,623** | **10,670** | | | **11,765** | | **29,058** |
| | | 247.851 Labor hours | | | | | | | | | |
| | | 161.740 Equipment hours | | | | | | | | | |
| **02315.400** | | **Drilling & Blasting** | | | | | | | | | |
| | 1008 | Hydraulic Hoe Ram -Medium | 636.00 | cy | 3,020 | - | 95,400 | | | 154.75 /cy | 98,420 |
| | | **Drilling & Blasting** | | | **3,020** | | **95,400** | | | | **98,420** |
| | | 101.76 Labor hours | | | | | | | | | |
| | | 50.88 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 1,185.73 | cy | - | - | - | | - | | |
| | 40 | Foundation Excavation Spoils (Summary) | 636.00 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 549.73 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 549.73 | cy | 1,596 | - | - | | 1,704 | 6.002 /cy | 3,300 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 636.00 | cy | 1,258 | - | - | | 2,083 | 5.254 /cy | 3,342 |
| A0A4 | | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 549.73 | cy | 5,044 | - | - | | 4,122 | 16.673 /cy | 9,165 |
| A0I7 | | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 636.00 | cy | 811 | - | - | | 919 | 2.721 /cy | 1,730 |
| | | **Excavation Spoils** | | | **8,709** | | | | **8,828** | | **17,537** |
| | | 263.12 Labor hours | | | | | | | | | |
| | | 131.56 Equipment hours | | | | | | | | | |
| **02720.100** | | **Aggregate Base Course** | | | | | | | | | |
| | 1180 | Crushed Rock 1" | 242.00 | cy | 316 | 2,474 | - | | 929 | 15.37 /cy | 3,720 |
| | 1230 | Granular Fill | 690.00 | cy | 3,383 | 8,252 | - | | 9,934 | 31.26 /cy | 21,570 |
| | | **Aggregate Base Course** | | | **3,700** | **10,726** | | | **10,863** | | **25,289** |
| | | 120.73 Labor hours | | | | | | | | | |
| | | 120.73 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| n | 10 | Bitum Paving | 242.00 | sy | - | - | 3,824 | | - | 15.80 /sy | 3,824 |
| | | **Asphalt Paving - Location** | | | | | **3,824** | | | | **3,824** |
| **02750.100** | | **Concrete Paving** | | | | | | | | | |
| z015 | | Concrete Pavement, Walkways | 70.00 | sy | 230 | 800 | - | | 53 | 15.48 /sy | 1,084 |
| | | **Concrete Paving** | | | **230** | **800** | | | **53** | | **1,084** |
| | | 7.63 Labor hours | | | | | | | | | |
| | | 0.77 Equipment hours | | | | | | | | | |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n z004 | | Loam & Seeding w/Imported Material, 4"thk | 303.00 | sy | 100 | 664 | - | | 25 | 2.603 /sy | 789 |
| ---- | | Restoration including plants & new trees | 303.00 | sy | | | 4,545 | | - | 15.00 /sy | 4,545 |
| | | **Lawns & Grasses** | | | **100** | **664** | **4,545** | | **25** | | **5,334** |
| | | 3.03 Labor hours | | | | | | | | | |
| | | 0.61 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 140 | Concrete: Secondary Aeration Influent Structure | 86.00 | cy | 13,452 | 30,100 | - | | 4,337 | 556.85 /cy | 47,889 |
| | | **Concrete in Place** | | | **13,452** | **30,100** | | | **4,337** | | **47,889** |
| | | 516.000 Labor hours | | | | | | | | | |
| | | 86.00 Equipment hours | | | | | | | | | |
| **03150.010** | | **Concrete Core & Saw** | | | | | | | | | |
| e240 | | Core Drill 66"dia | 1.00 | ea | 2,506 | - | - | | | 2,506.40 /ea | 2,506 |
| | | **Concrete Core & Saw** | | | **2,506** | | | | | | **2,506** |
| | | 104.000 Labor hours | | | | | | | | | |
| **04000.015** | | **Masonry Demolition** | | | | | | | | | |
| | 5 | Masonry Demolition | 320.00 | sf | 131 | - | - | | 95 | 0.71 /sf | 226 |
| | | **Masonry Demolition** | | | **131** | | | | **95** | | **226** |
| | | 4.80 Labor hours | | | | | | | | | |
| | | 4.80 Equipment hours | | | | | | | | | |
| **04210.000** | | **Clay Masonry Units** | | | | | | | | | |
| n | 8105 | Brick Mortar Type S | 24.312 | cf | 38 | 106 | - | | - | 5.901 /cf | 143 |
| | 8900 | Clean Brick | 320.00 | sf | 118 | 74 | - | | - | 0.60 /sf | 192 |
| n 018A | | Standard Face Brick - Common Bond | 2,026.00 | ea | 1,671 | 972 | - | | - | 1.31 /ea | 2,644 |
| | | **Clay Masonry Units** | | | **1,827** | **1,152** | | | | | **2,979** |
| | | 66.002 Labor hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n JD7 | | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type JD-AL | 1.00 | ea | 87 | 1,277 | - | | - | 1,363.09 /ea | 1,363 |
| | | **Hatch, Aluminum, 300psf** | | | **87** | **1,277** | | | | | **1,363** |
| | | 3.20 Labor hours | | | | | | | | | |
| **15230.400** | | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | 0 | Unload Care & Protect PCCP & Fittings | 264.00 | lf | 1 | - | - | | 2 | 0.01 /lf | 3 |
| | 10 | Layout Pipe & Fitting | 264.00 | lf | 83 | - | - | | - | 0.32 /lf | 83 |
| | 460 | PCCP Equipment- RT Crane 60 MT | 58.08 | ch | 1,662 | - | - | | 11,494 | 226.52 /ch | 13,156 |
| n B072 | | Prestressed Concrete Cylinder Pipe (250#) 66 | 264.00 | lf | 24,350 | 66,000 | - | | - | 342.24 /lf | 90,350 |
| n K072 | | PCCP 90 Bend 66 | 1.00 | ea | 683 | 2,500 | - | | - | 3,182.80 /ea | 3,183 |

| Item | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|
| **15230.400** | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| n L066 | PCCP 45 Bend 66 | 2.00 | ea | 1,252 | 4,000 | | | | 2,625.82 /ea | 5,252 |
| n m066 | PCCP-Restrained Joint (weld) 66 | 6.00 | ea | 189 | 480 | - | | - | 111.48 /ea | 669 |
| | **Prestr Conc Cylind-(PCCP)** | | | **28,220** | **72,980** | | | **11,496** | | **112,696** |
| | 901.72 Labor hours | | | | | | | | | |
| | 58.11 Equipment hours | | | | | | | | | |
| | ***01 UNOX Bypass*** | | | ***79,766*** | ***144,541*** | ***219,394*** | | ***60,293*** | | ***503,994*** |
| | 2,664.52 Labor hours | | | | | | | | | |
| | 722.88 Equipment hours | | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***02 Secondary Storage*** | | | | | | | | | |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Water Cannon | 11.00 | ea | - | - | 44,000 | | - | 4,000.00 /ea | 44,000 |
| | 20 | Protect the Existing Utilities | 1.00 | ls | - | - | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | 20 | Structural Rehabilitation to Entire Settling Basin | 1.00 | ls | - | - | 2,000,000 | | - | 2,000,000.00 /ls | 2,000,000 |
| | | **Sitework Allowance** | | | | | **2,049,000** | | | | **2,049,000** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2508 | Remove 60" DIP | 73.00 | lf | 209 | - | - | | 226 | 5.96 /lf | 435 |
| | 2508 | Remove 48" DIP | 86.00 | lf | 246 | - | - | | 267 | 5.96 /lf | 513 |
| | 2508 | Remove 42"DIP | 462.00 | lf | 1,321 | - | - | | 1,432 | 5.96 /lf | 2,753 |
| | 2508 | Remove 36"DIP | 330.00 | lf | 944 | - | - | | 1,023 | 5.96 /lf | 1,967 |
| | 3004 | Demo Launders | 1,065.00 | cy | 3,655 | - | - | | 5,424 | 8.53 /cy | 9,079 |
| | 3004 | Demo Concrete Weirs | 9.00 | cy | 1,287 | - | - | | 172 | 162.10 /cy | 1,459 |
| | 3006 | Demo Concrete Return Sludge Channel | 477.00 | cy | 68,211 | - | - | | 9,110 | 162.10 /cy | 77,321 |
| | 3006 | Demo Drain PS - 23vf | 22.00 | cy | 3,146 | - | - | | 420 | 162.10 /cy | 3,566 |
| | 3012 | Demo Concrete | 417.00 | cy | 59,631 | - | - | | 7,964 | 162.10 /cy | 67,595 |
| | SP12 | Sawcut Concrete | 3,024.00 | lf | 12,034 | - | - | | 12,192 | 8.011 /lf | 24,226 |
| | SP12 | Sawcut Concrete Weirs | 125.00 | lf | 497 | - | - | | 504 | 8.011 /lf | 1,001 |
| | | **Selective Site Demolition** | | | **151,181** | | | | **38,735** | | **189,916** |
| | | 5,266.72 Labor hours | | | | | | | | | |
| | | 647.72 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 1,579.00 | lf | 181 | | - | | - | 0.12 /lf | 181 |
| n | 2090 | Trenching- Backhoe/Loader 95HP (15 cy/hr-120cy/day) Average Exc. | 71.79 | cy | 242 | - | - | | 258 | 6.96 /cy | 500 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 1,540.52 | cy | 2,650 | - | - | | 6,814 | 6.143 /cy | 9,464 |
| n | 3090 | Trench Bedding-Backhoe/Loader 95HP | 67.97 | cy | 333 | - | - | | 275 | 8.951 /cy | 608 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 47.26 | cy | 122 | - | - | | 238 | 7.622 /cy | 360 |
| n | 4090 | Trench Pipe Zone Backfill-Backhoe/Loader 95HP | 48.341 | cy | 284 | - | - | | 235 | 10.74 /cy | 519 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 150.72 | cy | 622 | - | - | | 1,216 | 12.20 /cy | 1,838 |
| n | 5090 | Trench Native Backfill-Backhoe/Loader 95HP | -54.799 | cy | (294) | - | - | | (292) | 10.681 /cy | (585) |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 1,292.55 | cy | 1,849 | - | - | | 3,679 | 4.28 /cy | 5,528 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 314.282 | cy | - | 11,063 | - | | - | 35.20 /cy | 11,063 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 374.56 | cy | 946 | - | - | | 1,009 | 5.22 /cy | 1,955 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 374.56 | cy | 747 | - | - | | 610 | 3.624 /cy | 1,358 |
| n | 8367 | Trench Shores- Aluminum Hydraulic 36" width x 7' Rail | 4.00 | u/mo | | - | - | | 304 | 76.00 /u/mo | 304 |
| | A006 | Pipe Test | 1,579.00 | lf | 1,518 | 1,263 | - | | - | 1.761 /lf | 2,781 |
| | | **Trenching** | | | **9,200** | **12,326** | | | **14,347** | | **35,874** |
| | | 336.201 Labor hours | | | | | | | | | |
| | | 188.16 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 374.56 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 374.56 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 374.56 | cy | 1,087 | - | - | | 1,161 | 6.002 /cy | 2,248 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 374.56 | cy | 3,437 | - | - | | 2,808 | 16.673 /cy | 6,245 |
| | | **Excavation Spoils** | | | **4,524** | | | | **3,969** | | **8,493** |
| | | 134.744 Labor hours | | | | | | | | | |
| | | 67.372 Equipment hours | | | | | | | | | |
| **02720.100** | | **Aggregate Base Course** | | | | | | | | | |
| | 1180 | Crushed Rock 1" | 560.00 | cy | 732 | 5,725 | - | | 2,150 | 15.37 /cy | 8,607 |
| | | **Aggregate Base Course** | | | **732** | **5,725** | | | **2,150** | | **8,607** |
| | | 23.893 Labor hours | | | | | | | | | |
| | | 23.893 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| n | 10 | Bitum Paving | 608.00 | sy | - | - | 9,606 | | - | 15.80 /sy | 9,606 |
| | | **Asphalt Paving - Location** | | | | | **9,606** | | | | **9,606** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 741.00 | sy | 244 | 1,623 | - | | 62 | 2.603 /sy | 1,929 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Lawns & Grasses** | | | **244** | **1,623** | | | **62** | | **1,929** |
| | | 7.41 Labor hours | | | | | | | | | |
| | | 1.482 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 110 | Concrete: Walkway | 107.00 | cy | 9,763 | 33,170 | - | | 2,914 | 428.48 /cy | 45,847 |
| n | 110 | Concrete: Channel Inverts | 417.00 | cy | 38,049 | 129,270 | - | | 11,354 | 428.472 /cy | 178,673 |
| n | 140 | Concrete: Wetwell | 183.00 | cy | 28,625 | 64,050 | - | | 9,229 | 556.85 /cy | 101,904 |
| n | 175 | Concrete: Plug Secondary Walls (mixture of 72"dia - 36"dia - 15total) | 8.00 | cy | 417 | 1,120 | - | | 40 | 197.183 /cy | 1,577 |
| n | 180 | Concrete: Grout Fill | 275.00 | cy | 14,339 | 27,500 | - | | 1,387 | 157.183 /cy | 43,225 |
| | | **Concrete in Place** | | | **91,193** | **255,110** | | | **24,923** | | **371,226** |
| | | 3,498.000 Labor hours | | | | | | | | | |
| | | 494.260 Equipment hours | | | | | | | | | |
| **04000.015** | | **Masonry Demolition** | | | | | | | | | |
| | 5 | Masonry Demolition | 320.00 | sf | 131 | - | - | | 95 | 0.71 /sf | 226 |
| | | **Masonry Demolition** | | | **131** | | | | **95** | | **226** |
| | | 4.80 Labor hours | | | | | | | | | |
| | | 4.80 Equipment hours | | | | | | | | | |
| **04210.000** | | **Clay Masonry Units** | | | | | | | | | |
| n | 8105 | Brick Mortar Type S | 24.312 | cf | 38 | 106 | - | | - | 5.901 /cf | 143 |
| | 8900 | Clean Brick | 320.00 | sf | 118 | 74 | - | | - | 0.60 /sf | 192 |
| n | 018A | Standard Face Brick - Common Bond | 2,026.00 | ea | 1,671 | 972 | - | | - | 1.31 /ea | 2,644 |
| | | **Clay Masonry Units** | | | **1,827** | **1,152** | | | | | **2,979** |
| | | 66.002 Labor hours | | | | | | | | | |
| **05140.410** | | **Misc. Alum. Fabrications** | | | | | | | | | |
| | 0 | Aluminum Weirs | 100.00 | lf | | | 2,500 | | | 25.00 /lf | 2,500 |
| | | **Misc. Alum. Fabrications** | | | | | **2,500** | | | | **2,500** |
| **05520.000** | | **Handrail/Railing** | | | | | | | | | |
| | 103 | 3 Rail-Handrail Alum. w/Toe | 828.00 | lf | 9,315 | 71,415 | - | | - | 97.50 /lf | 80,730 |
| | | **Handrail/Railing** | | | **9,315** | **71,415** | | | | | **80,730** |
| | | 207.00 Labor hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 1.00 | ea | 87 | 1,277 | - | | - | 1,363.12 /ea | 1,363 |
| | | **Hatch, Aluminum, 300psf** | | | **87** | **1,277** | | | | | **1,363** |
| | | 3.20 Labor hours | | | | | | | | | |
| **11200.010** | | **Process Equipment N.O.C.** | | | | | | | | | |
| | A 1 | Pumps | 2.00 | ea | 30,221 | 60,000 | - | | - | 45,110.40 /ea | 90,221 |
| | | **Process Equipment N.O.C.** | | | **30,221** | **60,000** | | | | | **90,221** |
| | | 960.000 Labor hours | | | | | | | | | |
| **11217.100** | | **Submersible Sump Pumps** | | | | | | | | | |
| | 05 | Sump Pump | 1.00 | ea | 3,530 | 7,000 | - | | 1,713 | 12,243.00 /ea | 12,243 |
| | | **Submersible Sump Pumps** | | | **3,530** | **7,000** | | | **1,713** | | **12,243** |
| | | 120.00 Labor hours | | | | | | | | | |
| | | 20.00 Equipment hours | | | | | | | | | |
| **11284.000** | | **Sluice Gates** | | | | | | | | | |
| | 1616 | 16" x 16" Sluice Gate, MO | 5.00 | ea | 9,916 | 14,300 | - | | - | 4,843.24 /ea | 24,216 |
| | | **Sluice Gates** | | | **9,916** | **14,300** | | | | | **24,216** |
| | | 315.000 Labor hours | | | | | | | | | |
| **13400.005** | | **Measurement & Ctrl Instr** | | | | | | | | | |
| | -sub | Level Sensors | 6.00 | ea | 1,623 | 10,350 | | | - | 1,995.492 /ea | 11,973 |
| | -sub | Electrical/I&C | 0.00 | ls | - | - | 0 | | - | | |
| | | **Measurement & Ctrl Instr** | | | **1,623** | **10,350** | | | | | **11,973** |
| | | 60.00 Labor hours | | | | | | | | | |
| **15113.420** | | **GV Double Disc Gate CI/DI** | | | | | | | | | |
| n | 001P | Gate Valve, Push-on, Double Disk, NRS, 6"dia | 9.00 | ea | 1,293 | 2,849 | - | | 518 | 517.76 /ea | 4,660 |

| | Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **GV Double Disc Gate Cl/DI** | | | **1,293** | **2,849** | | | **518** | | **4,660** |
| | | | 36.36 Labor hours | | | | | | | | | |
| | | | 4.68 Equipment hours | | | | | | | | | |
| | **1511Z.000** | | **Valve Accessories** | | | | | | | | | |
| | G006 | | 6" Diameter Valve Box | 9.00 | ea | 1,133 | 4,500 | - | | - | 625.92 /ea | 5,633 |
| | | | **Valve Accessories** | | | **1,133** | **4,500** | | | | | **5,633** |
| | | | 36.00 Labor hours | | | | | | | | | |
| | **15120.300** | | **Bolt & Gaskets Sets** | | | | | | | | | |
| n | 111S | | 16-0/0" 150# A307 Steel Bolt Sets | 2.50 | ea | - | 188 | - | | - | 75.00 /ea | 188 |
| | 222S | | 16-0/0" Full Faced Red Rubber (SBR) Gasket 1/8" | 2.50 | ea | - | 27 | - | | - | 10.74 /ea | 27 |
| | | | **Bolt & Gaskets Sets** | | | | **214** | | | | | **214** |
| | **15210.010** | | **DIP Totals** | | | | | | | | | |
| | | 0 | Total Weight (Zero Cost Item) | 81,242.70 | lbs | - | - | - | | - | | |
| | | 1 | Weight of Pipe (Zero Cost Item) | 67,927.70 | lbs | - | - | - | | - | | |
| | | 2 | Weight of Fittings (Zero Cost Item) | 13,315.00 | lbs | - | - | - | | - | | |
| | **15210.100** | | **DIP CML FL & GV CL53/250** | | | | | | | | | |
| | | 0 | Unload Care & Protect Flanged/PE DIP & Fittings | 1,151.00 | lbs | 4 | - | - | | 7 | 0.01 /lbs | 11 |
| | | 1 | Weight of Flanged/PE Pipe (Zero Cost Item) | 1,151.00 | lbs | - | - | - | | - | | |
| | | 10 | Layout Flanged/PE DIP & Fitting | 10.00 | lf | 3 | - | - | | - | 0.31 /lf | 3 |
| | 20UC | | DI Pipe, FLxPE, CL53, CML, 16" x 2'-0" | 5.00 | ea | 1,346 | 2,106 | - | | - | 690.42 /ea | 3,452 |
| | | | **DIP CML FL & GV CL53/250** | | | **1,353** | **2,106** | | | **7** | | **3,466** |
| | | | 42.98 Labor hours | | | | | | | | | |
| | | | 0.13 Equipment hours | | | | | | | | | |
| | **15210.200** | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | | 0 | Unload Care & Protect Push-on DIP & Fittings | 80,091.70 | lbs | 264 | - | - | | 505 | 0.01 /lbs | 769 |
| | | 1 | Weight of Push-on Pipe (Zero Cost Item) | 66,776.70 | lbs | - | - | - | | - | | |
| | | 2 | Weight of Push-on Fittings (Zero Cost Item) | 13,315.00 | lbs | - | - | - | | - | | |
| | | 5 | Layout Push-on DIP & Fitting | 1,579.00 | lf | 484 | - | - | | - | 0.31 /lf | 484 |
| n | | 206 | DIP CML, Push-On, Class 52, 6" | 1,069.00 | lf | 7,403 | 13,237 | - | | - | 19.31 /lf | 20,641 |
| n | | 212 | DIP CML, Push-On, Class 52, 12" | 120.00 | lf | 1,171 | 3,342 | - | | - | 37.61 /lf | 4,513 |
| n | | 216 | DIP CML, Push-On, Class 52, 16" | 170.00 | lf | 1,873 | 7,114 | - | | - | 52.864 /lf | 8,987 |
| n | | 224 | DIP CML, Push-On, Class 52, 24" | 140.00 | lf | 1,763 | 9,730 | - | | - | 82.094 /lf | 11,493 |
| n | | 230 | DIP CML, Push-On, Class 52, 30" | 80.00 | lf | 1,108 | 7,836 | - | | - | 111.81 /lf | 8,945 |
| n | 2AMM | | DIP CML, Push-on, 90 Bend, 6" | 4.00 | ea | 295 | 480 | - | | - | 193.663 /ea | 775 |
| n | 2APP | | DIP CML, Push-on, 90 Bend, 12" | 12.00 | ea | 1,745 | 4,080 | - | | - | 485.44 /ea | 5,825 |
| n | FAPK | | DIP CML, Push-on, Tee BxB, 6"x 2" | 11.00 | ea | 1,212 | 1,760 | - | | - | 270.18 /ea | 2,972 |
| n | FAPP | | DIP CML, Push-on, Tee BxB, 6"x 6" | 5.00 | ea | 551 | 900 | - | | - | 290.18 /ea | 1,451 |
| n | FAUU | | DIP CML, Push-on, Tee BxB, 16"x 16" | 1.00 | ea | 258 | 1,825 | - | | - | 2,083.45 /ea | 2,083 |
| n | FAXX | | DIP CML, Push-on, Tee BxB, 24"x 24" | 2.00 | ea | 727 | 8,250 | - | | - | 4,488.28 /ea | 8,977 |
| n | FAYU | | DIP CML, Push-on, Tee BxB, 30"x 16" | 2.00 | ea | 859 | 11,430 | - | | - | 6,144.70 /ea | 12,289 |
| n | KAXU | | DIP, CML, Push-on, Reducer BxB, 24"x 16" | 1.00 | ea | 253 | 1,638 | - | | - | 1,890.91 /ea | 1,891 |
| n | KAYX | | DIP, CML, Push-on, Reducer BxB, 30"x 24" | 1.00 | ea | 282 | 3,630 | - | | - | 3,911.75 /ea | 3,912 |
| | | | **DIP CML Push-On Pipe** | | | **20,249** | **75,252** | | | **505** | | **96,006** |
| | | | 644.070 Labor hours | | | | | | | | | |
| | | | 8.810 Equipment hours | | | | | | | | | |
| | **15241.100** | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | | 0 | Unload Care & Protect Pipe/Fittings | 60.00 | lf | 0 | - | - | | 0 | 0.01 /lf | 1 |
| | | 10 | Layout Pipe & Fitting | 60.00 | lf | 19 | - | - | | - | 0.32 /lf | 19 |
| n | 80E0 | | PVC Schd. 80 Pipe, 3.00" | 60.00 | lf | 151 | 374 | - | | - | 8.76 /lf | 526 |
| | a010 | | PVC Joint Primer- Quart | 0.07 | qrt | - | 1 | - | | - | 15.30 /qrt | 1 |
| | a020 | | PVC Solvent Cement Low VOC- Quart | 0.07 | qrt | - | 1 | - | | - | 22.00 /qrt | 1 |
| | | | **PVC Schd Pipe & Fittings** | | | **170** | **377** | | | **0** | | **547** |
| | | | 5.41 Labor hours | | | | | | | | | |
| | | | 0.01 Equipment hours | | | | | | | | | |
| | **15400.131** | | **Copper DWV** | | | | | | | | | |
| | | 9347 | CU DWV Cleanout FtgxCO 3 | 1.00 | ea | 40 | 123 | - | | - | 162.91 /ea | 163 |
| | | | **Copper DWV** | | | **40** | **123** | | | | | **163** |
| | | | 1.27 Labor hours | | | | | | | | | |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | ***02 Secondary Storage*** | | ***337,964*** | ***525,699*** | ***2,061,106*** | | ***87,024*** | | ***3,011,793*** |
| | 11,769.050 Labor hours | | | | | | | | |
| | 1,461.305 Equipment hours | | | | | | | | |

| | Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ***03 Gravity Thickener*** | | | | | | | | | |
| | **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | | 2734 | Remove Asphalt Pavement | 1,000.00 | sy | 1,553 | - | - | | 3,130 | 4.684 /sy | 4,684 |
| | | | **Selective Site Demolition** | | | **1,553** | | | | **3,130** | | **4,684** |
| | | | 95.00 Labor hours | | | | | | | | | |
| | | | 76.000 Equipment hours | | | | | | | | | |
| | **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | | 2 | Design Shoring System-Average | 1.00 | ls | - | - | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | | 100 | Survey & Layout Shoring | 28.00 | lf | 1 | - | - | | - | 0.03 /lf | 1 |
| | | 105 | Mobilize Pile Driving Equipment | 1.00 | ea | - | - | 25,000 | | - | 25,000.00 /ea | 25,000 |
| | | 1025 | Steel Sheeting,15' x 22psf, pulled & salvage | 420.00 | sf | 2,592 | 2,083 | - | | 2,875 | 17.98 /sf | 7,550 |
| | | 1045 | Install & Remove Wales/Struts/Connectors | 0.462 | ton | 134 | 425 | - | | 148 | 1,530.152 /ton | 707 |
| n | | 1050 | Rent Steel Sheet Piling and Wales, first month | 5.082 | ton | - | 1,324 | - | | - | 260.58 /ton | 1,324 |
| | | | **Sheet Piling** | | | **2,727** | **3,833** | **35,000** | | **3,023** | | **44,582** |
| | | | 75.404 Labor hours | | | | | | | | | |
| | | | 18.844 Equipment hours | | | | | | | | | |
| | **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 4,349.47 | cy | 6,268 | - | - | | 9,911 | 3.72 /cy | 16,179 |
| | | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 500.00 | cy | 316 | - | - | | 855 | 2.341 /cy | 1,171 |
| | 461C | | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 1,528.284 | cy | 4,561 | - | - | | 5,056 | 6.293 /cy | 9,617 |
| n | A000 | | IMPORT MATERIAL (Summary) | 2.00 | CY | - | - | - | | - | | |
| n | A015 | | Import Gravel Fill | 215.111 | cy | - | 3,227 | 1,205 | | - | 20.60 /cy | 4,431 |
| | | | **Foundation Excavation** | | | **11,144** | **3,227** | **1,205** | | **15,822** | | **31,398** |
| | | | 435.37 Labor hours | | | | | | | | | |
| | | | 248.25 Equipment hours | | | | | | | | | |
| | **02315.300** | | **Trenching** | | | | | | | | | |
| | | 0 | Survey & Stake Pipeline | 930.00 | lf | 107 | | - | | - | 0.12 /lf | 107 |
| n | | 2090 | Trenching- Backhoe/Loader 95HP (15 cy/hr-120cy/day) Average Exc. | 1,292.870 | cy | 4,352 | - | - | | 4,646 | 6.96 /cy | 8,998 |
| n | | 3090 | Trench Bedding-Backhoe/Loader 95HP | 74.76 | cy | 366 | - | - | | 303 | 8.951 /cy | 669 |
| n | | 4090 | Trench Pipe Zone Backfill-Backhoe/Loader 95HP | 396.51 | cy | 2,331 | - | - | | 1,928 | 10.74 /cy | 4,259 |
| n | | 5090 | Trench Native Backfill-Backhoe/Loader 95HP | 803.70 | cy | 4,308 | - | - | | 4,276 | 10.681 /cy | 8,584 |
| | | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 471.262 | cy | - | 16,588 | - | | - | 35.20 /cy | 16,588 |
| | | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 489.174 | cy | 1,235 | - | - | | 1,318 | 5.22 /cy | 2,553 |
| | | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 489.174 | cy | 976 | - | - | | 797 | 3.624 /cy | 1,773 |
| | A006 | | Pipe Test | 930.00 | lf | 894 | 744 | - | | - | 1.761 /lf | 1,638 |
| | A008 | | Pipe Locates (Pot Hole) | 1.00 | ea | 226 | 50 | - | | 27 | 303.13 /ea | 303 |
| | | | **Trenching** | | | **14,794** | **17,382** | | | **13,295** | | **45,471** |
| | | | 582.33 Labor hours | | | | | | | | | |
| | | | 334.39 Equipment hours | | | | | | | | | |
| | **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | | 0 | EXCAVATION SPOILS (Grand Total) | 3,310.36 | cy | - | - | - | | - | | |
| | | 40 | Foundation Excavation Spoils (Summary) | 2,821.19 | cy | - | - | - | | - | | |
| | | 45 | Trenching Spoils (Summary) | 489.174 | cy | - | - | - | | - | | |
| | | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 489.174 | cy | 1,420 | - | - | | 1,516 | 6.002 /cy | 2,936 |
| | | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 2,821.19 | cy | 5,582 | - | - | | 9,241 | 5.254 /cy | 14,823 |
| | | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 500.00 | cy | 145 | - | - | | 409 | 1.11 /cy | 555 |
| | A0A4 | | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 489.174 | cy | 4,488 | - | - | | 3,668 | 16.673 /cy | 8,156 |
| | A0I7 | | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 2,821.19 | cy | 3,598 | - | - | | 4,077 | 2.721 /cy | 7,675 |
| | A0I7 | | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 500.00 | cy | 313 | - | - | | 723 | 2.071 /cy | 1,036 |
| | | | **Excavation Spoils** | | | **15,546** | | | | **19,634** | | **35,180** |
| | | | 492.29 Labor hours | | | | | | | | | |
| | | | 246.143 Equipment hours | | | | | | | | | |
| | **02446.000** | | **Drainage Outflow To Head** | | | | | | | | | |
| n | | 0 | Mob/Demob Directional Drilling Equipment | 2.00 | ea | - | - | 5,000 | | - | 2,500.00 /ea | 5,000 |
| n | | 1008 | Install 8" Pipe DIP | 60.00 | lf | - | - | 2,700 | | - | 45.00 /lf | 2,700 |
| n | | 1010 | Install 10" Pipe DIP | 120.00 | lf | - | - | 7,200 | | - | 60.00 /lf | 7,200 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Drainage Outflow To Head** | | | | | **14,900** | | | | **14,900** |
| **02720.150** | | **Aggregate Base- Roads** | | | | | | | | | |
| | 1116 | Aggregate Base | 300.00 | cy | 85 | 2,691 | - | | 432 | 10.70 /cy | 3,208 |
| | | **Aggregate Base- Roads** | | | **85** | **2,691** | | | **432** | | **3,208** |
| | | 4.80 Labor hours | | | | | | | | | |
| | | 4.80 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| | 20 | Bitum Paving | 1,000.00 | sy | - | - | 8,000 | | - | 8.00 /sy | 8,000 |
| | | **Asphalt Paving - Location** | | | | | **8,000** | | | | **8,000** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 15,000.00 | sy | 4,937 | 32,850 | - | | 1,253 | 2.603 /sy | 39,040 |
| | | **Lawns & Grasses** | | | **4,937** | **32,850** | | | **1,253** | | **39,040** |
| | | 150.00 Labor hours | | | | | | | | | |
| | | 30.00 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 110 | Concrete: Slab on Grade | 60.00 | cy | 5,475 | 18,600 | - | | 1,634 | 428.48 /cy | 25,709 |
| n | 120 | Concrete: Slab on Grade Circular | 353.954 | cy | 36,910 | 109,726 | - | | 9,637 | 441.51 /cy | 156,273 |
| n | 140 | Concrete: Wall | 290.00 | cy | 45,362 | 101,500 | - | | 14,625 | 556.85 /cy | 161,487 |
| | | **Concrete in Place** | | | **87,747** | **229,826** | | | **25,896** | | **343,468** |
| | | 3,365.82 Labor hours | | | | | | | | | |
| | | 513.54 Equipment hours | | | | | | | | | |
| **11000.015** | | **Equipment Demolition** | | | | | | | | | |
| | 101 | Demo Selective Items-Each - Gravity Thickener | 1.00 | ea | 119 | - | - | | | 119.28 /ea | 119 |
| | 3335 | Wash Down/Disinfect Tank -Gravity THickener | 200.00 | sf | 21 | 10 | - | | 4 | 0.18 /sf | 35 |
| | | **Equipment Demolition** | | | **141** | **10** | | | **4** | | **155** |
| | | 6.67 Labor hours | | | | | | | | | |
| | | 1.67 Equipment hours | | | | | | | | | |
| **11225.100** | | **Gravity Thickener** | | | | | | | | | |
| | 0 | Unload & Protect Gravity Thickener | 2.00 | ea | 744 | - | - | | 792 | 767.80 /ea | 1,536 |
| | 00 | Warehouse & Care of Gravity Thickener | 2.00 | u/mo | 146 | - | - | | - | 73.06 /u/mo | 146 |
| n | 70 | Gravity Thickener 70' Diameter | 2.00 | ea | 138,942 | 270,000 | - | | 147,831 | 278,386.650 /ea | 556,773 |
| | 6091 | 90 Ton Crane w/1cy Bucket | 47.512 | cy | 45 | - | - | | 367 | 8.681 /cy | 412 |
| | F000 | Swept-in Grout | 47.512 | cy | 2,217 | - | - | | - | 121.662 /cy | 5,780 |
| | G100 | Test & Check Gravity Thickener | 2.00 | ea | 585 | - | - | | - | 292.25 /ea | 585 |
| | z900 | Gravity Thickener Manufacturers Representative | 6.00 | day | - | 4,800 | 4,800 | | - | 1,750.00 /day | 10,500 |
| | | **Gravity Thickener** | | | **142,679** | **274,800** | **4,800** | | **148,990** | | **575,732** |
| | | 4,622.61 Labor hours | | | | | | | | | |
| | | 754.17 Equipment hours | | | | | | | | | |
| **11310.100** | | **Submersible Sludge Pumps** | | | | | | | | | |
| | 05 | Thickened Sludge Pump | 2.00 | ea | 1,412 | 4,000 | - | | 685 | 3,048.60 /ea | 6,097 |
| | | **Submersible Sludge Pumps** | | | **1,412** | **4,000** | | | **685** | | **6,097** |
| | | 48.00 Labor hours | | | | | | | | | |
| | | 8.00 Equipment hours | | | | | | | | | |
| **13121.000** | | **Pre-Engineered Metal Bldg** | | | | | | | | | |
| | z001 | Pre-Engineered Metal Bldg - Sludge Pump Shelter | 300.00 | sf | | | 22,500 | | | 75.00 /sf | 22,500 |
| | | **Pre-Engineered Metal Bldg** | | | | | **22,500** | | | | **22,500** |
| **15111.650** | | **Plug Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | 200P | Plug Valve, MJ, 6" | 6.00 | ea | 1,214 | 2,550 | - | | - | 627.382 /ea | 3,764 |
| n | 200Q | Plug Valve, MJ, 8" | 2.00 | ea | 450 | 1,150 | - | | - | 800.04 /ea | 1,600 |
| | | **Plug Valve (CI/DI/IBBM)** | | | **1,664** | **3,700** | | | | | **5,364** |
| | | 47.38 Labor hours | | | | | | | | | |
| **15114.500** | | **Check Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | C20Q | Check Valve, Double Disc, MJ, 8" | 2.00 | ea | 493 | 600 | - | | - | 546.59 /ea | 1,093 |
| n | C20R | Check Valve, Double Disc, MJ, 10" | 2.00 | ea | 556 | 1,000 | - | | - | 778.11 /ea | 1,556 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Check Valve (CI/DI/IBBM)** | | | **1,049** | **1,600** | | | | | **2,649** |
| | | 30.98 Labor hours | | | | | | | | | |
| **15210.010** | | **DIP Totals** | | | | | | | | | |
| | 0 | Total Weight (Zero Cost Item) | 30,141.00 | lbs | - | - | - | | - | | |
| | 1 | Weight of Pipe (Zero Cost Item) | 29,331.00 | lbs | - | - | - | | - | | |
| | 2 | Weight of Fittings (Zero Cost Item) | 810.00 | lbs | - | - | - | | - | | |
| **15210.200** | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | 0 | Unload Care & Protect Push-on DIP & Fittings | 30,141.00 | lbs | 100 | - | - | | 190 | 0.01 /lbs | 289 |
| | 1 | Weight of Push-on Pipe (Zero Cost Item) | 29,331.00 | lbs | - | - | - | | - | | |
| | 2 | Weight of Push-on Fittings (Zero Cost Item) | 810.00 | lbs | - | - | - | | - | | |
| | 5 | Layout Push-on DIP & Fitting | 930.00 | lf | 285 | - | - | | - | 0.31 /lf | 285 |
| n | 208 | DIP CML, Push-On, Class 52, 8" | 630.00 | lf | 4,958 | 10,668 | - | | - | 24.803 /lf | 15,626 |
| n | 210 | DIP CML, Push-On, Class 52, 10" | 300.00 | lf | 2,644 | 6,638 | - | | - | 30.94 /lf | 9,282 |
| n FAQQ | | DIP CML, Push-on, Wye BxB, 8"x 8" | 2.00 | ea | 263 | 540 | - | | - | 401.27 /ea | 803 |
| n FAQQ | | DIP CML, Push-on, Tee BxB, 8"x 8" | 4.00 | ea | 525 | 1,080 | - | | - | 401.273 /ea | 1,605 |
| | | **DIP CML Push-On Pipe** | | | **8,774** | **18,925** | | | **190** | | **27,890** |
| | | 279.14 Labor hours | | | | | | | | | |
| | | 3.32 Equipment hours | | | | | | | | | |
| **16000.005** | | **Electrical Allowance** | | | | | | | | | |
| | 5 | Electrical Allowance | 0.00 | ls | 0 | 0 | 0 | | - | | |
| | | ***03 Gravity Thickener*** | | | ***294,253*** | ***592,844*** | ***86,405*** | | ***232,354*** | | ***1,210,319*** |
| | | 10,235.77 Labor hours | | | | | | | | | |
| | | 2,239.11 Equipment hours | | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***04 Chemical Feed*** | | | | | | | | | |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2510 | Demo 12'dia x 40'tall Steel Tank | 1.00 | ea | | - | 5,000 | | | 5,000.00 /ea | 5,000 |
| | 2734 | Remove Asphalt Pavement, 5"thk | 189.00 | sy | 518 | - | - | | 592 | 5.87 /sy | 1,109 |
| | 3012 | Demo Concrete Elevated Slab | 22.00 | cy | 50 | - | - | | 74 | 5.61 /cy | 123 |
| | | **Selective Site Demolition** | | | **567** | | **5,000** | | **665** | | **6,233** |
| | | 19.692 Labor hours | | | | | | | | | |
| | | 14.943 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 480.00 | lf | 55 | | - | | - | 0.12 /lf | 55 |
| n | 2090 | Trenching- Backhoe/Loader 95HP (15 cy/hr-120cy/day) Average Exc. | 583.87 | cy | 1,965 | - | - | | 2,098 | 6.96 /cy | 4,063 |
| n | 3090 | Trench Bedding-Backhoe/Loader 95HP | 36.543 | cy | 179 | - | - | | 148 | 8.95 /cy | 327 |
| n | 4090 | Trench Pipe Zone Backfill-Backhoe/Loader 95HP | 109.65 | cy | 645 | - | - | | 533 | 10.741 /cy | 1,178 |
| n | 5090 | Trench Native Backfill-Backhoe/Loader 95HP | 109.65 | cy | 588 | - | - | | 583 | 10.681 /cy | 1,171 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 146.193 | cy | - | 5,146 | - | | - | 35.20 /cy | 5,146 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 146.48 | cy | 370 | - | - | | 395 | 5.22 /cy | 765 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 146.48 | cy | 292 | - | - | | 239 | 3.624 /cy | 531 |
| | A002 | Pipe Detectable/Non-Detectable Tape | 480.00 | lf | 55 | 26 | - | | - | 0.17 /lf | 81 |
| | A006 | Pipe Test | 480.00 | lf | 461 | 384 | - | | - | 1.761 /lf | 845 |
| | | **Trenching** | | | **4,610** | **5,556** | | | **3,996** | | **14,163** |
| | | 179.20 Labor hours | | | | | | | | | |
| | | 91.695 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 146.48 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 146.48 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 146.48 | cy | 425 | - | - | | 454 | 6.002 /cy | 879 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 146.48 | cy | 1,344 | - | - | | 1,098 | 16.673 /cy | 2,442 |
| | | **Excavation Spoils** | | | **1,769** | | | | **1,552** | | **3,321** |
| | | 52.694 Labor hours | | | | | | | | | |
| | | 26.35 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| n | 10 | Bitum Paving | 189.00 | sy | - | - | 2,986 | | - | 15.80 /sy | 2,986 |
| | | **Asphalt Paving - Location** | | | | | **2,986** | | | | **2,986** |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 145 | Concrete: Elevated Slab - Flow Splitter Box | 22.00 | cy | 3,154 | 7,920 | - | | 1,109 | 553.82 /cy | 12,184 |
| | | **Concrete in Place** | | | **3,154** | **7,920** | | | **1,109** | | **12,184** |
| | | 121.000 Labor hours | | | | | | | | | |
| | | 22.00 Equipment hours | | | | | | | | | |
| **03150.010** | | **Concrete Core & Saw** | | | | | | | | | |
| | c 10 | Core Drill 1" to 12" depth - Dewatering Wall | 3.00 | ea | 58 | - | - | | | 19.28 /ea | 58 |
| | c 10 | Core Drill 1" to 12" depth - Flow Splitter Wall | 3.00 | ea | 58 | - | - | | | 19.28 /ea | 58 |
| | | **Concrete Core & Saw** | | | **116** | | | | | | **116** |
| | | 4.80 Labor hours | | | | | | | | | |
| **05000.001** | | **Metals Allowance** | | | | | | | | | |
| | 5 | Metals Allowance - Mount Chemical Induction System | 1.00 | ls | | | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | | **Metals Allowance** | | | | | **5,000** | | | | **5,000** |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL - Chem Induction | 1.00 | ea | 87 | 1,277 | - | | - | 1,363.12 /ea | 1,363 |
| | | **Hatch, Aluminum, 300psf** | | | **87** | **1,277** | | | | | **1,363** |
| | | 3.20 Labor hours | | | | | | | | | |
| **11220.100** | | **Chemical Mixing Units** | | | | | | | | | |
| | 02 | Polymer Supply Mechanical Mixer | 4.00 | ea | 3,778 | 6,000 | - | | - | 2,444.40 /ea | 9,778 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Chemical Mixing Units** | | | **3,778** | **6,000** | | | | | **9,778** |
| | | 120.000 Labor hours | | | | | | | | | |
| **11240.400** | | **Polymer Store/Feed Equip** | | | | | | | | | |
| | 0 | Metering Pump/Poly Blend and Feed Pump | 3.00 | ea | 21,182 | 42,000 | - | | 10,276 | 24,486.00 /ea | 73,458 |
| | 0 | First Fill of Polymer | 3.00 | day | 2,118 | 4,500 | - | | 1,028 | 2,548.60 /day | 7,646 |
| | | **Polymer Store/Feed Equip** | | | **23,301** | **46,500** | | | **11,303** | | **81,104** |
| | | 792.00 Labor hours | | | | | | | | | |
| | | 132.00 Equipment hours | | | | | | | | | |
| **11240.420** | | **Storage Tanks** | | | | | | | | | |
| f110 | | Submerged Chemical Induction System | 1.00 | ls | 23,536 | 40,000 | - | | - | 63,536.00 /ls | 63,536 |
| | | **Storage Tanks** | | | **23,536** | **40,000** | | | | | **63,536** |
| | | 800.000 Labor hours | | | | | | | | | |
| **13000.005** | | **Special Const Allowance** | | | | | | | | | |
| | 5 | SCADA Allowance | 1.00 | ls | | | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | 5 | Polymer Tote Containment | 4.00 | ea | 433 | 3,680 | - | | - | 1,028.20 /ea | 4,113 |
| | | **Special Const Allowance** | | | **433** | **3,680** | **5,000** | | | | **9,113** |
| | | 16.00 Labor hours | | | | | | | | | |
| **15115.810** | | **Diaphragm Valve PVC** | | | | | | | | | |
| n | 130I | PVC Diaphragm Valve, flg, 1" | 9.00 | ea | 615 | 8,640 | - | | - | 1,028.313 /ea | 9,255 |
| n | 130K | PVC Diaphragm Valve, flg, 2" | 6.00 | ea | 800 | 9,060 | - | | - | 1,643.34 /ea | 9,860 |
| | | **Diaphragm Valve PVC** | | | **1,415** | **17,700** | | | | | **19,115** |
| | | 38.73 Labor hours | | | | | | | | | |
| **15241.100** | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | 0 | Unload Care & Protect Pipe/Fittings | 680.00 | lf | 2 | - | - | | 4 | 0.01 /lf | 7 |
| | 10 | Layout Pipe & Fitting | 680.00 | lf | 214 | - | - | | - | 0.32 /lf | 214 |
| n | 8080 | PVC Schd. 80 Pipe, 1.00" | 600.00 | lf | 944 | 792 | - | | - | 2.894 /lf | 1,736 |
| n | 80C0 | PVC Schd. 80 Pipe, 2.00" | 80.00 | lf | 176 | 245 | - | | - | 5.264 /lf | 421 |
| n | 8A80 | PVC Sch 80. 90 Ell , 1.00" | 18.00 | ea | 96 | 79 | - | | - | 9.752 /ea | 176 |
| n | 8AC0 | PVC Sch 80. 90 Ell , 2.00" | 11.00 | ea | 93 | 84 | - | | - | 16.12 /ea | 177 |
| n | 8F88 | PVC Sch 80. Tee , 1.00" | 12.00 | ea | 87 | 95 | - | | - | 15.13 /ea | 182 |
| n | 8FCC | PVC Sch 80. Tee , 2.00" | 7.00 | ea | 82 | 190 | - | | - | 38.754 /ea | 271 |
| | a010 | PVC Joint Primer- Quart | 1.21 | qrt | - | 19 | - | | - | 15.35 /qrt | 19 |
| | a020 | PVC Solvent Cement Low VOC- Quart | 1.21 | qrt | - | 26 | - | | - | 21.90 /qrt | 26 |
| | | **PVC Schd Pipe & Fittings** | | | **1,695** | **1,529** | | | **4** | | **3,229** |
| | | 53.855 Labor hours | | | | | | | | | |
| | | 0.075 Equipment hours | | | | | | | | | |
| **15400.005** | | **Plumbing Allowance** | | | | | | | | | |
| | 5 | Plumbing Allowance - Hook Plant Water to Poly System | 1.00 | ls | | | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | | **Plumbing Allowance** | | | | | **5,000** | | | | **5,000** |
| **16000.005** | | **Electrical Allowance** | | | | | | | | | |
| | 5 | Electrical Allowance - Wire Chemical Induction to Controls | 1.00 | ls | 0 | 0 | 25,000 | | - | 25,000.00 /ls | 25,000 |
| | | **Electrical Allowance** | | | | | **25,000** | | | | **25,000** |
| | | 0.000 Labor hours | | | | | | | | | |
| | | ***04 Chemical Feed*** | | | ***64,460*** | ***130,162*** | ***47,986*** | | ***18,631*** | | ***261,239*** |
| | | 2,201.171 Labor hours | | | | | | | | | |
| | | 287.06 Equipment hours | | | | | | | | | |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | ***06 I&C*** | | | | | | | | |
| **13000.005** | **Special Const Allowance** | | | | | | | | |
| 5 | I&C Allowance | 0.00 ls | 0 | 0 | - | | - | | |
| | ***06 I&C*** | | ***0*** | ***0*** | ***0*** | | ***0*** | | ***0*** |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | ***07 Electrical*** | | | | | | | | |
| **16000.005** | **Electrical Allowance** | | | | | | | | |
| 5 | Electrical Allowance | 0.00 ls | 0 | 0 | 0 | | - | | |
| | ***07 Electrical*** | | ***0*** | ***0*** | ***0*** | | ***0*** | | ***0*** |

## Estimate Totals

| Description | Amount | Totals | Hours | Rate |
|---|---|---|---|---|
| Labor | 776,443 | | 26,871 hrs | |
| Material | 1,393,246 | | | |
| Subcontract | 2,414,891 | | | |
| Equipment | 398,302 | | 4,710 hrs | |
| Other | 4,463 | | | |
| **Subtotal Direct Cost** | **4,987,345** | **4,987,345** | | |
| I&C | 498.737 | | | 10.00 % |
| Electrical | 748.105 | | | 15.00 % |
| | **1,246,842** | **6,234,187** | | |
| Indirect Costs: | | | | |
| Building Permits(% total cost) | 52.180 | | | 0.40 % |
| Sales Tax (MEO) | | | | |
| Builders Risk Ins % total cost | 32.612 | | | 0.25 % |
| Gen Liability Ins % total cost | 260.898 | | | 2.00 % |
| GC Bonds (% total cost) | 130.449 | | | 1.00 % |
| **Subtotal Prior to OH&P** | **476,139** | **6,710,326** | | |
| GC Field General Conditions | 671.035 | | | 10.00 % |
| GC Indirects. OH & Profit | 671.035 | | | 10.00 % |
| **Subtotal** | **1,342,070** | **8,052,396** | | |
| Construction Contingency | 2,818,346 | | | 35.00 % |
| **Total Construction Cost** | **2,818,346** | **10,870,742** | | |
| Engineering, Permitting, Bond Financing, Legal and Administration | 2.174.153 | | | 20.00 % |
| **Total Program Costs** | **2,174,153** | **13,044,895** | | |
| | ***Total*** | ***13,044,895*** | | |

This is an Opinion of Probable Construction Cost only, as defined by the documents provided at the level of design indicated on the front sheet of this estimate.
There are not any costs provided for: Change Orders, Construction Oversight, land acquisition or temporary/permanent easements, Operations, or any other costs associated with this project that are not specifically part of the bidding contractor's proposed scope.
The total cost shown is valid to only two significant figures.

# *Knoxville, Tennessee*
# *Kuwahee WWTP - Options 2*
# *Opinion of Probable Construction Cost, Prelim Design, March 2007*

| | |
|---|---|
| **Project name** | TN, Knoxville KWWTP |
| **Estimator** | MacIsaac |
| **Labor rate table** | TN07 Knoxville |
| **Equipment rate table** | 00 071H Equip Rental |
| **database version:** | V6.0 TES 9.4.22.0 |
| **ENR 20 City CCI** | March 2007: 7856 |
| **Notes** | This is an Opinion of Probable Construction Cost only, as defined by the documents provided at the level of design indicated above. CDM has no control over the cost of labor, materials, equipment, or services furnished, over schedules, over contractor's methods of determining prices, competitive bidding, market or negotiating conditions. CDM does not guarantee that this opinion will not vary from actual cost, or contractor's bids. There are not any costs provided for: Change Orders, Construction Oversight, Land Acquisition or temporary/permanent Easements, Operations, or any other costs associated with this project that are not specifically part of the bidding contractor's proposed scope.<br><br>The total cost shown is valid to only two significant figures<br><br>Assumptions:<br>No rock excavation is required.<br>Only nominal dewatering is needed.<br>No consideration for contaminated soils or hazardous materials (i.e. asbestos, lead)<br>No finishes are included.<br>Based on a 40 hour work week with no overtime.<br><br>This job is sales tax exempt. |
| **Report format** | Sorted by 'Proj Area/Phase'<br>'Detail' summary<br>Allocate addons<br>Round unit prices<br>Combine items<br>Paginate |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***01 UNOX Bypass*** | | | | | | | | | |
| **01010.000** | | **General Conditions** | | | | | | | | | |
| | 5 | Assumption of 20% of Excavated Material is Contaminated | 2,590.00 | cy | - | - | 64,750 | | - | 25.00 /cy | 64,750 |
| | | **General Conditions** | | | | | **64,750** | | | | **64,750** |
| **01590.000** | | **Traffic/Pollution Control** | | | | | | | | | |
| ---- | | Traffic Control | 1.00 | ls | | | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | | **Traffic/Pollution Control** | | | | | **10,000** | | | | **10,000** |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Protect Utilities (6"pw, 4"cw, 16" sludge, duct) | 1.00 | ls | - | - | 2,500 | | - | 2,500.00 /ls | 2,500 |
| | | **Sitework Allowance** | | | | | **2,500** | | | | **2,500** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2508 | Remove 48" DIP - 11' deep | 70.00 | lf | 114 | - | - | | 217 | 4.731 /lf | 331 |
| | 2512 | Demo Existing Secondary Aeratio Influent Structure (86cy concrete) | 1.00 | ea | | - | 21,500 | | | 21,500.00 /ea | 21,500 |
| | 2734 | Remove Pavement/Concrete Walk | 312.00 | sy | 485 | - | - | | 977 | 4.684 /sy | 1,461 |
| | | **Selective Site Demolition** | | | **599** | | **21,500** | | **1,194** | | **23,293** |
| | | 36.64 Labor hours | | | | | | | | | |
| | | 27.212 Equipment hours | | | | | | | | | |
| **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | 2 | Design Shoring System-Average | 1.00 | ls | - | - | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | 100 | Survey & Layout Shoring | 70.00 | lf | 1 | - | - | | - | 0.02 /lf | 1 |
| | 105 | Mobilize Pile Driving Equipment | 1.00 | ea | - | - | 25,000 | | - | 25,000.00 /ea | 25,000 |
| | 1030 | Steel Sheeting,20' x 27psf, pulled & salvage | 1,400.00 | sf | 7,255 | 9,016 | - | | 9,582 | 18.47 /sf | 25,853 |
| | 1045 | Install & Remove Wales/Struts/Connectors | 1.89 | ton | 459 | 1,739 | - | | 606 | 1,483.73 /ton | 2,804 |
| n | 1050 | Rent Steel Sheet Piling and Wales, first month | 20.79 | ton | - | 5,418 | - | | - | 260.59 /ton | 5,418 |
| | | **Sheet Piling** | | | **7,715** | **16,172** | **35,000** | | **10,188** | | **69,076** |
| | | 254.123 Labor hours | | | | | | | | | |
| | | 63.513 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 636.00 | cy | 536 | - | - | | 1,449 | 3.121 /cy | 1,985 |
| | | **Foundation Excavation** | | | **536** | | | | **1,449** | | **1,985** |
| | | 33.92 Labor hours | | | | | | | | | |
| | | 16.96 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 285.00 | lf | 26 | | - | | - | 0.092 /lf | 26 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 1,274.583 | cy | 1,289 | - | - | | 5,637 | 5.434 /cy | 6,926 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 53.951 | cy | 82 | - | - | | 272 | 6.56 /cy | 354 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 273.30 | cy | 663 | - | - | | 2,204 | 10.492 /cy | 2,867 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 681.13 | cy | 616 | - | - | | 1,939 | 3.751 /cy | 2,555 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 327.25 | cy | - | 11,519 | - | | - | 35.20 /cy | 11,519 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 593.46 | cy | 832 | - | - | | 1,599 | 4.10 /cy | 2,432 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 593.46 | cy | 581 | - | - | | 967 | 2.61 /cy | 1,548 |
| n | 8367 | Trench Shores- Aluminum Hydraulic 36" width x 7' Rail | 1.00 | u/mo | | - | - | | 76 | 76.00 /u/mo | 76 |
| | | **Trenching** | | | **4,089** | **11,519** | | | **12,695** | | **28,303** |
| | | 267.56 Labor hours | | | | | | | | | |
| | | 174.61 Equipment hours | | | | | | | | | |
| **02315.400** | | **Drilling & Blasting** | | | | | | | | | |
| | 1008 | Hydraulic Hoe Ram | 636.00 | cy | 1,775 | - | 95,400 | | | 152.79 /cy | 97,175 |
| | | **Drilling & Blasting** | | | **1,775** | | **95,400** | | | | **97,175** |
| | | 101.76 Labor hours | | | | | | | | | |
| | | 50.88 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 1,229.46 | cy | - | - | - | | - | | |
| | 40 | Foundation Excavation Spoils (Summary) | 636.00 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 593.46 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 593.46 | cy | 957 | - | - | | 1,839 | 4.712 /cy | 2,796 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 636.00 | cy | 185 | - | - | | 521 | 1.11 /cy | 706 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 593.46 | cy | 2,672 | - | - | | 4,449 | 12.001 /cy | 7,122 |
| | A0I7 | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 636.00 | cy | 398 | - | - | | 919 | 2.071 /cy | 1,317 |
| | | **Excavation Spoils** | | | **4,212** | | | | **7,729** | | **11,941** |
| | | 247.051 Labor hours | | | | | | | | | |
| | | 123.53 Equipment hours | | | | | | | | | |
| **02720.100** | | **Aggregate Base Course** | | | | | | | | | |
| | 1180 | Crushed Rock 1" | 242.00 | cy | 184 | 2,474 | - | | 929 | 14.822 /cy | 3,587 |
| | 1230 | Granular Fill | 690.00 | cy | 1,966 | 8,252 | - | | 9,934 | 29.21 /cy | 20,152 |
| | | **Aggregate Base Course** | | | **2,150** | **10,726** | | | **10,863** | | **23,739** |
| | | 120.73 Labor hours | | | | | | | | | |
| | | 120.73 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| n | 10 | Bitum Paving | 242.00 | sy | - | - | 3,824 | | - | 15.80 /sy | 3,824 |
| | | **Asphalt Paving - Location** | | | | | **3,824** | | | | **3,824** |
| **02750.100** | | **Concrete Paving** | | | | | | | | | |
| | z015 | Concrete Pavement, Walkways | 70.00 | sy | 143 | 800 | - | | 53 | 14.23 /sy | 996 |
| | | **Concrete Paving** | | | **143** | **800** | | | **53** | | **996** |
| | | 7.63 Labor hours | | | | | | | | | |
| | | 0.77 Equipment hours | | | | | | | | | |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 303.00 | sy | 63 | 664 | - | | 25 | 2.481 /sy | 752 |
| | ---- | Restoration including plants & new trees | 303.00 | sy | | | 4,545 | | - | 15.00 /sy | 4,545 |
| | | **Lawns & Grasses** | | | **63** | **664** | **4,545** | | **25** | | **5,297** |
| | | 3.03 Labor hours | | | | | | | | | |
| | | 0.61 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 140 | Concrete: Secondary Aeration Influent Structure | 86.00 | cy | 10,671 | 30,100 | - | | 4,337 | 524.52 /cy | 45,108 |
| | | **Concrete in Place** | | | **10,671** | **30,100** | | | **4,337** | | **45,108** |
| | | 516.000 Labor hours | | | | | | | | | |
| | | 86.00 Equipment hours | | | | | | | | | |
| **03150.010** | | **Concrete Core & Saw** | | | | | | | | | |
| | e240 | Core Drill 66"dia | 1.00 | ea | 1,283 | - | - | | | 1,283.36 /ea | 1,283 |
| | | **Concrete Core & Saw** | | | **1,283** | | | | | | **1,283** |
| | | 104.000 Labor hours | | | | | | | | | |
| **04000.015** | | **Masonry Demolition** | | | | | | | | | |
| | 5 | Masonry Demolition | 320.00 | sf | 75 | - | - | | 95 | 0.531 /sf | 170 |
| | | **Masonry Demolition** | | | **75** | | | | **95** | | **170** |
| | | 4.80 Labor hours | | | | | | | | | |
| | | 4.80 Equipment hours | | | | | | | | | |
| **04210.000** | | **Clay Masonry Units** | | | | | | | | | |
| n | 8105 | Brick Mortar Type S | 24.312 | cf | 32 | 106 | - | | - | 5.684 /cf | 138 |
| | 8900 | Clean Brick | 320.00 | sf | 102 | 74 | - | | - | 0.55 /sf | 175 |
| n | 018A | Standard Face Brick - Common Bond | 2,026.00 | ea | 1,439 | 972 | - | | - | 1.19 /ea | 2,411 |
| | | **Clay Masonry Units** | | | **1,573** | **1,152** | | | | | **2,725** |
| | | 66.002 Labor hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | JD7 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type JD-AL | 1.00 | ea | 77 | 1,277 | - | | - | 1,353.17 /ea | 1,353 |
| | | **Hatch, Aluminum, 300psf** | | | **77** | **1,277** | | | | | **1,353** |
| | | 3.20 Labor hours | | | | | | | | | |
| **15230.400** | | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | 0 | Unload Care & Protect PCCP & Fittings | 285.00 | lf | 1 | - | - | | 2 | 0.01 /lf | 2 |
| | 10 | Layout Pipe & Fitting | 285.00 | lf | 68 | - | - | | - | 0.24 /lf | 68 |
| | 460 | PCCP Equipment- RT Crane 60 MT | 62.70 | ch | 1,134 | - | - | | 12,408 | 215.984 /ch | 13,542 |
| n | B072 | Prestressed Concrete Cylinder Pipe (250#) 66 | 285.00 | lf | 19,924 | 71,250 | - | | - | 319.910 /lf | 91,174 |
| n | K072 | PCCP 90 Bend 66 | 1.00 | ea | 517 | 2,500 | - | | - | 3,017.31 /ea | 3,017 |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| **15230.400** | **Prestr Conc Cylind-(PCCP)** | | | | | | | | |
| n L066 | PCCP 45 Bend 66 | 2.00 ea | 948 | 4,000 | - | | - | 2,474.14 /ea | 4,948 |
| n m066 | PCCP-Restrained Joint (weld) 66 | 6.00 ea | 143 | 480 | - | | - | 103.86 /ea | 623 |
| | **Prestr Conc Cylind-(PCCP)** | | **22,735** | **78,230** | | | **12,410** | | **113,376** |
| | 968.081 Labor hours | | | | | | | | |
| | 62.731 Equipment hours | | | | | | | | |
| | ***01 UNOX Bypass*** | | ***57,696*** | ***150,640*** | ***237,519*** | | ***61,038*** | | ***506,893*** |
| | 2,734.52 Labor hours | | | | | | | | |
| | 732.33 Equipment hours | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***02 Primary Redirect*** | | | | | | | | | |
| **01590.000** | | **Traffic/Pollution Control** | | | | | | | | | |
| | 5 | Traffic Control | 1.00 | ls | 108 | | 10,000 | | - | 10,107.68 /ls | 10,108 |
| | | **Traffic/Pollution Control** | | | **108** | | **10,000** | | | | **10,108** |
| | | 8.00 Labor hours | | | | | | | | | |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Protect Existing Utilities (6"CIP WS, 10"CIP SFPE, 48" RCP San) | 1.00 | ls | - | - | 2,500 | | - | 2,500.00 /ls | 2,500 |
| | 20 | Connect to Existing Basin | 1.00 | ls | - | - | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | | **Sitework Allowance** | | | | | **7,500** | | | | **7,500** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2508 | Remove 72" Steel Pipe (21vf) | 70.00 | lf | 114 | - | - | | 217 | 4.731 /lf | 331 |
| | 2514 | Demo Railroad Lines | 70.00 | lf | 343 | - | - | | 891 | 17.63 /lf | 1,234 |
| | 2734 | Remove Asphalt Pavement, 5"thk | 333.00 | sy | 517 | - | - | | 1,042 | 4.684 /sy | 1,560 |
| | 3006 | Demo Concrete Return Sludge Channel | 66.00 | cy | 5,386 | - | - | | 1,261 | 100.70 /cy | 6,646 |
| | | **Selective Site Demolition** | | | **6,360** | | | | **3,411** | | **9,771** |
| | | 389.64 Labor hours | | | | | | | | | |
| | | 45.71 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 35.00 | lf | 3 | | - | | - | 0.092 /lf | 3 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 136.111 | cy | 138 | - | - | | 602 | 5.434 /cy | 740 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 5.761 | cy | 9 | - | - | | 29 | 6.56 /cy | 38 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 26.80 | cy | 65 | - | - | | 216 | 10.492 /cy | 281 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 81.38 | cy | 74 | - | - | | 232 | 3.75 /cy | 305 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 32.56 | cy | - | 1,146 | - | | - | 35.20 /cy | 1,146 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 54.733 | cy | 77 | - | - | | 148 | 4.10 /cy | 224 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 54.733 | cy | 54 | - | - | | 89 | 2.61 /cy | 143 |
| n | 8367 | Trench Shores- Aluminum Hydraulic 36" width x 7' Rail | 1.00 | u/mo | | - | - | | 76 | 76.00 /u/mo | 76 |
| | | **Trenching** | | | **419** | **1,146** | | | **1,392** | | **2,956** |
| | | 27.31 Labor hours | | | | | | | | | |
| | | 17.984 Equipment hours | | | | | | | | | |
| **02315.400** | | **Drilling & Blasting** | | | | | | | | | |
| | 1008 | Hydraulic Hoe Ram | 144.00 | cy | 402 | - | 21,600 | | | 152.79 /cy | 22,002 |
| | | **Drilling & Blasting** | | | **402** | | **21,600** | | | | **22,002** |
| | | 23.04 Labor hours | | | | | | | | | |
| | | 11.52 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 54.733 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 54.733 | cy | - | - | - | | - | | |
| | 46 | Bore & Jack Spoils Spoils (Summary) | 136.14 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 190.87 | cy | 308 | - | - | | 592 | 4.712 /cy | 899 |
| | A0A0 | Haul Spoils/Off Site 10cy Rear Dump 4.00 Hour/Load | 136.14 | cy | 613 | - | - | | 1,021 | 12.001 /cy | 1,634 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 54.733 | cy | 246 | - | - | | 410 | 12.001 /cy | 657 |
| | | **Excavation Spoils** | | | **1,167** | | | | **2,023** | | **3,190** |
| | | 68.663 Labor hours | | | | | | | | | |
| | | 34.332 Equipment hours | | | | | | | | | |
| **02445.000** | | **Boring & Jack Conduit** | | | | | | | | | |
| | 0 | Mob/Demob Bore & Jack Equipment | 1.00 | ea | - | - | 5,000 | | - | 5,000.00 /ea | 5,000 |
| | 100 | Excavate Jacking Pit | 453.333 | cy | 824 | - | - | | 2,227 | 6.731 /cy | 3,051 |
| | 105 | Excavate Recieving Pit | 75.56 | cy | 137 | - | - | | 371 | 6.731 /cy | 509 |
| | 200 | Shore Jacking/Receiving Pits | 2,720.00 | bsf | - | - | 40,800 | | - | 15.00 /bsf | 40,800 |
| | 300 | Backfill Jacking/Receiving Pits | 528.89 | cy | 2,589 | - | - | | 5,407 | 15.12 /cy | 7,996 |
| | 400 | Jacking Slab & Reaction Block | 11.971 | cy | 2,602 | 2,753 | - | | - | 447.373 /cy | 5,356 |
| n | 5072 | Bore & Jack Pipe 72 | 130.00 | lf | - | - | 120,900 | | - | 930.00 /lf | 120,900 |
| | 7000 | Grout Casing | 59.56 | cy | 244 | 10,274 | - | | 288 | 181.434 /cy | 10,806 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Boring & Jack Conduit** | | | **6,397** | **13,027** | **166,700** | | **8,294** | | **194,418** |
| | | 346.16 Labor hours | | | | | | | | | |
| | | 137.19 Equipment hours | | | | | | | | | |
| **02720.100** | | **Aggregate Base Course** | | | | | | | | | |
| | 1180 | Crushed Rock | 222.00 | cy | 169 | 2,270 | - | | 852 | 14.822 /cy | 3,291 |
| | 1230 | Granular Fill | 144.00 | cy | 410 | 1,722 | - | | 2,073 | 29.21 /cy | 4,206 |
| | | **Aggregate Base Course** | | | **579** | **3,992** | | | **2,925** | | **7,496** |
| | | 32.512 Labor hours | | | | | | | | | |
| | | 32.512 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| n | 10 | Bitum Paving | 333.00 | sy | - | - | 5,261 | | - | 15.80 /sy | 5,261 |
| | | **Asphalt Paving - Location** | | | | | **5,261** | | | | **5,261** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 311.00 | sy | 65 | 681 | - | | 26 | 2.481 /sy | 772 |
| | | **Lawns & Grasses** | | | **65** | **681** | | | **26** | | **772** |
| | | 3.11 Labor hours | | | | | | | | | |
| | | 0.622 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 140 | Concrete: Primary Redirect Junction Chamber | 75.00 | cy | 9,306 | 26,250 | - | | 3,782 | 524.52 /cy | 39,339 |
| | | **Concrete in Place** | | | **9,306** | **26,250** | | | **3,782** | | **39,339** |
| | | 450.000 Labor hours | | | | | | | | | |
| | | 75.00 Equipment hours | | | | | | | | | |
| **04210.000** | | **Clay Masonry Units** | | | | | | | | | |
| n | 8105 | Brick Mortar Type S | 24.312 | cf | 32 | 106 | - | | - | 5.69 /cf | 138 |
| | 8900 | Clean Brick | 320.00 | sf | 102 | 74 | - | | - | 0.55 /sf | 175 |
| n | 018A | Standard Face Brick - Common Bond | 2,026.00 | ea | 1,439 | 972 | - | | - | 1.19 /ea | 2,411 |
| | | **Clay Masonry Units** | | | **1,573** | **1,152** | | | | | **2,725** |
| | | 66.002 Labor hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 1.00 | ea | 77 | 1,277 | - | | - | 1,353.17 /ea | 1,353 |
| | | **Hatch, Aluminum, 300psf** | | | **77** | **1,277** | | | | | **1,353** |
| | | 3.20 Labor hours | | | | | | | | | |
| **11284.000** | | **Sluice Gates** | | | | | | | | | |
| | 5454 | 54" x 54" Sluice Gate, MO | 2.00 | ea | 25,005 | 49,200 | - | | - | 37,102.64 /ea | 74,205 |
| | | **Sluice Gates** | | | **25,005** | **49,200** | | | | | **74,205** |
| | | 1,048.00 Labor hours | | | | | | | | | |
| **13000.005** | | **Special Const Allowance** | | | | | | | | | |
| | 5 | SCADA Allowance for 2 gates & knife gate valve | 1.00 | ls | | | 1,500 | | - | 1,500.00 /ls | 1,500 |
| | | **Special Const Allowance** | | | | | **1,500** | | | | **1,500** |
| **15220.302** | | **A53 CW Pipe PE/GE/T&C/SW** | | | | | | | | | |
| n | 300h | A53 CW Standard Pipe PE, 54" | 130.00 | lf | 5,932 | 96,454 | - | | - | 787.591 /lf | 102,387 |
| n | 300k | A53 CW Standard Pipe PE, 72" | 110.00 | lf | 6,701 | 109,008 | - | | - | 1,051.90 /lf | 115,709 |
| | | **A53 CW Pipe PE/GE/T&C/SW** | | | **12,633** | **205,462** | | | | | **218,095** |
| | | 460.57 Labor hours | | | | | | | | | |
| **15230.400** | | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | 0 | Unload Care & Protect PCCP & Fittings | 35.00 | lf | 0 | - | - | | 0 | 0.01 /lf | 0 |
| | 10 | Layout Pipe & Fitting | 35.00 | lf | 8 | - | - | | - | 0.24 /lf | 8 |
| | 325 | PCCP Equipment- Cat 325 Excavator | 6.30 | ch | 122 | - | - | | 698 | 130.09 /ch | 820 |
| n | B060 | Prestressed Concrete Cylinder Pipe (250#) 60 | 35.00 | lf | 2,087 | 7,350 | - | | - | 269.63 /lf | 9,437 |
| n | K060 | PCCP 90 Bend 60 | 1.00 | ea | 431 | 2,100 | - | | - | 2,531.15 /ea | 2,531 |
| | | **Prestr Conc Cylind-(PCCP)** | | | **2,648** | **9,450** | | | **698** | | **12,796** |
| | | 112.224 Labor hours | | | | | | | | | |
| | | 6.304 Equipment hours | | | | | | | | | |
| **16000.005** | | **Electrical Allowance** | | | | | | | | | |
| | 5 | Electrical Allowance for 2 gates & knife gate valve | 0.00 | ls | 0 | 0 | - | | - | | |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | ***02 Primary Redirect*** | | ***66,738*** | ***311,637*** | ***212,561*** | | ***22,550*** | | ***613,487*** |
| | 3,038.42 Labor hours | | | | | | | | |
| | 361.17 Equipment hours | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***03 Secondary Storage*** | | | | | | | | | |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Water Cannon | 8.00 | ea | - | 32,000 | | | - | 4,000.00 /ea | 32,000 |
| | 20 | Protect the Existing Utilities | 1.00 | ls | - | - | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | 20 | Structural Rehabilitation to Entire Settling Basin | 1.00 | ls | - | - | 2,000,000 | | - | 2,000,000.00 /ls | 2,000,000 |
| | | **Sitework Allowance** | | | | **32,000** | **2,005,000** | | | | **2,037,000** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2508 | Remove 60" DIP | 73.00 | lf | 119 | - | - | | 226 | 4.731 /lf | 345 |
| | 2508 | Remove 48" DIP | 86.00 | lf | 140 | - | - | | 267 | 4.731 /lf | 407 |
| | 2508 | Remove 42"DIP | 462.00 | lf | 754 | - | - | | 1,432 | 4.731 /lf | 2,186 |
| | 2508 | Remove 36"DIP | 330.00 | lf | 539 | - | - | | 1,023 | 4.731 /lf | 1,561 |
| | 3004 | Demo Launders | 852.00 | cy | 69,523 | - | - | | 16,273 | 100.70 /cy | 85,796 |
| | 3004 | Demo Concrete Weirs | 7.00 | cy | 571 | - | - | | 134 | 100.70 /cy | 705 |
| | 3006 | Demo Concrete Return Sludge Channel | 416.00 | cy | 33,946 | - | - | | 7,945 | 100.70 /cy | 41,891 |
| | 3006 | Demo Drain PS - 23vf | 22.00 | cy | 1,795 | - | - | | 420 | 100.70 /cy | 2,215 |
| | 3012 | Demo Concrete | 333.00 | cy | 27,173 | - | - | | 6,360 | 100.70 /cy | 33,533 |
| | SP12 | Sawcut Concrete | 2,684.00 | lf | 5,704 | - | - | | 10,821 | 6.16 /lf | 16,526 |
| | SP12 | Sawcut Concrete Weirs | 100.00 | lf | 213 | - | - | | 403 | 6.16 /lf | 616 |
| | | **Selective Site Demolition** | | | **140,477** | | | | **45,304** | | **185,781** |
| | | 8,615.372 Labor hours | | | | | | | | | |
| | | 662.322 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 1,450.00 | lf | 134 | | - | | - | 0.092 /lf | 134 |
| n | 2090 | Trenching- Backhoe/Loader 95HP (15 cy/hr-120cy/day) Average Exc. | 1,004.444 | cy | 1,878 | - | - | | 3,609 | 5.463 /cy | 5,488 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 2,044.91 | cy | 2,067 | - | - | | 9,045 | 5.434 /cy | 11,112 |
| n | 3090 | Trench Bedding-Backhoe/Loader 95HP | 50.36 | cy | 135 | - | - | | 204 | 6.74 /cy | 339 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 68.293 | cy | 104 | - | - | | 344 | 6.56 /cy | 448 |
| n | 4090 | Trench Pipe Zone Backfill-Backhoe/Loader 95HP | 81.04 | cy | 261 | - | - | | 394 | 8.09 /cy | 655 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 250.73 | cy | 608 | - | - | | 2,022 | 10.492 /cy | 2,631 |
| n | 5090 | Trench Native Backfill-Backhoe/Loader 95HP | 865.433 | cy | 2,526 | - | - | | 4,605 | 8.24 /cy | 7,130 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 1,575.964 | cy | 1,425 | - | - | | 4,486 | 3.751 /cy | 5,911 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 450.42 | cy | - | 15,855 | - | | - | 35.20 /cy | 15,855 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 607.954 | cy | 853 | - | - | | 1,638 | 4.10 /cy | 2,491 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 607.954 | cy | 595 | - | - | | 991 | 2.61 /cy | 1,586 |
| n | 8367 | Trench Shores- Aluminum Hydraulic 36" width x 7' Rail | 5.00 | u/mo | | - | - | | 380 | 76.00 /u/mo | 380 |
| | A006 | Pipe Test | 1,350.00 | lf | 998 | 1,080 | - | | - | 1.54 /lf | 2,078 |
| | | **Trenching** | | | **11,584** | **16,935** | | | **27,718** | | **56,237** |
| | | 766.36 Labor hours | | | | | | | | | |
| | | 474.93 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 607.954 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 607.954 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 607.954 | cy | 980 | - | - | | 1,884 | 4.712 /cy | 2,865 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 607.954 | cy | 2,738 | - | - | | 4,558 | 12.001 /cy | 7,296 |
| | | **Excavation Spoils** | | | **3,718** | | | | **6,442** | | **10,160** |
| | | 218.71 Labor hours | | | | | | | | | |
| | | 109.353 Equipment hours | | | | | | | | | |
| **02720.100** | | **Aggregate Base Course** | | | | | | | | | |
| | 1180 | Crushed Rock 1" | 560.00 | cy | 425 | 5,725 | - | | 2,150 | 14.822 /cy | 8,301 |
| | | **Aggregate Base Course** | | | **425** | **5,725** | | | **2,150** | | **8,301** |
| | | 23.893 Labor hours | | | | | | | | | |
| | | 23.893 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| n | 10 | Bitum Paving | 608.00 | sy | - | - | 9,606 | | - | 15.80 /sy | 9,606 |
| | | **Asphalt Paving - Location** | | | | | **9,606** | | | | **9,606** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 741.00 | sy | 154 | 1,623 | - | | 62 | 2.481 /sy | 1,839 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Lawns & Grasses** | | | **154** | **1,623** | | | **62** | | **1,839** |
| | | 7.41 Labor hours | | | | | | | | | |
| | | 1.482 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 110 | Concrete: Walkway | 72.00 | cy | 5,212 | 22,320 | - | | 1,960 | 409.61 /cy | 29,492 |
| n | 110 | Concrete: Channel Inverts | 333.00 | cy | 24,104 | 103,230 | - | | 9,067 | 409.61 /cy | 136,400 |
| n | 140 | Concrete: Wetwell | 183.00 | cy | 22,708 | 64,050 | - | | 9,229 | 524.52 /cy | 95,986 |
| n | 140 | Concrete: Weir | 11.00 | cy | 1,365 | 3,850 | - | | 555 | 524.52 /cy | 5,770 |
| n | 175 | Concrete: Plug Secondary Walls (mixture of 72"dia - 36"dia - 13total) | 7.00 | cy | 290 | 980 | - | | 35 | 186.404 /cy | 1,305 |
| n | 180 | Concrete: Grout Fill | 220.00 | cy | 9,100 | 22,000 | - | | 1,109 | 146.41 /cy | 32,209 |
| | | **Concrete in Place** | | | **62,777** | **216,430** | | | **21,955** | | **301,162** |
| | | 3,035.500 Labor hours | | | | | | | | | |
| | | 435.40 Equipment hours | | | | | | | | | |
| **04000.015** | | **Masonry Demolition** | | | | | | | | | |
| | 5 | Masonry Demolition | 320.00 | sf | 75 | - | - | | 95 | 0.531 /sf | 170 |
| | | **Masonry Demolition** | | | **75** | | | | **95** | | **170** |
| | | 4.80 Labor hours | | | | | | | | | |
| | | 4.80 Equipment hours | | | | | | | | | |
| **04210.000** | | **Clay Masonry Units** | | | | | | | | | |
| n | 8105 | Brick Mortar Type S | 24.312 | cf | 32 | 106 | - | | - | 5.69 /cf | 138 |
| | 8900 | Clean Brick | 320.00 | sf | 102 | 74 | - | | - | 0.55 /sf | 175 |
| n | 018A | Standard Face Brick - Common Bond | 2,026.00 | ea | 1,439 | 972 | - | | - | 1.19 /ea | 2,411 |
| | | **Clay Masonry Units** | | | **1,573** | **1,152** | | | | | **2,725** |
| | | 66.002 Labor hours | | | | | | | | | |
| **05140.410** | | **Misc. Alum. Fabrications** | | | | | | | | | |
| | 0 | Aluminum Weirs | 100.00 | lf | | | 2,500 | | | 25.00 /lf | 2,500 |
| | | **Misc. Alum. Fabrications** | | | | | **2,500** | | | | **2,500** |
| **05520.000** | | **Handrail/Railing** | | | | | | | | | |
| | 103 | 3 Rail-Handrail Alum. w/Toe | 552.00 | lf | 4,904 | 47,610 | - | | - | 95.134 /lf | 52,514 |
| | | **Handrail/Railing** | | | **4,904** | **47,610** | | | | | **52,514** |
| | | 138.00 Labor hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 1.00 | ea | 77 | 1,277 | - | | - | 1,353.20 /ea | 1,353 |
| | | **Hatch, Aluminum, 300psf** | | | **77** | **1,277** | | | | | **1,353** |
| | | 3.20 Labor hours | | | | | | | | | |
| **11200.010** | | **Process Equipment N.O.C.** | | | | | | | | | |
| | A 1 | Pumps | 2.00 | ea | 16,034 | 60,000 | - | | - | 38,016.96 /ea | 76,034 |
| | | **Process Equipment N.O.C.** | | | **16,034** | **60,000** | | | | | **76,034** |
| | | 672.00 Labor hours | | | | | | | | | |
| **11217.100** | | **Submersible Sump Pumps** | | | | | | | | | |
| | 05 | Sump Pump | 1.00 | ea | 3,387 | 7,000 | - | | 2,398 | 12,784.24 /ea | 12,784 |
| | | **Submersible Sump Pumps** | | | **3,387** | **7,000** | | | **2,398** | | **12,784** |
| | | 168.00 Labor hours | | | | | | | | | |
| | | 28.00 Equipment hours | | | | | | | | | |
| **11284.000** | | **Sluice Gates** | | | | | | | | | |
| | 1616 | 16" x 16" Sluice Gate, MO | 5.00 | ea | 7,516 | 14,300 | - | | - | 4,363.18 /ea | 21,816 |
| | | **Sluice Gates** | | | **7,516** | **14,300** | | | | | **21,816** |
| | | 315.000 Labor hours | | | | | | | | | |
| **13400.005** | | **Measurement & Ctrl Instr** | | | | | | | | | |
| | -sub | Level Sensors | 5.00 | ea | 1,927 | 8,625 | | | - | 2,110.40 /ea | 10,552 |
| | -sub | Electrical/I&C | 1.00 | ls | - | - | 7,500 | | - | 7,500.00 /ls | 7,500 |
| | | **Measurement & Ctrl Instr** | | | **1,927** | **8,625** | **7,500** | | | | **18,052** |
| | | 50.00 Labor hours | | | | | | | | | |
| **15113.420** | | **GV Double Disc Gate CI/DI** | | | | | | | | | |
| n | 001P | Gate Valve, Push-on, Double Disk, NRS, 6"dia | 6.00 | ea | 730 | 1,899 | - | | 345 | 495.782 /ea | 2,975 |

| | Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **GV Double Disc Gate Cl/Dl** | | | **730** | **1,899** | | | **345** | | **2,975** |
| | | | 24.24 Labor hours | | | | | | | | | |
| | | | 3.12 Equipment hours | | | | | | | | | |
| | **1511Z.000** | | **Valve Accessories** | | | | | | | | | |
| | G006 | | 6" Diameter Valve Box | 6.00 | ea | 573 | 1,800 | - | | - | 395.44 /ea | 2,373 |
| | | | **Valve Accessories** | | | **573** | **1,800** | | | | | **2,373** |
| | | | 24.00 Labor hours | | | | | | | | | |
| | **15120.300** | | **Bolt & Gaskets Sets** | | | | | | | | | |
| n | 111S | | 16-0/0" 150# A307 Steel Bolt Sets | 2.00 | ea | - | 150 | - | | - | 75.00 /ea | 150 |
| n | 111d | | 66-0/0" 150# A307 Steel Bolt Sets | 0.50 | ea | - | 750 | - | | - | 1,500.00 /ea | 750 |
| n | 111d | | 74-0/0" 150# A307 Steel Bolt Sets | 0.50 | ea | - | 750 | - | | - | 1,500.00 /ea | 750 |
| | 222S | | 16-0/0" Full Faced Red Rubber (SBR) Gasket 1/8" | 2.00 | ea | - | 21 | - | | - | 10.74 /ea | 21 |
| | 222c | | 64-0/0" Full Faced Red Rubber (SBR) Gasket 1/8" | 0.50 | ea | - | 36 | - | | - | 72.00 /ea | 36 |
| | 222c | | 72-0/0" Full Faced Red Rubber (SBR) Gasket 1/8" | 0.50 | ea | - | 36 | - | | - | 72.00 /ea | 36 |
| | | | **Bolt & Gaskets Sets** | | | | **1,743** | | | | | **1,743** |
| | **15210.010** | | **DIP Totals** | | | | | | | | | |
| | | 0 | Total Weight (Zero Cost Item) | 73,313.40 | lbs | - | - | - | | - | | |
| | | 1 | Weight of Pipe (Zero Cost Item) | 62,533.40 | lbs | - | - | - | | - | | |
| | | 2 | Weight of Fittings (Zero Cost Item) | 10,780.00 | lbs | - | - | - | | - | | |
| | **15210.100** | | **DIP CML FL & GV CL53/250** | | | | | | | | | |
| | | 0 | Unload Care & Protect Flanged/PE DIP & Fittings | 6,658.80 | lbs | 13 | - | - | | 42 | 0.01 /lbs | 55 |
| | | 1 | Weight of Flanged/PE Pipe (Zero Cost Item) | 6,658.80 | lbs | - | - | - | | - | | |
| | | 10 | Layout Flanged/PE DIP & Fitting | 12.00 | lf | 3 | - | - | | - | 0.23 /lf | 3 |
| | 20UC | | DI Pipe, FLxPE, CL53, CML, 16" x 2'-0" | 4.00 | ea | 816 | 1,685 | - | | - | 625.183 /ea | 2,501 |
| | 20fC | | DI Pipe, FLxPE, CL53, CML, 72" x 2'-0" | 2.00 | ea | 815 | 13,025 | - | | - | 6,920.16 /ea | 13,840 |
| | | | **DIP CML FL & GV CL53/250** | | | **1,646** | **14,710** | | | **42** | | **16,399** |
| | | | 69.212 Labor hours | | | | | | | | | |
| | | | 0.732 Equipment hours | | | | | | | | | |
| | **15210.200** | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | | 0 | Unload Care & Protect Push-on DIP & Fittings | 66,654.600 | lbs | 129 | - | - | | 420 | 0.01 /lbs | 548 |
| | | 1 | Weight of Push-on Pipe (Zero Cost Item) | 55,874.60 | lbs | - | - | - | | - | | |
| | | 2 | Weight of Push-on Fittings (Zero Cost Item) | 10,780.00 | lbs | - | - | - | | - | | |
| | | 5 | Layout Push-on DIP & Fitting | 1,350.00 | lf | 306 | - | - | | - | 0.23 /lf | 306 |
| n | | 206 | DIP CML, Push-On, Class 52, 6" | 792.00 | lf | 4,157 | 9,807 | - | | - | 17.632 /lf | 13,965 |
| n | | 212 | DIP CML, Push-On, Class 52, 12" | 252.00 | lf | 1,863 | 7,018 | - | | - | 35.242 /lf | 8,881 |
| n | | 216 | DIP CML, Push-On, Class 52, 16" | 156.00 | lf | 1,302 | 6,528 | - | | - | 50.194 /lf | 7,830 |
| n | | 224 | DIP CML, Push-On, Class 52, 24" | 140.00 | lf | 1,336 | 9,730 | - | | - | 79.05 /lf | 11,066 |
| n | | 230 | DIP CML, Push-On, Class 52, 30" | 10.00 | lf | 105 | 980 | - | | - | 108.45 /lf | 1,084 |
| n | 2AMM | | DIP CML, Push-on, 90 Bend, 6" | 2.00 | ea | 112 | 240 | - | | - | 175.81 /ea | 352 |
| n | 2APP | | DIP CML, Push-on, 90 Bend, 12" | 12.00 | ea | 1,322 | 4,080 | - | | - | 450.19 /ea | 5,402 |
| n | FAPK | | DIP CML, Push-on, Tee BxB, 6"x 2" | 8.00 | ea | 668 | 1,280 | - | | - | 243.51 /ea | 1,948 |
| n | FAPP | | DIP CML, Push-on, Tee BxB, 6"x 6" | 2.00 | ea | 167 | 360 | - | | - | 263.51 /ea | 527 |
| n | FAUU | | DIP CML, Push-on, Tee BxB, 16"x 16" | 1.00 | ea | 196 | 1,825 | - | | - | 2,020.89 /ea | 2,021 |
| n | FAXX | | DIP CML, Push-on, Tee BxB, 24"x 24" | 2.00 | ea | 550 | 8,250 | - | | - | 4,400.23 /ea | 8,800 |
| n | FAYU | | DIP CML, Push-on, Tee BxB, 30"x 16" | 1.00 | ea | 326 | 5,715 | - | | - | 6,040.55 /ea | 6,041 |
| n | KAXU | | DIP, CML, Push-on, Reducer BxB, 24"x 16" | 1.00 | ea | 192 | 1,638 | - | | - | 1,829.49 /ea | 1,829 |
| n | KAYX | | DIP, CML, Push-on, Reducer BxB, 30"x 24" | 1.00 | ea | 213 | 3,630 | - | | - | 3,843.46 /ea | 3,843 |
| | | | **DIP CML Push-On Pipe** | | | **12,945** | **61,080** | | | **420** | | **74,445** |
| | | | 545.252 Labor hours | | | | | | | | | |
| | | | 7.332 Equipment hours | | | | | | | | | |
| | **15230.400** | | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | | 0 | Unload Care & Protect PCCP & Fittings | 100.00 | lf | 0 | - | - | | 1 | 0.01 /lf | 1 |
| | | 10 | Layout Pipe & Fitting | 100.00 | lf | 24 | - | - | | - | 0.24 /lf | 24 |
| n | B074 | | Prestressed Concrete Cylinder Pipe (250#) 54 | 100.00 | lf | 5,011 | 19,000 | - | | - | 240.11 /lf | 24,011 |
| n | K078 | | PCCP 90 Bend 78 | 2.00 | ea | 1,121 | 5,600 | - | | - | 3,360.47 /ea | 6,721 |
| | | | **Prestr Conc Cylind-(PCCP)** | | | **6,156** | **24,600** | | | **1** | | **30,756** |
| | | | 257.991 Labor hours | | | | | | | | | |
| | | | 0.011 Equipment hours | | | | | | | | | |
| | **15241.100** | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | | 0 | Unload Care & Protect Pipe/Fittings | 60.00 | lf | 0 | - | - | | 0 | 0.01 /lf | 1 |
| | | 10 | Layout Pipe & Fitting | 60.00 | lf | 14 | - | - | | - | 0.24 /lf | 14 |

| Item | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|
| **15241.100** | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| n 80E0 | PVC Schd. 80 Pipe, 3.00" | 60.00 | lf | 114 | 374 | - | | - | 8.15 /lf | 489 |
| a010 | PVC Joint Primer- Quart | 0.07 | qrt | - | 1 | - | | - | 15.30 /qrt | 1 |
| a020 | PVC Solvent Cement Low VOC- Quart | 0.07 | qrt | - | 1 | - | | - | 22.00 /qrt | 1 |
| | **PVC Schd Pipe & Fittings** | | | **129** | **377** | | | **0** | | **506** |
| | 5.41 Labor hours | | | | | | | | | |
| | 0.01 Equipment hours | | | | | | | | | |
| **15400.131** | **Copper DWV** | | | | | | | | | |
| 9347 | CU DWV Cleanout FtgxCO 3 | 1.00 | ea | 25 | 123 | - | | - | 147.63 /ea | 148 |
| | **Copper DWV** | | | **25** | **123** | | | | | **148** |
| | 1.27 Labor hours | | | | | | | | | |
| | ***03 Secondary Storage*** | | | ***276,831*** | ***519,009*** | ***2,024,606*** | | ***106,932*** | | ***2,927,379*** |
| | 15,011.612 Labor hours | | | | | | | | | |
| | 1,751.38 Equipment hours | | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***04 HRC Sludge*** | | | | | | | | | |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Protect Existing Utilities (6" CIP WS, 10" CIP SFPE, 48" RCP San) | 1.00 | ls | - | - | 2,500 | | - | 2,500.00 /ls | 2,500 |
| | 20 | Connect to Flow Splitting Structure | 1.00 | ls | - | - | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | 20 | Connect to Existing Secondary Basin | 1.00 | ls | - | - | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | | **Sitework Allowance** | | | | | **12,500** | | | | **12,500** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2514 | Demo Railroad | 30.00 | lf | 147 | - | - | | 382 | 17.63 /lf | 529 |
| | 2720 | Demo Concrete Curbs | 66.00 | lf | 162 | - | - | | 420 | 8.814 /lf | 582 |
| | 2734 | Remove Asphalt Pavement, 5"thk | 160.00 | sy | 249 | - | - | | 501 | 4.684 /sy | 749 |
| | | **Selective Site Demolition** | | | **557** | | | | **1,303** | | **1,860** |
| | | 34.10 Labor hours | | | | | | | | | |
| | | 18.46 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 208.00 | lf | 19 | | - | | - | 0.092 /lf | 19 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 417.94 | cy | 423 | - | - | | 1,849 | 5.434 /cy | 2,271 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 17.72 | cy | 27 | - | - | | 89 | 6.56 /cy | 116 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 52.394 | cy | 127 | - | - | | 423 | 10.492 /cy | 550 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 335.101 | cy | 303 | - | - | | 954 | 3.751 /cy | 1,257 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 70.113 | cy | - | 2,468 | - | | - | 35.20 /cy | 2,468 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 82.834 | cy | 116 | - | - | | 223 | 4.10 /cy | 339 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 82.834 | cy | 81 | - | - | | 135 | 2.61 /cy | 216 |
| n | 9616 | Trench Shield- 6x16 | 0.15 | u/mo | - | - | - | | 212 | 1,410.00 /u/mo | 212 |
| | A006 | Pipe Test | 208.00 | lf | 154 | 166 | - | | - | 1.54 /lf | 320 |
| | C0R0 | Concrete Thrust Block, 16" | 1.00 | ea | 95 | 33 | - | | - | 128.44 /ea | 128 |
| | | **Trenching** | | | **1,345** | **2,667** | | | **3,884** | | **7,897** |
| | | 79.714 Labor hours | | | | | | | | | |
| | | 47.672 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 82.834 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 82.834 | cy | - | - | - | | - | | |
| | 46 | Bore & Jack Spoils Spoils (Summary) | 19.55 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 102.382 | cy | 165 | - | - | | 317 | 4.712 /cy | 482 |
| | A0A0 | Haul Spoils/Off Site 10cy Rear Dump 4.00 Hour/Load | 19.55 | cy | 88 | - | - | | 147 | 12.001 /cy | 235 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 82.834 | cy | 373 | - | - | | 621 | 12.001 /cy | 994 |
| | | **Excavation Spoils** | | | **626** | | | | **1,085** | | **1,711** |
| | | 36.83 Labor hours | | | | | | | | | |
| | | 18.42 Equipment hours | | | | | | | | | |
| **02445.000** | | **Boring & Jack Conduit** | | | | | | | | | |
| | 0 | Mob/Demob Bore & Jack Equipment | 1.00 | ea | - | - | 5,000 | | - | 5,000.00 /ea | 5,000 |
| | 100 | Excavate Jacking Pit | 100.741 | cy | 183 | - | - | | 495 | 6.731 /cy | 678 |
| | 105 | Excavate Recieving Pit | 50.370 | cy | 92 | - | - | | 247 | 6.731 /cy | 339 |
| | 200 | Shore Jacking/Receiving Pits | 1,564.00 | bsf | - | - | 23,460 | | - | 15.00 /bsf | 23,460 |
| | 300 | Backfill Jacking/Receiving Pits | 151.111 | cy | 740 | - | - | | 1,545 | 15.12 /cy | 2,285 |
| | 400 | Jacking Slab & Reaction Block | 2.66 | cy | 578 | 612 | - | | - | 447.372 /cy | 1,190 |
| n | 5024 | Bore & Jack Pipe 24 | 168.00 | lf | - | - | 40,320 | | - | 240.00 /lf | 40,320 |
| | 7000 | Grout Casing | 10.86 | cy | 45 | 1,873 | - | | 52 | 181.433 /cy | 1,970 |
| | | **Boring & Jack Conduit** | | | **1,637** | **2,485** | **68,780** | | **2,340** | | **75,242** |
| | | 89.76 Labor hours | | | | | | | | | |
| | | 38.683 Equipment hours | | | | | | | | | |
| **02720.100** | | **Aggregate Base Course** | | | | | | | | | |
| | 1180 | Crushed Rock 1" | 77.00 | cy | 59 | 787 | - | | 296 | 14.822 /cy | 1,141 |
| | | **Aggregate Base Course** | | | **59** | **787** | | | **296** | | **1,141** |
| | | 3.29 Labor hours | | | | | | | | | |
| | | 3.29 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| n | 10 | Bitum Paving | 160.00 | sy | - | - | 2,528 | | - | 15.80 /sy | 2,528 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Asphalt Paving - Location** | | | | | **2,528** | | | | **2,528** |
| **02770.300** | | **Concrete Curb & Gutter** | | | | | | | | | |
| | 106 | Curb 6" x 12" | 66.00 | lf | - | - | 1,320 | | - | 20.00 /lf | 1,320 |
| | | **Concrete Curb & Gutter** | | | | | **1,320** | | | | **1,320** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n z004 | | Loam & Seeding w/Imported Material, 4"thk | 430.00 | sy | 89 | 942 | - | | 36 | 2.481 /sy | 1,067 |
| | | **Lawns & Grasses** | | | **89** | **942** | | | **36** | | **1,067** |
| | | 4.30 Labor hours | | | | | | | | | |
| | | 0.86 Equipment hours | | | | | | | | | |
| **15210.010** | | **DIP Totals** | | | | | | | | | |
| | 0 | Total Weight (Zero Cost Item) | 14,733.800 | lbs | - | - | - | | - | | |
| | 1 | Weight of Pipe (Zero Cost Item) | 14,268.800 | lbs | - | - | - | | - | | |
| | 2 | Weight of Fittings (Zero Cost Item) | 465.00 | lbs | - | - | - | | - | | |
| **15210.200** | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | 0 | Unload Care & Protect Push-on DIP & Fittings | 14,733.800 | lbs | 28 | - | - | | 93 | 0.01 /lbs | 121 |
| | 1 | Weight of Push-on Pipe (Zero Cost Item) | 14,268.800 | lbs | - | - | - | | - | | |
| | 2 | Weight of Push-on Fittings (Zero Cost Item) | 465.00 | lbs | - | - | - | | - | | |
| | 5 | Layout Push-on DIP & Fitting | 208.00 | lf | 47 | - | - | | - | 0.23 /lf | 47 |
| n | 216 | DIP CML, Push-On, Class 52, 16" | 168.00 | lf | 1,613 | 8,067 | - | | - | 57.62 /lf | 9,680 |
| n | 216 | DIP CML, Push-On, Class 52, 16" | 208.00 | lf | 1,736 | 8,704 | - | | - | 50.194 /lf | 10,440 |
| n 2ARR | | DIP CML, Push-on, 90 Bend, 16" | 1.00 | ea | 140 | 1,163 | - | | - | 1,302.80 /ea | 1,303 |
| | | **DIP CML Push-On Pipe** | | | **3,565** | **17,934** | | | **93** | | **21,592** |
| | | 141.181 Labor hours | | | | | | | | | |
| | | 1.621 Equipment hours | | | | | | | | | |
| | | ***04 HRC Sludge*** | | | ***7,878*** | ***24,815*** | ***85,128*** | | ***9,036*** | | ***126,858*** |
| | | 389.17 Labor hours | | | | | | | | | |
| | | 129.00 Equipment hours | | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***05 Actiflo*** | | | | | | | | | |
| **01560.000** | | **Const Equip & Small Tools** | | | | | | | | | |
| DM31 | | Crawler Mounted Lattice Boom Crane-Manitowoc 4600-5 317.5MT@334HP | 36.00 | wk | | - | - | | 690,264 | 19,174.00 /wk | 690,264 |
| | | **Const Equip & Small Tools** | | | | | | | **690,264** | | **690,264** |
| | | 1,440.00 Labor hours | | | | | | | | | |
| | | 1,440.00 Equipment hours | | | | | | | | | |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2734 | Remove Asphalt Pavement, 5"thk | 450.00 | sy | 699 | - | - | | 1,409 | 4.684 /sy | 2,108 |
| | | **Selective Site Demolition** | | | **699** | | | | **1,409** | | **2,108** |
| | | 42.75 Labor hours | | | | | | | | | |
| | | 34.20 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 43.593 | cy | 37 | - | - | | 99 | 3.121 /cy | 136 |
| | 461C | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 23.41 | cy | 40 | - | - | | 77 | 5.012 /cy | 117 |
| n | A000 | IMPORT MATERIAL (Summary) | 4.00 | CY | - | - | - | | - | | |
| n | A015 | Import Gravel Fill | 10.741 | cy | - | 161 | 60 | | - | 20.601 /cy | 221 |
| | | **Foundation Excavation** | | | **77** | **161** | **60** | | **177** | | **475** |
| | | 5.134 Labor hours | | | | | | | | | |
| | | 3.04 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 1,160.00 | lf | 107 | | - | | - | 0.092 /lf | 107 |
| n | 2090 | Trenching- Backhoe/Loader 95HP (15 cy/hr-120cy/day) Average Exc. | 43.92 | cy | 82 | - | - | | 158 | 5.463 /cy | 240 |
| n | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 300.073 | cy | 303 | - | - | | 855 | 3.86 /cy | 1,158 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 274.083 | cy | 277 | - | - | | 1,212 | 5.434 /cy | 1,489 |
| n | 3090 | Trench Bedding-Backhoe/Loader 95HP | 41.55 | cy | 112 | - | - | | 168 | 6.74 /cy | 280 |
| n | 3130 | Trench Bedding-Excavator- 130 HP | 25.901 | cy | 52 | - | - | | 152 | 7.901 /cy | 205 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 17.04 | cy | 26 | - | - | | 86 | 6.56 /cy | 112 |
| n | 4090 | Trench Pipe Zone Backfill-Backhoe/Loader 95HP | 92.48 | cy | 298 | - | - | | 450 | 8.09 /cy | 748 |
| n | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 75.37 | cy | 244 | - | - | | 709 | 12.641 /cy | 953 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 50.38 | cy | 122 | - | - | | 406 | 10.492 /cy | 529 |
| n | 5090 | Trench Native Backfill-Backhoe/Loader 95HP | -96.705 | cy | (282) | - | - | | (515) | 8.24 /cy | (797) |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 375.84 | cy | 340 | - | - | | 1,070 | 3.75 /cy | 1,410 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 302.710 | cy | - | 10,655 | - | | - | 35.20 /cy | 10,655 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 338.942 | cy | 327 | - | - | | 629 | 2.822 /cy | 957 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 338.942 | cy | 332 | - | - | | 552 | 2.61 /cy | 884 |
| n | 9616 | Trench Shield- 6x16 | 0.30 | u/mo | - | - | - | | 423 | 1,410.00 /u/mo | 423 |
| A006 | | Pipe Test | 1,160.00 | lf | 857 | 928 | - | | - | 1.54 /lf | 1,785 |
| A008 | | Pipe Locates (Pot Hole) | 1.00 | ea | 152 | 50 | - | | 27 | 228.96 /ea | 229 |
| C0P0 | | Concrete Thrust Block, 12" | 6.00 | ea | 544 | 108 | - | | - | 108.63 /ea | 652 |
| C0R0 | | Concrete Thrust Block, 16" | 6.00 | ea | 573 | 198 | - | | - | 128.44 /ea | 771 |
| | | **Trenching** | | | **4,466** | **11,939** | | | **6,383** | | **22,789** |
| | | 241.992 Labor hours | | | | | | | | | |
| | | 97.552 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 359.13 | cy | - | - | - | | - | | |
| | 40 | Foundation Excavation Spoils (Summary) | 20.19 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 338.942 | cy | - | - | - | | - | | |
| | 46 | Bore & Jack Spoils Spoils (Summary) | 15.13 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 354.07 | cy | 401 | - | - | | 770 | 3.31 /cy | 1,171 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 20.19 | cy | 6 | - | - | | 17 | 1.11 /cy | 22 |
| A0A0 | | Haul Spoils/Off Site 10cy Rear Dump 4.00 Hour/Load | 15.13 | cy | 68 | - | - | | 113 | 12.001 /cy | 182 |
| A0A4 | | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 338.942 | cy | 1,526 | - | - | | 2,541 | 12.001 /cy | 4,068 |
| A0I7 | | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 20.19 | cy | 13 | - | - | | 29 | 2.072 /cy | 42 |
| | | **Excavation Spoils** | | | **2,014** | | | | **3,471** | | **5,485** |
| | | 117.891 Labor hours | | | | | | | | | |
| | | 58.95 Equipment hours | | | | | | | | | |
| **02445.000** | | **Boring & Jack Conduit** | | | | | | | | | |
| | 0 | Mob/Demob Bore & Jack Equipment | 1.00 | ea | - | - | 5,000 | | - | 5,000.00 /ea | 5,000 |
| | 100 | Excavate Jacking Pit | 71.111 | cy | 129 | - | - | | 349 | 6.731 /cy | 479 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **02445.000** | | **Boring & Jack Conduit** | | | | | | | | | |
| | 105 | Excavate Recieving Pit | 35.56 | cy | 65 | - | - | | 175 | 6.731 /cy | 239 |
| | 200 | Shore Jacking/Receiving Pits | 1,104.00 | bsf | - | - | 16,560 | | - | 15.00 /bsf | 16,560 |
| | 300 | Backfill Jacking/Receiving Pits | 106.67 | cy | 522 | - | - | | 1,091 | 15.12 /cy | 1,613 |
| | 400 | Jacking Slab & Reaction Block | 2.66 | cy | 578 | 612 | - | | - | 447.372 /cy | 1,190 |
| n | 5024 | Bore & Jack Pipe 24 | 130.00 | lf | - | - | 31,200 | | - | 240.00 /lf | 31,200 |
| | 7000 | Grout Casing | 8.403 | cy | 34 | 1,450 | - | | 41 | 181.434 /cy | 1,525 |
| | | **Boring & Jack Conduit** | | | **1,329** | **2,061** | **52,760** | | **1,655** | | **57,805** |
| | | 71.37 Labor hours | | | | | | | | | |
| | | 27.37 Equipment hours | | | | | | | | | |
| **02639.020** | | **Storm Drainage Manholes** | | | | | | | | | |
| | 0 | Unload Care & Protect Manhole | 2.00 | ea | 35 | - | - | | - | 17.51 /ea | 35 |
| | 4800 | Place & Shape Manhole Base & Inverts- 48" | 1.00 | ea | 210 | - | - | | - | 372.04 /ea | 372 |
| | 4805 | Manhole 48" x 5' Deep | 1.00 | ea | 113 | 1,657 | - | | | 1,769.79 /ea | 1,770 |
| | 6000 | Place & Shape Manhole Base & Inverts- 60" | 1.00 | ea | 210 | - | - | | - | 436.44 /ea | 436 |
| | 6007 | Manhole 60" x 7' Deep | 1.00 | ea | 274 | 2,834 | - | | 496 | 3,604.40 /ea | 3,604 |
| | | **Storm Drainage Manholes** | | | **842** | **4,491** | | | **496** | | **6,218** |
| | | 50.000 Labor hours | | | | | | | | | |
| | | 8.00 Equipment hours | | | | | | | | | |
| **02720.150** | | **Aggregate Base- Roads** | | | | | | | | | |
| | 1118 | Aggregate Base | 283.00 | cy | 81 | 2,539 | - | | 407 | 10.70 /cy | 3,027 |
| | | **Aggregate Base- Roads** | | | **81** | **2,539** | | | **407** | | **3,027** |
| | | 4.53 Labor hours | | | | | | | | | |
| | | 4.53 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| n | 10 | Bitum Paving | 869.00 | sy | - | - | 13,730 | | - | 15.80 /sy | 13,730 |
| | | **Asphalt Paving - Location** | | | | | **13,730** | | | | **13,730** |
| **02750.100** | | **Concrete Paving** | | | | | | | | | |
| | z015 | Concrete Pavement, Walkways | 50.00 | sy | 102 | 572 | - | | 38 | 14.23 /sy | 711 |
| | | **Concrete Paving** | | | **102** | **572** | | | **38** | | **711** |
| | | 5.45 Labor hours | | | | | | | | | |
| | | 0.55 Equipment hours | | | | | | | | | |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 100.00 | sy | 21 | 219 | - | | 8 | 2.482 /sy | 248 |
| | | **Lawns & Grasses** | | | **21** | **219** | | | **8** | | **248** |
| | | 1.00 Labor hours | | | | | | | | | |
| | | 0.20 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 110 | Concrete: Pad for HRC | 111.00 | cy | 8,035 | 34,410 | - | | 3,022 | 409.61 /cy | 45,467 |
| n | 110 | Concrete: Pump Support Slab | 1.00 | cy | 72 | 310 | - | | 27 | 409.61 /cy | 410 |
| n | 110 | Concrete: Bottom Slab | 9.00 | cy | 651 | 2,790 | - | | 245 | 409.62 /cy | 3,687 |
| n | 110 | Concrete: Pump Support Slab | 1.00 | cy | 72 | 310 | - | | 27 | 409.61 /cy | 410 |
| n | 140 | Concrete | 180.00 | cy | 22,335 | 63,000 | - | | 9,077 | 524.52 /cy | 94,413 |
| n | 140 | Concrete: Baffle Wall | 70.00 | cy | 8,686 | 24,500 | - | | 3,530 | 524.52 /cy | 36,716 |
| n | 140 | Concrete: Wall | 430.00 | cy | 53,357 | 301,000 | - | | 21,685 | 874.52 /cy | 376,042 |
| n | 140 | Concrete: Influent & Effluent Channel | 40.00 | cy | 4,963 | 40,000 | - | | 2,017 | 1,174.52 /cy | 46,981 |
| n | 140 | Concrete: Wet Well Wall | 48.00 | cy | 5,956 | 16,800 | - | | 2,421 | 524.52 /cy | 25,177 |
| n | 140 | Concrete:Valve Vault Walls | 40.00 | cy | 4,963 | 14,000 | - | | 2,017 | 524.52 /cy | 20,981 |
| n | 140 | Concrete: Wet Well Top Slab & Wall | 92.00 | cy | 11,416 | 32,200 | - | | 4,640 | 524.52 /cy | 48,255 |
| n | 145 | Concrete: Top Slab | 9.00 | cy | 1,024 | 3,240 | - | | 454 | 524.18 /cy | 4,718 |
| n | 180 | Concrete: Grout Fill | 81.00 | ls | 3,350 | 8,100 | - | | 408 | 146.404 /ls | 11,859 |
| | | **Concrete in Place** | | | **124,882** | **540,660** | | | **49,571** | | **715,113** |
| | | 6,038.500 Labor hours | | | | | | | | | |
| | | 982.98 Equipment hours | | | | | | | | | |
| **05510.000** | | **Metal Ladders** | | | | | | | | | |
| | 10 | Straight Ladder-Aluminum | 300.00 | lf | 5,331 | 13,762 | - | | - | 63.642 /lf | 19,093 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Metal Ladders** | | | **5,331** | **13,762** | | | | | **19,093** |
| | | 150.00 Labor hours | | | | | | | | | |
| **05520.000** | | **Handrail/Railing** | | | | | | | | | |
| | 103 | 3 Rail-Handrail Alum. w/Toe | 330.00 | lf | 2,932 | 22,770 | - | | - | 77.884 /lf | 25,702 |
| | | **Handrail/Railing** | | | **2,932** | **22,770** | | | | | **25,702** |
| | | 82.50 Labor hours | | | | | | | | | |
| **05530.115** | | **Steel Grate-Riveted** | | | | | | | | | |
| 1.5A | | 1-1/2x1/8 Riveted Grate-Stnd. | 1,300.00 | sf | 7,854 | 37,440 | - | | - | 34.841 /sf | 45,294 |
| | | **Steel Grate-Riveted** | | | **7,854** | **37,440** | | | | | **45,294** |
| | | 221.000 Labor hours | | | | | | | | | |
| **05530.200** | | **Alum. Grating-Riveted** | | | | | | | | | |
| 8 K | | 1-1/2x3/16 Riveted Grate-Stnd. | 201.00 | sf | 1,214 | 12,205 | - | | - | 66.761 /sf | 13,419 |
| | | **Alum. Grating-Riveted** | | | **1,214** | **12,205** | | | | | **13,419** |
| | | 34.17 Labor hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n J07 | | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 12.00 | ea | 920 | 15,318 | - | | - | 1,353.172 /ea | 16,238 |
| | | **Hatch, Aluminum, 300psf** | | | **920** | **15,318** | | | | | **16,238** |
| | | 38.40 Labor hours | | | | | | | | | |
| **11210.000** | | **PUMPS** | | | | | | | | | |
| ---- | | Pumps (low lift) | 5.00 | ea | 130,694 | 250,000 | - | | - | 76,138.88 /ea | 380,694 |
| | | **PUMPS** | | | **130,694** | **250,000** | | | | | **380,694** |
| | | 5,760.00 Labor hours | | | | | | | | | |
| **11212.200** | | **Submersible Well Pumps** | | | | | | | | | |
| | 05 | Submersible Pump | 3.00 | ea | 13,063 | 21,000 | - | | 9,248 | 14,436.88 /ea | 43,311 |
| | | **Submersible Well Pumps** | | | **13,063** | **21,000** | | | **9,248** | | **43,311** |
| | | 648.00 Labor hours | | | | | | | | | |
| | | 108.00 Equipment hours | | | | | | | | | |
| **11217.100** | | **Submersible Sump Pumps** | | | | | | | | | |
| | 05 | Sump Pump | 1.00 | ea | 2,903 | 6,000 | - | | 2,055 | 10,957.92 /ea | 10,958 |
| | 05 | Sump Pump 50gpm | 1.00 | ea | 2,903 | 6,000 | - | | 2,055 | 10,957.92 /ea | 10,958 |
| | | **Submersible Sump Pumps** | | | **5,806** | **12,000** | | | **4,110** | | **21,916** |
| | | 288.00 Labor hours | | | | | | | | | |
| | | 48.000 Equipment hours | | | | | | | | | |
| **11218.400** | | **Chemical Metering Pumps** | | | | | | | | | |
| | 10 | Polymer Metering Pump and control panel | 4.00 | ea | 3,436 | 6,000 | - | | - | 2,358.96 /ea | 9,436 |
| | 10 | Coagulant Metering Pump and control panel | 4.00 | ea | 3,436 | 6,000 | - | | - | 2,358.96 /ea | 9,436 |
| | | **Chemical Metering Pumps** | | | **6,872** | **12,000** | | | | | **18,872** |
| | | 288.00 Labor hours | | | | | | | | | |
| **11225.300** | | **ACTIFLO System** | | | | | | | | | |
| n | 05 | Coagulation Mixer | 2.00 | ea | 774,080 | 2,852,000 | - | | 548,032 | 2,087,056.00 /ea | 4,174,112 |
| n | 05 | Maturation Tank VFD | 2.00 | ea | 14,514 | 30,000 | - | | 10,276 | 27,394.80 /ea | 54,790 |
| n | 05 | Scraper VFD | 2.00 | ea | 14,514 | 30,000 | - | | 10,276 | 27,394.80 /ea | 54,790 |
| | 1005 | Injection Tank Mixer | 0.00 | ea | 0 | - | - | | 0 | | |
| | 2005 | Maturation Tank Mixer | 0.00 | ea | 0 | - | - | | 0 | | |
| | D408 | Settling | 0.00 | ea | 0 | - | - | | - | | |
| | D408 | Coagulation Feed | 0.00 | ea | 0 | - | - | | - | | |
| | D408 | Polymer Feed | 0.00 | ea | 0 | - | - | | - | | |
| | D408 | Coagulant Storage | 2.00 | ea | 21,011 | 42,900 | - | | - | 31,955.60 /ea | 63,911 |
| | | **ACTIFLO System** | | | **824,119** | **2,954,900** | | | **568,583** | | **4,347,602** |
| | | 40,820.00 Labor hours | | | | | | | | | |
| | | 6,640.000 Equipment hours | | | | | | | | | |
| **11240.410** | | **Dry Poly Store/Feed Equip** | | | | | | | | | |
| | 0 | Automatic Dry Polymer Preparation Systems | 1.00 | ea | 4,838 | - | - | | 3,425 | 8,263.200 /ea | 8,263 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Dry Poly Store/Feed Equip** | | | **4,838** | | | | **3,425** | | **8,263** |
| | | 240.00 Labor hours | | | | | | | | | |
| | | 40.00 Equipment hours | | | | | | | | | |
| **11282.000** | | **Slide Gates** | | | | | | | | | |
| | 6060 | 60" x 60" Slide Gate, MO | 4.00 | ea | 57,073 | 120,000 | - | | - | 44,268.28 /ea | 177,073 |
| | | **Slide Gates** | | | **57,073** | **120,000** | | | | | **177,073** |
| | | 2,392.00 Labor hours | | | | | | | | | |
| **11330.100** | | **Barscreens** | | | | | | | | | |
| n | A 50 | Fine Screenings for 55mgd Influent | 1.00 | ea | 125,026 | 250,000 | - | | - | 375,026.40 /ea | 375,026 |
| | B 5 | Screen Conveyor | 1.00 | ea | 100,212 | 200,000 | - | | - | 300,212.00 /ea | 300,212 |
| | f200 | Rolloff Dumpster & Cover (40cy) | 1.00 | ea | 95 | 3,500 | - | | - | 3,595.44 /ea | 3,595 |
| | | **Barscreens** | | | **225,334** | **453,500** | | | | | **678,834** |
| | | 9,444.00 Labor hours | | | | | | | | | |
| **13000.005** | | **Special Const Allowance** | | | | | | | | | |
| | 5 | Level Sensor | 1.00 | ea | 385 | 1,725 | - | | - | 2,110.40 /ea | 2,110 |
| | | **Special Const Allowance** | | | **385** | **1,725** | | | | | **2,110** |
| | | 10.00 Labor hours | | | | | | | | | |
| **13121.000** | | **Pre-Engineered Metal Bldg** | | | | | | | | | |
| | z001 | Pre-Engineered Metal Bldg - Chem | 1,000.00 | sf | | | 75,000 | | | 75.00 /sf | 75,000 |
| | z001 | Pre-Engineered Metal Bldg - barscreens | 800.00 | sf | | | 60,000 | | | 75.00 /sf | 60,000 |
| | | **Pre-Engineered Metal Bldg** | | | | | **135,000** | | | | **135,000** |
| **13400.005** | | **Measurement & Ctrl Instr** | | | | | | | | | |
| | -sub | Pressure Sensor on Pump | 2.00 | ea | 771 | 3,450 | | | - | 2,110.40 /ea | 4,221 |
| | | **Measurement & Ctrl Instr** | | | **771** | **3,450** | | | | | **4,221** |
| | | 20.00 Labor hours | | | | | | | | | |
| **13420.000** | | **Instruments** | | | | | | | | | |
| n | e412 | 12" Magnetic Flow Meter - Flanged | 1.00 | ea | 658 | 6,900 | - | | - | 7,558.32 /ea | 7,558 |
| | | **Instruments** | | | **658** | **6,900** | | | | | **7,558** |
| | | 24.00 Labor hours | | | | | | | | | |
| **15111.650** | | **Plug Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | 103S | Plug Valve, Gear & Wheel Operated, flg, 12" | 3.00 | ea | 1,128 | 7,500 | - | | - | 2,876.113 /ea | 8,628 |
| n | 200U | Plug Valve, MJ, 16" | 2.00 | ea | 847 | 6,200 | - | | - | 3,523.34 /ea | 7,047 |
| | | **Plug Valve (CI/DI/IBBM)** | | | **1,975** | **13,700** | | | | | **15,675** |
| | | 62.06 Labor hours | | | | | | | | | |
| **15114.500** | | **Check Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | 310S | Check Valve, Swing, flg, 12" | 3.00 | ea | 876 | 11,190 | - | | - | 4,021.88 /ea | 12,066 |
| n | C20U | Check Valve, Double Disc, MJ, 16" | 1.00 | ea | 466 | 3,800 | - | | - | 4,265.99 /ea | 4,266 |
| | | **Check Valve (CI/DI/IBBM)** | | | **1,342** | **14,990** | | | | | **16,332** |
| | | 42.15 Labor hours | | | | | | | | | |
| **15119.600** | | **Air/Vacuum Relief Valve** | | | | | | | | | |
| n | 100J | Air Release Valve, 16" | 1.00 | ea | 94 | 200 | - | | - | 293.93 /ea | 294 |
| | | **Air/Vacuum Relief Valve** | | | **94** | **200** | | | | | **294** |
| | | 3.03 Labor hours | | | | | | | | | |
| **15120.300** | | **Bolt & Gaskets Sets** | | | | | | | | | |
| n | 111Q | 12-0/0" 150# A307 Steel Bolt Sets | 8.50 | ea | - | 340 | - | | - | 40.00 /ea | 340 |
| | 222Q | 12-0/0" Full Faced Red Rubber (SBR) Gasket 1/8" | 8.50 | ea | - | 52 | - | | - | 6.15 /ea | 52 |
| | | **Bolt & Gaskets Sets** | | | | **392** | | | | | **392** |
| **15210.010** | | **DIP Totals** | | | | | | | | | |
| | 0 | Total Weight (Zero Cost Item) | 53,920.60 | lbs | - | - | - | | - | | |
| | 1 | Weight of Pipe (Zero Cost Item) | 47,580.60 | lbs | - | - | - | | - | | |
| | 2 | Weight of Fittings (Zero Cost Item) | 6,340.00 | lbs | - | - | - | | - | | |
| **15210.100** | | **DIP CML FL & GV CL53/250** | | | | | | | | | |
| | 0 | Unload Care & Protect Flanged/PE DIP & Fittings | 2,078.60 | lbs | 4 | - | - | | 13 | 0.01 /lbs | 17 |
| | 1 | Weight of Flanged/PE Pipe (Zero Cost Item) | 263.600 | lbs | - | - | - | | - | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **15210.100** | | **DIP CML FL & GV CL53/250** | | | | | | | | | |
| | 2 | Weight of Flanged Fittings (Zero Cost Item) | 1,815.00 | lbs | - | - | - | | - | | |
| | 10 | Layout Flanged/PE DIP & Fitting | 15.75 | lf | 4 | - | - | | - | 0.23 /lf | 4 |
| | 10SF | DI Pipe, FLxFL, CL53, CML, 12" x 3'-0" | 1.00 | ea | 264 | 485 | - | | - | 749.28 /ea | 749 |
| | 1CS0 | DI, CML, 45 Bend, FL, 12" | 3.00 | ea | 455 | 1,200 | - | | - | 551.51 /ea | 1,655 |
| | 1FSS | DI, CML, Wye, FL, 12"x 12" | 3.00 | ea | 655 | 2,430 | - | | - | 1,028.32 /ea | 3,085 |
| | | **DIP CML FL & GV CL53/250** | | | **1,381** | **4,115** | | | **13** | | **5,509** |
| | | 57.97 Labor hours | | | | | | | | | |
| | | 0.23 Equipment hours | | | | | | | | | |
| **15210.200** | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | 0 | Unload Care & Protect Push-on DIP & Fittings | 51,842.00 | lbs | 100 | - | - | | 327 | 0.01 /lbs | 427 |
| | 1 | Weight of Push-on Pipe (Zero Cost Item) | 47,317.00 | lbs | - | - | - | | - | | |
| | 2 | Weight of Push-on Fittings (Zero Cost Item) | 4,525.00 | lbs | - | - | - | | - | | |
| | 5 | Layout Push-on DIP & Fitting | 1,160.00 | lf | 263 | - | - | | - | 0.23 /lf | 263 |
| n | 206 | DIP CML, Push-On, Class 52, 6" | 600.00 | lf | 3,150 | 7,430 | - | | - | 17.632 /lf | 10,579 |
| n | 208 | DIP CML, Push-On, Class 52, 8" | 50.00 | lf | 298 | 847 | - | | - | 22.90 /lf | 1,145 |
| n | 212 | DIP CML, Push-On, Class 52, 12" | 60.00 | lf | 444 | 1,671 | - | | - | 35.242 /lf | 2,114 |
| n | 216 | DIP CML, Push-On, Class 52, 16" | 580.00 | lf | 4,844 | 24,271 | - | | - | 50.20 /lf | 29,114 |
| n | 2APP | DIP CML, Push-on, 90 Bend, 12" | 3.00 | ea | 331 | 1,020 | - | | - | 450.19 /ea | 1,351 |
| n | 2ARR | DIP CML, Push-on, 90 Bend, 16" | 4.00 | ea | 561 | 4,650 | - | | - | 1,302.80 /ea | 5,211 |
| n | CARR | DIP CML, Push-on, 22-1/2 Bend, 16" | 2.00 | ea | 267 | 1,925 | - | | - | 1,096.12 /ea | 2,192 |
| n | KAUS | DIP, CML, Push-on, Reducer BxB, 16"x 12" | 3.00 | ea | 386 | 2,513 | - | | - | 966.29 /ea | 2,899 |
| | | **DIP CML Push-On Pipe** | | | **10,643** | **44,326** | | | **327** | | **55,296** |
| | | 448.183 Labor hours | | | | | | | | | |
| | | 5.703 Equipment hours | | | | | | | | | |
| **15220.302** | | **A53 CW Pipe PE/GE/T&C/SW** | | | | | | | | | |
| n | 300V | A53 CW Standard Pipe PE, 24" | 130.00 | lf | 2,294 | 36,902 | - | | - | 301.51 /lf | 39,196 |
| | | **A53 CW Pipe PE/GE/T&C/SW** | | | **2,294** | **36,902** | | | | | **39,196** |
| | | 96.200 Labor hours | | | | | | | | | |
| **15221.120** | | **Fab 304L Stainless Pipe** | | | | | | | | | |
| | 0 | Unload Care & Protect Pipe/Fittings | 230.00 | lbs | 0 | - | - | | 1 | 0.01 /lbs | 2 |
| | 1 | Weight of Pipe (Zero Cost Item) | 230.00 | lbs | - | - | - | | - | | |
| | 10 | Layout Pipe & Fitting | 100.00 | lf | 24 | - | - | | - | 0.24 /lf | 24 |
| | 107A | Install Fabricated 304L SS Pipe, 1-1/4" | 100.00 | lf | 191 | - | - | | - | 1.91 /lf | 191 |
| n | 50A0 | 304L Sch 40s Stainless Pipe, 1.25" | 100.00 | lf | - | 932 | - | | - | 9.32 /lf | 932 |
| | | **Fab 304L Stainless Pipe** | | | **215** | **932** | | | **1** | | **1,149** |
| | | 9.03 Labor hours | | | | | | | | | |
| | | 0.03 Equipment hours | | | | | | | | | |
| **15241.100** | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | 0 | Unload Care & Protect Pipe/Fittings | 300.00 | lf | 1 | - | - | | 2 | 0.01 /lf | 2 |
| | 10 | Layout Pipe & Fitting | 300.00 | lf | 72 | - | - | | - | 0.24 /lf | 72 |
| n | 80G0 | PVC Schd. 80 Pipe, 4.00" | 150.00 | lf | 358 | 1,367 | - | | - | 11.50 /lf | 1,724 |
| n | 80L0 | PVC Schd. 80 Pipe, 8" | 150.00 | lf | 680 | 4,010 | - | | - | 31.263 /lf | 4,690 |
| | a010 | PVC Joint Primer- Quart | 1.56 | qrt | - | 24 | - | | - | 15.35 /qrt | 24 |
| | a020 | PVC Solvent Cement Low VOC- Quart | 1.56 | qrt | - | 34 | - | | - | 21.90 /qrt | 34 |
| | | **PVC Schd Pipe & Fittings** | | | **1,110** | **5,434** | | | **2** | | **6,546** |
| | | 46.533 Labor hours | | | | | | | | | |
| | | 0.033 Equipment hours | | | | | | | | | |
| **15500.001** | | **HVAC Equipment** | | | | | | | | | |
| | 155 | HVAC Allowance - Chem Feed Bldg | 1,000.00 | sf | - | - | 40,000 | | - | 40.00 /sf | 40,000 |
| | | **HVAC Equipment** | | | | | **40,000** | | | | **40,000** |
| **16000.005** | | **Electrical Allowance** | | | | | | | | | |
| | 5 | Electrical Allowance for pumps | 1.00 | ls | | | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | | **Electrical Allowance** | | | | | **10,000** | | | | **10,000** |
| | | 0.000 Labor hours | | | | | | | | | |
| | | ***05 Actiflo*** | | | ***1,441,431*** | ***4,620,602*** | ***251,550*** | | ***1,339,589*** | | ***7,653,561*** |
| | | 69,243.830 Labor hours | | | | | | | | | |
| | | 9,499.35 Equipment hours | | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***06 Gravity Thickener*** | | | | | | | | | |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2734 | Remove Asphalt Pavement | 1,000.00 | sy | 1,553 | - | - | | 3,130 | 4.684 /sy | 4,684 |
| | | **Selective Site Demolition** | | | **1,553** | | | | **3,130** | | **4,684** |
| | | 95.00 Labor hours | | | | | | | | | |
| | | 76.000 Equipment hours | | | | | | | | | |
| **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | 2 | Design Shoring System-Average | 1.00 | ls | - | - | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | 100 | Survey & Layout Shoring | 28.00 | lf | 0 | - | - | | - | 0.02 /lf | 0 |
| | 105 | Mobilize Pile Driving Equipment | 1.00 | ea | - | - | 25,000 | | - | 25,000.00 /ea | 25,000 |
| | 1025 | Steel Sheeting,15' x 22psf, pulled & salvage | 420.00 | sf | 2,176 | 2,083 | - | | 2,875 | 16.99 /sf | 7,134 |
| | 1045 | Install & Remove Wales/Struts/Connectors | 0.462 | ton | 112 | 425 | - | | 148 | 1,483.77 /ton | 686 |
| n | 1050 | Rent Steel Sheet Piling and Wales, first month | 5.082 | ton | - | 1,324 | - | | - | 260.58 /ton | 1,324 |
| | | **Sheet Piling** | | | **2,289** | **3,833** | **35,000** | | **3,023** | | **44,144** |
| | | 75.404 Labor hours | | | | | | | | | |
| | | 18.844 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 4,849.47 | cy | 3,982 | - | - | | 10,765 | 3.041 /cy | 14,747 |
| | 461C | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 1,528.284 | cy | 2,602 | - | - | | 5,056 | 5.011 /cy | 7,659 |
| n | A000 | IMPORT MATERIAL (Summary) | 2.00 | CY | - | - | - | | - | | |
| n | A015 | Import Gravel Fill | 215.111 | cy | - | 3,227 | 1,205 | | - | 20.60 /cy | 4,431 |
| | | **Foundation Excavation** | | | **6,584** | **3,227** | **1,205** | | **15,822** | | **26,837** |
| | | 435.37 Labor hours | | | | | | | | | |
| | | 248.25 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 930.00 | lf | 86 | | - | | - | 0.092 /lf | 86 |
| n | 2090 | Trenching- Backhoe/Loader 95HP (15 cy/hr-120cy/day) Average Exc. | 1,292.870 | cy | 2,418 | - | - | | 4,646 | 5.463 /cy | 7,063 |
| n | 3090 | Trench Bedding-Backhoe/Loader 95HP | 74.76 | cy | 201 | - | - | | 303 | 6.74 /cy | 504 |
| n | 4090 | Trench Pipe Zone Backfill-Backhoe/Loader 95HP | 396.51 | cy | 1,278 | - | - | | 1,928 | 8.09 /cy | 3,206 |
| n | 5090 | Trench Native Backfill-Backhoe/Loader 95HP | 803.70 | cy | 2,346 | - | - | | 4,276 | 8.24 /cy | 6,622 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 471.262 | cy | - | 16,588 | - | | - | 35.20 /cy | 16,588 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 489.174 | cy | 686 | - | - | | 1,318 | 4.10 /cy | 2,004 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 489.174 | cy | 479 | - | - | | 797 | 2.61 /cy | 1,276 |
| | A006 | Pipe Test | 930.00 | lf | 687 | 744 | - | | - | 1.54 /lf | 1,431 |
| | A008 | Pipe Locates (Pot Hole) | 1.00 | ea | 152 | 50 | - | | 27 | 228.96 /ea | 229 |
| | | **Trenching** | | | **8,332** | **17,382** | | | **13,295** | | **39,010** |
| | | 582.33 Labor hours | | | | | | | | | |
| | | 334.39 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 3,310.36 | cy | - | - | - | | - | | |
| | 40 | Foundation Excavation Spoils (Summary) | 2,821.19 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 489.174 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 489.174 | cy | 789 | - | - | | 1,516 | 4.712 /cy | 2,305 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 3,321.19 | cy | 965 | - | - | | 2,720 | 1.11 /cy | 3,685 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 489.174 | cy | 2,203 | - | - | | 3,668 | 12.001 /cy | 5,870 |
| | A0I7 | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 3,321.19 | cy | 2,079 | - | - | | 4,800 | 2.071 /cy | 6,879 |
| | | **Excavation Spoils** | | | **6,036** | | | | **12,703** | | **18,739** |
| | | 351.23 Labor hours | | | | | | | | | |
| | | 175.614 Equipment hours | | | | | | | | | |
| **02446.000** | | **Drainage Outflow To Head** | | | | | | | | | |
| n | 0 | Mob/Demob Directional Drilling Equipment | 2.00 | ea | - | - | 5,000 | | - | 2,500.00 /ea | 5,000 |
| n | 1008 | Install 8" Pipe DIP | 60.00 | lf | - | - | 2,700 | | - | 45.00 /lf | 2,700 |
| n | 1010 | Install 10" Pipe DIP | 120.00 | lf | - | - | 7,200 | | - | 60.00 /lf | 7,200 |
| | | **Drainage Outflow To Head** | | | | | **14,900** | | | | **14,900** |
| **02720.150** | | **Aggregate Base- Roads** | | | | | | | | | |
| | 1116 | Aggregate Base | 300.00 | cy | 85 | 2,691 | - | | 432 | 10.70 /cy | 3,208 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Aggregate Base- Roads** | | | **85** | **2,691** | | | **432** | | **3,208** |
| | | 4.80 Labor hours | | | | | | | | | |
| | | 4.80 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| | 20 | Bitum Paving | 1,000.00 | sy | - | - | 8,000 | | - | 8.00 /sy | 8,000 |
| | | **Asphalt Paving - Location** | | | | | **8,000** | | | | **8,000** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 15,000.00 | sy | 3,119 | 32,850 | - | | 1,253 | 2.482 /sy | 37,223 |
| | | **Lawns & Grasses** | | | **3,119** | **32,850** | | | **1,253** | | **37,223** |
| | | 150.00 Labor hours | | | | | | | | | |
| | | 30.00 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 110 | Concrete: Slab on Grade | 60.00 | cy | 4,343 | 18,600 | - | | 1,634 | 409.62 /cy | 24,577 |
| n | 120 | Concrete: Slab on Grade Circular | 353.954 | cy | 29,280 | 109,726 | - | | 9,637 | 419.951 /cy | 148,643 |
| n | 140 | Concrete: Wall | 290.00 | cy | 35,985 | 101,500 | - | | 14,625 | 524.52 /cy | 152,110 |
| | | **Concrete in Place** | | | **69,608** | **229,826** | | | **25,896** | | **325,330** |
| | | 3,365.82 Labor hours | | | | | | | | | |
| | | 513.54 Equipment hours | | | | | | | | | |
| **11000.015** | | **Equipment Demolition** | | | | | | | | | |
| | 101 | Demo Selective Items-Each - Gravity Thickener | 1.00 | ea | 119 | - | - | | | 119.28 /ea | 119 |
| | 3335 | Wash Down/Disinfect Tank -Gravity THickener | 200.00 | sf | 21 | 10 | - | | 4 | 0.18 /sf | 35 |
| | | **Equipment Demolition** | | | **141** | **10** | | | **4** | | **155** |
| | | 6.67 Labor hours | | | | | | | | | |
| | | 1.67 Equipment hours | | | | | | | | | |
| **11225.100** | | **Gravity Thickener** | | | | | | | | | |
| | 0 | Unload & Protect Gravity Thickener | 2.00 | ea | 549 | - | - | | 792 | 670.52 /ea | 1,341 |
| | 00 | Warehouse & Care of Gravity Thickener | 2.00 | u/mo | 127 | - | - | | - | 63.66 /u/mo | 127 |
| n | 70 | Gravity Thickener 70' Diameter | 2.00 | ea | 137,360 | 270,000 | - | | 197,900 | 302,630.00 /ea | 605,260 |
| | 6091 | 90 Ton Crane w/1cy Bucket | 47.512 | cy | 29 | - | - | | 367 | 8.33 /cy | 396 |
| | F000 | Swept-in Grout | 47.512 | cy | 1,447 | - | - | | - | 105.46 /cy | 5,011 |
| | G100 | Test & Check Gravity Thickener | 2.00 | ea | 509 | - | - | | - | 254.64 /ea | 509 |
| | z900 | Gravity Thickener Manufacturers Representative | 6.00 | day | - | | 4,800 | | - | 950.00 /day | 5,700 |
| | | **Gravity Thickener** | | | **140,022** | **270,000** | **4,800** | | **199,059** | | **618,344** |
| | | 6,140.61 Labor hours | | | | | | | | | |
| | | 1,007.17 Equipment hours | | | | | | | | | |
| **11310.100** | | **Submersible Sludge Pumps** | | | | | | | | | |
| | 05 | Thickened Sludge Pump | 2.00 | ea | 1,984 | 4,000 | - | | 1,404 | 3,693.96 /ea | 7,388 |
| | | **Submersible Sludge Pumps** | | | **1,984** | **4,000** | | | **1,404** | | **7,388** |
| | | 98.40 Labor hours | | | | | | | | | |
| | | 16.40 Equipment hours | | | | | | | | | |
| **13121.000** | | **Pre-Engineered Metal Bldg** | | | | | | | | | |
| | z001 | Pre-Engineered Metal Bldg - Sludge Pump Shelter | 300.00 | sf | | | 22,500 | | | 75.00 /sf | 22,500 |
| | | **Pre-Engineered Metal Bldg** | | | | | **22,500** | | | | **22,500** |
| **15111.650** | | **Plug Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | 200P | Plug Valve, MJ, 6" | 6.00 | ea | 1,058 | 2,550 | - | | - | 601.283 /ea | 3,608 |
| n | 200Q | Plug Valve, MJ, 8" | 2.00 | ea | 450 | 1,150 | - | | - | 800.04 /ea | 1,600 |
| | | **Plug Valve (CI/DI/IBBM)** | | | **1,508** | **3,700** | | | | | **5,208** |
| | | 47.38 Labor hours | | | | | | | | | |
| **15114.500** | | **Check Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | C20Q | Check Valve, Double Disc, MJ, 8" | 2.00 | ea | 430 | 600 | - | | - | 514.86 /ea | 1,030 |
| n | C20R | Check Valve, Double Disc, MJ, 10" | 2.00 | ea | 556 | 1,000 | - | | - | 778.11 /ea | 1,556 |
| | | **Check Valve (CI/DI/IBBM)** | | | **986** | **1,600** | | | | | **2,586** |
| | | 30.98 Labor hours | | | | | | | | | |
| **15210.010** | | **DIP Totals** | | | | | | | | | |
| | 0 | Total Weight (Zero Cost Item) | 30,141.00 | lbs | - | - | - | | - | | |
| | 1 | Weight of Pipe (Zero Cost Item) | 29,331.00 | lbs | - | - | - | | - | | |
| | 2 | Weight of Fittings (Zero Cost Item) | 810.00 | lbs | - | - | - | | - | | |

| | Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **15210.200** | | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | | 0 | Unload Care & Protect Push-on DIP & Fittings | 30,141.00 | lbs | 58 | - | - | | 190 | 0.01 /lbs | 248 |
| | | 1 | Weight of Push-on Pipe (Zero Cost Item) | 29,331.00 | lbs | - | - | - | | - | | |
| | | 2 | Weight of Push-on Fittings (Zero Cost Item) | 810.00 | lbs | - | - | - | | - | | |
| | | 5 | Layout Push-on DIP & Fitting | 930.00 | lf | 211 | - | - | | - | 0.23 /lf | 211 |
| n | | 208 | DIP CML, Push-On, Class 52, 8" | 630.00 | lf | 3,756 | 10,668 | - | | - | 22.90 /lf | 14,424 |
| n | | 210 | DIP CML, Push-On, Class 52, 10" | 300.00 | lf | 2,004 | 6,638 | - | | - | 28.81 /lf | 8,642 |
| n | FAQQ | | DIP CML, Push-on, Wye BxB, 8"x 8" | 2.00 | ea | 199 | 540 | - | | - | 369.46 /ea | 739 |
| n | FAQQ | | DIP CML, Push-on, Tee BxB, 8"x 8" | 4.00 | ea | 398 | 1,080 | - | | - | 369.46 /ea | 1,478 |
| | | | **DIP CML Push-On Pipe** | | | **6,626** | **18,925** | | | **190** | | **25,742** |
| | | | 279.14 Labor hours | | | | | | | | | |
| | | | 3.32 Equipment hours | | | | | | | | | |
| **16000.005** | | | **Electrical Allowance** | | | | | | | | | |
| | | 5 | Electrical Allowance | 0.00 | ls | 0 | 0 | - | | - | | |
| | | | ***06 Gravity Thickener*** | | | ***248,874*** | ***588,044*** | ***86,405*** | | ***276,211*** | | ***1,203,997*** |
| | | | 11,663.11 Labor hours | | | | | | | | | |
| | | | 2,429.980 Equipment hours | | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***07 Chlorination Contact Tank #2*** | | | | | | | | | |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2711 | Saw Cut Concrete | 48.00 | lf | 9 | 24 | - | | 27 | 1.25 /lf | 60 |
| | 3004 | Demo Conc Walls | 46.00 | cy | 3,754 | - | - | | 879 | 100.70 /cy | 4,632 |
| | | **Selective Site Demolition** | | | **3,762** | **24** | | | **906** | | **4,692** |
| | | 230.48 Labor hours | | | | | | | | | |
| | | 7.38 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 140 | Concrete: Wall | 75.00 | cy | 9,306 | 26,250 | - | | 3,782 | 524.52 /cy | 39,339 |
| | | **Concrete in Place** | | | **9,306** | **26,250** | | | **3,782** | | **39,339** |
| | | 450.000 Labor hours | | | | | | | | | |
| | | 75.00 Equipment hours | | | | | | | | | |
| | | ***07 Chlorination Contact Tank #2*** | | | ***13,069*** | ***26,274*** | ***0*** | | ***4,688*** | | ***44,031*** |
| | | 680.480 Labor hours | | | | | | | | | |
| | | 82.38 Equipment hours | | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***08 Chlorination of HRC Effluent*** | | | | | | | | | |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2734 | Remove Asphalt Pavement | 400.00 | sy | 621 | - | - | | 1,252 | 4.684 /sy | 1,873 |
| | | **Selective Site Demolition** | | | **621** | | | | **1,252** | | **1,873** |
| | | 38.00 Labor hours | | | | | | | | | |
| | | 30.40 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 1,380.00 | lf | 127 | | - | | - | 0.092 /lf | 127 |
| n | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 1,751.04 | cy | 1,770 | - | - | | 4,988 | 3.86 /cy | 6,758 |
| n | 3130 | Trench Bedding-Excavator- 130 HP | 149.291 | cy | 302 | - | - | | 878 | 7.901 /cy | 1,180 |
| n | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 534.172 | cy | 1,728 | - | - | | 5,025 | 12.642 /cy | 6,753 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 447.993 | cy | 405 | - | - | | 1,275 | 3.751 /cy | 1,680 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 683.463 | cy | - | 24,058 | - | | - | 35.20 /cy | 24,058 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 1,013.97 | cy | 1,422 | - | - | | 2,733 | 4.10 /cy | 4,155 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 1,013.97 | cy | 993 | - | - | | 1,653 | 2.61 /cy | 2,645 |
| n | 9616 | Trench Shield- 6x16 | 0.50 | u/mo | - | - | - | | 705 | 1,410.00 /u/mo | 705 |
| A002 | | Pipe Detectable/Non-Detectable Tape | 870.00 | lf | 80 | 48 | - | | - | 0.15 /lf | 128 |
| A006 | | Pipe Test | 870.00 | lf | 643 | 696 | - | | - | 1.54 /lf | 1,339 |
| | | **Trenching** | | | **7,471** | **24,802** | | | **17,256** | | **49,528** |
| | | 477.59 Labor hours | | | | | | | | | |
| | | 298.25 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 1,013.97 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 1,013.97 | cy | - | - | - | | - | | |
| | 46 | Bore & Jack Spoils Spoils (Summary) | 3.782 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 1,017.750 | cy | 1,641 | - | - | | 3,154 | 4.712 /cy | 4,795 |
| A0A0 | | Haul Spoils/Off Site 10cy Rear Dump 4.00 Hour/Load | 3.782 | cy | 17 | - | - | | 28 | 12.002 /cy | 45 |
| A0A4 | | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 1,013.97 | cy | 4,566 | - | - | | 7,602 | 12.001 /cy | 12,168 |
| | | **Excavation Spoils** | | | **6,224** | | | | **10,785** | | **17,009** |
| | | 366.13 Labor hours | | | | | | | | | |
| | | 183.063 Equipment hours | | | | | | | | | |
| **02445.000** | | **Boring & Jack Conduit** | | | | | | | | | |
| | 0 | Mob/Demob Bore & Jack Equipment | 1.00 | ea | - | - | 5,000 | | - | 5,000.00 /ea | 5,000 |
| | 100 | Excavate Jacking Pit | 41.481 | cy | 75 | - | - | | 204 | 6.731 /cy | 279 |
| | 105 | Excavate Recieving Pit | 20.741 | cy | 38 | - | - | | 102 | 6.73 /cy | 140 |
| | 200 | Shore Jacking/Receiving Pits | 644.00 | bsf | - | - | 9,660 | | - | 15.00 /bsf | 9,660 |
| | 300 | Backfill Jacking/Receiving Pits | 62.222 | cy | 305 | - | - | | 636 | 15.12 /cy | 941 |
| | 400 | Jacking Slab & Reaction Block | 2.66 | cy | 578 | 612 | - | | - | 447.372 /cy | 1,190 |
| n | 5012 | Bore & Jack Pipe 12 | 130.00 | lf | - | - | 15,600 | | - | 120.00 /lf | 15,600 |
| | 7000 | Grout Casing | 2.84 | cy | 12 | 489 | - | | 14 | 181.43 /cy | 515 |
| | | **Boring & Jack Conduit** | | | **1,008** | **1,101** | **30,260** | | **956** | | **33,324** |
| | | 52.20 Labor hours | | | | | | | | | |
| | | 15.791 Equipment hours | | | | | | | | | |
| **02720.100** | | **Aggregate Base Course** | | | | | | | | | |
| | 1126 | Gravel Base | 4.00 | cy | 11 | 36 | - | | 58 | 26.22 /cy | 105 |
| | | **Aggregate Base Course** | | | **11** | **36** | | | **58** | | **105** |
| | | 0.64 Labor hours | | | | | | | | | |
| | | 0.64 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| n | 10 | Bitum Paving | 350.00 | sy | - | - | 5,530 | | - | 15.80 /sy | 5,530 |
| | | **Asphalt Paving - Location** | | | | | **5,530** | | | | **5,530** |
| **02750.100** | | **Concrete Paving** | | | | | | | | | |
| z015 | | Concrete Pavement, Walkways | 50.00 | sy | 102 | 572 | - | | 38 | 14.23 /sy | 711 |

| | Item | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Concrete Paving** | | | **102** | **572** | | | **38** | | **711** |
| | | 5.45 Labor hours | | | | | | | | | |
| | | 0.55 Equipment hours | | | | | | | | | |
| | **02920.010** | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 100.00 | sy | 21 | 219 | - | | 8 | 2.482 /sy | 248 |
| | | **Lawns & Grasses** | | | **21** | **219** | | | **8** | | **248** |
| | | 1.00 Labor hours | | | | | | | | | |
| | | 0.20 Equipment hours | | | | | | | | | |
| | **05600.115** | **Manifolds** | | | | | | | | | |
| | z001 | 6T Cylinder Manifold System | 1.00 | ls | 418 | 1,725 | - | | | 2,142.50 /ls | 2,143 |
| | | **Manifolds** | | | **418** | **1,725** | | | | | **2,143** |
| | | 16.00 Labor hours | | | | | | | | | |
| | | 8.00 Equipment hours | | | | | | | | | |
| | **11240.500** | **Chlorination Equipment** | | | | | | | | | |
| | A100 | Chlorinator | 1.00 | ea | 7,499 | 15,400 | - | | 5,309 | 28,207.96 /ea | 28,208 |
| | B100 | Chlorine Evaporator | 1.00 | ea | 9,999 | 21,600 | - | | 7,079 | 38,677.97 /ea | 38,678 |
| | F100 | Evaporator Electric-Operated Vacuum Regulator | 1.00 | ea | 2,000 | 4,300 | - | | - | 6,299.88 /ea | 6,300 |
| | S004 | Electronic 6T Cylinder Scale System | 1.00 | ea | 8,999 | 18,300 | - | | 6,371 | 33,669.550 /ea | 33,670 |
| | S004 | Trunnion Scale for 1T Chlorine Cylinders | 1.00 | ea | 750 | 1,500 | - | | 531 | 2,780.80 /ea | 2,781 |
| | f200 | Chlor-A-Vac Submersible Chemical Induction Unit | 1.00 | ea | 484 | 19,256 | - | | - | 19,739.80 /ea | 19,740 |
| | | **Chlorination Equipment** | | | **29,730** | **80,356** | | | **19,290** | | **129,376** |
| | | 1,450.12 Labor hours | | | | | | | | | |
| | | 225.270 Equipment hours | | | | | | | | | |
| | **15119.500** | **Pressure Red/Reg Valve** | | | | | | | | | |
| n | 300G | Pressure & Temperature Relief Valve | 1.00 | ea | 150 | 1,400 | - | | - | 1,550.35 /ea | 1,550 |
| | | **Pressure Red/Reg Valve** | | | **150** | **1,400** | | | | | **1,550** |
| | | 4.85 Labor hours | | | | | | | | | |
| | **15220.302** | **A53 CW Pipe PE/GE/T&C/SW** | | | | | | | | | |
| n | 300P | A53 CW Standard Pipe PE, 12" | 130.00 | lf | 1,674 | 19,328 | - | | - | 161.56 /lf | 21,003 |
| | | **A53 CW Pipe PE/GE/T&C/SW** | | | **1,674** | **19,328** | | | | | **21,003** |
| | | 70.20 Labor hours | | | | | | | | | |
| | **15220.322** | **A53 CW Pipe- BW (36.10)** | | | | | | | | | |
| | 0 | Unload Care & Protect Pipe/Fittings | 224.63 | lbs | 0 | - | - | | 1 | 0.01 /lbs | 2 |
| | 1 | Weight of Pipe (Zero Cost Item) | 224.63 | lbs | - | - | - | | - | | |
| | 10 | Layout Pipe & Fitting | 75.00 | lf | 18 | - | - | | - | 0.24 /lf | 18 |
| n | 4080 | A53 CW Schd. 40 Pipe BW, 1.00" | 25.00 | lf | 66 | 126 | - | | - | 7.661 /lf | 192 |
| n | 40C0 | A53 CW Schd. 40 Pipe BW, 2.00" | 50.00 | lf | 215 | 548 | - | | - | 15.254 /lf | 763 |
| | | **A53 CW Pipe- BW (36.10)** | | | **299** | **674** | | | **1** | | **974** |
| | | 12.525 Labor hours | | | | | | | | | |
| | | 0.025 Equipment hours | | | | | | | | | |
| | **15230.400** | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | 0 | Unload Care & Protect PCCP & Fittings | 510.00 | lf | 1 | - | - | | 3 | 0.01 /lf | 4 |
| | 10 | Layout Pipe & Fitting | 510.00 | lf | 122 | - | - | | - | 0.24 /lf | 122 |
| | 325 | PCCP Equipment- Cat 325 Excavator | 91.80 | ch | 1,777 | - | - | | 10,165 | 130.091 /ch | 11,942 |
| n | B060 | Prestressed Concrete Cylinder Pipe (250#) 60 | 510.00 | lf | 30,422 | 107,100 | - | | - | 269.65 /lf | 137,522 |
| n | K060 | PCCP 90 Bend 60 | 2.00 | ea | 862 | 4,200 | - | | - | 2,531.15 /ea | 5,062 |
| n | L054 | PCCP 45 Bend 54 | 2.00 | ea | 776 | 4,000 | - | | - | 2,387.800 /ea | 4,776 |
| | | **Prestr Conc Cylind-(PCCP)** | | | **33,959** | **115,300** | | | **10,168** | | **159,428** |
| | | 1,440.62 Labor hours | | | | | | | | | |
| | | 91.86 Equipment hours | | | | | | | | | |
| | **15241.100** | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | 0 | Unload Care & Protect Pipe/Fittings | 870.00 | lf | 2 | - | - | | 5 | 0.01 /lf | 7 |
| | 10 | Layout Pipe & Fitting | 870.00 | lf | 208 | - | - | | - | 0.24 /lf | 208 |
| n | 80J0 | PVC Schd. 80 Pipe, 6" | 870.00 | lf | 2,906 | 15,129 | - | | - | 20.73 /lf | 18,035 |
| n | 8AJ0 | PVC Sch 80. 90 Ell , 6" | 130.00 | ea | 2,481 | 11,268 | - | | - | 105.77 /ea | 13,750 |
| | a010 | PVC Joint Primer- Quart | 3.67 | qrt | - | 56 | - | | - | 15.35 /qrt | 56 |
| | a020 | PVC Solvent Cement Low VOC- Quart | 3.67 | qrt | - | 80 | - | | - | 21.90 /qrt | 80 |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | **PVC Schd Pipe & Fittings** | | **5,597** | **26,534** | | | **5** | | **32,137** |
| | 234.60 Labor hours | | | | | | | | |
| | 0.10 Equipment hours | | | | | | | | |
| | ***08 Chlorination of HRC Effluent*** | | ***87,285*** | ***272,047*** | ***35,790*** | | ***59,817*** | | ***454,939*** |
| | 4,169.91 Labor hours | | | | | | | | |
| | 854.140 Equipment hours | | | | | | | | |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | ***10 I&C*** | | | | | | | | |
| **13000.005** | **Special Const Allowance** | | | | | | | | |
| 5 | I&C Allowance | 0.00 ls | 0 | 0 | - | | - | | |
| | ***10 I&C*** | | ***0*** | ***0*** | ***0*** | | ***0*** | | ***0*** |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | ***11 Electrical*** | | | | | | | | |
| **16000.005** | **Electrical Allowance** | | | | | | | | |
| 5 | Electrical Allowance | 0.00 ls | 0 | 0 | - | | - | | |
| | ***11 Electrical*** | | ***0*** | ***0*** | ***0*** | | ***0*** | | ***0*** |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***12 Chemical Feed*** | | | | | | | | | |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2510 | Demo 12'dia x 40'tall Steel Tank | 1.00 | ea | | - | 5,000 | | | 5,000.00 /ea | 5,000 |
| | 2734 | Remove Asphalt Pavement, 5"thk | 189.00 | sy | 518 | - | - | | 592 | 5.87 /sy | 1,109 |
| | 3012 | Demo Concrete Elevated Slab | 22.00 | cy | 50 | - | - | | 74 | 5.61 /cy | 123 |
| | | **Selective Site Demolition** | | | **567** | | **5,000** | | **665** | | **6,233** |
| | | 19.692 Labor hours | | | | | | | | | |
| | | 14.943 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 480.00 | lf | 55 | | - | | - | 0.12 /lf | 55 |
| n | 2090 | Trenching- Backhoe/Loader 95HP (15 cy/hr-120cy/day) Average Exc. | 583.87 | cy | 1,965 | - | - | | 2,098 | 6.96 /cy | 4,063 |
| n | 3090 | Trench Bedding-Backhoe/Loader 95HP | 36.543 | cy | 179 | - | - | | 148 | 8.95 /cy | 327 |
| n | 4090 | Trench Pipe Zone Backfill-Backhoe/Loader 95HP | 109.65 | cy | 645 | - | - | | 533 | 10.741 /cy | 1,178 |
| n | 5090 | Trench Native Backfill-Backhoe/Loader 95HP | 109.65 | cy | 588 | - | - | | 583 | 10.681 /cy | 1,171 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 146.193 | cy | - | 5,146 | - | | - | 35.20 /cy | 5,146 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 146.48 | cy | 370 | - | - | | 395 | 5.22 /cy | 765 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 146.48 | cy | 292 | - | - | | 239 | 3.624 /cy | 531 |
| | A002 | Pipe Detectable/Non-Detectable Tape | 480.00 | lf | 55 | 26 | - | | - | 0.17 /lf | 81 |
| | A006 | Pipe Test | 480.00 | lf | 461 | 384 | - | | - | 1.761 /lf | 845 |
| | | **Trenching** | | | **4,610** | **5,556** | | | **3,996** | | **14,163** |
| | | 179.20 Labor hours | | | | | | | | | |
| | | 91.695 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 146.48 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 146.48 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 146.48 | cy | 425 | - | - | | 454 | 6.002 /cy | 879 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 146.48 | cy | 1,344 | - | - | | 1,098 | 16.673 /cy | 2,442 |
| | | **Excavation Spoils** | | | **1,769** | | | | **1,552** | | **3,321** |
| | | 52.694 Labor hours | | | | | | | | | |
| | | 26.35 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| n | 10 | Bitum Paving | 189.00 | sy | - | - | 2,986 | | - | 15.80 /sy | 2,986 |
| | | **Asphalt Paving - Location** | | | | | **2,986** | | | | **2,986** |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 145 | Concrete: Elevated Slab - Flow Splitter Box | 22.00 | cy | 3,154 | 7,920 | - | | 1,109 | 553.82 /cy | 12,184 |
| | | **Concrete in Place** | | | **3,154** | **7,920** | | | **1,109** | | **12,184** |
| | | 121.000 Labor hours | | | | | | | | | |
| | | 22.00 Equipment hours | | | | | | | | | |
| **03150.010** | | **Concrete Core & Saw** | | | | | | | | | |
| | c 10 | Core Drill 1" to 12" depth - Dewatering Wall | 3.00 | ea | 58 | - | - | | | 19.28 /ea | 58 |
| | c 10 | Core Drill 1" to 12" depth - Flow Splitter Wall | 3.00 | ea | 58 | - | - | | | 19.28 /ea | 58 |
| | | **Concrete Core & Saw** | | | **116** | | | | | | **116** |
| | | 4.80 Labor hours | | | | | | | | | |
| **05000.001** | | **Metals Allowance** | | | | | | | | | |
| | 5 | Metals Allowance - Mount Chemical Induction System | 1.00 | ls | | | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | | **Metals Allowance** | | | | | **5,000** | | | | **5,000** |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL - Chem Induction | 1.00 | ea | 87 | 1,277 | - | | - | 1,363.12 /ea | 1,363 |
| | | **Hatch, Aluminum, 300psf** | | | **87** | **1,277** | | | | | **1,363** |
| | | 3.20 Labor hours | | | | | | | | | |
| **11220.100** | | **Chemical Mixing Units** | | | | | | | | | |
| | 02 | Polymer Supply Mechanical Mixer | 4.00 | ea | 3,778 | 6,000 | - | | - | 2,444.40 /ea | 9,778 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Chemical Mixing Units** | | | **3,778** | **6,000** | | | | | **9,778** |
| | | 120.000 Labor hours | | | | | | | | | |
| **11240.400** | | **Polymer Store/Feed Equip** | | | | | | | | | |
| | 0 | Metering Pump/Poly Blend and Feed Pump | 3.00 | ea | 21,182 | 42,000 | - | | 10,276 | 24,486.00 /ea | 73,458 |
| | 0 | First Fill of Polymer | 3.00 | day | 2,118 | 4,500 | - | | 1,028 | 2,548.60 /day | 7,646 |
| | | **Polymer Store/Feed Equip** | | | **23,301** | **46,500** | | | **11,303** | | **81,104** |
| | | 792.00 Labor hours | | | | | | | | | |
| | | 132.00 Equipment hours | | | | | | | | | |
| **11240.420** | | **Storage Tanks** | | | | | | | | | |
| f110 | | Submerged Chemical Induction System | 1.00 | ls | 23,536 | 40,000 | - | | - | 63,536.00 /ls | 63,536 |
| | | **Storage Tanks** | | | **23,536** | **40,000** | | | | | **63,536** |
| | | 800.000 Labor hours | | | | | | | | | |
| **13000.005** | | **Special Const Allowance** | | | | | | | | | |
| | 5 | SCADA Allowance | 1.00 | ls | | | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | 5 | Polymer Tote Containment | 4.00 | ea | 433 | 3,680 | - | | - | 1,028.20 /ea | 4,113 |
| | | **Special Const Allowance** | | | **433** | **3,680** | **5,000** | | | | **9,113** |
| | | 16.00 Labor hours | | | | | | | | | |
| **15115.810** | | **Diaphragm Valve PVC** | | | | | | | | | |
| n 130I | | PVC Diaphragm Valve, flg, 1" | 9.00 | ea | 615 | 8,640 | - | | - | 1,028.313 /ea | 9,255 |
| n 130K | | PVC Diaphragm Valve, flg, 2" | 6.00 | ea | 800 | 9,060 | - | | - | 1,643.34 /ea | 9,860 |
| | | **Diaphragm Valve PVC** | | | **1,415** | **17,700** | | | | | **19,115** |
| | | 38.73 Labor hours | | | | | | | | | |
| **15241.100** | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | 0 | Unload Care & Protect Pipe/Fittings | 680.00 | lf | 2 | - | - | | 4 | 0.01 /lf | 7 |
| | 10 | Layout Pipe & Fitting | 680.00 | lf | 214 | - | - | | - | 0.32 /lf | 214 |
| n | 8080 | PVC Schd. 80 Pipe, 1.00" | 600.00 | lf | 944 | 792 | - | | - | 2.894 /lf | 1,736 |
| n 80C0 | | PVC Schd. 80 Pipe, 2.00" | 80.00 | lf | 176 | 245 | - | | - | 5.264 /lf | 421 |
| n 8A80 | | PVC Sch 80. 90 Ell , 1.00" | 18.00 | ea | 96 | 79 | - | | - | 9.752 /ea | 176 |
| n 8AC0 | | PVC Sch 80. 90 Ell , 2.00" | 11.00 | ea | 93 | 84 | - | | - | 16.12 /ea | 177 |
| n 8F88 | | PVC Sch 80. Tee , 1.00" | 12.00 | ea | 87 | 95 | - | | - | 15.13 /ea | 182 |
| n 8FCC | | PVC Sch 80. Tee , 2.00" | 7.00 | ea | 82 | 190 | - | | - | 38.754 /ea | 271 |
| a010 | | PVC Joint Primer- Quart | 1.21 | qrt | - | 19 | - | | - | 15.35 /qrt | 19 |
| a020 | | PVC Solvent Cement Low VOC- Quart | 1.21 | qrt | - | 26 | - | | - | 21.90 /qrt | 26 |
| | | **PVC Schd Pipe & Fittings** | | | **1,695** | **1,529** | | | **4** | | **3,229** |
| | | 53.855 Labor hours | | | | | | | | | |
| | | 0.075 Equipment hours | | | | | | | | | |
| **15400.005** | | **Plumbing Allowance** | | | | | | | | | |
| | 5 | Plumbing Allowance - Hook Plant Water to Poly System | 1.00 | ls | | | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | | **Plumbing Allowance** | | | | | **5,000** | | | | **5,000** |
| **16000.005** | | **Electrical Allowance** | | | | | | | | | |
| | 5 | Electrical Allowance - Wire Chemical Induction to Controls | 1.00 | ls | | | 25,000 | | - | 25,000.00 /ls | 25,000 |
| | | **Electrical Allowance** | | | | | **25,000** | | | | **25,000** |
| | | 0.000 Labor hours | | | | | | | | | |
| | | ***12 Chemical Feed*** | | | ***64,460*** | ***130,162*** | ***47,986*** | | ***18,631*** | | ***261,239*** |
| | | 2,201.171 Labor hours | | | | | | | | | |
| | | 287.06 Equipment hours | | | | | | | | | |

## Estimate Totals

| Description | Amount | Totals | Hours | Rate |
|---|---|---|---|---|
| Labor | 2,264,262 | | 109,132 hrs | |
| Material | 6,643,230 | | | |
| Subcontract | 2,981,546 | | | |
| Equipment | 1,898,493 | | 16,127 hrs | |
| Other | 4,852 | | | |
| **Subtotal Direct Cost** | **13,792,383** | **13,792,383** | | |
| I&C | 1.379.226 | | | 10.00 % |
| Electrical | 2.068.839 | | | 15.00 % |
| | **3,448,065** | **17,240,448** | | |
| Indirect Costs: | | | | |
| Building Permits(% total cost) | 144.300 | | | 0.40 % |
| Sales Tax (MEO) | | | | |
| Builders Risk Ins % total cost | 90.187 | | | 0.25 % |
| Gen Liability Ins % total cost | 721.499 | | | 2.00 % |
| GC Bonds (% total cost) | 360.749 | | | 1.00 % |
| **Subtotal Prior to OH&P** | **1,316,735** | **18,557,183** | | |
| GC Field General Conditions | 1.855.706 | | | 10.00 % |
| GC Indirects. OH & Profit | 1.855.706 | | | 10.00 % |
| **Subtotal** | **3,711,412** | **22,268,595** | | |
| Construction Contingency | 7.793.966 | | | 35.00 % |
| **Total Construction Cost** | **7,793,966** | **30,062,561** | | |
| Engineering, Permitting, Bond Financing, Legal and Administration | 6.012.488 | | | 20.00 % |
| **Total Program Cost** | **6,012,488** | **36,075,049** | | |
| | ***Total*** | ***36,075,049*** | | |

This is an Opinion of Probable Construction Cost only, as defined by the documents provided at the level of design indicated on the front sheet of this estimate.
There are not any costs provided for: Change Orders, Construction Oversight, land acquisition or temporary/permanent easements, Operations, or any other costs associated with this project that are not specifically part of the bidding contractor's proposed scope.
The total cost shown is valid to only two significant figures.

# *Knoxville, Tennessee*
# *Kuwahee WWTP - Options 3*
# *Opinion of Probable Construction Cost, Prelim Design, March 2007*

| | |
|---|---|
| **Project name** | TN, Knoxville KWWTP |
| **Estimator** | MacIsaac |
| **Labor rate table** | TN07 Knoxville |
| **Equipment rate table** | 00 071H Equip Rental |
| **database version:** | V6.0 TES 9.4.22.0 |
| **ENR 20 City CCI** | March 2007: 7856 |
| **Notes** | This is an Opinion of Probable Construction Cost only, as defined by the documents provided at the level of design indicated above. CDM has no control over the cost of labor, materials, equipment, or services furnished, over schedules, over contractor's methods of determining prices, competitive bidding, market or negotiating conditions. CDM does not guarantee that this opinion will not vary from actual cost, or contractor's bids. There are not any costs provided for: Change Orders, Construction Oversight, Land Acquisition or temporary/permanent Easements, Operations, or any other costs associated with this project that are not specifically part of the bidding contractor's proposed scope.<br><br>The total cost shown is valid to only two significant figures<br><br>Assumptions:<br>Only nominal dewatering is needed.<br>No consideration for contaminated soils or hazardous materials (i.e. asbestos, lead)<br>No finishes are included.<br>Based on a 40 hour work week with no overtime.<br><br>This job is sales tax exempt. |
| **Report format** | Sorted by 'Proj Area/Phase'<br>'Detail' summary<br>Allocate addons<br>Round unit prices<br>Combine items<br>Paginate |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***01 UNOX Bypass*** | | | | | | | | | |
| **01010.000** | | **General Conditions** | | | | | | | | | |
| | 5 | Assumption of 20% of Excavated Material is Contaminated | 2,232.00 | cy | - | - | 55,800 | | - | 25.00 /cy | 55,800 |
| | | **General Conditions** | | | | | **55,800** | | | | **55,800** |
| **01590.000** | | **Traffic/Pollution Control** | | | | | | | | | |
| ---- | | Traffic Control | 1.00 | ls | | | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | | **Traffic/Pollution Control** | | | | | **10,000** | | | | **10,000** |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Protect Utilities (6"pw, 4"cw, 16" sludge, duct) | 1.00 | ls | - | - | 2,500 | | - | 2,500.00 /ls | 2,500 |
| | | **Sitework Allowance** | | | | | **2,500** | | | | **2,500** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2508 | Remove 48" DIP - 11' deep | 70.00 | lf | 114 | - | - | | 217 | 4.731 /lf | 331 |
| | 2512 | Demo Existing Secondary Aeratio Influent Structure (86cy concrete) | 1.00 | ea | | - | 21,500 | | | 21,500.00 /ea | 21,500 |
| | 2734 | Remove Pavement/Concrete Walk | 312.00 | sy | 485 | - | - | | 977 | 4.684 /sy | 1,461 |
| | | **Selective Site Demolition** | | | **599** | | **21,500** | | **1,194** | | **23,293** |
| | | 36.64 Labor hours | | | | | | | | | |
| | | 27.212 Equipment hours | | | | | | | | | |
| **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | 2 | Design Shoring System-Average | 1.00 | ls | - | - | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | 100 | Survey & Layout Shoring | 70.00 | lf | 1 | - | - | | - | 0.02 /lf | 1 |
| | 105 | Mobilize Pile Driving Equipment | 1.00 | ea | - | - | 25,000 | | - | 25,000.00 /ea | 25,000 |
| | 1030 | Steel Sheeting,20' x 27psf, pulled & salvage | 1,400.00 | sf | 7,255 | 9,016 | - | | 9,582 | 18.47 /sf | 25,853 |
| | 1045 | Install & Remove Wales/Struts/Connectors | 1.89 | ton | 459 | 1,739 | - | | 606 | 1,483.73 /ton | 2,804 |
| n | 1050 | Rent Steel Sheet Piling and Wales, first month | 20.79 | ton | - | 5,418 | - | | - | 260.59 /ton | 5,418 |
| | | **Sheet Piling** | | | **7,715** | **16,172** | **35,000** | | **10,188** | | **69,076** |
| | | 254.123 Labor hours | | | | | | | | | |
| | | 63.513 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 636.00 | cy | 536 | - | - | | 1,449 | 3.121 /cy | 1,985 |
| | | **Foundation Excavation** | | | **536** | | | | **1,449** | | **1,985** |
| | | 33.92 Labor hours | | | | | | | | | |
| | | 16.96 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 285.00 | lf | 26 | | - | | - | 0.092 /lf | 26 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 1,274.583 | cy | 1,289 | - | - | | 5,637 | 5.434 /cy | 6,926 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 53.951 | cy | 82 | - | - | | 272 | 6.56 /cy | 354 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 273.30 | cy | 663 | - | - | | 2,204 | 10.492 /cy | 2,867 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 681.13 | cy | 616 | - | - | | 1,939 | 3.751 /cy | 2,555 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 327.25 | cy | - | 11,519 | - | | - | 35.20 /cy | 11,519 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 593.46 | cy | 832 | - | - | | 1,599 | 4.10 /cy | 2,432 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 593.46 | cy | 581 | - | - | | 967 | 2.61 /cy | 1,548 |
| n | 8367 | Trench Shores- Aluminum Hydraulic 36" width x 7' Rail | 1.00 | u/mo | | - | - | | 76 | 76.00 /u/mo | 76 |
| | | **Trenching** | | | **4,089** | **11,519** | | | **12,695** | | **28,303** |
| | | 267.56 Labor hours | | | | | | | | | |
| | | 174.61 Equipment hours | | | | | | | | | |
| **02315.400** | | **Drilling & Blasting** | | | | | | | | | |
| | 1008 | Hydraulic Hoe Ram -Medium | 636.00 | cy | 1,775 | - | 95,400 | | | 152.79 /cy | 97,175 |
| | | **Drilling & Blasting** | | | **1,775** | | **95,400** | | | | **97,175** |
| | | 101.76 Labor hours | | | | | | | | | |
| | | 50.88 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 1,229.46 | cy | - | - | - | | - | | |
| | 40 | Foundation Excavation Spoils (Summary) | 636.00 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 593.46 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 593.46 | cy | 957 | - | - | | 1,839 | 4.712 /cy | 2,796 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 636.00 | cy | 739 | - | - | | 2,083 | 4.44 /cy | 2,823 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| A0A4 | | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 593.46 | cy | 2,672 | - | - | | 4,449 | 12.001 /cy | 7,122 |
| A0I7 | | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 636.00 | cy | 398 | - | - | | 919 | 2.071 /cy | 1,317 |
| | | **Excavation Spoils** | | | **4,767** | | | | **9,291** | | **14,058** |
| | | 278.851 Labor hours | | | | | | | | | |
| | | 139.43 Equipment hours | | | | | | | | | |
| **02720.100** | | **Aggregate Base Course** | | | | | | | | | |
| | 1180 | Crushed Rock 1" | 242.00 | cy | 184 | 2,474 | - | | 929 | 14.822 /cy | 3,587 |
| | 1230 | Granular Fill | 690.00 | cy | 1,966 | 8,252 | - | | 9,934 | 29.21 /cy | 20,152 |
| | | **Aggregate Base Course** | | | **2,150** | **10,726** | | | **10,863** | | **23,739** |
| | | 120.73 Labor hours | | | | | | | | | |
| | | 120.73 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| n | 10 | Bitum Paving | 242.00 | sy | - | - | 3,824 | | - | 15.80 /sy | 3,824 |
| | | **Asphalt Paving - Location** | | | | | **3,824** | | | | **3,824** |
| **02750.100** | | **Concrete Paving** | | | | | | | | | |
| z015 | | Concrete Pavement, Walkways | 70.00 | sy | 143 | 800 | - | | 53 | 14.23 /sy | 996 |
| | | **Concrete Paving** | | | **143** | **800** | | | **53** | | **996** |
| | | 7.63 Labor hours | | | | | | | | | |
| | | 0.77 Equipment hours | | | | | | | | | |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n z004 | | Loam & Seeding w/Imported Material, 4"thk | 303.00 | sy | 63 | 664 | - | | 25 | 2.482 /sy | 752 |
| ---- | | Restoration including plants & new trees | 303.00 | sy | | | 4,545 | | - | 15.00 /sy | 4,545 |
| | | **Lawns & Grasses** | | | **63** | **664** | **4,545** | | **25** | | **5,297** |
| | | 3.03 Labor hours | | | | | | | | | |
| | | 0.61 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 140 | Concrete: Secondary Aeration Influent Structure | 86.00 | cy | 10,671 | 30,100 | - | | 4,337 | 524.52 /cy | 45,108 |
| | | **Concrete in Place** | | | **10,671** | **30,100** | | | **4,337** | | **45,108** |
| | | 516.000 Labor hours | | | | | | | | | |
| | | 86.00 Equipment hours | | | | | | | | | |
| **03150.010** | | **Concrete Core & Saw** | | | | | | | | | |
| e240 | | Core Drill 66"dia | 1.00 | ea | 1,283 | - | - | | | 1,283.36 /ea | 1,283 |
| | | **Concrete Core & Saw** | | | **1,283** | | | | | | **1,283** |
| | | 104.000 Labor hours | | | | | | | | | |
| **04000.015** | | **Masonry Demolition** | | | | | | | | | |
| | 5 | Masonry Demolition | 320.00 | sf | 75 | - | - | | 95 | 0.531 /sf | 170 |
| | | **Masonry Demolition** | | | **75** | | | | **95** | | **170** |
| | | 4.80 Labor hours | | | | | | | | | |
| | | 4.80 Equipment hours | | | | | | | | | |
| **04210.000** | | **Clay Masonry Units** | | | | | | | | | |
| n | 8105 | Brick Mortar Type S | 24.312 | cf | 32 | 106 | - | | - | 5.684 /cf | 138 |
| | 8900 | Clean Brick | 320.00 | sf | 102 | 74 | - | | - | 0.55 /sf | 175 |
| n 018A | | Standard Face Brick - Common Bond | 2,026.00 | ea | 1,439 | 972 | - | | - | 1.19 /ea | 2,411 |
| | | **Clay Masonry Units** | | | **1,573** | **1,152** | | | | | **2,725** |
| | | 66.002 Labor hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n JD7 | | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type JD-AL | 1.00 | ea | 77 | 1,277 | - | | - | 1,353.17 /ea | 1,353 |
| | | **Hatch, Aluminum, 300psf** | | | **77** | **1,277** | | | | | **1,353** |
| | | 3.20 Labor hours | | | | | | | | | |
| **15230.400** | | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | 0 | Unload Care & Protect PCCP & Fittings | 285.00 | lf | 1 | - | - | | 2 | 0.01 /lf | 2 |
| | 10 | Layout Pipe & Fitting | 285.00 | lf | 68 | - | - | | - | 0.24 /lf | 68 |
| | 460 | PCCP Equipment- RT Crane 60 MT | 62.70 | ch | 1,134 | - | - | | 12,408 | 215.984 /ch | 13,542 |
| n B072 | | Prestressed Concrete Cylinder Pipe (250#) 66 | 285.00 | lf | 19,924 | 71,250 | - | | - | 319.910 /lf | 91,174 |
| n K072 | | PCCP 90 Bend 66 | 1.00 | ea | 517 | 2,500 | - | | - | 3,017.31 /ea | 3,017 |
| n L066 | | PCCP 45 Bend 66 | 2.00 | ea | 948 | 4,000 | - | | - | 2,474.14 /ea | 4,948 |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| **15230.400** | **Prestr Conc Cylind-(PCCP)** | | | | | | | | |
| n m066 | PCCP-Restrained Joint (weld) 66 | 6.00 ea | 143 | 480 | - | | - | 103.86 /ea | 623 |
| | **Prestr Conc Cylind-(PCCP)** | | **22,735** | **78,230** | | | **12,410** | | **113,376** |
| | 968.081 Labor hours | | | | | | | | |
| | 62.731 Equipment hours | | | | | | | | |
| | ***01 UNOX Bypass*** | | ***58,250*** | ***150,640*** | ***228,569*** | | ***62,601*** | | ***500,060*** |
| | 2,766.32 Labor hours | | | | | | | | |
| | 748.23 Equipment hours | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***02 Primary Redirect*** | | | | | | | | | |
| **01590.000** | | **Traffic/Pollution Control** | | | | | | | | | |
| | 5 | Traffic Control | 1.00 | ls | | | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | | **Traffic/Pollution Control** | | | | | **10,000** | | | | **10,000** |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Protect Existing Utilities (6"CIP WS, 10"CIP SFPE, 48" RCP San) | 1.00 | ls | - | - | 2,500 | | - | 2,500.00 /ls | 2,500 |
| | 20 | Connect to Existing Basin | 1.00 | ls | - | - | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | | **Sitework Allowance** | | | | | **7,500** | | | | **7,500** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2508 | Remove 72" Steel Pipe (21vf) | 70.00 | lf | 114 | - | - | | 217 | 4.731 /lf | 331 |
| | 2514 | Demo Railroad Lines | 70.00 | lf | 343 | - | - | | 891 | 17.63 /lf | 1,234 |
| | 2734 | Remove Asphalt Pavement, 5"thk | 333.00 | sy | 517 | - | - | | 1,042 | 4.684 /sy | 1,560 |
| | 3006 | Demo Concrete Return Sludge Channel | 66.00 | cy | 5,386 | - | - | | 1,261 | 100.70 /cy | 6,646 |
| | | **Selective Site Demolition** | | | **6,360** | | | | **3,411** | | **9,771** |
| | | 389.64 Labor hours | | | | | | | | | |
| | | 45.71 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 35.00 | lf | 3 | | - | | - | 0.092 /lf | 3 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 136.111 | cy | 138 | - | - | | 602 | 5.434 /cy | 740 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 5.761 | cy | 9 | - | - | | 29 | 6.56 /cy | 38 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 26.80 | cy | 65 | - | - | | 216 | 10.492 /cy | 281 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 81.38 | cy | 74 | - | - | | 232 | 3.75 /cy | 305 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 32.56 | cy | - | 1,146 | - | | - | 35.20 /cy | 1,146 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 54.733 | cy | 77 | - | - | | 148 | 4.10 /cy | 224 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 54.733 | cy | 54 | - | - | | 89 | 2.61 /cy | 143 |
| n | 8367 | Trench Shores- Aluminum Hydraulic 36" width x 7' Rail | 1.00 | u/mo | | - | - | | 76 | 76.00 /u/mo | 76 |
| | | **Trenching** | | | **419** | **1,146** | | | **1,392** | | **2,956** |
| | | 27.31 Labor hours | | | | | | | | | |
| | | 17.984 Equipment hours | | | | | | | | | |
| **02315.400** | | **Drilling & Blasting** | | | | | | | | | |
| | 1008 | Hydraulic Hoe Ram -Medium | 144.00 | cy | 402 | - | 21,600 | | | 152.79 /cy | 22,002 |
| | | **Drilling & Blasting** | | | **402** | | **21,600** | | | | **22,002** |
| | | 23.04 Labor hours | | | | | | | | | |
| | | 11.52 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 54.733 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 54.733 | cy | - | - | - | | - | | |
| | 46 | Bore & Jack Spoils Spoils (Summary) | 136.14 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 190.87 | cy | 308 | - | - | | 592 | 4.712 /cy | 899 |
| | A0A0 | Haul Spoils/Off Site 10cy Rear Dump 4.00 Hour/Load | 136.14 | cy | 613 | - | - | | 1,021 | 12.001 /cy | 1,634 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 54.733 | cy | 246 | - | - | | 410 | 12.001 /cy | 657 |
| | | **Excavation Spoils** | | | **1,167** | | | | **2,023** | | **3,190** |
| | | 68.663 Labor hours | | | | | | | | | |
| | | 34.332 Equipment hours | | | | | | | | | |
| **02445.000** | | **Boring & Jack Conduit** | | | | | | | | | |
| | 0 | Mob/Demob Bore & Jack Equipment | 1.00 | ea | - | - | 5,000 | | - | 5,000.00 /ea | 5,000 |
| | 100 | Excavate Jacking Pit | 453.333 | cy | 824 | - | - | | 2,227 | 6.731 /cy | 3,051 |
| | 105 | Excavate Recieving Pit | 75.56 | cy | 137 | - | - | | 371 | 6.731 /cy | 509 |
| | 200 | Shore Jacking/Receiving Pits | 2,720.00 | bsf | - | - | 40,800 | | - | 15.00 /bsf | 40,800 |
| | 300 | Backfill Jacking/Receiving Pits | 528.89 | cy | 2,589 | - | - | | 5,407 | 15.12 /cy | 7,996 |
| | 400 | Jacking Slab & Reaction Block | 11.971 | cy | 2,602 | 2,753 | - | | - | 447.373 /cy | 5,356 |
| n | 5072 | Bore & Jack Pipe 72 | 130.00 | lf | - | - | 120,900 | | - | 930.00 /lf | 120,900 |
| | 7000 | Grout Casing | 59.56 | cy | 244 | 10,274 | - | | 288 | 181.434 /cy | 10,806 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Boring & Jack Conduit** | | | **6,397** | **13,027** | **166,700** | | **8,294** | | **194,418** |
| | | 346.16 Labor hours | | | | | | | | | |
| | | 137.19 Equipment hours | | | | | | | | | |
| **02720.100** | | **Aggregate Base Course** | | | | | | | | | |
| | 1180 | Crushed Rock | 222.00 | cy | 169 | 2,270 | - | | 852 | 14.822 /cy | 3,291 |
| | 1230 | Granular Fill | 144.00 | cy | 410 | 1,722 | - | | 2,073 | 29.21 /cy | 4,206 |
| | | **Aggregate Base Course** | | | **579** | **3,992** | | | **2,925** | | **7,496** |
| | | 32.512 Labor hours | | | | | | | | | |
| | | 32.512 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| n | 10 | Bitum Paving | 333.00 | sy | - | - | 5,261 | | - | 15.80 /sy | 5,261 |
| | | **Asphalt Paving - Location** | | | | | **5,261** | | | | **5,261** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 311.00 | sy | 65 | 681 | - | | 26 | 2.482 /sy | 772 |
| | | **Lawns & Grasses** | | | **65** | **681** | | | **26** | | **772** |
| | | 3.11 Labor hours | | | | | | | | | |
| | | 0.622 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 140 | Concrete: Primary Redirect Junction Chamber | 75.00 | cy | 9,306 | 26,250 | - | | 3,782 | 524.52 /cy | 39,339 |
| | | **Concrete in Place** | | | **9,306** | **26,250** | | | **3,782** | | **39,339** |
| | | 450.000 Labor hours | | | | | | | | | |
| | | 75.00 Equipment hours | | | | | | | | | |
| **04210.000** | | **Clay Masonry Units** | | | | | | | | | |
| n | 8105 | Brick Mortar Type S | 24.312 | cf | 32 | 106 | - | | - | 5.684 /cf | 138 |
| | 8900 | Clean Brick | 320.00 | sf | 102 | 74 | - | | - | 0.55 /sf | 175 |
| n | 018A | Standard Face Brick - Common Bond | 2,026.00 | ea | 1,439 | 972 | - | | - | 1.19 /ea | 2,411 |
| | | **Clay Masonry Units** | | | **1,573** | **1,152** | | | | | **2,725** |
| | | 66.002 Labor hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 1.00 | ea | 77 | 1,277 | - | | - | 1,353.17 /ea | 1,353 |
| | | **Hatch, Aluminum, 300psf** | | | **77** | **1,277** | | | | | **1,353** |
| | | 3.20 Labor hours | | | | | | | | | |
| **11284.000** | | **Sluice Gates** | | | | | | | | | |
| | 5454 | 54" x 54" Sluice Gate, MO | 2.00 | ea | 24,994 | 49,200 | - | | - | 37,097.160 /ea | 74,194 |
| | | **Sluice Gates** | | | **24,994** | **49,200** | | | | | **74,194** |
| | | 1,047.98 Labor hours | | | | | | | | | |
| **13000.005** | | **Special Const Allowance** | | | | | | | | | |
| | 5 | SCADA Allowance for 2 gates & Knife gate valve | 0.00 | ls | 0 | 0 | - | | - | | |
| **15220.302** | | **A53 CW Pipe PE/GE/T&C/SW** | | | | | | | | | |
| n | 300h | A53 CW Standard Pipe PE, 54" | 130.00 | lf | 5,932 | 96,454 | - | | - | 787.591 /lf | 102,387 |
| n | 300k | A53 CW Standard Pipe PE, 72" | 110.00 | lf | 6,701 | 109,008 | - | | - | 1,051.90 /lf | 115,709 |
| | | **A53 CW Pipe PE/GE/T&C/SW** | | | **12,633** | **205,462** | | | | | **218,095** |
| | | 460.57 Labor hours | | | | | | | | | |
| **15230.400** | | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | 0 | Unload Care & Protect PCCP & Fittings | 35.00 | lf | 0 | - | - | | 0 | 0.01 /lf | 0 |
| | 10 | Layout Pipe & Fitting | 35.00 | lf | 8 | - | - | | - | 0.24 /lf | 8 |
| | 325 | PCCP Equipment- Cat 325 Excavator | 6.30 | ch | 122 | - | - | | 698 | 130.09 /ch | 820 |
| n | B060 | Prestressed Concrete Cylinder Pipe (250#) 60 | 35.00 | lf | 2,087 | 7,350 | - | | - | 269.63 /lf | 9,437 |
| n | K060 | PCCP 90 Bend 60 | 1.00 | ea | 431 | 2,100 | - | | - | 2,531.15 /ea | 2,531 |
| | | **Prestr Conc Cylind-(PCCP)** | | | **2,648** | **9,450** | | | **698** | | **12,796** |
| | | 112.224 Labor hours | | | | | | | | | |
| | | 6.304 Equipment hours | | | | | | | | | |
| **16000.005** | | **Electrical Allowance** | | | | | | | | | |
| | 5 | Electrical Allowance for 2 gates & knife gate valve | 0.00 | ls | 0 | 0 | - | | - | | |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | ***02 Primary Redirect*** | | ***66,620*** | ***311,637*** | ***211,061*** | | ***22,551*** | | ***611,868*** |
| | 3,030.40 Labor hours | | | | | | | | |
| | 361.17 Equipment hours | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***03 Return Activiated Sludge*** | | | | | | | | | |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Allowance to repair retaining wall after direction drilling | 1.00 | ls | - | - | 1,500 | | - | 1,500.00 /ls | 1,500 |
| | | **Sitework Allowance** | | | | | **1,500** | | | | **1,500** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 101 | Structural Allowance for Misc. Demo to access RAS Pipe Gallery | 1.00 | ls | | - | 5,000 | | | 5,000.00 /ls | 5,000 |
| | | **Selective Site Demolition** | | | | | **5,000** | | | | **5,000** |
| **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | 1 | Design Shoring System-Minor | 1.00 | ls | - | - | 1,000 | | - | 1,000.00 /ls | 1,000 |
| | 2 | Design Shoring System-Average | 1.00 | ls | - | - | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | 100 | Survey & Layout Shoring | 288.00 | lf | 4 | - | - | | - | 0.02 /lf | 4 |
| | 105 | Mobilize Pile Driving Equipment | 2.00 | ea | - | - | 50,000 | | - | 25,000.00 /ea | 50,000 |
| n | 1025 | Steel Sheeting,15' x 22psf, pulled & salvage | 3,420.00 | sf | 17,723 | 19,870 | - | | 23,407 | 17.84 /sf | 61,000 |
| | 1045 | Install & Remove Wales/Struts/Connectors | 3.762 | ton | 914 | 3,461 | - | | 1,207 | 1,483.73 /ton | 5,582 |
| n | 1050 | Rent Steel Sheet Piling and Wales, first month | 41.382 | ton | - | 12,564 | - | | - | 303.60 /ton | 12,564 |
| | | **Sheet Piling** | | | **18,641** | **35,895** | **61,000** | | **24,614** | | **140,150** |
| | | 614.064 Labor hours | | | | | | | | | |
| | | 153.444 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 464.45 | cy | 391 | - | - | | 1,058 | 3.121 /cy | 1,450 |
| | 461C | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 175.41 | cy | 299 | - | - | | 580 | 5.011 /cy | 879 |
| n | A000 | IMPORT MATERIAL (Summary) | 12.00 | CY | - | - | - | | - | | |
| n | A015 | Import Gravel Fill | 52.222 | cy | - | 783 | 292 | | - | 20.60 /cy | 1,076 |
| | | **Foundation Excavation** | | | **690** | **783** | **292** | | **1,639** | | **3,405** |
| | | 45.82 Labor hours | | | | | | | | | |
| | | 26.42 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 700.00 | lf | 65 | | - | | - | 0.092 /lf | 65 |
| n | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 403.09 | cy | 408 | - | - | | 1,148 | 3.86 /cy | 1,556 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 162.60 | cy | 164 | - | - | | 719 | 5.434 /cy | 884 |
| n | 2242 | Trenching Excavator- 240 HP (45 cy/hr-360cy/day) Difficult Exc. | 959.852 | cy | 647 | - | - | | 2,830 | 3.623 /cy | 3,477 |
| n | 3130 | Trench Bedding-Excavator- 130 HP | 30.741 | cy | 62 | - | - | | 181 | 7.901 /cy | 243 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 36.67 | cy | 56 | - | - | | 185 | 6.56 /cy | 240 |
| n | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 104.911 | cy | 339 | - | - | | 987 | 12.641 /cy | 1,326 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 115.14 | cy | 279 | - | - | | 929 | 10.492 /cy | 1,208 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 1,163.351 | cy | 1,052 | - | - | | 3,311 | 3.751 /cy | 4,363 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 287.46 | cy | - | 10,119 | - | | - | 35.20 /cy | 10,119 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 362.19 | cy | 508 | - | - | | 976 | 4.10 /cy | 1,484 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 362.19 | cy | 355 | - | - | | 590 | 2.61 /cy | 945 |
| n | 8367 | Trench Shores- Aluminum Hydraulic 36" width x 7' Rail | 1.00 | u/mo | | - | - | | 76 | 76.00 /u/mo | 76 |
| n | 9616 | Trench Shield- 6x16 | 0.35 | u/mo | - | - | - | | 494 | 1,410.00 /u/mo | 494 |
| | A006 | Pipe Test | 700.00 | lf | 517 | 560 | - | | - | 1.54 /lf | 1,077 |
| | A008 | Pipe Locates (Pot Hole) | 3.00 | ea | 456 | 150 | - | | 81 | 228.96 /ea | 687 |
| | C0R0 | Concrete Thrust Block, 16" | 3.00 | ea | 286 | 99 | - | | - | 128.44 /ea | 385 |
| | C0T0 | Concrete Thrust Block, 20" | 4.00 | ea | 429 | 224 | - | | - | 163.37 /ea | 653 |
| | C0V0 | Concrete Thrust Block, 24" | 8.00 | ea | 859 | 688 | - | | - | 193.37 /ea | 1,547 |
| | | **Trenching** | | | **6,483** | **11,840** | | | **12,507** | | **30,829** |
| | | 361.45 Labor hours | | | | | | | | | |
| | | 178.292 Equipment hours | | | | | | | | | |
| **02315.400** | | **Drilling & Blasting** | | | | | | | | | |
| | 1008 | Hydraulic Hoe Ram | 476.00 | cy | 1,328 | - | 71,400 | | | 152.79 /cy | 72,728 |
| | | **Drilling & Blasting** | | | **1,328** | | **71,400** | | | | **72,728** |
| | | 76.16 Labor hours | | | | | | | | | |
| | | 38.08 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 651.222 | cy | - | - | - | | - | | |
| | 40 | Foundation Excavation Spoils (Summary) | 289.04 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 362.19 | cy | - | - | - | | - | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 362.19 | cy | 584 | - | - | | 1,123 | 4.712 /cy | 1,707 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 289.04 | cy | 336 | - | - | | 947 | 4.44 /cy | 1,283 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 362.19 | cy | 1,631 | - | - | | 2,715 | 12.001 /cy | 4,346 |
| | A0I7 | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 289.04 | cy | 181 | - | - | | 418 | 2.071 /cy | 599 |
| | | **Excavation Spoils** | | | **2,732** | | | | **5,202** | | **7,934** |
| | | 160.00 Labor hours | | | | | | | | | |
| | | 80.00 Equipment hours | | | | | | | | | |
| **02446.000** | | **Drainage Outflow To Head** | | | | | | | | | |
| n | 0 | Mob/Demob Directional Drilling Equipment | 1.00 | ea | - | - | 2,500 | | - | 2,500.00 /ea | 2,500 |
| n | 1024 | Install 24" Pipe N.O.C. | 900.00 | lf | - | - | 180,000 | | - | 200.00 /lf | 180,000 |
| | | **Drainage Outflow To Head** | | | | | **182,500** | | | | **182,500** |
| **02639.020** | | **Storm Drainage Manholes** | | | | | | | | | |
| | 0 | Unload Care & Protect Manhole | 1.00 | ea | 18 | - | - | | - | 17.52 /ea | 18 |
| | 6000 | Place & Shape Manhole Base & Inverts- 60" | 1.00 | ea | 210 | - | - | | - | 436.44 /ea | 436 |
| | 6010 | Manhole 60" x 10' Deep | 1.00 | ea | 274 | 4,048 | - | | 496 | 4,818.80 /ea | 4,819 |
| | | **Storm Drainage Manholes** | | | **502** | **4,048** | | | **496** | | **5,273** |
| | | 29.00 Labor hours | | | | | | | | | |
| | | 4.00 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| | 20 | Bitum Paving Parking Lots | 312.00 | sy | - | - | 2,496 | | - | 8.00 /sy | 2,496 |
| | | **Asphalt Paving - Location** | | | | | **2,496** | | | | **2,496** |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 110 | Concrete: Slab on Grade - Wet Well | 24.00 | cy | 1,737 | 7,440 | - | | 654 | 409.62 /cy | 9,831 |
| n | 110 | Concrete: Pump Support Pad - Wet Well | 1.00 | cy | 72 | 310 | - | | 27 | 409.61 /cy | 410 |
| n | 110 | Concrete: Slab on Grade - Valve Vault | 13.00 | cy | 941 | 4,030 | - | | 354 | 409.611 /cy | 5,325 |
| n | 140 | Concrete: Wall - Wet Well | 142.00 | cy | 17,620 | 49,700 | - | | 7,161 | 524.52 /cy | 74,481 |
| n | 140 | Concrete: Wall - Valve Vault | 71.00 | cy | 8,810 | 24,850 | - | | 3,581 | 524.52 /cy | 37,241 |
| n | 145 | Concrete: Elevated Slab - Wet Well | 24.00 | cy | 2,730 | 8,640 | - | | 1,210 | 524.18 /cy | 12,580 |
| n | 145 | Concrete: Elevated Slab - Valve Vault | 13.00 | cy | 1,479 | 4,680 | - | | 656 | 524.18 /cy | 6,814 |
| n | 180 | Concrete: Grout Fill - to avoid grit deposits | 10.00 | cy | 414 | 1,000 | - | | 50 | 146.41 /cy | 1,464 |
| | | **Concrete in Place** | | | **33,803** | **100,650** | | | **13,693** | | **148,146** |
| | | 1,634.500 Labor hours | | | | | | | | | |
| | | 271.52 Equipment hours | | | | | | | | | |
| **03150.010** | | **Concrete Core & Saw** | | | | | | | | | |
| | c240 | Core Drill 24" to 12" depth | 1.00 | ea | 68 | - | - | | | 67.87 /ea | 68 |
| | | **Concrete Core & Saw** | | | **68** | | | | | | **68** |
| | | 5.50 Labor hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 8.00 | ea | 613 | 10,212 | - | | - | 1,353.173 /ea | 10,825 |
| | | **Hatch, Aluminum, 300psf** | | | **613** | **10,212** | | | | | **10,825** |
| | | 25.60 Labor hours | | | | | | | | | |
| **11210.000** | | **PUMPS** | | | | | | | | | |
| | ---- | 25HP Pump & VFD | 3.00 | ea | 47,921 | 96,501 | - | | - | 48,140.76 /ea | 144,422 |
| | | **PUMPS** | | | **47,921** | **96,501** | | | | | **144,422** |
| | | 2,112.00 Labor hours | | | | | | | | | |
| **11217.100** | | **Submersible Sump Pumps** | | | | | | | | | |
| | 50 | Sump Pump 50 HP | 1.00 | ea | 2,903 | 6,000 | - | | 2,055 | 10,957.92 /ea | 10,958 |
| | | **Submersible Sump Pumps** | | | **2,903** | **6,000** | | | **2,055** | | **10,958** |
| | | 144.00 Labor hours | | | | | | | | | |
| | | 24.00 Equipment hours | | | | | | | | | |
| **13000.005** | | **Special Const Allowance** | | | | | | | | | |
| | 5 | SCADA Allowance to Operate Motorized Plug Valve | 0.00 | ls | 0 | 0 | - | | - | | |
| | 5 | SCADA Allowance for Pumps and Flow meter | 0.00 | ls | 0 | 0 | - | | - | | |
| | 5 | SCADA Allowance to Operate Motorized Plug Valve | 0.00 | ls | 0 | 0 | - | | - | | |

| | Item | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **13420.000** | **Instruments** | | | | | | | | | |
| | c116 | Level Sensor | 1.00 | ea | 274 | 1,725 | - | | - | 1,999.30 /ea | 1,999 |
| n | e424 | 24" Magnetic Flow Meter - Flanged | 1.00 | ea | 597 | 13,800 | - | | - | 14,397.15 /ea | 14,397 |
| | | **Instruments** | | | **871** | **15,525** | | | | | **16,396** |
| | | 31.77 Labor hours | | | | | | | | | |
| | **15111.650** | **Plug Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | 103U | Plug Valve, Gear & Wheel Operated, flg, 16" | 3.00 | ea | 1,443 | 12,810 | - | | - | 4,750.95 /ea | 14,253 |
| n | 200W | Plug Valve, MJ, 20" | 1.00 | ea | 581 | 3,600 | - | | - | 4,180.58 /ea | 4,181 |
| n | 200X | Plug Valve, MJ, 24" | 1.00 | ea | 643 | 4,600 | - | | - | 5,243.40 /ea | 5,243 |
| | | **Plug Valve (CI/DI/IBBM)** | | | **2,667** | **21,010** | | | | | **23,677** |
| | | 83.79 Labor hours | | | | | | | | | |
| | **15114.500** | **Check Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | 310U | Check Valve, Swing, flg, 16" | 3.00 | ea | 1,311 | 19,470 | - | | - | 6,926.89 /ea | 20,781 |
| | | **Check Valve (CI/DI/IBBM)** | | | **1,311** | **19,470** | | | | | **20,781** |
| | | 41.19 Labor hours | | | | | | | | | |
| | **15119.600** | **Air/Vacuum Relief Valve** | | | | | | | | | |
| n | 100J | Air Release Valve, 24" | 1.00 | ea | 94 | 200 | - | | - | 293.93 /ea | 294 |
| | | **Air/Vacuum Relief Valve** | | | **94** | **200** | | | | | **294** |
| | | 3.03 Labor hours | | | | | | | | | |
| | **15120.300** | **Bolt & Gaskets Sets** | | | | | | | | | |
| n | 111S | 16-0/0" 150# A307 Steel Bolt Sets | 3.00 | ea | - | 225 | - | | - | 75.00 /ea | 225 |
| n | 111V | 24-0/0" 150# A307 Steel Bolt Sets | 4.50 | ea | - | 833 | - | | - | 185.00 /ea | 833 |
| | 222S | 16-0/0" Full Faced Red Rubber (SBR) Gasket 1/8" | 3.00 | ea | - | 32 | - | | - | 10.74 /ea | 32 |
| | 222V | 24-0/0" Full Faced Red Rubber (SBR) Gasket 1/8" | 4.50 | ea | - | 77 | - | | - | 17.22 /ea | 77 |
| | | **Bolt & Gaskets Sets** | | | | **1,167** | | | | | **1,167** |
| | **15210.010** | **DIP Totals** | | | | | | | | | |
| | 0 | Total Weight (Zero Cost Item) | 88,835.00 | lbs | - | - | - | | - | | |
| | 1 | Weight of Pipe (Zero Cost Item) | 67,340.00 | lbs | - | - | - | | - | | |
| | 2 | Weight of Fittings (Zero Cost Item) | 21,495.00 | lbs | - | - | - | | - | | |
| | **15210.100** | **DIP CML FL & GV CL53/250** | | | | | | | | | |
| | 0 | Unload Care & Protect Flanged/PE DIP & Fittings | 6,255.00 | lbs | 12 | - | - | | 39 | 0.01 /lbs | 51 |
| | 2 | Weight of Flanged Fittings (Zero Cost Item) | 6,255.00 | lbs | - | - | - | | - | | |
| | 10 | Layout Flanged/PE DIP & Fitting | 26.49 | lf | 6 | - | - | | - | 0.23 /lf | 6 |
| | 1CU0 | DI, CML, 45 Bend, FL, 16" | 3.00 | ea | 646 | 2,100 | - | | - | 915.22 /ea | 2,746 |
| | 1HXU | DI, CML, 45 Wye Lateral, FL, 24"x 16" | 3.00 | ea | 1,457 | 13,538 | - | | - | 4,998.09 /ea | 14,994 |
| | | **DIP CML FL & GV CL53/250** | | | **2,120** | **15,638** | | | **39** | | **17,797** |
| | | 89.093 Labor hours | | | | | | | | | |
| | | 0.69 Equipment hours | | | | | | | | | |
| | **15210.200** | **DIP CML Push-On Pipe** | | | | | | | | | |
| | 0 | Unload Care & Protect Push-on DIP & Fittings | 82,580.00 | lbs | 159 | - | - | | 520 | 0.01 /lbs | 679 |
| | 1 | Weight of Push-on Pipe (Zero Cost Item) | 67,340.00 | lbs | - | - | - | | - | | |
| | 2 | Weight of Push-on Fittings (Zero Cost Item) | 15,240.00 | lbs | - | - | - | | - | | |
| | 5 | Layout Push-on DIP & Fitting | 700.00 | lf | 159 | - | - | | - | 0.23 /lf | 159 |
| | 11 | DIP Equipment- Cat 325 Excavator | 19.20 | ch | 372 | - | - | | 2,126 | 130.091 /ch | 2,498 |
| n | 216 | DIP CML, Push-On, Class 52, 16" | 100.00 | lf | 835 | 4,185 | - | | - | 50.20 /lf | 5,020 |
| n | 220 | DIP CML, Push-On, Class 52, 20" | 300.00 | lf | 2,720 | 16,379 | - | | - | 63.662 /lf | 19,099 |
| n | 224 | DIP CML, Push-On, Class 52, 24" | 1,200.00 | lf | 11,453 | 83,402 | - | | - | 79.05 /lf | 94,855 |
| n | 2ATT | DIP CML, Push-on, 90 Bend, 20" | 2.00 | ea | 367 | 3,400 | - | | - | 1,883.72 /ea | 3,767 |
| n | 2AUU | DIP CML, Push-on, 90 Bend, 24" | 2.00 | ea | 434 | 5,325 | - | | - | 2,879.30 /ea | 5,759 |
| n | AARR | DIP CML, Push-on, 45 Bend, 16" | 3.00 | ea | 401 | 2,850 | - | | - | 1,083.56 /ea | 3,251 |
| n | AAUU | DIP CML, Push-on, 45 Bend, 24" | 2.00 | ea | 426 | 4,000 | - | | - | 2,213.11 /ea | 4,426 |
| n | DATT | DIP CML, Push-on, 11-1/4 Bend, 20" | 3.00 | ea | 542 | 4,050 | - | | - | 1,530.523 /ea | 4,592 |
| n | DAUU | DIP CML, Push-on, 11-1/4 Bend, 24" | 4.00 | ea | 852 | 8,100 | - | | - | 2,238.11 /ea | 8,952 |
| n | FAWW | DIP CML, Push-on, Tee BxB, 20"x 20" | 1.00 | ea | 236 | 2,638 | - | | - | 2,873.24 /ea | 2,873 |
| n | FAXX | DIP CML, Push-on, Tee BxB, 24"x 24" | 2.00 | ea | 550 | 8,250 | - | | - | 4,400.23 /ea | 8,800 |
| n | KAUQ | DIP, CML, Push-on, Reducer BxB, 16"x 8" | 3.00 | ea | 386 | 2,063 | - | | - | 816.29 /ea | 2,449 |

| Item | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|
| | **DIP CML Push-On Pipe** | | | **19,892** | **144,641** | | | **2,646** | | **167,179** |
| | 840.144 Labor hours | | | | | | | | | |
| | 28.284 Equipment hours | | | | | | | | | |
| **15241.100** | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| 0 | Unload Care & Protect Pipe/Fittings | 100.00 | lf | 0 | - | - | | 1 | 0.01 /lf | 1 |
| 10 | Layout Pipe & Fitting | 100.00 | lf | 24 | - | - | | - | 0.24 /lf | 24 |
| n 80E0 | PVC Schd. 80 Pipe, 3.00" | 100.00 | lf | 191 | 624 | - | | - | 8.15 /lf | 815 |
| a010 | PVC Joint Primer- Quart | 0.11 | qrt | - | 2 | - | | - | 15.40 /qrt | 2 |
| a020 | PVC Solvent Cement Low VOC- Quart | 0.11 | qrt | - | 2 | - | | - | 21.90 /qrt | 2 |
| | **PVC Schd Pipe & Fittings** | | | **215** | **628** | | | **1** | | **844** |
| | 9.011 Labor hours | | | | | | | | | |
| | 0.011 Equipment hours | | | | | | | | | |
| **16000.005** | **Electrical Allowance** | | | | | | | | | |
| 5 | Electrical Allowance - Motorized Plug Valve | 0.00 | ls | 0 | 0 | - | | - | | |
| 5 | Electrical Allowance - Pumps & Flow Meter | 0.00 | ls | 0 | 0 | - | | - | | |
| 5 | Electrical Allowance - Operate Motorized Plug Valve | 0.00 | ls | 0 | 0 | - | | - | | |
| | ***03 Return Activiated Sludge*** | | | ***142,854*** | ***484,207*** | ***324,188*** | | ***62,892*** | | ***1,014,368*** |
| | 6,306.12 Labor hours | | | | | | | | | |
| | 804.735 Equipment hours | | | | | | | | | |

| | Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ***04 Gravity Thickener*** | | | | | | | | | |
| | **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | | 2734 | Remove Asphalt Pavement | 1,000.00 | sy | 1,553 | - | - | | 3,130 | 4.684 /sy | 4,684 |
| | | | **Selective Site Demolition** | | | **1,553** | | | | **3,130** | | **4,684** |
| | | | 95.00 Labor hours | | | | | | | | | |
| | | | 76.000 Equipment hours | | | | | | | | | |
| | **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | | 2 | Design Shoring System-Average | 1.00 | ls | - | - | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | | 100 | Survey & Layout Shoring | 28.00 | lf | 0 | - | - | | - | 0.02 /lf | 0 |
| | | 105 | Mobilize Pile Driving Equipment | 1.00 | ea | - | - | 25,000 | | - | 25,000.00 /ea | 25,000 |
| | | 1025 | Steel Sheeting,15' x 22psf, pulled & salvage | 420.00 | sf | 2,176 | 2,083 | - | | 2,875 | 16.99 /sf | 7,134 |
| | | 1045 | Install & Remove Wales/Struts/Connectors | 0.462 | ton | 112 | 425 | - | | 148 | 1,483.77 /ton | 686 |
| n | | 1050 | Rent Steel Sheet Piling and Wales, first month | 5.082 | ton | - | 1,324 | - | | - | 260.58 /ton | 1,324 |
| | | | **Sheet Piling** | | | **2,289** | **3,833** | **35,000** | | **3,023** | | **44,144** |
| | | | 75.404 Labor hours | | | | | | | | | |
| | | | 18.844 Equipment hours | | | | | | | | | |
| | **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 4,849.47 | cy | 3,982 | - | - | | 10,765 | 3.041 /cy | 14,747 |
| | 461C | | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 1,528.284 | cy | 2,602 | - | - | | 5,056 | 5.011 /cy | 7,659 |
| n | A000 | | IMPORT MATERIAL (Summary) | 2.00 | CY | - | - | - | | - | | |
| n | A015 | | Import Gravel Fill | 215.111 | cy | - | 3,227 | 1,205 | | - | 20.60 /cy | 4,431 |
| | | | **Foundation Excavation** | | | **6,584** | **3,227** | **1,205** | | **15,822** | | **26,837** |
| | | | 435.37 Labor hours | | | | | | | | | |
| | | | 248.25 Equipment hours | | | | | | | | | |
| | **02315.300** | | **Trenching** | | | | | | | | | |
| | | 0 | Survey & Stake Pipeline | 930.00 | lf | 86 | | - | | - | 0.092 /lf | 86 |
| n | | 2090 | Trenching- Backhoe/Loader 95HP (15 cy/hr-120cy/day) Average Exc. | 1,292.870 | cy | 2,418 | - | - | | 4,646 | 5.463 /cy | 7,063 |
| n | | 3090 | Trench Bedding-Backhoe/Loader 95HP | 74.76 | cy | 201 | - | - | | 303 | 6.74 /cy | 504 |
| n | | 4090 | Trench Pipe Zone Backfill-Backhoe/Loader 95HP | 396.51 | cy | 1,278 | - | - | | 1,928 | 8.09 /cy | 3,206 |
| n | | 5090 | Trench Native Backfill-Backhoe/Loader 95HP | 803.70 | cy | 2,346 | - | - | | 4,276 | 8.24 /cy | 6,622 |
| | | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 471.262 | cy | - | 16,588 | - | | - | 35.20 /cy | 16,588 |
| | | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 489.174 | cy | 686 | - | - | | 1,318 | 4.10 /cy | 2,004 |
| | | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 489.174 | cy | 479 | - | - | | 797 | 2.61 /cy | 1,276 |
| | A006 | | Pipe Test | 930.00 | lf | 687 | 744 | - | | - | 1.54 /lf | 1,431 |
| | A008 | | Pipe Locates (Pot Hole) | 1.00 | ea | 152 | 50 | - | | 27 | 228.96 /ea | 229 |
| | | | **Trenching** | | | **8,332** | **17,382** | | | **13,295** | | **39,010** |
| | | | 582.33 Labor hours | | | | | | | | | |
| | | | 334.39 Equipment hours | | | | | | | | | |
| | **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | | 0 | EXCAVATION SPOILS (Grand Total) | 3,310.36 | cy | - | - | - | | - | | |
| | | 40 | Foundation Excavation Spoils (Summary) | 2,821.19 | cy | - | - | - | | - | | |
| | | 45 | Trenching Spoils (Summary) | 489.174 | cy | - | - | - | | - | | |
| | | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 489.174 | cy | 789 | - | - | | 1,516 | 4.712 /cy | 2,305 |
| | | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 3,321.19 | cy | 3,425 | - | - | | 9,651 | 3.94 /cy | 13,076 |
| | A0A4 | | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 489.174 | cy | 2,203 | - | - | | 3,668 | 12.001 /cy | 5,870 |
| | A0I7 | | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 3,321.19 | cy | 2,079 | - | - | | 4,800 | 2.071 /cy | 6,879 |
| | | | **Excavation Spoils** | | | **8,496** | | | | **19,634** | | **28,130** |
| | | | 492.29 Labor hours | | | | | | | | | |
| | | | 246.143 Equipment hours | | | | | | | | | |
| | **02446.000** | | **Drainage Outflow To Head** | | | | | | | | | |
| n | | 0 | Mob/Demob Directional Drilling Equipment | 2.00 | ea | - | - | 5,000 | | - | 2,500.00 /ea | 5,000 |
| n | | 1008 | Install 8" Pipe DIP | 60.00 | lf | - | - | 2,700 | | - | 45.00 /lf | 2,700 |
| n | | 1010 | Install 10" Pipe DIP | 120.00 | lf | - | - | 7,200 | | - | 60.00 /lf | 7,200 |
| | | | **Drainage Outflow To Head** | | | | | **14,900** | | | | **14,900** |
| | **02720.150** | | **Aggregate Base- Roads** | | | | | | | | | |
| | | 1116 | Aggregate Base | 300.00 | cy | 85 | 2,691 | - | | 432 | 10.70 /cy | 3,208 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Aggregate Base- Roads** | | | **85** | **2,691** | | | **432** | | **3,208** |
| | | 4.80 Labor hours | | | | | | | | | |
| | | 4.80 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| | 20 | Bitum Paving | 1,000.00 | sy | - | - | 8,000 | | - | 8.00 /sy | 8,000 |
| | | **Asphalt Paving - Location** | | | | | **8,000** | | | | **8,000** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 15,000.00 | sy | 3,119 | 32,850 | - | | 1,253 | 2.482 /sy | 37,223 |
| | | **Lawns & Grasses** | | | **3,119** | **32,850** | | | **1,253** | | **37,223** |
| | | 150.00 Labor hours | | | | | | | | | |
| | | 30.00 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 110 | Concrete: Slab on Grade | 60.00 | cy | 4,343 | 18,600 | - | | 1,634 | 409.62 /cy | 24,577 |
| n | 120 | Concrete: Slab on Grade Circular | 353.954 | cy | 29,280 | 109,726 | - | | 9,637 | 419.951 /cy | 148,643 |
| n | 140 | Concrete: Wall | 290.00 | cy | 35,985 | 101,500 | - | | 14,625 | 524.52 /cy | 152,110 |
| | | **Concrete in Place** | | | **69,608** | **229,826** | | | **25,896** | | **325,330** |
| | | 3,365.82 Labor hours | | | | | | | | | |
| | | 513.54 Equipment hours | | | | | | | | | |
| **11000.015** | | **Equipment Demolition** | | | | | | | | | |
| | 101 | Demo Selective Items-Each - Gravity Thickener | 1.00 | ea | 119 | - | - | | | 119.28 /ea | 119 |
| | 3335 | Wash Down/Disinfect Tank -Gravity THickener | 200.00 | sf | 21 | 10 | - | | 4 | 0.18 /sf | 35 |
| | | **Equipment Demolition** | | | **141** | **10** | | | **4** | | **155** |
| | | 6.67 Labor hours | | | | | | | | | |
| | | 1.67 Equipment hours | | | | | | | | | |
| **11225.100** | | **Gravity Thickener** | | | | | | | | | |
| | 0 | Unload & Protect Gravity Thickener | 2.00 | ea | 549 | - | - | | 792 | 670.52 /ea | 1,341 |
| | 00 | Warehouse & Care of Gravity Thickener | 2.00 | u/mo | 127 | - | - | | - | 63.66 /u/mo | 127 |
| n | 70 | Gravity Thickener 70' Diameter | 2.00 | ea | 134,338 | 270,000 | - | | 193,546 | 298,942.14 /ea | 597,884 |
| | 6091 | 90 Ton Crane w/1cy Bucket | 47.512 | cy | 29 | - | - | | 367 | 8.33 /cy | 396 |
| | F000 | Swept-in Grout | 47.512 | cy | 1,447 | - | - | | - | 105.46 /cy | 5,011 |
| | G100 | Test & Check Gravity Thickener | 2.00 | ea | 509 | - | - | | - | 254.64 /ea | 509 |
| | z900 | Gravity Thickener Manufacturers Representative | 6.00 | day | - | | 4,800 | | - | 950.00 /day | 5,700 |
| | | **Gravity Thickener** | | | **137,000** | **270,000** | **4,800** | | **194,705** | | **610,968** |
| | | 6,008.61 Labor hours | | | | | | | | | |
| | | 985.17 Equipment hours | | | | | | | | | |
| **11310.100** | | **Submersible Sludge Pumps** | | | | | | | | | |
| | 05 | Thickened Sludge Pump | 2.00 | ea | 1,984 | 4,000 | - | | 1,404 | 3,693.96 /ea | 7,388 |
| | | **Submersible Sludge Pumps** | | | **1,984** | **4,000** | | | **1,404** | | **7,388** |
| | | 98.40 Labor hours | | | | | | | | | |
| | | 16.40 Equipment hours | | | | | | | | | |
| **13121.000** | | **Pre-Engineered Metal Bldg** | | | | | | | | | |
| | z001 | Pre-Engineered Metal Bldg - Sludge Pump Shelter | 300.00 | sf | | | 22,500 | | | 75.00 /sf | 22,500 |
| | | **Pre-Engineered Metal Bldg** | | | | | **22,500** | | | | **22,500** |
| **15111.650** | | **Plug Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | 200P | Plug Valve, MJ, 6" | 6.00 | ea | 1,058 | 2,550 | - | | - | 601.283 /ea | 3,608 |
| n | 200Q | Plug Valve, MJ, 8" | 2.00 | ea | 450 | 1,150 | - | | - | 800.04 /ea | 1,600 |
| | | **Plug Valve (CI/DI/IBBM)** | | | **1,508** | **3,700** | | | | | **5,208** |
| | | 47.38 Labor hours | | | | | | | | | |
| **15114.500** | | **Check Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | C20Q | Check Valve, Double Disc, MJ, 8" | 2.00 | ea | 430 | 600 | - | | - | 514.86 /ea | 1,030 |
| n | C20R | Check Valve, Double Disc, MJ, 10" | 2.00 | ea | 556 | 1,000 | - | | - | 778.11 /ea | 1,556 |
| | | **Check Valve (CI/DI/IBBM)** | | | **986** | **1,600** | | | | | **2,586** |
| | | 30.98 Labor hours | | | | | | | | | |
| **15210.010** | | **DIP Totals** | | | | | | | | | |
| | 0 | Total Weight (Zero Cost Item) | 30,141.00 | lbs | - | - | - | | - | | |
| | 1 | Weight of Pipe (Zero Cost Item) | 29,331.00 | lbs | - | - | - | | - | | |
| | 2 | Weight of Fittings (Zero Cost Item) | 810.00 | lbs | - | - | - | | - | | |

| | Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **15210.200** | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | | 0 | Unload Care & Protect Push-on DIP & Fittings | 30,141.00 | lbs | 58 | - | - | | 190 | 0.01 /lbs | 248 |
| | | 1 | Weight of Push-on Pipe (Zero Cost Item) | 29,331.00 | lbs | - | - | - | | - | | |
| | | 2 | Weight of Push-on Fittings (Zero Cost Item) | 810.00 | lbs | - | - | - | | - | | |
| | | 5 | Layout Push-on DIP & Fitting | 930.00 | lf | 211 | - | - | | - | 0.23 /lf | 211 |
| n | | 208 | DIP CML, Push-On, Class 52, 8" | 630.00 | lf | 3,756 | 10,668 | - | | - | 22.90 /lf | 14,424 |
| n | | 210 | DIP CML, Push-On, Class 52, 10" | 300.00 | lf | 2,004 | 6,638 | - | | - | 28.81 /lf | 8,642 |
| n | FAQQ | | DIP CML, Push-on, Wye BxB, 8"x 8" | 2.00 | ea | 199 | 540 | - | | - | 369.46 /ea | 739 |
| n | FAQQ | | DIP CML, Push-on, Tee BxB, 8"x 8" | 4.00 | ea | 398 | 1,080 | - | | - | 369.46 /ea | 1,478 |
| | | | **DIP CML Push-On Pipe** | | | **6,626** | **18,925** | | | **190** | | **25,742** |
| | | | 279.14 Labor hours | | | | | | | | | |
| | | | 3.32 Equipment hours | | | | | | | | | |
| | **16000.005** | | **Electrical Allowance** | | | | | | | | | |
| | | 5 | Electrical Allowance | 0.00 | ls | 0 | 0 | - | | - | | |
| | | | ***04 Gravity Thickener*** | | | ***248,312*** | ***588,044*** | ***86,405*** | | ***278,788*** | | ***1,206,012*** |
| | | | 11,672.17 Labor hours | | | | | | | | | |
| | | | 2,478.51 Equipment hours | | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***05 Chlorination Contact Tank No. 2*** | | | | | | | | | |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2711 | Saw Cut Concrete | 48.00 | lf | 102 | | - | | 194 | 6.16 /lf | 296 |
| | 3004 | Demo Conc Walls | 46.00 | cy | 3,754 | - | - | | 879 | 100.70 /cy | 4,632 |
| | | **Selective Site Demolition** | | | **3,856** | | | | **1,072** | | **4,928** |
| | | 236.384 Labor hours | | | | | | | | | |
| | | 13.284 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 140 | Concrete: Wall | 75.00 | cy | 9,306 | 26,250 | - | | 3,782 | 524.52 /cy | 39,339 |
| | | **Concrete in Place** | | | **9,306** | **26,250** | | | **3,782** | | **39,339** |
| | | 450.000 Labor hours | | | | | | | | | |
| | | 75.00 Equipment hours | | | | | | | | | |
| | | ***05 Chlorination Contact Tank No. 2*** | | | ***13,162*** | ***26,250*** | ***0*** | | ***4,854*** | | ***44,266*** |
| | | 686.384 Labor hours | | | | | | | | | |
| | | 88.284 Equipment hours | | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***06 ACTIFLO*** | | | | | | | | | |
| **01560.000** | | **Const Equip & Small Tools** | | | | | | | | | |
| DM31 | | Crawler Mounted Lattice Boom Crane-Manitowoc 4600-5 317.5MT@334HP | 36.00 | wk | | - | - | | 690,264 | 19,174.00 /wk | 690,264 |
| | | **Const Equip & Small Tools** | | | | | | | **690,264** | | **690,264** |
| | | 1,440.00 Labor hours | | | | | | | | | |
| | | 1,440.00 Equipment hours | | | | | | | | | |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Structural Rehab of Entire Settling Basin | 1.00 | ls | - | - | 2,000,000 | | - | 2,000,000.00 /ls | 2,000,000 |
| | | **Sitework Allowance** | | | | | **2,000,000** | | | | **2,000,000** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2734 | Remove Asphalt Pavement, 5"thk | 250.00 | sy | 388 | - | - | | 783 | 4.684 /sy | 1,171 |
| | | **Selective Site Demolition** | | | **388** | | | | **783** | | **1,171** |
| | | 23.75 Labor hours | | | | | | | | | |
| | | 19.00 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 800.00 | lf | 74 | | - | | - | 0.092 /lf | 74 |
| n | 2090 | Trenching- Backhoe/Loader 95HP (15 cy/hr-120cy/day) Average Exc. | 43.92 | cy | 82 | - | - | | 158 | 5.463 /cy | 240 |
| n | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 148.063 | cy | 150 | - | - | | 422 | 3.86 /cy | 571 |
| n | 3090 | Trench Bedding-Backhoe/Loader 95HP | 41.55 | cy | 112 | - | - | | 168 | 6.74 /cy | 280 |
| n | 3130 | Trench Bedding-Excavator- 130 HP | 12.78 | cy | 26 | - | - | | 75 | 7.90 /cy | 101 |
| n | 4090 | Trench Pipe Zone Backfill-Backhoe/Loader 95HP | 92.48 | cy | 298 | - | - | | 450 | 8.09 /cy | 748 |
| n | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 37.784 | cy | 122 | - | - | | 355 | 12.641 /cy | 478 |
| n | 5090 | Trench Native Backfill-Backhoe/Loader 95HP | -96.705 | cy | (282) | - | - | | (515) | 8.24 /cy | (797) |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 88.33 | cy | 80 | - | - | | 251 | 3.751 /cy | 331 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 184.59 | cy | - | 6,497 | - | | - | 35.20 /cy | 6,497 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 200.36 | cy | 133 | - | - | | 256 | 1.941 /cy | 389 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 200.36 | cy | 196 | - | - | | 327 | 2.61 /cy | 523 |
| n | 9616 | Trench Shield- 6x16 | 0.10 | u/mo | - | - | - | | 141 | 1,410.00 /u/mo | 141 |
| A006 | | Pipe Test | 800.00 | lf | 591 | 640 | - | | - | 1.54 /lf | 1,231 |
| A008 | | Pipe Locates (Pot Hole) | 1.00 | ea | 152 | 50 | - | | 27 | 228.96 /ea | 229 |
| C0R0 | | Concrete Thrust Block, 16" | 6.00 | ea | 573 | 198 | - | | - | 128.44 /ea | 771 |
| | | **Trenching** | | | **2,306** | **7,385** | | | **2,115** | | **11,807** |
| | | 121.421 Labor hours | | | | | | | | | |
| | | 38.012 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 200.36 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 200.36 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 200.36 | cy | 153 | - | - | | 294 | 2.231 /cy | 447 |
| A0A4 | | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 200.36 | cy | 902 | - | - | | 1,502 | 12.001 /cy | 2,404 |
| | | **Excavation Spoils** | | | **1,055** | | | | **1,796** | | **2,852** |
| | | 61.531 Labor hours | | | | | | | | | |
| | | 30.77 Equipment hours | | | | | | | | | |
| **02720.150** | | **Aggregate Base- Roads** | | | | | | | | | |
| | 1118 | Aggregate Base | 222.00 | cy | 63 | 1,991 | - | | 320 | 10.70 /cy | 2,374 |
| | | **Aggregate Base- Roads** | | | **63** | **1,991** | | | **320** | | **2,374** |
| | | 3.552 Labor hours | | | | | | | | | |
| | | 3.552 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| n | 10 | Bitum Paving | 669.00 | sy | - | - | 10,570 | | - | 15.80 /sy | 10,570 |
| | | **Asphalt Paving - Location** | | | | | **10,570** | | | | **10,570** |
| **02750.100** | | **Concrete Paving** | | | | | | | | | |
| z015 | | Concrete Pavement, Walkways | 50.00 | sy | 102 | 572 | - | | 38 | 14.23 /sy | 711 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Concrete Paving** | | | **102** | **572** | | | **38** | | **711** |
| | | 5.45 Labor hours | | | | | | | | | |
| | | 0.55 Equipment hours | | | | | | | | | |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 50.00 | sy | 10 | 110 | - | | 4 | 2.481 /sy | 124 |
| | | **Lawns & Grasses** | | | **10** | **110** | | | **4** | | **124** |
| | | 0.50 Labor hours | | | | | | | | | |
| | | 0.10 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 110 | Concrete: Pad for HRC | 180.00 | cy | 13,029 | 55,800 | - | | 4,902 | 409.62 /cy | 73,731 |
| n | 110 | Concrete: Pump Support Slab | 1.00 | cy | 72 | 310 | - | | 27 | 409.61 /cy | 410 |
| n | 140 | Concrete | 180.00 | cy | 22,335 | 63,000 | - | | 9,077 | 524.52 /cy | 94,413 |
| n | 140 | Concrete: Baffle Wall | 45.00 | cy | 5,584 | 15,750 | - | | 2,269 | 524.52 /cy | 23,603 |
| n | 140 | Concrete: Wall | 680.00 | cy | 84,378 | 476,000 | - | | 34,292 | 874.52 /cy | 594,671 |
| n | 140 | Concrete: Influent & Effluent Channel | 80.00 | cy | 9,927 | 80,000 | - | | 4,034 | 1,174.52 /cy | 93,961 |
| n | 140 | Concrete: Wet Well Top Slab & Wall | 90.00 | cy | 11,168 | 31,500 | - | | 4,539 | 524.52 /cy | 47,206 |
| n | 180 | Concrete: Grout Fill | 160.00 | cy | 6,618 | 16,000 | - | | 807 | 146.41 /cy | 23,425 |
| | | **Concrete in Place** | | | **153,112** | **738,360** | | | **59,948** | | **951,420** |
| | | 7,403.500 Labor hours | | | | | | | | | |
| | | 1,188.74 Equipment hours | | | | | | | | | |
| **05510.000** | | **Metal Ladders** | | | | | | | | | |
| | 10 | Straight Ladder-Aluminum | 500.00 | lf | 8,884 | 22,937 | - | | - | 63.642 /lf | 31,821 |
| | | **Metal Ladders** | | | **8,884** | **22,937** | | | | | **31,821** |
| | | 250.00 Labor hours | | | | | | | | | |
| **05520.000** | | **Handrail/Railing** | | | | | | | | | |
| | 103 | 3 Rail-Handrail Alum. w/Toe | 500.00 | lf | 4,442 | 34,500 | - | | - | 77.884 /lf | 38,942 |
| | | **Handrail/Railing** | | | **4,442** | **34,500** | | | | | **38,942** |
| | | 125.00 Labor hours | | | | | | | | | |
| **05530.200** | | **Alum. Grating-Riveted** | | | | | | | | | |
| | 6 K | 1-1/4x3/16 Riveted Grate-Stnd. | 2,300.00 | sf | 13,895 | 80,408 | - | | - | 41.001 /sf | 94,303 |
| | | **Alum. Grating-Riveted** | | | **13,895** | **80,408** | | | | | **94,303** |
| | | 391.00 Labor hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 4.00 | ea | 307 | 5,106 | - | | - | 1,353.173 /ea | 5,413 |
| | | **Hatch, Aluminum, 300psf** | | | **307** | **5,106** | | | | | **5,413** |
| | | 12.80 Labor hours | | | | | | | | | |
| **11210.000** | | **PUMPS** | | | | | | | | | |
| | ---- | Pumps (low lift) | 5.00 | ea | 83,499 | 175,000 | - | | - | 51,699.84 /ea | 258,499 |
| | | **PUMPS** | | | **83,499** | **175,000** | | | | | **258,499** |
| | | 3,680.00 Labor hours | | | | | | | | | |
| **11217.100** | | **Submersible Sump Pumps** | | | | | | | | | |
| | 05 | Sump Pump | 1.00 | ea | 2,903 | 6,000 | - | | 2,055 | 10,957.92 /ea | 10,958 |
| | | **Submersible Sump Pumps** | | | **2,903** | **6,000** | | | **2,055** | | **10,958** |
| | | 144.00 Labor hours | | | | | | | | | |
| | | 24.00 Equipment hours | | | | | | | | | |
| **11218.400** | | **Chemical Metering Pumps** | | | | | | | | | |
| | 10 | Polymer Metering Pump and control panel | 2.00 | ea | 1,718 | 3,000 | - | | - | 2,358.96 /ea | 4,718 |
| | 10 | Coagulant Metering Pump and control panel | 2.00 | ea | 1,718 | 3,000 | - | | - | 2,358.96 /ea | 4,718 |
| | | **Chemical Metering Pumps** | | | **3,436** | **6,000** | | | | | **9,436** |
| | | 144.00 Labor hours | | | | | | | | | |
| **11225.300** | | **ACTIFLO System** | | | | | | | | | |
| n | 05 | Coagulation Mixer | 4.00 | ea | 1,548,160 | 5,039,000 | - | | 1,096,064 | 1,920,806.00 /ea | 7,683,224 |
| n | 05 | Maturation Tank Mixer VFD | 4.00 | ea | 29,028 | 60,000 | - | | 20,551 | 27,394.80 /ea | 109,579 |
| n | 05 | Settling Tank Scraper VFD | 4.00 | ea | 29,028 | 60,000 | - | | 20,551 | 27,394.80 /ea | 109,579 |
| | 1005 | Injection Tank Mixer | 0.00 | ea | 0 | - | - | | 0 | | |
| | 2005 | Maturation Tank Mixer | 0.00 | ea | 0 | - | - | | 0 | | |
| | D408 | Settling | 0.00 | ea | 0 | - | - | | - | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **11225.300** | | **ACTIFLO System** | | | | | | | | | |
| D408 | | Coagulation Feed | 0.00 | ea | 0 | - | - | | - | | |
| D408 | | Polymer Feed | 0.00 | ea | 0 | - | - | | - | | |
| D408 | | Coagulant Storage | 2.00 | ea | 21,011 | 42,900 | - | | - | 31,955.60 /ea | 63,911 |
| | | **ACTIFLO System** | | | **1,627,227** | **5,201,900** | | | **1,137,166** | | **7,966,294** |
| | | 80,660.00 Labor hours | | | | | | | | | |
| | | 13,280.000 Equipment hours | | | | | | | | | |
| **11240.410** | | **Dry Poly Store/Feed Equip** | | | | | | | | | |
| | 0 | Automatic Dry Polymer Preparation Systems | 1.00 | ea | 4,838 | - | - | | 3,425 | 8,263.200 /ea | 8,263 |
| | | **Dry Poly Store/Feed Equip** | | | **4,838** | | | | **3,425** | | **8,263** |
| | | 240.00 Labor hours | | | | | | | | | |
| | | 40.00 Equipment hours | | | | | | | | | |
| **11282.000** | | **Slide Gates** | | | | | | | | | |
| | 6060 | 60" x 60" Slide Gate | 6.00 | ea | 85,610 | 180,000 | - | | - | 44,268.28 /ea | 265,610 |
| | | **Slide Gates** | | | **85,610** | **180,000** | | | | | **265,610** |
| | | 3,588.00 Labor hours | | | | | | | | | |
| **11330.100** | | **Barscreens** | | | | | | | | | |
| n | A 50 | Fine Screenings for 65mgd Influent | 1.00 | ea | 125,026 | 250,000 | - | | - | 375,026.40 /ea | 375,026 |
| | B 5 | Screen Conveyor | 1.00 | ea | 100,212 | 200,000 | - | | - | 300,212.00 /ea | 300,212 |
| | f200 | Rolloff Dumpster & Cover (40cy) | 1.00 | ea | 95 | 3,500 | - | | - | 3,595.44 /ea | 3,595 |
| | | **Barscreens** | | | **225,334** | **453,500** | | | | | **678,834** |
| | | 9,444.00 Labor hours | | | | | | | | | |
| **13000.005** | | **Special Const Allowance** | | | | | | | | | |
| | 5 | Level Sensor | 2.00 | ea | 771 | 3,450 | - | | - | 2,110.40 /ea | 4,221 |
| | | **Special Const Allowance** | | | **771** | **3,450** | | | | | **4,221** |
| | | 20.00 Labor hours | | | | | | | | | |
| **13121.000** | | **Pre-Engineered Metal Bldg** | | | | | | | | | |
| z001 | | Pre-Engineered Metal Bldg | 1,000.00 | sf | | | 75,000 | | | 75.00 /sf | 75,000 |
| z001 | | Pre-Engineered Metal Bldg - barscreen | 1,200.00 | sf | | | 90,000 | | | 75.00 /sf | 90,000 |
| | | **Pre-Engineered Metal Bldg** | | | | | **165,000** | | | | **165,000** |
| **15210.010** | | **DIP Totals** | | | | | | | | | |
| | 0 | Total Weight (Zero Cost Item) | 26,915.00 | lbs | - | - | - | | - | | |
| | 1 | Weight of Pipe (Zero Cost Item) | 23,905.00 | lbs | - | - | - | | - | | |
| | 2 | Weight of Fittings (Zero Cost Item) | 3,010.00 | lbs | - | - | - | | - | | |
| **15210.200** | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | 0 | Unload Care & Protect Push-on DIP & Fittings | 26,915.00 | lbs | 52 | - | - | | 170 | 0.01 /lbs | 221 |
| | 1 | Weight of Push-on Pipe (Zero Cost Item) | 23,905.00 | lbs | - | - | - | | - | | |
| | 2 | Weight of Push-on Fittings (Zero Cost Item) | 3,010.00 | lbs | - | - | - | | - | | |
| | 5 | Layout Push-on DIP & Fitting | 800.00 | lf | 182 | - | - | | - | 0.23 /lf | 182 |
| n | 206 | DIP CML, Push-On, Class 52, 6" | 600.00 | lf | 3,150 | 7,430 | - | | - | 17.632 /lf | 10,579 |
| n | 208 | DIP CML, Push-On, Class 52, 8" | 50.00 | lf | 298 | 847 | - | | - | 22.90 /lf | 1,145 |
| n | 216 | DIP CML, Push-On, Class 52, 16" | 150.00 | lf | 1,253 | 6,277 | - | | - | 50.20 /lf | 7,530 |
| n | 2ARR | DIP CML, Push-on, 90 Bend, 16" | 4.00 | ea | 561 | 4,650 | - | | - | 1,302.80 /ea | 5,211 |
| n | CARR | DIP CML, Push-on, 22-1/2 Bend, 16" | 2.00 | ea | 267 | 1,925 | - | | - | 1,096.12 /ea | 2,192 |
| | | **DIP CML Push-On Pipe** | | | **5,762** | **21,128** | | | **170** | | **27,060** |
| | | 242.681 Labor hours | | | | | | | | | |
| | | 2.961 Equipment hours | | | | | | | | | |
| **15221.120** | | **Fab 304L Stainless Pipe** | | | | | | | | | |
| | 0 | Unload Care & Protect Pipe/Fittings | 575.00 | lbs | 1 | - | - | | 4 | 0.01 /lbs | 5 |
| | 1 | Weight of Pipe (Zero Cost Item) | 575.00 | lbs | - | - | - | | - | | |
| | 10 | Layout Pipe & Fitting | 250.00 | lf | 60 | - | - | | - | 0.24 /lf | 60 |
| | 107A | Install Fabricated 304L SS Pipe, 1-1/4" | 250.00 | lf | 477 | - | - | | - | 1.91 /lf | 477 |
| n | 50A0 | 304L Sch 40s Stainless Pipe, 1.25" | 250.00 | lf | - | 2,330 | - | | - | 9.32 /lf | 2,330 |
| | | **Fab 304L Stainless Pipe** | | | **538** | **2,330** | | | **4** | | **2,872** |
| | | 22.563 Labor hours | | | | | | | | | |
| | | 0.063 Equipment hours | | | | | | | | | |
| **15241.100** | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | 0 | Unload Care & Protect Pipe/Fittings | 400.00 | lf | 1 | - | - | | 3 | 0.01 /lf | 3 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **15241.100** | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | 10 | Layout Pipe & Fitting | 400.00 | lf | 95 | - | - | | - | 0.24 /lf | 95 |
| n | 80G0 | PVC Schd. 80 Pipe, 4.00" | 200.00 | lf | 477 | 1,822 | - | | - | 11.50 /lf | 2,299 |
| n | 80L0 | PVC Schd. 80 Pipe, 8" | 200.00 | lf | 907 | 5,346 | - | | - | 31.263 /lf | 6,253 |
| | a010 | PVC Joint Primer- Quart | 1.943 | qrt | - | 30 | - | | - | 15.35 /qrt | 30 |
| | a020 | PVC Solvent Cement Low VOC- Quart | 1.943 | qrt | - | 43 | - | | - | 21.90 /qrt | 43 |
| | | **PVC Schd Pipe & Fittings** | | | **1,480** | **7,240** | | | **3** | | **8,723** |
| | | 62.044 Labor hours | | | | | | | | | |
| | | 0.044 Equipment hours | | | | | | | | | |
| **15500.001** | | **HVAC Equipment** | | | | | | | | | |
| | 155 | HVAC Allowance - Chem Feed Bldg | 1,000.00 | sf | - | - | 40,000 | | - | 40.00 /sf | 40,000 |
| | | **HVAC Equipment** | | | | | **40,000** | | | | **40,000** |
| **16000.005** | | **Electrical Allowance** | | | | | | | | | |
| | 5 | Electrical Allowance | 0.00 | ls | 0 | 0 | - | | - | | |
| | | ***06 ACTIFLO*** | | | ***2,225,963*** | ***6,947,918*** | ***2,215,570*** | | ***1,898,090*** | | ***13,287,541*** |
| | | 108,085.792 Labor hours | | | | | | | | | |
| | | 16,067.79 Equipment hours | | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***07 Chlorination of HRC Effluent*** | | | | | | | | | |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2734 | Remove Asphalt Pavement | 400.00 | sy | 621 | - | - | | 1,252 | 4.684 /sy | 1,873 |
| | | **Selective Site Demolition** | | | **621** | | | | **1,252** | | **1,873** |
| | | 38.00 Labor hours | | | | | | | | | |
| | | 30.40 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 1,380.00 | lf | 127 | | - | | - | 0.092 /lf | 127 |
| n | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 1,751.04 | cy | 1,770 | - | - | | 4,988 | 3.86 /cy | 6,758 |
| n | 3130 | Trench Bedding-Excavator- 130 HP | 149.291 | cy | 302 | - | - | | 878 | 7.901 /cy | 1,180 |
| n | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 534.172 | cy | 1,728 | - | - | | 5,025 | 12.642 /cy | 6,753 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 447.993 | cy | 405 | - | - | | 1,275 | 3.751 /cy | 1,680 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 683.463 | cy | - | 24,058 | - | | - | 35.20 /cy | 24,058 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 1,013.97 | cy | 1,422 | - | - | | 2,733 | 4.10 /cy | 4,155 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 1,013.97 | cy | 993 | - | - | | 1,653 | 2.61 /cy | 2,645 |
| n | 9616 | Trench Shield- 6x16 | 0.50 | u/mo | - | - | - | | 705 | 1,410.00 /u/mo | 705 |
| | A002 | Pipe Detectable/Non-Detectable Tape | 870.00 | lf | 80 | 48 | - | | - | 0.15 /lf | 128 |
| | A006 | Pipe Test | 870.00 | lf | 643 | 696 | - | | - | 1.54 /lf | 1,339 |
| | | **Trenching** | | | **7,471** | **24,802** | | | **17,256** | | **49,528** |
| | | 477.59 Labor hours | | | | | | | | | |
| | | 298.25 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 1,013.97 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 1,013.97 | cy | - | - | - | | - | | |
| | 46 | Bore & Jack Spoils Spoils (Summary) | 3.782 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 1,017.750 | cy | 1,641 | - | - | | 3,154 | 4.712 /cy | 4,795 |
| | A0A0 | Haul Spoils/Off Site 10cy Rear Dump 4.00 Hour/Load | 3.782 | cy | 17 | - | - | | 28 | 12.002 /cy | 45 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 1,013.97 | cy | 4,566 | - | - | | 7,602 | 12.001 /cy | 12,168 |
| | | **Excavation Spoils** | | | **6,224** | | | | **10,785** | | **17,009** |
| | | 366.13 Labor hours | | | | | | | | | |
| | | 183.063 Equipment hours | | | | | | | | | |
| **02445.000** | | **Boring & Jack Conduit** | | | | | | | | | |
| | 0 | Mob/Demob Bore & Jack Equipment | 1.00 | ea | - | - | 5,000 | | - | 5,000.00 /ea | 5,000 |
| | 100 | Excavate Jacking Pit | 41.481 | cy | 75 | - | - | | 204 | 6.731 /cy | 279 |
| | 105 | Excavate Recieving Pit | 20.741 | cy | 38 | - | - | | 102 | 6.731 /cy | 140 |
| | 200 | Shore Jacking/Receiving Pits | 644.00 | bsf | - | - | 9,660 | | - | 15.00 /bsf | 9,660 |
| | 300 | Backfill Jacking/Receiving Pits | 62.222 | cy | 305 | - | - | | 636 | 15.12 /cy | 941 |
| | 400 | Jacking Slab & Reaction Block | 2.66 | cy | 578 | 612 | - | | - | 447.372 /cy | 1,190 |
| n | 5012 | Bore & Jack Pipe 12 | 130.00 | lf | - | - | 15,600 | | - | 120.00 /lf | 15,600 |
| | 7000 | Grout Casing | 2.84 | cy | 12 | 489 | - | | 14 | 181.44 /cy | 515 |
| | | **Boring & Jack Conduit** | | | **1,008** | **1,101** | **30,260** | | **956** | | **33,324** |
| | | 52.20 Labor hours | | | | | | | | | |
| | | 15.791 Equipment hours | | | | | | | | | |
| **02720.100** | | **Aggregate Base Course** | | | | | | | | | |
| | 1126 | Gravel Base | 4.00 | cy | 11 | 36 | - | | 58 | 26.22 /cy | 105 |
| | | **Aggregate Base Course** | | | **11** | **36** | | | **58** | | **105** |
| | | 0.64 Labor hours | | | | | | | | | |
| | | 0.64 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| n | 10 | Bitum Paving | 350.00 | sy | - | - | 5,530 | | - | 15.80 /sy | 5,530 |
| | | **Asphalt Paving - Location** | | | | | **5,530** | | | | **5,530** |
| **02750.100** | | **Concrete Paving** | | | | | | | | | |
| | z015 | Concrete Pavement, Walkways | 50.00 | sy | 102 | 572 | - | | 38 | 14.23 /sy | 711 |

| | Item | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Concrete Paving** | | | **102** | **572** | | | **38** | | **711** |
| | | 5.45 Labor hours | | | | | | | | | |
| | | 0.55 Equipment hours | | | | | | | | | |
| | **02920.010** | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 100.00 | sy | 21 | 219 | - | | 8 | 2.482 /sy | 248 |
| | | **Lawns & Grasses** | | | **21** | **219** | | | **8** | | **248** |
| | | 1.00 Labor hours | | | | | | | | | |
| | | 0.20 Equipment hours | | | | | | | | | |
| | **05600.115** | **Manifolds** | | | | | | | | | |
| | z001 | 6T Cylinder Manifold System | 1.00 | ls | 417 | 1,725 | - | | | 2,142.49 /ls | 2,142 |
| | | **Manifolds** | | | **417** | **1,725** | | | | | **2,142** |
| | | 16.00 Labor hours | | | | | | | | | |
| | | 8.00 Equipment hours | | | | | | | | | |
| | **11240.500** | **Chlorination Equipment** | | | | | | | | | |
| | A100 | Chlorinator | 1.00 | ea | 7,499 | 15,400 | - | | 5,309 | 28,207.96 /ea | 28,208 |
| | B100 | Chlorine Evaporator | 1.00 | ea | 9,999 | 21,600 | - | | 7,079 | 38,677.97 /ea | 38,678 |
| | F100 | Evaporator Electric-Operated Vacuum Regulator | 1.00 | ea | 2,000 | 4,300 | - | | - | 6,299.88 /ea | 6,300 |
| | S004 | Electronic 6T Cylinder Scale System | 1.00 | ea | 8,999 | 18,300 | - | | 6,371 | 33,669.550 /ea | 33,670 |
| | S004 | Trunnion Scale for 1T Chlorine Cylinders | 1.00 | ea | 750 | 1,500 | - | | 531 | 2,780.80 /ea | 2,781 |
| | f200 | Chlor-A-Vac Submersible Chemical Induction Unit | 1.00 | ea | 484 | 19,256 | - | | - | 19,739.80 /ea | 19,740 |
| | | **Chlorination Equipment** | | | **29,730** | **80,356** | | | **19,290** | | **129,376** |
| | | 1,450.12 Labor hours | | | | | | | | | |
| | | 225.270 Equipment hours | | | | | | | | | |
| | **15119.500** | **Pressure Red/Reg Valve** | | | | | | | | | |
| n | 300G | Pressure Relief Valve | 1.00 | ea | 150 | 1,400 | - | | - | 1,550.35 /ea | 1,550 |
| | | **Pressure Red/Reg Valve** | | | **150** | **1,400** | | | | | **1,550** |
| | | 4.85 Labor hours | | | | | | | | | |
| | **15220.302** | **A53 CW Pipe PE/GE/T&C/SW** | | | | | | | | | |
| n | 300P | A53 CW Standard Pipe PE, 12" | 130.00 | lf | 1,674 | 19,328 | - | | - | 161.56 /lf | 21,003 |
| | | **A53 CW Pipe PE/GE/T&C/SW** | | | **1,674** | **19,328** | | | | | **21,003** |
| | | 70.20 Labor hours | | | | | | | | | |
| | **15220.322** | **A53 CW Pipe- BW (36.10)** | | | | | | | | | |
| | 0 | Unload Care & Protect Pipe/Fittings | 224.63 | lbs | 0 | - | - | | 1 | 0.01 /lbs | 2 |
| | 1 | Weight of Pipe (Zero Cost Item) | 224.63 | lbs | - | - | - | | - | | |
| | 10 | Layout Pipe & Fitting | 75.00 | lf | 18 | - | - | | - | 0.24 /lf | 18 |
| n | 4080 | A53 CW Schd. 40 Pipe BW, 1.00" | 25.00 | lf | 66 | 126 | - | | - | 7.661 /lf | 192 |
| n | 40C0 | A53 CW Schd. 40 Pipe BW, 2.00" | 50.00 | lf | 215 | 548 | - | | - | 15.254 /lf | 763 |
| | | **A53 CW Pipe- BW (36.10)** | | | **299** | **674** | | | **1** | | **974** |
| | | 12.525 Labor hours | | | | | | | | | |
| | | 0.025 Equipment hours | | | | | | | | | |
| | **15230.400** | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | 0 | Unload Care & Protect PCCP & Fittings | 510.00 | lf | 1 | - | - | | 3 | 0.01 /lf | 4 |
| | 10 | Layout Pipe & Fitting | 510.00 | lf | 122 | - | - | | - | 0.24 /lf | 122 |
| | 325 | PCCP Equipment- Cat 325 Excavator | 91.80 | ch | 1,777 | - | - | | 10,165 | 130.091 /ch | 11,942 |
| n | B060 | Prestressed Concrete Cylinder Pipe (250#) 60 | 510.00 | lf | 30,422 | 107,100 | - | | - | 269.65 /lf | 137,522 |
| n | K060 | PCCP 90 Bend 60 | 2.00 | ea | 862 | 4,200 | - | | - | 2,531.15 /ea | 5,062 |
| n | L054 | PCCP 45 Bend 54 | 2.00 | ea | 776 | 4,000 | - | | - | 2,387.800 /ea | 4,776 |
| | | **Prestr Conc Cylind-(PCCP)** | | | **33,959** | **115,300** | | | **10,168** | | **159,428** |
| | | 1,440.62 Labor hours | | | | | | | | | |
| | | 91.86 Equipment hours | | | | | | | | | |
| | **15241.100** | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | 0 | Unload Care & Protect Pipe/Fittings | 870.00 | lf | 2 | - | - | | 5 | 0.01 /lf | 7 |
| | 10 | Layout Pipe & Fitting | 870.00 | lf | 208 | - | - | | - | 0.24 /lf | 208 |
| n | 80J0 | PVC Schd. 80 Pipe, 6" | 870.00 | lf | 2,906 | 15,129 | - | | - | 20.73 /lf | 18,035 |
| n | 8AJ0 | PVC Sch 80. 90 Ell , 6" | 130.00 | ea | 2,481 | 11,268 | - | | - | 105.77 /ea | 13,750 |
| | a010 | PVC Joint Primer- Quart | 3.67 | qrt | - | 56 | - | | - | 15.35 /qrt | 56 |
| | a020 | PVC Solvent Cement Low VOC- Quart | 3.67 | qrt | - | 80 | - | | - | 21.90 /qrt | 80 |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | **PVC Schd Pipe & Fittings** | | **5,597** | **26,534** | | | **5** | | **32,137** |
| | 234.60 Labor hours | | | | | | | | |
| | 0.10 Equipment hours | | | | | | | | |
| | ***07 Chlorination of HRC Effluent*** | | ***87,285*** | ***272,047*** | ***35,790*** | | ***59,817*** | | ***454,939*** |
| | 4,169.91 Labor hours | | | | | | | | |
| | 854.140 Equipment hours | | | | | | | | |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | ***09 I&C*** | | | | | | | | |
| **13000.005** | **Special Const Allowance** | | | | | | | | |
| 5 | I&C Allowance | 0.00 ls | 0 | 0 | - | | - | | |
| | ***09 I&C*** | | ***0*** | ***0*** | ***0*** | | ***0*** | | ***0*** |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | ***10 Electrical*** | | | | | | | | |
| **16000.005** | **Electrical Allowance** | | | | | | | | |
| | 5 Electrical Allowance | 0.00 ls | 0 | 0 | - | | - | | |
| | ***10 Electrical*** | | ***0*** | ***0*** | ***0*** | | ***0*** | | ***0*** |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***11 Chemical Feed*** | | | | | | | | | |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2510 | Demo 12'dia x 40'tall Steel Tank | 1.00 | ea | | - | 5,000 | | | 5,000.00 /ea | 5,000 |
| | 2734 | Remove Asphalt Pavement, 5"thk | 189.00 | sy | 518 | - | - | | 592 | 5.87 /sy | 1,109 |
| | 3012 | Demo Concrete Elevated Slab | 22.00 | cy | 50 | - | - | | 74 | 5.61 /cy | 123 |
| | | **Selective Site Demolition** | | | **567** | | **5,000** | | **665** | | **6,233** |
| | | 19.692 Labor hours | | | | | | | | | |
| | | 14.943 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 480.00 | lf | 55 | | - | | - | 0.12 /lf | 55 |
| n | 2090 | Trenching- Backhoe/Loader 95HP (15 cy/hr-120cy/day) Average Exc. | 583.87 | cy | 1,965 | - | - | | 2,098 | 6.96 /cy | 4,063 |
| n | 3090 | Trench Bedding-Backhoe/Loader 95HP | 36.543 | cy | 179 | - | - | | 148 | 8.95 /cy | 327 |
| n | 4090 | Trench Pipe Zone Backfill-Backhoe/Loader 95HP | 109.65 | cy | 645 | - | - | | 533 | 10.741 /cy | 1,178 |
| n | 5090 | Trench Native Backfill-Backhoe/Loader 95HP | 109.65 | cy | 588 | - | - | | 583 | 10.681 /cy | 1,171 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 146.193 | cy | - | 5,146 | - | | - | 35.20 /cy | 5,146 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 146.48 | cy | 370 | - | - | | 395 | 5.22 /cy | 765 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 146.48 | cy | 292 | - | - | | 239 | 3.624 /cy | 531 |
| | A002 | Pipe Detectable/Non-Detectable Tape | 480.00 | lf | 55 | 26 | - | | - | 0.17 /lf | 81 |
| | A006 | Pipe Test | 480.00 | lf | 461 | 384 | - | | - | 1.761 /lf | 845 |
| | | **Trenching** | | | **4,610** | **5,556** | | | **3,996** | | **14,163** |
| | | 179.20 Labor hours | | | | | | | | | |
| | | 91.695 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 146.48 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 146.48 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 146.48 | cy | 425 | - | - | | 454 | 6.002 /cy | 879 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 146.48 | cy | 1,344 | - | - | | 1,098 | 16.673 /cy | 2,442 |
| | | **Excavation Spoils** | | | **1,769** | | | | **1,552** | | **3,321** |
| | | 52.694 Labor hours | | | | | | | | | |
| | | 26.35 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| n | 10 | Bitum Paving | 189.00 | sy | - | - | 2,986 | | - | 15.80 /sy | 2,986 |
| | | **Asphalt Paving - Location** | | | | | **2,986** | | | | **2,986** |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 145 | Concrete: Elevated Slab - Flow Splitter Box | 22.00 | cy | 3,154 | 7,920 | - | | 1,109 | 553.82 /cy | 12,184 |
| | | **Concrete in Place** | | | **3,154** | **7,920** | | | **1,109** | | **12,184** |
| | | 121.000 Labor hours | | | | | | | | | |
| | | 22.00 Equipment hours | | | | | | | | | |
| **03150.010** | | **Concrete Core & Saw** | | | | | | | | | |
| | c 10 | Core Drill 1" to 12" depth - Dewatering Wall | 3.00 | ea | 58 | - | - | | | 19.28 /ea | 58 |
| | c 10 | Core Drill 1" to 12" depth - Flow Splitter Wall | 3.00 | ea | 58 | - | - | | | 19.28 /ea | 58 |
| | | **Concrete Core & Saw** | | | **116** | | | | | | **116** |
| | | 4.80 Labor hours | | | | | | | | | |
| **05000.001** | | **Metals Allowance** | | | | | | | | | |
| | 5 | Metals Allowance - Mount Chemical Induction System | 1.00 | ls | | | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | | **Metals Allowance** | | | | | **5,000** | | | | **5,000** |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL - Chem Induction | 1.00 | ea | 87 | 1,277 | - | | - | 1,363.09 /ea | 1,363 |
| | | **Hatch, Aluminum, 300psf** | | | **87** | **1,277** | | | | | **1,363** |
| | | 3.20 Labor hours | | | | | | | | | |
| **11220.100** | | **Chemical Mixing Units** | | | | | | | | | |
| | 02 | Polymer Supply Mechanical Mixer | 4.00 | ea | 3,778 | 6,000 | - | | - | 2,444.40 /ea | 9,778 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Chemical Mixing Units** | | | **3,778** | **6,000** | | | | | **9,778** |
| | | 120.000 Labor hours | | | | | | | | | |
| **11240.400** | | **Polymer Store/Feed Equip** | | | | | | | | | |
| | 0 | Metering Pump/Poly Blend and Feed Pump | 3.00 | ea | 21,182 | 42,000 | - | | 10,276 | 24,486.00 /ea | 73,458 |
| | 0 | First Fill of Polymer | 3.00 | day | 2,118 | 4,500 | - | | 1,028 | 2,548.60 /day | 7,646 |
| | | **Polymer Store/Feed Equip** | | | **23,301** | **46,500** | | | **11,303** | | **81,104** |
| | | 792.00 Labor hours | | | | | | | | | |
| | | 132.00 Equipment hours | | | | | | | | | |
| **11240.420** | | **Storage Tanks** | | | | | | | | | |
| f110 | | Submerged Chemical Induction System | 1.00 | ls | 23,536 | 40,000 | - | | - | 63,536.00 /ls | 63,536 |
| | | **Storage Tanks** | | | **23,536** | **40,000** | | | | | **63,536** |
| | | 800.000 Labor hours | | | | | | | | | |
| **13000.005** | | **Special Const Allowance** | | | | | | | | | |
| | 5 | SCADA Allowance | 1.00 | ls | | | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | 5 | Polymer Tote Containment | 4.00 | ea | 433 | 3,680 | - | | - | 1,028.20 /ea | 4,113 |
| | | **Special Const Allowance** | | | **433** | **3,680** | **5,000** | | | | **9,113** |
| | | 16.00 Labor hours | | | | | | | | | |
| **15115.810** | | **Diaphragm Valve PVC** | | | | | | | | | |
| n | 130I | PVC Diaphragm Valve, flg, 1" | 9.00 | ea | 615 | 8,640 | - | | - | 1,028.313 /ea | 9,255 |
| n | 130K | PVC Diaphragm Valve, flg, 2" | 6.00 | ea | 800 | 9,060 | - | | - | 1,643.34 /ea | 9,860 |
| | | **Diaphragm Valve PVC** | | | **1,415** | **17,700** | | | | | **19,115** |
| | | 38.73 Labor hours | | | | | | | | | |
| **15241.100** | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | 0 | Unload Care & Protect Pipe/Fittings | 680.00 | lf | 2 | - | - | | 4 | 0.01 /lf | 7 |
| | 10 | Layout Pipe & Fitting | 680.00 | lf | 214 | - | - | | - | 0.32 /lf | 214 |
| n | 8080 | PVC Schd. 80 Pipe, 1.00" | 600.00 | lf | 944 | 792 | - | | - | 2.894 /lf | 1,736 |
| n | 80C0 | PVC Schd. 80 Pipe, 2.00" | 80.00 | lf | 176 | 245 | - | | - | 5.264 /lf | 421 |
| n | 8A80 | PVC Sch 80. 90 Ell , 1.00" | 18.00 | ea | 96 | 79 | - | | - | 9.752 /ea | 176 |
| n | 8AC0 | PVC Sch 80. 90 Ell , 2.00" | 11.00 | ea | 93 | 84 | - | | - | 16.12 /ea | 177 |
| n | 8F88 | PVC Sch 80. Tee , 1.00" | 12.00 | ea | 87 | 95 | - | | - | 15.13 /ea | 182 |
| n | 8FCC | PVC Sch 80. Tee , 2.00" | 7.00 | ea | 82 | 190 | - | | - | 38.754 /ea | 271 |
| | a010 | PVC Joint Primer- Quart | 1.21 | qrt | - | 19 | - | | - | 15.35 /qrt | 19 |
| | a020 | PVC Solvent Cement Low VOC- Quart | 1.21 | qrt | - | 26 | - | | - | 21.90 /qrt | 26 |
| | | **PVC Schd Pipe & Fittings** | | | **1,695** | **1,529** | | | **4** | | **3,229** |
| | | 53.855 Labor hours | | | | | | | | | |
| | | 0.075 Equipment hours | | | | | | | | | |
| **15400.005** | | **Plumbing Allowance** | | | | | | | | | |
| | 5 | Plumbing Allowance - Hook Plant Water to Poly System | 1.00 | ls | | | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | | **Plumbing Allowance** | | | | | **5,000** | | | | **5,000** |
| **16000.005** | | **Electrical Allowance** | | | | | | | | | |
| | 5 | Electrical Allowance - Wire Chemical Induction to Controls | 1.00 | ls | | | 25,000 | | - | 25,000.00 /ls | 25,000 |
| | | **Electrical Allowance** | | | | | **25,000** | | | | **25,000** |
| | | 0.000 Labor hours | | | | | | | | | |
| | | ***11 Chemical Feed*** | | | ***64,460*** | ***130,162*** | ***47,986*** | | ***18,631*** | | ***261,239*** |
| | | 2,201.171 Labor hours | | | | | | | | | |
| | | 287.06 Equipment hours | | | | | | | | | |

## Estimate Totals

| | Description | Amount | Totals | Hours | Rate |
|---|---|---|---|---|---|
| | Labor | 2,906,907 | | 138,918 hrs | |
| | Material | 8,910,904 | | | |
| | Subcontract | 3,149,569 | | | |
| | Equipment | 2,408,224 | | 21,690 hrs | |
| | Other | 4,690 | | | |
| **Subtotal Direct Cost** | | **17,380,294** | **17,380,294** | | |
| | I&C | 1,738,019 | | | 10.00 % |
| | Electrical | 2,607,028 | | | 15.00 % |
| | | **4,345,047** | **21,725,341** | | |
| | Indirect Costs: | | | | |
| | Building Permits(% total cost) | 181.838 | | | 0.40 % |
| | Sales Tax (MEO) | | | | |
| | Builders Risk Ins % total cost | 113.649 | | | 0.25 % |
| | Gen Liability Ins % total cost | 909.190 | | | 2.00 % |
| | GC Bonds (% total cost) | 454.595 | | | 1.00 % |
| **Subtotal Prior to OH&P** | | **1,659,272** | **23,384,613** | | |
| | GC Field General Conditions | 2,338.451 | | | 10.00 % |
| | GC Indirects. OH & Profit | 2,338.451 | | | 10.00 % |
| **Subtotal** | | **4,676,902** | **28,061,515** | | |
| | Construction Contingency | 9,821.493 | | | 35.00 % |
| | **Total Construction Cost** | **9,821,493** | **37,883,008** | | |
| | Engineering, Permitting, Bond Financing, Legal and Administration | 7.576.580 | | | 20.00 % |
| **Total Program Costs** | | **7,576,580** | **45,459,588** | | |
| | ***Total*** | | ***45,459,588*** | | |

This is an Opinion of Probable Construction Cost only, as defined by the documents provided at the level of design indicated on the front sheet of this estimate.
There are not any costs provided for: Change Orders, Construction Oversight, land acquisition or temporary/permanent easements, Operations, or any other costs associated with this project that are not specifically part of the bidding contractor's proposed scope.
The total cost shown is valid to only two significant figures.

# *Knoxville, Tennessee*
# *Kuwahee WWTP - Options 6a*
# *Opinion of Probable Construction Cost, Prelim Design, March 2007*

| | |
|---|---|
| **Project name** | TN, Knoxville KWWTP |
| **Estimator** | MacIsaac |
| **Labor rate table** | TN07 Knoxville |
| **Equipment rate table** | 00 071H Equip Rental |
| **database version:** | V6.0 TES 9.4.22.0 |
| **ENR 20 City CCI** | March 2007: 7856 |
| **Notes** | This is an Opinion of Probable Construction Cost only, as defined by the documents provided at the level of design indicated above. CDM has no control over the cost of labor, materials, equipment, or services furnished, over schedules, over contractor's methods of determining prices, competitive bidding, market or negotiating conditions. CDM does not guarantee that this opinion will not vary from actual cost, or contractor's bids. There are not any costs provided for: Change Orders, Construction Oversight, Land Acquisition or temporary/permanent Easements, Operations, or any other costs associated with this project that are not specifically part of the bidding contractor's proposed scope.<br><br>The total cost shown is valid to only two significant figures<br><br>Assumptions:<br>Only nominal dewatering is needed.<br>No finishes are included.<br>Based on a 40 hour work week with no overtime.<br><br>This job is sales tax exempt. |
| **Report format** | Sorted by 'Proj Area/Phase'<br>'Detail' summary<br>Allocate addons<br>Round unit prices<br>Combine items<br>Paginate |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***01 UNOX Bypass*** | | | | | | | | | |
| **01010.000** | | **General Conditions** | | | | | | | | | |
| | 5 | Assumption of 20% of Excavated Material is Contaminated | 3,810.00 | cy | - | - | 95,250 | | - | 25.00 /cy | 95,250 |
| | | **General Conditions** | | | | | **95,250** | | | | **95,250** |
| **01590.000** | | **Traffic/Pollution Control** | | | | | | | | | |
| ---- | | Traffic Control | 1.00 | ls | | | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | | **Traffic/Pollution Control** | | | | | **10,000** | | | | **10,000** |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Protect Utilities (6"pw, 4"cw, 16" sludge, duct) | 1.00 | ls | - | - | 2,500 | | - | 2,500.00 /ls | 2,500 |
| | | **Sitework Allowance** | | | | | **2,500** | | | | **2,500** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2508 | Remove 48" DIP - 11' deep | 70.00 | lf | 114 | - | - | | 217 | 4.731 /lf | 331 |
| | 2512 | Demo Existing Secondary Aeratio Influent Structure (86cy concrete) | 1.00 | ea | | - | 1,200 | | | 1,200.00 /ea | 1,200 |
| | 2734 | Remove Pavement/Concrete Walk | 312.00 | sy | 485 | - | - | | 977 | 4.684 /sy | 1,461 |
| | | **Selective Site Demolition** | | | **599** | | **1,200** | | **1,194** | | **2,993** |
| | | 36.64 Labor hours | | | | | | | | | |
| | | 27.212 Equipment hours | | | | | | | | | |
| **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | 2 | Design Shoring System-Average | 1.00 | ls | - | - | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | 100 | Survey & Layout Shoring | 70.00 | lf | 1 | - | - | | - | 0.02 /lf | 1 |
| | 105 | Mobilize Pile Driving Equipment | 1.00 | ea | - | - | 25,000 | | - | 25,000.00 /ea | 25,000 |
| | 1030 | Steel Sheeting,20' x 27psf, pulled & salvage | 1,400.00 | sf | 7,255 | 9,016 | - | | 9,582 | 18.47 /sf | 25,853 |
| | 1045 | Install & Remove Wales/Struts/Connectors | 1.89 | ton | 459 | 1,739 | - | | 606 | 1,483.73 /ton | 2,804 |
| n | 1050 | Rent Steel Sheet Piling and Wales, first month | 20.79 | ton | - | 5,418 | - | | - | 260.59 /ton | 5,418 |
| | | **Sheet Piling** | | | **7,715** | **16,172** | **35,000** | | **10,188** | | **69,076** |
| | | 254.123 Labor hours | | | | | | | | | |
| | | 63.513 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 636.00 | cy | 536 | - | - | | 1,449 | 3.121 /cy | 1,985 |
| | | **Foundation Excavation** | | | **536** | | | | **1,449** | | **1,985** |
| | | 33.92 Labor hours | | | | | | | | | |
| | | 16.96 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 285.00 | lf | 26 | | - | | - | 0.092 /lf | 26 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 1,274.583 | cy | 644 | - | - | | 2,819 | 2.72 /cy | 3,463 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 53.951 | cy | 82 | - | - | | 272 | 6.56 /cy | 354 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 273.30 | cy | 663 | - | - | | 2,204 | 10.492 /cy | 2,867 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 681.13 | cy | 616 | - | - | | 1,939 | 3.751 /cy | 2,555 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 327.25 | cy | - | 11,519 | - | | - | 35.20 /cy | 11,519 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 593.46 | cy | 832 | - | - | | 1,599 | 4.10 /cy | 2,432 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 593.46 | cy | 581 | - | - | | 967 | 2.61 /cy | 1,548 |
| n | 8367 | Trench Shores- Aluminum Hydraulic 36" width x 7' Rail | 1.00 | u/mo | | - | - | | 76 | 76.00 /u/mo | 76 |
| | | **Trenching** | | | **3,445** | **11,519** | | | **9,876** | | **24,840** |
| | | 225.071 Labor hours | | | | | | | | | |
| | | 153.362 Equipment hours | | | | | | | | | |
| **02315.400** | | **Drilling & Blasting** | | | | | | | | | |
| | 1008 | Hydraulic Hoe Ram -Medium | 636.00 | cy | | - | 95,400 | | | 150.00 /cy | 95,400 |
| | | **Drilling & Blasting** | | | | | **95,400** | | | | **95,400** |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 1,229.46 | cy | - | - | - | | - | | |
| | 40 | Foundation Excavation Spoils (Summary) | 636.00 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 593.46 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 593.46 | cy | 957 | - | - | | 1,839 | 4.712 /cy | 2,796 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 636.00 | cy | 739 | - | - | | 2,083 | 4.44 /cy | 2,823 |
| A0A4 | | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 593.46 | cy | 2,672 | - | - | | 4,449 | 12.001 /cy | 7,122 |
| A0I7 | | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 636.00 | cy | 398 | - | - | | 919 | 2.071 /cy | 1,317 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Excavation Spoils** | | | **4,767** | | | | **9,291** | | **14,058** |
| | | 278.851 Labor hours | | | | | | | | | |
| | | 139.43 Equipment hours | | | | | | | | | |
| **02720.100** | | **Aggregate Base Course** | | | | | | | | | |
| | 1180 | Crushed Rock 1" | 242.00 | cy | 184 | 2,474 | - | | 929 | 14.822 /cy | 3,587 |
| | 1230 | Granular Fill | 690.00 | cy | 1,966 | 8,252 | - | | 9,934 | 29.21 /cy | 20,152 |
| | | **Aggregate Base Course** | | | **2,150** | **10,726** | | | **10,863** | | **23,739** |
| | | 120.73 Labor hours | | | | | | | | | |
| | | 120.73 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| n | 10 | Bitum Paving | 242.00 | sy | - | - | 3,824 | | - | 15.80 /sy | 3,824 |
| | | **Asphalt Paving - Location** | | | | | **3,824** | | | | **3,824** |
| **02750.100** | | **Concrete Paving** | | | | | | | | | |
| | z015 | Concrete Pavement, Walkways | 70.00 | sy | 143 | 800 | - | | 53 | 14.23 /sy | 996 |
| | | **Concrete Paving** | | | **143** | **800** | | | **53** | | **996** |
| | | 7.63 Labor hours | | | | | | | | | |
| | | 0.77 Equipment hours | | | | | | | | | |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 303.00 | sy | 25 | 664 | - | | 25 | 2.36 /sy | 714 |
| | ---- | Restoration including plants & new trees | 303.00 | sy | | | 4,545 | | - | 15.00 /sy | 4,545 |
| | | **Lawns & Grasses** | | | **25** | **664** | **4,545** | | **25** | | **5,259** |
| | | 1.212 Labor hours | | | | | | | | | |
| | | 0.61 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 140 | Concrete: Secondary Aeration Influent Structure | 86.00 | cy | 10,671 | 30,100 | - | | 4,337 | 524.52 /cy | 45,108 |
| | | **Concrete in Place** | | | **10,671** | **30,100** | | | **4,337** | | **45,108** |
| | | 516.000 Labor hours | | | | | | | | | |
| | | 86.00 Equipment hours | | | | | | | | | |
| **03150.010** | | **Concrete Core & Saw** | | | | | | | | | |
| | e240 | Core Drill 66"dia | 1.00 | ea | 1,283 | - | - | | | 1,283.36 /ea | 1,283 |
| | | **Concrete Core & Saw** | | | **1,283** | | | | | | **1,283** |
| | | 104.000 Labor hours | | | | | | | | | |
| **04000.015** | | **Masonry Demolition** | | | | | | | | | |
| | 5 | Masonry Demolition | 320.00 | sf | 75 | - | - | | 95 | 0.531 /sf | 170 |
| | | **Masonry Demolition** | | | **75** | | | | **95** | | **170** |
| | | 4.80 Labor hours | | | | | | | | | |
| | | 4.80 Equipment hours | | | | | | | | | |
| **04210.000** | | **Clay Masonry Units** | | | | | | | | | |
| n | 8105 | Brick Mortar Type S | 24.312 | cf | 32 | 106 | - | | - | 5.684 /cf | 138 |
| | 8900 | Clean Brick | 320.00 | sf | 102 | 74 | - | | - | 0.55 /sf | 175 |
| n | 018A | Standard Face Brick - Common Bond | 2,026.00 | ea | 1,439 | 972 | - | | - | 1.19 /ea | 2,411 |
| | | **Clay Masonry Units** | | | **1,573** | **1,152** | | | | | **2,725** |
| | | 66.002 Labor hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | JD7 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type JD-AL | 1.00 | ea | 77 | 1,277 | - | | - | 1,353.17 /ea | 1,353 |
| | | **Hatch, Aluminum, 300psf** | | | **77** | **1,277** | | | | | **1,353** |
| | | 3.20 Labor hours | | | | | | | | | |
| **15230.400** | | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | 0 | Unload Care & Protect PCCP & Fittings | 285.00 | lf | 1 | - | - | | 2 | 0.01 /lf | 2 |
| | 10 | Layout Pipe & Fitting | 285.00 | lf | 68 | - | - | | - | 0.24 /lf | 68 |
| | 460 | PCCP Equipment- RT Crane 60 MT | 62.70 | ch | 1,134 | - | - | | 12,408 | 215.984 /ch | 13,542 |
| n | B072 | Prestressed Concrete Cylinder Pipe (250#) 66 | 285.00 | lf | 19,924 | 71,250 | - | | - | 319.910 /lf | 91,174 |
| n | K072 | PCCP 90 Bend 66 | 1.00 | ea | 517 | 2,500 | - | | - | 3,017.31 /ea | 3,017 |
| n | L066 | PCCP 45 Bend 66 | 2.00 | ea | 948 | 4,000 | - | | - | 2,474.14 /ea | 4,948 |
| n | m066 | PCCP-Restrained Joint (weld) 66 | 6.00 | ea | 143 | 480 | - | | - | 103.86 /ea | 623 |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | **Prestr Conc Cylind-(PCCP)** | | **22,735** | **78,230** | | | **12,410** | | **113,376** |
| | 968.081 Labor hours | | | | | | | | |
| | 62.731 Equipment hours | | | | | | | | |
| | ***01 UNOX Bypass*** | | ***55,794*** | ***150,640*** | ***247,719*** | | ***59,782*** | | ***513,934*** |
| | 2,620.26 Labor hours | | | | | | | | |
| | 676.105 Equipment hours | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***02 Primary Redirect*** | | | | | | | | | |
| **01590.000** | | **Traffic/Pollution Control** | | | | | | | | | |
| | 5 | Traffic Control | 1.00 | ls | | | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | | **Traffic/Pollution Control** | | | | | **10,000** | | | | **10,000** |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Protect Existing Utilities (6"CIP WS, 10"CIP SFPE, 48" RCP San) | 1.00 | ls | - | - | 2,500 | | - | 2,500.00 /ls | 2,500 |
| | 20 | Connect to Existing Basin | 1.00 | ls | - | - | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | | **Sitework Allowance** | | | | | **7,500** | | | | **7,500** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2508 | Remove 72" Steel Pipe (21vf) | 70.00 | lf | 114 | - | - | | 217 | 4.731 /lf | 331 |
| | 2514 | Demo Railroad Lines | 70.00 | lf | 343 | - | - | | 891 | 17.63 /lf | 1,234 |
| | 2734 | Remove Asphalt Pavement, 5"thk | 333.00 | sy | 517 | - | - | | 1,042 | 4.684 /sy | 1,560 |
| | 3006 | Demo Concrete Return Sludge Channel | 66.00 | cy | 5,386 | - | - | | 1,261 | 100.70 /cy | 6,646 |
| | | **Selective Site Demolition** | | | **6,360** | | | | **3,411** | | **9,771** |
| | | 389.64 Labor hours | | | | | | | | | |
| | | 45.71 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 35.00 | lf | 3 | | - | | - | 0.092 /lf | 3 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 136.111 | cy | 69 | - | - | | 301 | 2.72 /cy | 370 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 5.761 | cy | 9 | - | - | | 29 | 6.56 /cy | 38 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 26.80 | cy | 65 | - | - | | 216 | 10.492 /cy | 281 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 81.38 | cy | 74 | - | - | | 232 | 3.75 /cy | 305 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 32.56 | cy | - | 1,146 | - | | - | 35.20 /cy | 1,146 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 54.733 | cy | 77 | - | - | | 148 | 4.10 /cy | 224 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 54.733 | cy | 54 | - | - | | 89 | 2.61 /cy | 143 |
| n | 8367 | Trench Shores- Aluminum Hydraulic 36" width x 7' Rail | 1.00 | u/mo | | - | - | | 76 | 76.00 /u/mo | 76 |
| | | **Trenching** | | | **350** | **1,146** | | | **1,091** | | **2,586** |
| | | 22.772 Labor hours | | | | | | | | | |
| | | 15.72 Equipment hours | | | | | | | | | |
| **02315.400** | | **Drilling & Blasting** | | | | | | | | | |
| | 1008 | Hydraulic Hoe Ram -Medium | 144.00 | cy | | - | 21,600 | | | 150.00 /cy | 21,600 |
| | | **Drilling & Blasting** | | | | | **21,600** | | | | **21,600** |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 54.733 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 54.733 | cy | - | - | - | | - | | |
| | 46 | Bore & Jack Spoils Spoils (Summary) | 136.14 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 190.87 | cy | 308 | - | - | | 592 | 4.712 /cy | 899 |
| A0A0 | | Haul Spoils/Off Site 10cy Rear Dump 4.00 Hour/Load | 136.14 | cy | 613 | - | - | | 1,021 | 12.001 /cy | 1,634 |
| A0A4 | | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 54.733 | cy | 246 | - | - | | 410 | 12.001 /cy | 657 |
| | | **Excavation Spoils** | | | **1,167** | | | | **2,023** | | **3,190** |
| | | 68.663 Labor hours | | | | | | | | | |
| | | 34.332 Equipment hours | | | | | | | | | |
| **02445.000** | | **Boring & Jack Conduit** | | | | | | | | | |
| | 0 | Mob/Demob Bore & Jack Equipment | 1.00 | ea | - | - | 5,000 | | - | 5,000.00 /ea | 5,000 |
| | 100 | Excavate Jacking Pit | 453.333 | cy | 824 | - | - | | 2,227 | 6.731 /cy | 3,051 |
| | 105 | Excavate Recieving Pit | 75.56 | cy | 137 | - | - | | 371 | 6.731 /cy | 509 |
| | 200 | Shore Jacking/Receiving Pits | 2,720.00 | bsf | - | - | 40,800 | | - | 15.00 /bsf | 40,800 |
| | 300 | Backfill Jacking/Receiving Pits | 528.89 | cy | 2,589 | - | - | | 5,407 | 15.12 /cy | 7,996 |
| | 400 | Jacking Slab & Reaction Block | 11.971 | cy | 2,602 | 2,753 | - | | - | 447.373 /cy | 5,356 |
| n | 5072 | Bore & Jack Pipe 72 | 130.00 | lf | - | - | 120,900 | | - | 930.00 /lf | 120,900 |
| | 7000 | Grout Casing | 59.56 | cy | 244 | 10,274 | - | | 288 | 181.434 /cy | 10,806 |
| | | **Boring & Jack Conduit** | | | **6,397** | **13,027** | **166,700** | | **8,294** | | **194,418** |
| | | 346.16 Labor hours | | | | | | | | | |
| | | 137.19 Equipment hours | | | | | | | | | |
| **02720.100** | | **Aggregate Base Course** | | | | | | | | | |
| | 1180 | Crushed Rock | 222.00 | cy | 169 | 2,270 | - | | 852 | 14.822 /cy | 3,291 |
| | 1230 | Granular Fill | 144.00 | cy | 410 | 1,722 | - | | 2,073 | 29.21 /cy | 4,206 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Aggregate Base Course** | | | **579** | **3,992** | | | **2,925** | | **7,496** |
| | | 32.512 Labor hours | | | | | | | | | |
| | | 32.512 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| n | 10 | Bitum Paving | 333.00 | sy | - | - | 5,261 | | - | 15.80 /sy | 5,261 |
| | | **Asphalt Paving - Location** | | | | | **5,261** | | | | **5,261** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 311.00 | sy | 26 | 681 | - | | 26 | 2.36 /sy | 733 |
| | | **Lawns & Grasses** | | | **26** | **681** | | | **26** | | **733** |
| | | 1.244 Labor hours | | | | | | | | | |
| | | 0.622 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 140 | Concrete: Primary Redirect Junction Chamber | 75.00 | cy | 9,306 | 26,250 | - | | 3,782 | 524.52 /cy | 39,339 |
| n | 140 | Concrete: Wet Weather PS Effluent Junction Structure | 95.00 | cy | 11,788 | 33,250 | - | | 4,791 | 524.52 /cy | 49,829 |
| | | **Concrete in Place** | | | **21,095** | **59,500** | | | **8,573** | | **89,168** |
| | | 1,020.000 Labor hours | | | | | | | | | |
| | | 170.00 Equipment hours | | | | | | | | | |
| **04210.000** | | **Clay Masonry Units** | | | | | | | | | |
| n | 8105 | Brick Mortar Type S | 24.312 | cf | 32 | 106 | - | | - | 5.684 /cf | 138 |
| | 8900 | Clean Brick | 320.00 | sf | 102 | 74 | - | | - | 0.55 /sf | 175 |
| n | 018A | Standard Face Brick - Common Bond | 2,026.00 | ea | 1,439 | 972 | - | | - | 1.19 /ea | 2,411 |
| | | **Clay Masonry Units** | | | **1,573** | **1,152** | | | | | **2,725** |
| | | 66.002 Labor hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 2.00 | ea | 153 | 2,553 | - | | - | 1,353.17 /ea | 2,706 |
| | | **Hatch, Aluminum, 300psf** | | | **153** | **2,553** | | | | | **2,706** |
| | | 6.40 Labor hours | | | | | | | | | |
| **11284.000** | | **Sluice Gates** | | | | | | | | | |
| | 5454 | 54" x 54" Sluice Gate, MO | 2.00 | ea | 24,995 | 49,200 | - | | - | 37,097.38 /ea | 74,195 |
| | 6060 | 60" x 60" Sluice Gate, MO | 1.00 | ea | 14,997 | 30,000 | - | | - | 44,996.86 /ea | 44,997 |
| | | **Sluice Gates** | | | **39,992** | **79,200** | | | | | **119,192** |
| | | 1,676.80 Labor hours | | | | | | | | | |
| **13000.005** | | **Special Const Allowance** | | | | | | | | | |
| | 5 | SCADA Allowance for 3 gates & Knife Gate Valve | 1.00 | ls | | | 2,000 | | - | 2,000.00 /ls | 2,000 |
| | | **Special Const Allowance** | | | | | **2,000** | | | | **2,000** |
| **15113.450** | | **GV Knife Gate ValveCI/DI** | | | | | | | | | |
| n | 160b | Knife Gate Valve, Motor Oper, flg, 48" | 1.00 | ea | 1,452 | 24,750 | - | | - | 26,201.77 /ea | 26,202 |
| | | **GV Knife Gate ValveCI/DI** | | | **1,452** | **24,750** | | | | | **26,202** |
| | | 45.61 Labor hours | | | | | | | | | |
| **15220.302** | | **A53 CW Pipe PE/GE/T&C/SW** | | | | | | | | | |
| n | 300k | A53 CW Standard Pipe PE, 72" | 130.00 | lf | 7,919 | 128,827 | - | | - | 1,051.90 /lf | 136,746 |
| n | 300p | A53 CW Standard Pipe PE, 84" | 110.00 | lf | 7,830 | 127,269 | - | | - | 1,228.172 /lf | 135,099 |
| | | **A53 CW Pipe PE/GE/T&C/SW** | | | **15,749** | **256,096** | | | | | **271,845** |
| | | 574.155 Labor hours | | | | | | | | | |
| **15230.400** | | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | 0 | Unload Care & Protect PCCP & Fittings | 35.00 | lf | 0 | - | - | | 0 | 0.01 /lf | 0 |
| | 10 | Layout Pipe & Fitting | 35.00 | lf | 8 | - | - | | - | 0.24 /lf | 8 |
| | 325 | PCCP Equipment- Cat 325 Excavator | 6.30 | ch | 122 | - | - | | 698 | 130.09 /ch | 820 |
| n | B060 | Prestressed Concrete Cylinder Pipe (250#) 60 | 35.00 | lf | 2,087 | 7,350 | - | | - | 269.63 /lf | 9,437 |
| n | K060 | PCCP 90 Bend 60 | 1.00 | ea | 431 | 2,100 | - | | - | 2,531.15 /ea | 2,531 |
| | | **Prestr Conc Cylind-(PCCP)** | | | **2,648** | **9,450** | | | **698** | | **12,796** |
| | | 112.224 Labor hours | | | | | | | | | |
| | | 6.304 Equipment hours | | | | | | | | | |
| **16000.005** | | **Electrical Allowance** | | | | | | | | | |
| | 5 | Electrical Allowance for 3 gates & Knife Gate Valve | 0.00 | ls | 0 | 0 | - | | - | | |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | ***02 Primary Redirect*** | | ***97,540*** | ***451,547*** | ***213,061*** | | ***27,040*** | | ***789,189*** |
| | 4,362.17 Labor hours | | | | | | | | |
| | 442.38 Equipment hours | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***03 HRC Sludge*** | | | | | | | | | |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Protect Existing Utilities (6" CIP WS, 10" CIP SFPE, 48" RCP San) | 1.00 | ls | - | - | 2,500 | | - | 2,500.00 /ls | 2,500 |
| | 20 | Connect to Flow Splitting Structure | 1.00 | ls | - | - | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | 20 | Connect to Existing Secondary Basin | 1.00 | ls | - | - | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | | **Sitework Allowance** | | | | | **12,500** | | | | **12,500** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2514 | Demo Railroad | 30.00 | lf | 147 | - | - | | 382 | 17.63 /lf | 529 |
| | 2720 | Demo Concrete Curbs | 66.00 | lf | 162 | - | - | | 420 | 8.814 /lf | 582 |
| | 2734 | Remove Asphalt Pavement, 5"thk | 160.00 | sy | 249 | - | - | | 501 | 4.684 /sy | 749 |
| | | **Selective Site Demolition** | | | **557** | | | | **1,303** | | **1,860** |
| | | 34.10 Labor hours | | | | | | | | | |
| | | 18.46 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 208.00 | lf | 19 | | - | | - | 0.092 /lf | 19 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 503.27 | cy | 254 | - | - | | 1,113 | 2.72 /cy | 1,367 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 21.314 | cy | 32 | - | - | | 107 | 6.56 /cy | 140 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 72.74 | cy | 176 | - | - | | 587 | 10.492 /cy | 763 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 381.25 | cy | 345 | - | - | | 1,085 | 3.75 /cy | 1,430 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 94.052 | cy | - | 3,311 | - | | - | 35.20 /cy | 3,311 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 122.02 | cy | 171 | - | - | | 329 | 4.10 /cy | 500 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 122.02 | cy | 119 | - | - | | 199 | 2.61 /cy | 318 |
| n | 9616 | Trench Shield- 6x16 | 1.00 | u/mo | - | - | - | | 1,410 | 1,410.00 /u/mo | 1,410 |
| | A006 | Pipe Test | 208.00 | lf | 154 | 166 | - | | - | 1.54 /lf | 320 |
| | C0V0 | Concrete Thrust Block, 24" | 4.00 | ea | 429 | 344 | - | | - | 193.37 /ea | 773 |
| | | **Trenching** | | | **1,701** | **3,821** | | | **4,830** | | **10,352** |
| | | 95.012 Labor hours | | | | | | | | | |
| | | 51.281 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 122.02 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 122.02 | cy | - | - | - | | - | | |
| | 46 | Bore & Jack Spoils Spoils (Summary) | 43.982 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 166.002 | cy | 268 | - | - | | 514 | 4.712 /cy | 782 |
| | A0A0 | Haul Spoils/Off Site 10cy Rear Dump 4.00 Hour/Load | 43.982 | cy | 198 | - | - | | 330 | 12.001 /cy | 528 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 122.02 | cy | 549 | - | - | | 915 | 12.001 /cy | 1,464 |
| | | **Excavation Spoils** | | | **1,015** | | | | **1,759** | | **2,774** |
| | | 59.72 Labor hours | | | | | | | | | |
| | | 29.86 Equipment hours | | | | | | | | | |
| **02445.000** | | **Boring & Jack Conduit** | | | | | | | | | |
| | 0 | Mob/Demob Bore & Jack Equipment | 1.00 | ea | - | - | 5,000 | | - | 5,000.00 /ea | 5,000 |
| | 100 | Excavate Jacking Pit | 251.852 | cy | 458 | - | - | | 1,237 | 6.731 /cy | 1,695 |
| | 105 | Excavate Recieving Pit | 50.370 | cy | 92 | - | - | | 247 | 6.731 /cy | 339 |
| | 200 | Shore Jacking/Receiving Pits | 2,312.00 | bsf | - | - | 34,680 | | - | 15.00 /bsf | 34,680 |
| | 300 | Backfill Jacking/Receiving Pits | 302.222 | cy | 1,480 | - | - | | 3,090 | 15.12 /cy | 4,569 |
| | 400 | Jacking Slab & Reaction Block | 6.65 | cy | 1,446 | 1,530 | - | | - | 447.373 /cy | 2,975 |
| n | 5036 | Bore & Jack Pipe 36 | 168.00 | lf | - | - | 63,840 | | - | 380.00 /lf | 63,840 |
| | 7000 | Grout Casing | 24.44 | cy | 100 | 4,215 | - | | 118 | 181.434 /cy | 4,433 |
| | | **Boring & Jack Conduit** | | | **3,574** | **5,745** | **103,520** | | **4,693** | | **117,532** |
| | | 193.50 Labor hours | | | | | | | | | |
| | | 77.591 Equipment hours | | | | | | | | | |
| **02720.100** | | **Aggregate Base Course** | | | | | | | | | |
| | 1180 | Crushed Rock 1" | 77.00 | cy | 59 | 787 | - | | 296 | 14.822 /cy | 1,141 |
| | | **Aggregate Base Course** | | | **59** | **787** | | | **296** | | **1,141** |
| | | 3.29 Labor hours | | | | | | | | | |
| | | 3.29 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| n | 10 | Bitum Paving | 160.00 | sy | - | - | 2,528 | | - | 15.80 /sy | 2,528 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Asphalt Paving - Location** | | | | | **2,528** | | | | **2,528** |
| **02770.300** | | **Concrete Curb & Gutter** | | | | | | | | | |
| | 106 | Curb 6" x 12" | 66.00 | lf | - | - | 1,320 | | - | 20.00 /lf | 1,320 |
| | | **Concrete Curb & Gutter** | | | | | **1,320** | | | | **1,320** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 430.00 | sy | 36 | 942 | - | | 36 | 2.36 /sy | 1,013 |
| | | **Lawns & Grasses** | | | **36** | **942** | | | **36** | | **1,013** |
| | | 1.72 Labor hours | | | | | | | | | |
| | | 0.86 Equipment hours | | | | | | | | | |
| **15210.010** | | **DIP Totals** | | | | | | | | | |
| | 0 | Total Weight (Zero Cost Item) | 27,576.80 | lbs | - | - | - | | - | | |
| | 1 | Weight of Pipe (Zero Cost Item) | 23,316.80 | lbs | - | - | - | | - | | |
| | 2 | Weight of Fittings (Zero Cost Item) | 4,260.00 | lbs | - | - | - | | - | | |
| **15210.200** | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | 0 | Unload Care & Protect Push-on DIP & Fittings | 27,576.80 | lbs | 53 | - | - | | 174 | 0.01 /lbs | 227 |
| | 1 | Weight of Push-on Pipe (Zero Cost Item) | 23,316.80 | lbs | - | - | - | | - | | |
| | 2 | Weight of Push-on Fittings (Zero Cost Item) | 4,260.00 | lbs | - | - | - | | - | | |
| | 5 | Layout Push-on DIP & Fitting | 208.00 | lf | 47 | - | - | | - | 0.23 /lf | 47 |
| n | 224 | DIP CML, Push-On, Class 52, 24" | 168.00 | lf | 1,843 | 13,371 | - | | - | 90.563 /lf | 15,215 |
| n | 224 | DIP CML, Push-On, Class 52, 24" | 208.00 | lf | 1,985 | 14,456 | - | | - | 79.05 /lf | 16,442 |
| n | 236 | DIP CML, Push-On, Class 52, 36" | 168.00 | lf | 2,304 | 25,932 | - | | - | 168.071 /lf | 28,236 |
| n | 2AUU | DIP CML, Push-on, 90 Bend, 24" | 4.00 | ea | 868 | 10,650 | - | | - | 2,879.39 /ea | 11,518 |
| | | **DIP CML Push-On Pipe** | | | **7,101** | **64,410** | | | **174** | | **71,684** |
| | | 275.873 Labor hours | | | | | | | | | |
| | | 3.033 Equipment hours | | | | | | | | | |
| | | ***03 HRC Sludge*** | | | ***14,042*** | ***75,704*** | ***119,868*** | | ***13,090*** | | ***222,704*** |
| | | 663.21 Labor hours | | | | | | | | | |
| | | 184.370 Equipment hours | | | | | | | | | |

| | Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ***04 Actiflo*** | | | | | | | | | |
| | **01560.000** | | **Const Equip & Small Tools** | | | | | | | | | |
| | DM31 | | Crawler Mounted Lattice Boom Crane-Manitowoc 4600-5 317.5MT@334HP | 36.00 | wk | | - | - | | 690,264 | 19,174.00 /wk | 690,264 |
| | | | **Const Equip & Small Tools** | | | | | | | **690,264** | | **690,264** |
| | | | 1,440.00 Labor hours | | | | | | | | | |
| | | | 1,440.00 Equipment hours | | | | | | | | | |
| | **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | | 20 | Structural Rehabilitation of Entire Settling Basin | 1.00 | ls | - | - | 2,000,000 | | - | 2,000,000.00 /ls | 2,000,000 |
| | | | **Sitework Allowance** | | | | | **2,000,000** | | | | **2,000,000** |
| | **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | | 2734 | Remove Asphalt Pavement, 5"thk | 600.00 | sy | 932 | - | - | | 1,878 | 4.684 /sy | 2,810 |
| | | | **Selective Site Demolition** | | | **932** | | | | **1,878** | | **2,810** |
| | | | 57.00 Labor hours | | | | | | | | | |
| | | | 45.60 Equipment hours | | | | | | | | | |
| | **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 43.593 | cy | 37 | - | - | | 99 | 3.121 /cy | 136 |
| | 461C | | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 23.41 | cy | 40 | - | - | | 77 | 5.012 /cy | 117 |
| n | A000 | | IMPORT MATERIAL (Summary) | 4.00 | CY | - | - | - | | - | | |
| n | A015 | | Import Gravel Fill | 10.741 | cy | - | 161 | 60 | | - | 20.601 /cy | 221 |
| | | | **Foundation Excavation** | | | **77** | **161** | **60** | | **177** | | **475** |
| | | | 5.134 Labor hours | | | | | | | | | |
| | | | 3.04 Equipment hours | | | | | | | | | |
| | **02315.300** | | **Trenching** | | | | | | | | | |
| | | 0 | Survey & Stake Pipeline | 1,360.00 | lf | 126 | | - | | - | 0.092 /lf | 126 |
| n | | 2090 | Trenching- Backhoe/Loader 95HP (15 cy/hr-120cy/day) Average Exc. | 47.55 | cy | 89 | - | - | | 171 | 5.463 /cy | 260 |
| n | | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 448.14 | cy | 906 | - | - | | 2,553 | 7.72 /cy | 3,459 |
| n | | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 274.083 | cy | 139 | - | - | | 606 | 2.72 /cy | 745 |
| n | | 3090 | Trench Bedding-Backhoe/Loader 95HP | 44.95 | cy | 121 | - | - | | 182 | 6.74 /cy | 303 |
| n | | 3130 | Trench Bedding-Excavator- 130 HP | 38.68 | cy | 78 | - | - | | 227 | 7.901 /cy | 306 |
| n | | 3240 | Trench Bedding-Excavator- 240 HP | 17.04 | cy | 26 | - | - | | 86 | 6.56 /cy | 112 |
| n | | 4090 | Trench Pipe Zone Backfill-Backhoe/Loader 95HP | 100.60 | cy | 324 | - | - | | 489 | 8.09 /cy | 813 |
| n | | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 113.153 | cy | 366 | - | - | | 1,064 | 12.641 /cy | 1,430 |
| n | | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 50.38 | cy | 122 | - | - | | 406 | 10.492 /cy | 529 |
| n | | 5090 | Trench Native Backfill-Backhoe/Loader 95HP | -105.43 | cy | (308) | - | - | | (561) | 8.24 /cy | (869) |
| n | | 5130 | Trench Native Backfill- Loader C938 3cy | 464.164 | cy | 420 | - | - | | 1,321 | 3.751 /cy | 1,741 |
| | | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 364.80 | cy | - | 12,841 | - | | - | 35.20 /cy | 12,841 |
| | | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 411.03 | cy | 416 | - | - | | 799 | 2.954 /cy | 1,214 |
| | | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 411.03 | cy | 402 | - | - | | 670 | 2.61 /cy | 1,072 |
| n | | 9616 | Trench Shield- 6x16 | 0.30 | u/mo | - | - | - | | 423 | 1,410.00 /u/mo | 423 |
| | A006 | | Pipe Test | 1,360.00 | lf | 1,005 | 1,088 | - | | - | 1.54 /lf | 2,093 |
| | A008 | | Pipe Locates (Pot Hole) | 1.00 | ea | 152 | 50 | - | | 27 | 228.96 /ea | 229 |
| | C0P0 | | Concrete Thrust Block, 12" | 6.00 | ea | 544 | 108 | - | | - | 108.63 /ea | 652 |
| | C0R0 | | Concrete Thrust Block, 16" | 6.00 | ea | 573 | 198 | - | | - | 128.44 /ea | 771 |
| | | | **Trenching** | | | **5,500** | **14,285** | | | **8,464** | | **28,248** |
| | | | 305.92 Labor hours | | | | | | | | | |
| | | | 133.06 Equipment hours | | | | | | | | | |
| | **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | | 0 | EXCAVATION SPOILS (Grand Total) | 431.214 | cy | - | - | - | | - | | |
| | | 40 | Foundation Excavation Spoils (Summary) | 20.19 | cy | - | - | - | | - | | |
| | | 45 | Trenching Spoils (Summary) | 411.03 | cy | - | - | - | | - | | |
| | | 46 | Bore & Jack Spoils Spoils (Summary) | 15.13 | cy | - | - | - | | - | | |
| | | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 426.16 | cy | 502 | - | - | | 965 | 3.443 /cy | 1,467 |
| | | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 20.19 | cy | 23 | - | - | | 66 | 4.44 /cy | 90 |
| | A0A0 | | Haul Spoils/Off Site 10cy Rear Dump 4.00 Hour/Load | 15.13 | cy | 68 | - | - | | 113 | 12.001 /cy | 182 |
| | A0A4 | | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 411.03 | cy | 1,851 | - | - | | 3,082 | 12.001 /cy | 4,933 |
| | A0I7 | | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 20.19 | cy | 13 | - | - | | 29 | 2.071 /cy | 42 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Excavation Spoils** | | | **2,457** | | | | **4,256** | | **6,713** |
| | | 143.91 Labor hours | | | | | | | | | |
| | | 71.953 Equipment hours | | | | | | | | | |
| **02445.000** | | **Boring & Jack Conduit** | | | | | | | | | |
| | 0 | Mob/Demob Bore & Jack Equipment | 1.00 | ea | - | - | 5,000 | | - | 5,000.00 /ea | 5,000 |
| | 100 | Excavate Jacking Pit | 71.111 | cy | 129 | - | - | | 349 | 6.731 /cy | 479 |
| | 105 | Excavate Recieving Pit | 35.56 | cy | 65 | - | - | | 175 | 6.731 /cy | 239 |
| | 200 | Shore Jacking/Receiving Pits | 1,104.00 | bsf | - | - | 16,560 | | - | 15.00 /bsf | 16,560 |
| | 300 | Backfill Jacking/Receiving Pits | 106.67 | cy | 522 | - | - | | 1,091 | 15.12 /cy | 1,613 |
| | 400 | Jacking Slab & Reaction Block | 2.66 | cy | 578 | 612 | - | | - | 447.372 /cy | 1,190 |
| n | 5024 | Bore & Jack Pipe 24 | 130.00 | lf | - | - | 31,200 | | - | 240.00 /lf | 31,200 |
| | 7000 | Grout Casing | 8.403 | cy | 34 | 1,450 | - | | 41 | 181.434 /cy | 1,525 |
| | | **Boring & Jack Conduit** | | | **1,329** | **2,061** | **52,760** | | **1,655** | | **57,805** |
| | | 71.37 Labor hours | | | | | | | | | |
| | | 27.37 Equipment hours | | | | | | | | | |
| **02639.020** | | **Storm Drainage Manholes** | | | | | | | | | |
| | 0 | Unload Care & Protect Manhole | 2.00 | ea | 35 | - | - | | - | 17.51 /ea | 35 |
| | 4800 | Place & Shape Manhole Base & Inverts- 48" | 1.00 | ea | 210 | - | - | | - | 372.04 /ea | 372 |
| | 4805 | Manhole 48" x 5' Deep | 1.00 | ea | 113 | 1,657 | - | | | 1,769.79 /ea | 1,770 |
| | 6000 | Place & Shape Manhole Base & Inverts- 60" | 1.00 | ea | 210 | - | - | | - | 436.44 /ea | 436 |
| | 6007 | Manhole 60" x 7' Deep | 1.00 | ea | 274 | 2,834 | - | | 496 | 3,604.44 /ea | 3,604 |
| | | **Storm Drainage Manholes** | | | **842** | **4,491** | | | **496** | | **6,218** |
| | | 50.000 Labor hours | | | | | | | | | |
| | | 8.00 Equipment hours | | | | | | | | | |
| **02720.150** | | **Aggregate Base- Roads** | | | | | | | | | |
| | 1128 | Aggregate Base | 323.00 | cy | 920 | 2,897 | - | | 4,650 | 26.22 /cy | 8,468 |
| | | **Aggregate Base- Roads** | | | **920** | **2,897** | | | **4,650** | | **8,468** |
| | | 51.68 Labor hours | | | | | | | | | |
| | | 51.68 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| n | 10 | Bitum Paving | 969.00 | sy | - | - | 15,310 | | - | 15.80 /sy | 15,310 |
| | | **Asphalt Paving - Location** | | | | | **15,310** | | | | **15,310** |
| **02750.100** | | **Concrete Paving** | | | | | | | | | |
| | z015 | Concrete Pavement, Walkways | 100.00 | sy | 204 | 1,143 | - | | 76 | 14.23 /sy | 1,423 |
| | | **Concrete Paving** | | | **204** | **1,143** | | | **76** | | **1,423** |
| | | 10.90 Labor hours | | | | | | | | | |
| | | 1.10 Equipment hours | | | | | | | | | |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 100.00 | sy | 8 | 219 | - | | 8 | 2.36 /sy | 236 |
| | | **Lawns & Grasses** | | | **8** | **219** | | | **8** | | **236** |
| | | 0.40 Labor hours | | | | | | | | | |
| | | 0.20 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 110 | Concrete: Pad for HRC | 222.00 | cy | 16,069 | 68,820 | - | | 6,046 | 409.62 /cy | 90,935 |
| n | 110 | Concrete: Pump Support Slab | 1.00 | cy | 72 | 310 | - | | 27 | 409.61 /cy | 410 |
| n | 110 | Concrete: Bottom Slab | 9.00 | cy | 651 | 2,790 | - | | 245 | 409.62 /cy | 3,687 |
| n | 110 | Concrete: Pump Support Slab | 1.00 | cy | 72 | 310 | - | | 27 | 409.61 /cy | 410 |
| n | 140 | Concrete | 240.00 | cy | 29,781 | 84,000 | - | | 12,103 | 524.52 /cy | 125,884 |
| n | 140 | Concrete: Baffle Wall | 70.00 | cy | 8,686 | 24,500 | - | | 3,530 | 524.52 /cy | 36,716 |
| n | 140 | Concrete: Wall | 830.00 | cy | 102,991 | 581,000 | - | | 41,857 | 874.52 /cy | 725,848 |
| n | 140 | Concrete: Influent & Effluent Channel | 80.00 | cy | 9,927 | 80,000 | - | | 4,034 | 1,174.52 /cy | 93,961 |
| n | 140 | Concrete: Wet Well Wall | 48.00 | cy | 5,956 | 16,800 | - | | 2,421 | 524.52 /cy | 25,177 |
| n | 140 | Concrete:Valve Vault Walls | 40.00 | cy | 4,963 | 14,000 | - | | 2,017 | 524.52 /cy | 20,981 |
| n | 140 | Concrete: Wet Well Top Slab & Wall | 92.00 | cy | 11,416 | 32,200 | - | | 4,640 | 524.52 /cy | 48,255 |
| n | 145 | Concrete: Top Slab | 9.00 | cy | 1,024 | 3,240 | - | | 454 | 524.18 /cy | 4,718 |
| n | 180 | Concrete: Grout Fill | 160.00 | cy | 6,618 | 16,000 | - | | 807 | 146.41 /cy | 23,425 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Concrete in Place** | | | **198,227** | **923,970** | | | **78,208** | | **1,200,405** |
| | | 9,585.000 Labor hours | | | | | | | | | |
| | | 1,550.820 Equipment hours | | | | | | | | | |
| **05510.000** | | **Metal Ladders** | | | | | | | | | |
| | 10 | Straight Ladder-Aluminum | 450.00 | lf | 7,996 | 20,643 | - | | - | 63.642 /lf | 28,639 |
| | | **Metal Ladders** | | | **7,996** | **20,643** | | | | | **28,639** |
| | | 225.00 Labor hours | | | | | | | | | |
| **05520.000** | | **Handrail/Railing** | | | | | | | | | |
| | 103 | 3 Rail-Handrail Alum. w/Toe | 500.00 | lf | 4,442 | 34,500 | - | | - | 77.884 /lf | 38,942 |
| | | **Handrail/Railing** | | | **4,442** | **34,500** | | | | | **38,942** |
| | | 125.00 Labor hours | | | | | | | | | |
| **05530.200** | | **Alum. Grating-Riveted** | | | | | | | | | |
| | 7 K | 1-1/2x1/8 Riveted Grate-Stnd. | 2,300.00 | sf | 13,895 | 74,060 | - | | - | 38.241 /sf | 87,955 |
| | 8 K | 1-1/2x3/16 Riveted Grate-Stnd. | 201.00 | sf | 1,214 | 12,205 | - | | - | 66.761 /sf | 13,419 |
| | | **Alum. Grating-Riveted** | | | **15,109** | **86,265** | | | | | **101,374** |
| | | 425.17 Labor hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 14.00 | ea | 1,073 | 17,871 | - | | - | 1,353.172 /ea | 18,944 |
| | | **Hatch, Aluminum, 300psf** | | | **1,073** | **17,871** | | | | | **18,944** |
| | | 44.80 Labor hours | | | | | | | | | |
| **11210.000** | | **PUMPS** | | | | | | | | | |
| | ---- | Pumps (low lift) | 5.00 | ea | 125,000 | 250,000 | - | | - | 75,000.024 /ea | 375,000 |
| | | **PUMPS** | | | **125,000** | **250,000** | | | | | **375,000** |
| | | 5,509.04 Labor hours | | | | | | | | | |
| **11212.200** | | **Submersible Well Pumps** | | | | | | | | | |
| | 05 | Submersible Pump | 3.00 | ea | 10,500 | 21,000 | - | | 7,433 | 12,977.66 /ea | 38,933 |
| | | **Submersible Well Pumps** | | | **10,500** | **21,000** | | | **7,433** | | **38,933** |
| | | 520.88 Labor hours | | | | | | | | | |
| | | 86.813 Equipment hours | | | | | | | | | |
| **11217.100** | | **Submersible Sump Pumps** | | | | | | | | | |
| | 05 | Sump Pump | 1.00 | ea | 3,000 | 6,000 | - | | 2,124 | 11,123.76 /ea | 11,124 |
| | 05 | Sump Pump 50gpm | 1.00 | ea | 3,000 | 6,000 | - | | 2,124 | 11,123.76 /ea | 11,124 |
| | | **Submersible Sump Pumps** | | | **6,000** | **12,000** | | | **4,247** | | **22,248** |
| | | 297.65 Labor hours | | | | | | | | | |
| | | 49.61 Equipment hours | | | | | | | | | |
| **11218.400** | | **Chemical Metering Pumps** | | | | | | | | | |
| | 10 | Polymer Metering Pump and control panel | 8.00 | ea | 6,001 | 12,000 | - | | - | 2,250.16 /ea | 18,001 |
| | 10 | Coagulant Metering Pump and control panel | 4.00 | ea | 2,999 | 6,000 | - | | - | 2,249.85 /ea | 8,999 |
| | | **Chemical Metering Pumps** | | | **9,001** | **18,000** | | | | | **27,001** |
| | | 377.28 Labor hours | | | | | | | | | |
| **11225.300** | | **ACTIFLO System** | | | | | | | | | |
| n | 05 | Coagulation Mixer | 4.00 | ea | 1,548,160 | 4,623,000 | - | | 1,096,064 | 1,816,806.00 /ea | 7,267,224 |
| n | 05 | Maturation Tank VFD | 4.00 | ea | 30,000 | 60,000 | - | | 21,237 | 27,809.20 /ea | 111,237 |
| n | 05 | Scraper VFD | 4.00 | ea | 30,000 | 60,000 | - | | 21,237 | 27,809.20 /ea | 111,237 |
| | 1005 | Injection Tank Mixer | 0.00 | ea | 0 | - | - | | 0 | | |
| | 2005 | Maturation Tank Mixer | 0.00 | ea | 0 | - | - | | 0 | | |
| | D408 | Settling | 0.00 | ea | 0 | - | - | | - | | |
| | D408 | Coagulation Feed | 0.00 | ea | 0 | - | - | | - | | |
| | D408 | Polymer Feed | 0.00 | ea | 0 | - | - | | - | | |
| | D408 | Coagulant Storage | 4.00 | ea | 40,007 | 85,800 | - | | - | 31,454.87 /ea | 125,819 |
| | | **ACTIFLO System** | | | **1,648,167** | **4,828,800** | | | **1,138,538** | | **7,615,517** |
| | | 81,642.452 Labor hours | | | | | | | | | |
| | | 13,296.072 Equipment hours | | | | | | | | | |
| **11240.410** | | **Dry Poly Store/Feed Equip** | | | | | | | | | |
| | 0 | Automatic Dry Polymer Preparation Systems | 1.00 | ea | 4,838 | - | - | | 3,425 | 8,263.200 /ea | 8,263 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Dry Poly Store/Feed Equip** | | | **4,838** | | | | **3,425** | | **8,263** |
| | | 240.00 Labor hours | | | | | | | | | |
| | | 40.00 Equipment hours | | | | | | | | | |
| **11282.000** | | **Slide Gates** | | | | | | | | | |
| | 6060 | 60" x 60" Slide Gate, MO | 7.00 | ea | 100,021 | 210,000 | - | | - | 44,288.71 /ea | 310,021 |
| | | **Slide Gates** | | | **100,021** | **210,000** | | | | | **310,021** |
| | | 4,191.993 Labor hours | | | | | | | | | |
| **11330.100** | | **Barscreens** | | | | | | | | | |
| n | A 50 | Fine Screenings for 99mgd Influent | 2.00 | ea | 249,948 | 500,000 | - | | - | 374,973.79 /ea | 749,948 |
| | B 5 | Screen Conveyor | 1.00 | ea | 100,212 | 200,000 | - | | - | 300,212.00 /ea | 300,212 |
| | f200 | Rolloff Dumpster & Cover (40cy) | 1.00 | ea | 95 | 3,500 | - | | - | 3,595.44 /ea | 3,595 |
| | | **Barscreens** | | | **350,255** | **703,500** | | | | | **1,053,755** |
| | | 14,683.983 Labor hours | | | | | | | | | |
| **13000.005** | | **Special Const Allowance** | | | | | | | | | |
| | 5 | Level Sensor | 1.00 | ea | 385 | 1,725 | - | | - | 2,110.40 /ea | 2,110 |
| | | **Special Const Allowance** | | | **385** | **1,725** | | | | | **2,110** |
| | | 10.00 Labor hours | | | | | | | | | |
| **13121.000** | | **Brick Bldg** | | | | | | | | | |
| | z001 | Pre-Engineered Metal Bldg | 1,000.00 | sf | | | 75,000 | | | 75.00 /sf | 75,000 |
| | z001 | Pre-Engineered Metal Bldg - Barscreens | 1,200.00 | sf | | | 90,000 | | | 75.00 /sf | 90,000 |
| | | **Brick Bldg** | | | | | **165,000** | | | | **165,000** |
| **13400.005** | | **Measurement & Ctrl Instr** | | | | | | | | | |
| | -sub | Pressure Sensor on Pump | 2.00 | ea | 713 | 3,450 | | | - | 2,081.50 /ea | 4,163 |
| | | **Measurement & Ctrl Instr** | | | **713** | **3,450** | | | | | **4,163** |
| | | 20.00 Labor hours | | | | | | | | | |
| **13420.000** | | **Instruments** | | | | | | | | | |
| n | e412 | 12" Magnetic Flow Meter - Flanged | 1.00 | ea | 268 | 6,900 | - | | - | 7,167.72 /ea | 7,168 |
| | | **Instruments** | | | **268** | **6,900** | | | | | **7,168** |
| | | 9.76 Labor hours | | | | | | | | | |
| **15111.650** | | **Plug Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | 103S | Plug Valve, Gear & Wheel Operated, flg, 12" | 3.00 | ea | 1,128 | 7,500 | - | | - | 2,876.113 /ea | 8,628 |
| n | 200U | Plug Valve, MJ, 16" | 2.00 | ea | 847 | 6,200 | - | | - | 3,523.34 /ea | 7,047 |
| | | **Plug Valve (CI/DI/IBBM)** | | | **1,975** | **13,700** | | | | | **15,675** |
| | | 62.06 Labor hours | | | | | | | | | |
| **15114.500** | | **Check Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | 310S | Check Valve, Swing, flg, 12" | 3.00 | ea | 876 | 11,190 | - | | - | 4,021.88 /ea | 12,066 |
| n | C20U | Check Valve, Double Disc, MJ, 16" | 1.00 | ea | 466 | 3,800 | - | | - | 4,265.99 /ea | 4,266 |
| | | **Check Valve (CI/DI/IBBM)** | | | **1,342** | **14,990** | | | | | **16,332** |
| | | 42.15 Labor hours | | | | | | | | | |
| **15119.600** | | **Air/Vacuum Relief Valve** | | | | | | | | | |
| n | 100J | Air Release Valve, 16" | 1.00 | ea | 94 | 200 | - | | - | 293.93 /ea | 294 |
| | | **Air/Vacuum Relief Valve** | | | **94** | **200** | | | | | **294** |
| | | 3.03 Labor hours | | | | | | | | | |
| **15120.300** | | **Bolt & Gaskets Sets** | | | | | | | | | |
| n | 111Q | 12-0/0" 150# A307 Steel Bolt Sets | 8.50 | ea | - | 340 | - | | - | 40.00 /ea | 340 |
| | 222Q | 12-0/0" Full Faced Red Rubber (SBR) Gasket 1/8" | 8.50 | ea | - | 52 | - | | - | 6.15 /ea | 52 |
| | | **Bolt & Gaskets Sets** | | | | **392** | | | | | **392** |
| **15210.010** | | **DIP Totals** | | | | | | | | | |
| | 0 | Total Weight (Zero Cost Item) | 65,645.600 | lbs | - | - | - | | - | | |
| | 1 | Weight of Pipe (Zero Cost Item) | 59,305.60 | lbs | - | - | - | | - | | |
| | 2 | Weight of Fittings (Zero Cost Item) | 6,340.00 | lbs | - | - | - | | - | | |
| **15210.100** | | **DIP CML FL & GV CL53/250** | | | | | | | | | |
| | 0 | Unload Care & Protect Flanged/PE DIP & Fittings | 2,078.60 | lbs | 4 | - | - | | 13 | 0.01 /lbs | 17 |
| | 1 | Weight of Flanged/PE Pipe (Zero Cost Item) | 263.600 | lbs | - | - | - | | - | | |

| | Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **15210.100** | | **DIP CML FL & GV CL53/250** | | | | | | | | | |
| | | 2 | Weight of Flanged Fittings (Zero Cost Item) | 1,815.00 | lbs | - | - | - | | - | | |
| | | 10 | Layout Flanged/PE DIP & Fitting | 15.75 | lf | 4 | - | - | | - | 0.23 /lf | 4 |
| | 10SF | | DI Pipe, FLxFL, CL53, CML, 12" x 3'-0" | 1.00 | ea | 264 | 485 | - | | - | 749.28 /ea | 749 |
| | 1CS0 | | DI, CML, 45 Bend, FL, 12" | 3.00 | ea | 455 | 1,200 | - | | - | 551.51 /ea | 1,655 |
| | 1FSS | | DI, CML, Wye, FL, 12"x 12" | 3.00 | ea | 655 | 2,430 | - | | - | 1,028.32 /ea | 3,085 |
| | | | **DIP CML FL & GV CL53/250** | | | **1,381** | **4,115** | | | **13** | | **5,509** |
| | | | 57.97 Labor hours | | | | | | | | | |
| | | | 0.23 Equipment hours | | | | | | | | | |
| | **15210.200** | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | | 0 | Unload Care & Protect Push-on DIP & Fittings | 63,567.00 | lbs | 123 | - | - | | 401 | 0.01 /lbs | 523 |
| | | 1 | Weight of Push-on Pipe (Zero Cost Item) | 59,042.00 | lbs | - | - | - | | - | | |
| | | 2 | Weight of Push-on Fittings (Zero Cost Item) | 4,525.00 | lbs | - | - | - | | - | | |
| | | 5 | Layout Push-on DIP & Fitting | 1,360.00 | lf | 309 | - | - | | - | 0.23 /lf | 309 |
| n | | 206 | DIP CML, Push-On, Class 52, 6" | 600.00 | lf | 3,150 | 7,430 | - | | - | 17.632 /lf | 10,579 |
| n | | 208 | DIP CML, Push-On, Class 52, 8" | 100.00 | lf | 597 | 1,693 | - | | - | 22.90 /lf | 2,290 |
| n | | 212 | DIP CML, Push-On, Class 52, 12" | 60.00 | lf | 444 | 1,671 | - | | - | 35.242 /lf | 2,114 |
| n | | 216 | DIP CML, Push-On, Class 52, 16" | 730.00 | lf | 6,094 | 30,548 | - | | - | 50.194 /lf | 36,641 |
| n | 2APP | | DIP CML, Push-on, 90 Bend, 12" | 3.00 | ea | 331 | 1,020 | - | | - | 450.19 /ea | 1,351 |
| n | 2ARR | | DIP CML, Push-on, 90 Bend, 16" | 4.00 | ea | 561 | 4,650 | - | | - | 1,302.80 /ea | 5,211 |
| n | CARR | | DIP CML, Push-on, 22-1/2 Bend, 16" | 2.00 | ea | 267 | 1,925 | - | | - | 1,096.12 /ea | 2,192 |
| n | KAUS | | DIP, CML, Push-on, Reducer BxB, 16"x 12" | 3.00 | ea | 386 | 2,513 | - | | - | 966.29 /ea | 2,899 |
| | | | **DIP CML Push-On Pipe** | | | **12,260** | **51,449** | | | **401** | | **64,109** |
| | | | 516.472 Labor hours | | | | | | | | | |
| | | | 6.992 Equipment hours | | | | | | | | | |
| | **15220.302** | | **A53 CW Pipe PE/GE/T&C/SW** | | | | | | | | | |
| n | 300V | | A53 CW Standard Pipe PE, 24" | 130.00 | lf | 2,294 | 36,902 | - | | - | 301.51 /lf | 39,196 |
| | | | **A53 CW Pipe PE/GE/T&C/SW** | | | **2,294** | **36,902** | | | | | **39,196** |
| | | | 96.200 Labor hours | | | | | | | | | |
| | **15221.120** | | **Fab 304L Stainless Pipe** | | | | | | | | | |
| | | 0 | Unload Care & Protect Pipe/Fittings | 575.00 | lbs | 1 | - | - | | 4 | 0.01 /lbs | 5 |
| | | 1 | Weight of Pipe (Zero Cost Item) | 575.00 | lbs | - | - | - | | - | | |
| | | 10 | Layout Pipe & Fitting | 250.00 | lf | 60 | - | - | | - | 0.24 /lf | 60 |
| | 107A | | Install Fabricated 304L SS Pipe, 1-1/4" | 250.00 | lf | 477 | - | - | | - | 1.91 /lf | 477 |
| n | 50A0 | | 304L Sch 40s Stainless Pipe, 1.25" | 250.00 | lf | - | 2,330 | - | | - | 9.32 /lf | 2,330 |
| | | | **Fab 304L Stainless Pipe** | | | **538** | **2,330** | | | **4** | | **2,872** |
| | | | 22.563 Labor hours | | | | | | | | | |
| | | | 0.063 Equipment hours | | | | | | | | | |
| | **15241.100** | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | | 0 | Unload Care & Protect Pipe/Fittings | 600.00 | lf | 1 | - | - | | 4 | 0.01 /lf | 5 |
| | | 10 | Layout Pipe & Fitting | 600.00 | lf | 143 | - | - | | - | 0.24 /lf | 143 |
| n | 80G0 | | PVC Schd. 80 Pipe, 4.00" | 300.00 | lf | 716 | 2,733 | - | | - | 11.50 /lf | 3,449 |
| n | 80L0 | | PVC Schd. 80 Pipe, 8" | 300.00 | lf | 1,360 | 8,019 | - | | - | 31.263 /lf | 9,379 |
| | a010 | | PVC Joint Primer- Quart | 2.92 | qrt | - | 45 | - | | - | 15.35 /qrt | 45 |
| | a020 | | PVC Solvent Cement Low VOC- Quart | 2.92 | qrt | - | 64 | - | | - | 21.90 /qrt | 64 |
| | | | **PVC Schd Pipe & Fittings** | | | **2,220** | **10,861** | | | **4** | | **13,085** |
| | | | 93.07 Labor hours | | | | | | | | | |
| | | | 0.07 Equipment hours | | | | | | | | | |
| | **15500.001** | | **HVAC Equipment** | | | | | | | | | |
| | | 155 | HVAC Allowance - Chem Feed Bldg | 1,000.00 | sf | - | - | 40,000 | | - | 40.00 /sf | 40,000 |
| | | | **HVAC Equipment** | | | | | **40,000** | | | | **40,000** |
| | **16000.005** | | **Electrical Allowance** | | | | | | | | | |
| | | 5 | Electrical Allowance for pumps | 1.00 | ls | | | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | | | **Electrical Allowance** | | | | | **10,000** | | | | **10,000** |
| | | | 0.000 Labor hours | | | | | | | | | |
| | | | ***04 Actiflo*** | | | ***2,516,370*** | ***7,298,820*** | ***2,283,130*** | | ***1,944,196*** | | ***14,042,917*** |
| | | | 120,937.822 Labor hours | | | | | | | | | |
| | | | 16,812.66 Equipment hours | | | | | | | | | |

| | Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ***05 Gravity Thickener*** | | | | | | | | | |
| | **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | | 2734 | Remove Asphalt Pavement | 1,000.00 | sy | 1,553 | - | - | | 3,130 | 4.684 /sy | 4,684 |
| | | | **Selective Site Demolition** | | | **1,553** | | | | **3,130** | | **4,684** |
| | | | 95.00 Labor hours | | | | | | | | | |
| | | | 76.000 Equipment hours | | | | | | | | | |
| | **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | | 2 | Design Shoring System-Average | 1.00 | ls | - | - | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | | 100 | Survey & Layout Shoring | 28.00 | lf | 0 | - | - | | - | 0.02 /lf | 0 |
| | | 105 | Mobilize Pile Driving Equipment | 1.00 | ea | - | - | 25,000 | | - | 25,000.00 /ea | 25,000 |
| | | 1025 | Steel Sheeting,15' x 22psf, pulled & salvage | 420.00 | sf | 2,176 | 2,083 | - | | 2,875 | 16.99 /sf | 7,134 |
| | | 1045 | Install & Remove Wales/Struts/Connectors | 0.462 | ton | 112 | 425 | - | | 148 | 1,483.75 /ton | 685 |
| n | | 1050 | Rent Steel Sheet Piling and Wales, first month | 5.082 | ton | - | 1,324 | - | | - | 260.58 /ton | 1,324 |
| | | | **Sheet Piling** | | | **2,289** | **3,833** | **35,000** | | **3,023** | | **44,144** |
| | | | 75.404 Labor hours | | | | | | | | | |
| | | | 18.844 Equipment hours | | | | | | | | | |
| | **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 4,849.47 | cy | 3,982 | - | - | | 10,765 | 3.041 /cy | 14,747 |
| | | 461C | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 1,528.284 | cy | 2,602 | - | - | | 5,056 | 5.011 /cy | 7,659 |
| n | | A000 | IMPORT MATERIAL (Summary) | 2.00 | CY | - | - | - | | - | | |
| n | | A015 | Import Gravel Fill | 215.111 | cy | - | 3,227 | 1,205 | | - | 20.60 /cy | 4,431 |
| | | | **Foundation Excavation** | | | **6,584** | **3,227** | **1,205** | | **15,822** | | **26,837** |
| | | | 435.37 Labor hours | | | | | | | | | |
| | | | 248.25 Equipment hours | | | | | | | | | |
| | **02315.300** | | **Trenching** | | | | | | | | | |
| | | 0 | Survey & Stake Pipeline | 930.00 | lf | 86 | | - | | - | 0.092 /lf | 86 |
| n | | 2090 | Trenching- Backhoe/Loader 95HP (15 cy/hr-120cy/day) Average Exc. | 1,292.870 | cy | 2,418 | - | - | | 4,646 | 5.463 /cy | 7,063 |
| n | | 3090 | Trench Bedding-Backhoe/Loader 95HP | 74.76 | cy | 201 | - | - | | 303 | 6.74 /cy | 504 |
| n | | 4090 | Trench Pipe Zone Backfill-Backhoe/Loader 95HP | 396.51 | cy | 1,278 | - | - | | 1,928 | 8.09 /cy | 3,206 |
| n | | 5090 | Trench Native Backfill-Backhoe/Loader 95HP | 803.70 | cy | 2,346 | - | - | | 4,276 | 8.24 /cy | 6,622 |
| | | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 471.262 | cy | - | 16,588 | - | | - | 35.20 /cy | 16,588 |
| | | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 489.174 | cy | 686 | - | - | | 1,318 | 4.10 /cy | 2,004 |
| | | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 489.174 | cy | 479 | - | - | | 797 | 2.61 /cy | 1,276 |
| | | A006 | Pipe Test | 930.00 | lf | 687 | 744 | - | | - | 1.54 /lf | 1,431 |
| | | A008 | Pipe Locates (Pot Hole) | 1.00 | ea | 152 | 50 | - | | 27 | 228.96 /ea | 229 |
| | | | **Trenching** | | | **8,332** | **17,382** | | | **13,295** | | **39,010** |
| | | | 582.33 Labor hours | | | | | | | | | |
| | | | 334.39 Equipment hours | | | | | | | | | |
| | **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | | 0 | EXCAVATION SPOILS (Grand Total) | 3,310.36 | cy | - | - | - | | - | | |
| | | 40 | Foundation Excavation Spoils (Summary) | 2,821.19 | cy | - | - | - | | - | | |
| | | 45 | Trenching Spoils (Summary) | 489.174 | cy | - | - | - | | - | | |
| | | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 489.174 | cy | 789 | - | - | | 1,516 | 4.712 /cy | 2,305 |
| | | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 3,321.19 | cy | 3,425 | - | - | | 9,651 | 3.94 /cy | 13,076 |
| | | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 489.174 | cy | 2,203 | - | - | | 3,668 | 12.001 /cy | 5,870 |
| | | A0I7 | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 3,321.19 | cy | 2,079 | - | - | | 4,800 | 2.071 /cy | 6,879 |
| | | | **Excavation Spoils** | | | **8,496** | | | | **19,634** | | **28,130** |
| | | | 492.29 Labor hours | | | | | | | | | |
| | | | 246.143 Equipment hours | | | | | | | | | |
| | **02446.000** | | **Drainage Outflow To Head** | | | | | | | | | |
| n | | 0 | Mob/Demob Directional Drilling Equipment | 2.00 | ea | - | - | 5,000 | | - | 2,500.00 /ea | 5,000 |
| n | | 1008 | Install 8" Pipe DIP | 60.00 | lf | - | - | 2,700 | | - | 45.00 /lf | 2,700 |
| n | | 1010 | Install 10" Pipe DIP | 120.00 | lf | - | - | 7,200 | | - | 60.00 /lf | 7,200 |
| | | | **Drainage Outflow To Head** | | | | | **14,900** | | | | **14,900** |
| | **02720.150** | | **Aggregate Base- Roads** | | | | | | | | | |
| | | 1116 | Aggregate Base | 300.00 | cy | 85 | 2,691 | - | | 432 | 10.70 /cy | 3,208 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Aggregate Base- Roads** | | | **85** | **2,691** | | | **432** | | **3,208** |
| | | 4.80 Labor hours | | | | | | | | | |
| | | 4.80 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| | 20 | Bitum Paving | 1,000.00 | sy | - | - | 8,000 | | - | 8.00 /sy | 8,000 |
| | | **Asphalt Paving - Location** | | | | | **8,000** | | | | **8,000** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 15,000.00 | sy | 1,248 | 32,850 | - | | 1,253 | 2.36 /sy | 35,351 |
| | | **Lawns & Grasses** | | | **1,248** | **32,850** | | | **1,253** | | **35,351** |
| | | 60.00 Labor hours | | | | | | | | | |
| | | 30.00 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 110 | Concrete: Slab on Grade | 60.00 | cy | 4,343 | 18,600 | - | | 1,634 | 409.62 /cy | 24,577 |
| n | 120 | Concrete: Slab on Grade Circular | 353.954 | cy | 29,280 | 109,726 | - | | 9,637 | 419.951 /cy | 148,643 |
| n | 140 | Concrete: Wall | 290.00 | cy | 35,985 | 101,500 | - | | 14,625 | 524.52 /cy | 152,110 |
| | | **Concrete in Place** | | | **69,608** | **229,826** | | | **25,896** | | **325,330** |
| | | 3,365.82 Labor hours | | | | | | | | | |
| | | 513.54 Equipment hours | | | | | | | | | |
| **11000.015** | | **Equipment Demolition** | | | | | | | | | |
| | 101 | Demo Selective Items-Each - Gravity Thickener | 1.00 | ea | 119 | - | - | | | 119.28 /ea | 119 |
| | 3335 | Wash Down/Disinfect Tank -Gravity THickener | 200.00 | sf | 21 | 10 | - | | 4 | 0.18 /sf | 35 |
| | | **Equipment Demolition** | | | **141** | **10** | | | **4** | | **155** |
| | | 6.67 Labor hours | | | | | | | | | |
| | | 1.67 Equipment hours | | | | | | | | | |
| **11225.100** | | **Gravity Thickener** | | | | | | | | | |
| | 0 | Unload & Protect Gravity Thickener | 2.00 | ea | 549 | - | - | | 792 | 670.52 /ea | 1,341 |
| | 00 | Warehouse & Care of Gravity Thickener | 2.00 | u/mo | 127 | - | - | | - | 63.66 /u/mo | 127 |
| n | 70 | Gravity Thickener 70' Diameter | 2.00 | ea | 132,000 | 270,000 | - | | 190,178 | 296,088.75 /ea | 592,177 |
| | 6091 | 90 Ton Crane w/1cy Bucket | 47.512 | cy | 29 | - | - | | 367 | 8.33 /cy | 396 |
| | F000 | Swept-in Grout | 47.512 | cy | 1,447 | - | - | | - | 105.46 /cy | 5,011 |
| | G100 | Test & Check Gravity Thickener | 2.00 | ea | 509 | - | - | | - | 254.64 /ea | 509 |
| | z900 | Gravity Thickener Manufacturers Representative | 6.00 | day | - | | 4,800 | | - | 950.00 /day | 5,700 |
| | | **Gravity Thickener** | | | **134,662** | **270,000** | **4,800** | | **191,336** | | **605,262** |
| | | 5,906.48 Labor hours | | | | | | | | | |
| | | 968.15 Equipment hours | | | | | | | | | |
| **11310.100** | | **Submersible Sludge Pumps** | | | | | | | | | |
| | 05 | Thickened Sludge Pump | 2.00 | ea | 2,000 | 4,000 | - | | 1,416 | 3,708.01 /ea | 7,416 |
| | | **Submersible Sludge Pumps** | | | **2,000** | **4,000** | | | **1,416** | | **7,416** |
| | | 99.22 Labor hours | | | | | | | | | |
| | | 16.54 Equipment hours | | | | | | | | | |
| **13121.000** | | **Brick Bldg** | | | | | | | | | |
| | z001 | Pre-Engineered Metal Bldg - Sludge Pump Shelter | 300.00 | sf | | | 22,500 | | | 75.00 /sf | 22,500 |
| | | **Brick Bldg** | | | | | **22,500** | | | | **22,500** |
| **15111.650** | | **Plug Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | 200P | Plug Valve, MJ, 6" | 6.00 | ea | 1,058 | 2,550 | - | | - | 601.283 /ea | 3,608 |
| n | 200Q | Plug Valve, MJ, 8" | 2.00 | ea | 450 | 1,150 | - | | - | 800.04 /ea | 1,600 |
| | | **Plug Valve (CI/DI/IBBM)** | | | **1,508** | **3,700** | | | | | **5,208** |
| | | 47.38 Labor hours | | | | | | | | | |
| **15114.500** | | **Check Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | C20Q | Check Valve, Double Disc, MJ, 8" | 2.00 | ea | 430 | 600 | - | | - | 514.86 /ea | 1,030 |
| n | C20R | Check Valve, Double Disc, MJ, 10" | 2.00 | ea | 556 | 1,000 | - | | - | 778.11 /ea | 1,556 |
| | | **Check Valve (CI/DI/IBBM)** | | | **986** | **1,600** | | | | | **2,586** |
| | | 30.98 Labor hours | | | | | | | | | |
| **15210.010** | | **DIP Totals** | | | | | | | | | |
| | 0 | Total Weight (Zero Cost Item) | 30,141.00 | lbs | - | - | - | | - | | |
| | 1 | Weight of Pipe (Zero Cost Item) | 29,331.00 | lbs | - | - | - | | - | | |
| | 2 | Weight of Fittings (Zero Cost Item) | 810.00 | lbs | - | - | - | | - | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **15210.200** | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | 0 | Unload Care & Protect Push-on DIP & Fittings | 30,141.00 | lbs | 58 | - | - | | 190 | 0.01 /lbs | 248 |
| | 1 | Weight of Push-on Pipe (Zero Cost Item) | 29,331.00 | lbs | - | - | - | | - | | |
| | 2 | Weight of Push-on Fittings (Zero Cost Item) | 810.00 | lbs | - | - | - | | - | | |
| | 5 | Layout Push-on DIP & Fitting | 930.00 | lf | 211 | - | - | | - | 0.23 /lf | 211 |
| n | 208 | DIP CML, Push-On, Class 52, 8" | 630.00 | lf | 3,756 | 10,668 | - | | - | 22.90 /lf | 14,424 |
| n | 210 | DIP CML, Push-On, Class 52, 10" | 300.00 | lf | 2,004 | 6,638 | - | | - | 28.81 /lf | 8,642 |
| n | FAQQ | DIP CML, Push-on, Wye BxB, 8"x 8" | 2.00 | ea | 199 | 540 | - | | - | 369.46 /ea | 739 |
| n | FAQQ | DIP CML, Push-on, Tee BxB, 8"x 8" | 4.00 | ea | 398 | 1,080 | - | | - | 369.46 /ea | 1,478 |
| | | **DIP CML Push-On Pipe** | | | **6,626** | **18,925** | | | **190** | | **25,742** |
| | | 279.14 Labor hours | | | | | | | | | |
| | | 3.32 Equipment hours | | | | | | | | | |
| **16000.005** | | **Electrical Allowance** | | | | | | | | | |
| | 5 | Electrical Allowance | 0.00 | ls | 0 | 0 | 0 | | - | | |
| | | ***05 Gravity Thickener*** | | | ***244,119*** | ***588,044*** | ***86,405*** | | ***275,431*** | | ***1,198,462*** |
| | | 11,480.851 Labor hours | | | | | | | | | |
| | | 2,461.624 Equipment hours | | | | | | | | | |

| | Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **06 Headworks** | | | | | | | | | |
| | 02000.005 | | **Sitework Allowance** | | | | | | | | | |
| | | 20 | Demo Allowance of Old Admin Building (1 story) | 9,000.00 | sf | - | - | 45,000 | | - | 5.00 /sf | 45,000 |
| | | 20 | Architectural Rehab Allowance for Outer Walls of Bldg Connected to Admin Bldg | 1.00 | ls | - | - | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | | | **Sitework Allowance** | | | | | **55,000** | | | | **55,000** |
| | 02220.030 | | **Selective Site Demolition** | | | | | | | | | |
| | | 2720 | Demo Curb & Gutter | 80.00 | lf | 196 | - | - | | 509 | 8.82 /lf | 705 |
| | | 2734 | Remove Asphalt Pavement, 5"thk | 641.56 | sy | 997 | - | - | | 2,008 | 4.684 /sy | 3,005 |
| | | | **Selective Site Demolition** | | | **1,192** | | | | **2,518** | | **3,710** |
| | | | 72.95 Labor hours | | | | | | | | | |
| | | | 52.76 Equipment hours | | | | | | | | | |
| | 02250.250 | | **Sheet Piling** | | | | | | | | | |
| | | 1 | Design Shoring System-Minor | 1.00 | ls | - | - | 1,000 | | - | 1,000.00 /ls | 1,000 |
| | | 100 | Survey & Layout Shoring | 270.00 | lf | 4 | - | - | | - | 0.02 /lf | 4 |
| | | 105 | Mobilize Pile Driving Equipment | 1.00 | ea | - | - | 25,000 | | - | 25,000.00 /ea | 25,000 |
| n | | 1025 | Steel Sheeting,15' x 22psf, pulled & salvage | 2,700.00 | sf | 13,992 | 15,687 | - | | 18,479 | 17.84 /sf | 48,158 |
| | | 1045 | Install & Remove Wales/Struts/Connectors | 2.97 | ton | 721 | 2,732 | - | | 953 | 1,483.734 /ton | 4,407 |
| n | | 1050 | Rent Steel Sheet Piling and Wales, first month | 32.67 | ton | - | 9,919 | - | | - | 303.600 /ton | 9,919 |
| | | | **Sheet Piling** | | | **14,717** | **28,338** | **26,000** | | **19,432** | | **88,487** |
| | | | 484.83 Labor hours | | | | | | | | | |
| | | | 121.14 Equipment hours | | | | | | | | | |
| | 02315.200 | | **Foundation Excavation** | | | | | | | | | |
| | | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 3,314.003 | cy | 2,793 | - | - | | 7,552 | 3.121 /cy | 10,344 |
| | 461C | | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 7,021.45 | cy | 11,956 | - | - | | 23,231 | 5.011 /cy | 35,187 |
| n | A000 | | IMPORT MATERIAL (Summary) | 10.00 | CY | - | - | - | | - | | |
| n | A015 | | Import Gravel Fill | 102.52 | cy | - | 1,538 | 574 | | - | 20.60 /cy | 2,112 |
| | | | **Foundation Excavation** | | | **14,749** | **1,538** | **574** | | **30,782** | | **47,643** |
| | | | 1,019.32 Labor hours | | | | | | | | | |
| | | | 650.09 Equipment hours | | | | | | | | | |
| | 02315.300 | | **Trenching** | | | | | | | | | |
| | | 0 | Survey & Stake Pipeline | 555.00 | lf | 51 | | - | | - | 0.092 /lf | 51 |
| n | | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 599.54 | cy | 1,212 | - | - | | 3,415 | 7.72 /cy | 4,628 |
| n | | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 1,488.194 | cy | 752 | - | - | | 3,291 | 2.72 /cy | 4,043 |
| n | | 3130 | Trench Bedding-Excavator- 130 HP | 45.68 | cy | 92 | - | - | | 269 | 7.901 /cy | 361 |
| n | | 3240 | Trench Bedding-Excavator- 240 HP | 26.90 | cy | 41 | - | - | | 136 | 6.56 /cy | 176 |
| n | | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 202.51 | cy | 655 | - | - | | 1,905 | 12.642 /cy | 2,560 |
| n | | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 93.834 | cy | 228 | - | - | | 757 | 10.492 /cy | 985 |
| n | | 5130 | Trench Native Backfill- Loader C938 3cy | 1,528.594 | cy | 1,382 | - | - | | 4,351 | 3.75 /cy | 5,733 |
| | | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 368.92 | cy | - | 12,986 | - | | - | 35.20 /cy | 12,986 |
| | | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 559.14 | cy | 784 | - | - | | 1,507 | 4.10 /cy | 2,291 |
| | | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 559.14 | cy | 547 | - | - | | 911 | 2.61 /cy | 1,459 |
| n | | 8367 | Trench Shores- Aluminum Hydraulic 36" width x 7' Rail | 3.00 | u/mo | | - | - | | 228 | 76.00 /u/mo | 228 |
| n | | 9616 | Trench Shield- 6x16 | 1.00 | u/mo | - | - | - | | 1,410 | 1,410.00 /u/mo | 1,410 |
| | A006 | | Pipe Test | 255.00 | lf | 188 | 204 | - | | - | 1.54 /lf | 392 |
| | C0V0 | | Concrete Thrust Block, 24" | 5.00 | ea | 537 | 430 | - | | - | 193.37 /ea | 967 |
| | C0Y0 | | Concrete Thrust Block, 30" | 1.00 | ea | 119 | 188 | - | | - | 307.30 /ea | 307 |
| | C0c0 | | Concrete Thrust Block, 48" | 7.00 | ea | 1,670 | 4,816 | - | | - | 926.60 /ea | 6,486 |
| | | | **Trenching** | | | **8,260** | **18,624** | | | **18,179** | | **45,064** |
| | | | 473.42 Labor hours | | | | | | | | | |
| | | | 254.31 Equipment hours | | | | | | | | | |
| | 02315.400 | | **Drilling & Blasting** | | | | | | | | | |
| | | 1008 | Hydraulic Hoe Ram | 346.00 | cy | | - | 51,900 | | | 150.00 /cy | 51,900 |
| | | 1008 | Hydraulic Hoe Ram - Knife Gate Vault | 16.00 | cy | | - | 2,400 | | | 150.00 /cy | 2,400 |
| | | 1008 | Hydraulic Hoe Ram -Medium | 5,873.00 | cy | | - | 880,950 | | | 150.00 /cy | 880,950 |
| | | | **Drilling & Blasting** | | | | | **935,250** | | | | **935,250** |
| | 02315.500 | | **Excavation Spoils** | | | | | | | | | |
| | | 0 | EXCAVATION SPOILS (Grand Total) | 2,992.582 | cy | - | - | - | | - | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 40 | Foundation Excavation Spoils (Summary) | 2,433.444 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 559.14 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 559.14 | cy | 902 | - | - | | 1,733 | 4.712 /cy | 2,635 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 2,433.444 | cy | 2,829 | - | - | | 7,971 | 4.44 /cy | 10,800 |
| A0A4 | | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 559.14 | cy | 2,518 | - | - | | 4,192 | 12.001 /cy | 6,710 |
| A0I7 | | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 2,433.444 | cy | 1,523 | - | - | | 3,517 | 2.071 /cy | 5,040 |
| | | **Excavation Spoils** | | | **7,772** | | | | **17,413** | | **25,185** |
| | | 451.23 Labor hours | | | | | | | | | |
| | | 225.612 Equipment hours | | | | | | | | | |
| **02639.020** | | **Storm Drainage Manholes** | | | | | | | | | |
| | 0 | Unload Care & Protect Manhole | 1.00 | ea | 18 | - | - | | - | 17.51 /ea | 18 |
| C010 | | Manhole 120" x 10' Deep | 1.00 | ea | 343 | 7,729 | - | | 496 | 8,568.58 /ea | 8,569 |
| E000 | | Place & Shape Manhole Base & Inverts- 144" | 1.00 | ea | 245 | - | - | | - | 1,095.22 /ea | 1,095 |
| | | **Storm Drainage Manholes** | | | **606** | **7,729** | | | **496** | | **9,681** |
| | | 35.00 Labor hours | | | | | | | | | |
| | | 4.00 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| | 20 | Bitum Paving Parking Lots | 386.00 | sy | - | - | 3,088 | | - | 8.00 /sy | 3,088 |
| | | **Asphalt Paving - Location** | | | | | **3,088** | | | | **3,088** |
| **02740.110** | | **Asphalt Curbs** | | | | | | | | | |
| | 16 | Bituminous Curb & Gutter | 80.00 | lf | - | - | 320 | | - | 4.00 /lf | 320 |
| | | **Asphalt Curbs** | | | | | **320** | | | | **320** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n z004 | | Loam & Seeding w/Imported Material, 4"thk | 255.56 | sy | 21 | 560 | - | | 21 | 2.36 /sy | 602 |
| | | **Lawns & Grasses** | | | **21** | **560** | | | **21** | | **602** |
| | | 1.022 Labor hours | | | | | | | | | |
| | | 0.511 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 15 | Concrete: Grade Beam | 83.56 | cy | 6,048 | 27,573 | - | | 2,275 | 429.62 /cy | 35,897 |
| n | 110 | Concrete: Diversion Structure Bottom Slab | 33.00 | cy | 2,389 | 10,230 | - | | 898 | 409.61 /cy | 13,517 |
| n | 110 | Concrete: Slab on Grade - Diversion Structure | 16.37 | cy | 1,185 | 5,075 | - | | 446 | 409.62 /cy | 6,705 |
| n | 110 | Concrete: Slab on Grade - Knife Gate Vault | 1.00 | cy | 72 | 310 | - | | 27 | 409.61 /cy | 410 |
| n | 110 | Concrete: Slab on Grade - Wet Well | 86.00 | cy | 6,225 | 26,660 | - | | 2,342 | 409.62 /cy | 35,227 |
| n | 110 | Concrete: Pump Support Pad | 4.00 | cy | 290 | 1,240 | - | | 109 | 409.62 /cy | 1,638 |
| n | 110 | Concrete: Slab on Grade - Valve Vault | 55.00 | cy | 3,981 | 17,050 | - | | 1,497 | 409.61 /cy | 22,529 |
| n | 140 | Concrete: Diversion Structure Wall | 282.00 | cy | 34,992 | 98,700 | - | | 14,221 | 524.52 /cy | 147,914 |
| n | 140 | Concrete: Influent Trough | 5.00 | cy | 620 | 1,750 | - | | 252 | 524.52 /cy | 2,623 |
| n | 140 | Concrete: Wall - Knife Gate Vault | 18.00 | cy | 2,234 | 6,300 | - | | 908 | 524.52 /cy | 9,441 |
| n | 140 | Concrete: Wall - Wet Well | 466.00 | cy | 57,824 | 163,100 | - | | 23,500 | 524.52 /cy | 244,424 |
| n | 140 | Concrete: Wall - Valve Vault | 133.00 | cy | 16,503 | 46,550 | - | | 6,707 | 524.52 /cy | 69,761 |
| n | 145 | Concrete: Diversion Structure - Top Slab | 33.00 | cy | 3,754 | 11,880 | - | | 1,664 | 524.18 /cy | 17,298 |
| n | 145 | Concrete: Elevated Slab - Diversion Structure | 10.97 | cy | 1,248 | 3,948 | - | | 553 | 524.17 /cy | 5,749 |
| n | 145 | Concrete: Elevated Slab - Knife Gate Vault | 1.00 | cy | 114 | 360 | - | | 50 | 524.18 /cy | 524 |
| n | 145 | Concrete: Elevated Slab - Wet Well | 86.00 | cy | 9,782 | 30,960 | - | | 4,337 | 524.18 /cy | 45,079 |
| n | 145 | Concrete: Elevated Slab - Valve Vault | 55.00 | cy | 6,256 | 19,800 | - | | 2,774 | 524.18 /cy | 28,830 |
| n | 180 | Concrete: Grout Fill - avoid Grit Deposits | 5.00 | cy | 207 | 500 | - | | 25 | 146.404 /cy | 732 |
| n | 180 | Concrete: Grout Fill - avoid grit deposits | 4.00 | cy | 165 | 400 | - | | 20 | 146.41 /cy | 586 |
| | | **Concrete in Place** | | | **153,889** | **472,387** | | | **62,608** | | **688,883** |
| | | 7,441.07 Labor hours | | | | | | | | | |
| | | 1,241.49 Equipment hours | | | | | | | | | |
| **03150.010** | | **Concrete Core & Saw** | | | | | | | | | |
| c240 | | Core Drill 30" to 12" depth | 1.00 | ea | 68 | - | - | | | 67.87 /ea | 68 |
| | | **Concrete Core & Saw** | | | **68** | | | | | | **68** |
| | | 5.50 Labor hours | | | | | | | | | |
| **04910.000** | | **Unit Masonry Restoration** | | | | | | | | | |
| n | 9010 | Repair Brick Facade - Admin Bldg | 1,200.00 | sf | 3,717 | 624 | - | | - | 3.62 /sf | 4,341 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Unit Masonry Restoration** | | | **3,717** | **624** | | | | | **4,341** |
| | | 156.00 Labor hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 14.00 | ea | 1,073 | 17,871 | - | | - | 1,353.172 /ea | 18,944 |
| | | **Hatch, Aluminum, 300psf** | | | **1,073** | **17,871** | | | | | **18,944** |
| | | 44.80 Labor hours | | | | | | | | | |
| **06600.110** | | **FRP Weirs & Baffles** | | | | | | | | | |
| | 10 | Rectangular Weir | 18.00 | lf | 108 | 621 | - | | - | 40.52 /lf | 729 |
| | | **FRP Weirs & Baffles** | | | **108** | **621** | | | | | **729** |
| | | 4.50 Labor hours | | | | | | | | | |
| **11210.000** | | **PUMPS** | | | | | | | | | |
| ---- | | 90hp pump & vfd | 5.00 | ea | 250,000 | 500,000 | - | | - | 149,999.974 /ea | 750,000 |
| | | **PUMPS** | | | **250,000** | **500,000** | | | | | **750,000** |
| | | 11,018.064 Labor hours | | | | | | | | | |
| **11217.100** | | **Submersible Sump Pumps** | | | | | | | | | |
| | 25 | Sump Pump - 100gpm | 1.00 | ea | 3,500 | 7,000 | - | | 2,478 | 12,978.01 /ea | 12,978 |
| | | **Submersible Sump Pumps** | | | **3,500** | **7,000** | | | **2,478** | | **12,978** |
| | | 173.63 Labor hours | | | | | | | | | |
| | | 28.94 Equipment hours | | | | | | | | | |
| **13121.000** | | **Brick Bldg** | | | | | | | | | |
| | z001 | Brick Bldg - Pump Controls | 900.00 | sf | | | 225,000 | | | 250.00 /sf | 225,000 |
| | z001 | Brick Bldg - Office Building | 5,000.00 | sf | | | 1,250,000 | | | 250.00 /sf | 1,250,000 |
| | | **Brick Bldg** | | | | | **1,475,000** | | | | **1,475,000** |
| **13400.005** | | **Measurement & Ctrl Instr** | | | | | | | | | |
| | ---- | SCADA allowance for Motorized Valves - Knife Valve | 1.00 | LS | | | 1,500 | | - | 1,500.00 /LS | 1,500 |
| | ---- | Level Sensor | 1.00 | ea | 310 | 1,500 | - | | - | 1,810.00 /ea | 1,810 |
| | ---- | SCADA Allowance for LS | 1.00 | ls | | | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | | **Measurement & Ctrl Instr** | | | **310** | **1,500** | **6,500** | | | | **8,310** |
| | | 10.00 Labor hours | | | | | | | | | |
| **13420.200** | | **I&C Instruments** | | | | | | | | | |
| n | 05-FE-m048 | 48" Magnetic Flow Meter | 1.00 | ea | 1,123 | 46,000 | - | | - | 47,122.71 /ea | 47,123 |
| | | **I&C Instruments** | | | **1,123** | **46,000** | | | | | **47,123** |
| | | 40.93 Labor hours | | | | | | | | | |
| **15111.650** | | **Plug Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | 200X | Plug Valve, MJ, 24" | 5.00 | ea | 3,218 | 23,000 | - | | - | 5,243.602 /ea | 26,218 |
| | | **Plug Valve (CI/DI/IBBM)** | | | **3,218** | **23,000** | | | | | **26,218** |
| | | 101.10 Labor hours | | | | | | | | | |
| **15113.450** | | **GV Knife Gate ValveCI/DI** | | | | | | | | | |
| n | 160Y | Knife Gate Valve, Motor Oper, 30" | 1.00 | ea | 1,011 | 11,000 | - | | - | 12,010.92 /ea | 12,011 |
| | | **GV Knife Gate ValveCI/DI** | | | **1,011** | **11,000** | | | | | **12,011** |
| | | 31.77 Labor hours | | | | | | | | | |
| **15114.500** | | **Check Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | C20X | Check Valve, Double Disc, MJ, 24" | 5.00 | ea | 3,266 | 40,000 | - | | - | 8,653.152 /ea | 43,266 |
| | | **Check Valve (CI/DI/IBBM)** | | | **3,266** | **40,000** | | | | | **43,266** |
| | | 102.600 Labor hours | | | | | | | | | |
| **15210.010** | | **DIP Totals** | | | | | | | | | |
| | 0 | Total Weight (Zero Cost Item) | 38,045.50 | lbs | - | - | - | | - | | |
| | 1 | Weight of Pipe (Zero Cost Item) | 30,970.50 | lbs | - | - | - | | - | | |
| | 2 | Weight of Fittings (Zero Cost Item) | 7,075.00 | lbs | - | - | - | | - | | |
| **15210.200** | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | 0 | Unload Care & Protect Push-on DIP & Fittings | 38,045.50 | lbs | 73 | - | - | | 240 | 0.01 /lbs | 313 |
| | 1 | Weight of Push-on Pipe (Zero Cost Item) | 30,970.50 | lbs | - | - | - | | - | | |
| | 2 | Weight of Push-on Fittings (Zero Cost Item) | 7,075.00 | lbs | - | - | - | | - | | |
| | 5 | Layout Push-on DIP & Fitting | 255.00 | lf | 58 | - | - | | - | 0.23 /lf | 58 |

| | Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **15210.200** | | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | | 11 | DIP Equipment- Cat 325 Excavator | 24.65 | ch | 477 | - | - | | 2,729 | 130.081 /ch | 3,207 |
| n | | 224 | DIP CML, Push-On, Class 52, 24" | 200.00 | lf | 1,909 | 13,900 | - | | - | 79.05 /lf | 15,809 |
| n | | 230 | DIP CML, Push-On, Class 52, 30" | 50.00 | lf | 525 | 4,898 | - | | - | 108.453 /lf | 5,423 |
| n | | 236 | DIP CML, Push-On, Class 52, 36" | 5.00 | lf | 60 | 670 | - | | - | 145.98 /lf | 730 |
| n | 2AUU | | DIP CML, Push-on, 90 Bend, 24" | 5.00 | ea | 1,084 | 13,313 | - | | - | 2,879.39 /ea | 14,397 |
| n | 2AVV | | DIP CML, Push-on, 90 Bend, 30" | 1.00 | ea | 255 | 5,250 | - | | - | 5,505.06 /ea | 5,505 |
| | | | **DIP CML Push-On Pipe** | | | **4,441** | **38,031** | | | **2,969** | | **45,441** |
| | | | 192.03 Labor hours | | | | | | | | | |
| | | | 28.84 Equipment hours | | | | | | | | | |
| **15230.400** | | | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | | 0 | Unload Care & Protect PCCP & Fittings | 300.00 | lf | 1 | - | - | | 2 | 0.01 /lf | 2 |
| | | 10 | Layout Pipe & Fitting | 300.00 | lf | 72 | - | - | | - | 0.24 /lf | 72 |
| | | 325 | PCCP Equipment- Cat 325 Excavator | 48.00 | ch | 929 | - | - | | 5,315 | 130.091 /ch | 6,244 |
| n | B048 | | Prestressed Concrete Cylinder Pipe (250#) 48 | 300.00 | lf | 13,457 | 51,000 | - | | - | 214.86 /lf | 64,457 |
| n | K054 | | PCCP 90 Bend 54 | 1.00 | ea | 388 | 2,000 | - | | - | 2,387.800 /ea | 2,388 |
| n | L048 | | PCCP 45 Bend 48 | 6.00 | ea | 2,070 | 10,200 | - | | - | 2,045.02 /ea | 12,270 |
| n | Q048 | | PCCP Wye 48 | 1.00 | ea | 478 | 1,700 | - | | - | 2,177.68 /ea | 2,178 |
| n | U048 | | PCCP Reducer 48 | 1.00 | ea | 258 | 1,700 | - | | - | 1,957.58 /ea | 1,958 |
| | | | **Prestr Conc Cylind-(PCCP)** | | | **17,652** | **66,600** | | | **5,317** | | **89,569** |
| | | | 748.873 Labor hours | | | | | | | | | |
| | | | 48.033 Equipment hours | | | | | | | | | |
| **15241.100** | | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | | 0 | Unload Care & Protect Pipe/Fittings | 100.00 | lf | 0 | - | - | | 1 | 0.01 /lf | 1 |
| | | 10 | Layout Pipe & Fitting | 100.00 | lf | 24 | - | - | | - | 0.24 /lf | 24 |
| n | 80E0 | | PVC Schd. 80 Pipe, 3.00" | 100.00 | lf | 191 | 624 | - | | - | 8.15 /lf | 815 |
| | a010 | | PVC Joint Primer- Quart | 0.11 | qrt | - | 2 | - | | - | 15.40 /qrt | 2 |
| | a020 | | PVC Solvent Cement Low VOC- Quart | 0.11 | qrt | - | 2 | - | | - | 21.90 /qrt | 2 |
| | | | **PVC Schd Pipe & Fittings** | | | **215** | **628** | | | **1** | | **844** |
| | | | 9.011 Labor hours | | | | | | | | | |
| | | | 0.011 Equipment hours | | | | | | | | | |
| **15500.001** | | | **HVAC Equipment** | | | | | | | | | |
| | | 155 | HVAC Allowance - Pump Control Bldg | 900.00 | sf | - | - | 36,000 | | - | 40.00 /sf | 36,000 |
| | | 155 | HVAC Allowance - Office | 5,000.00 | sf | - | - | 200,000 | | - | 40.00 /sf | 200,000 |
| | | | **HVAC Equipment** | | | | | **236,000** | | | | **236,000** |
| **16000.005** | | | **Electrical Allowance** | | | | | | | | | |
| | | 5 | Electrical Allowance for LS | 0.00 | ls | 0 | 0 | - | | - | | |
| | | 5 | Electrical Allowance - Pump Control Bldg | 0.00 | sf | 0 | 0 | - | | - | | |
| | | 5 | Electrical Allowance - Office | 0.00 | sf | 0 | 0 | - | | - | | |
| | ---- | | Electrical Allowance for Motorized Valve | 0.00 | LS | 0 | 0 | - | | - | | |
| | | | ***06 Headworks*** | | | ***490,908*** | ***1,282,050*** | ***2,737,732*** | | ***162,215*** | | ***4,673,755*** |
| | | | 22,617.63 Labor hours | | | | | | | | | |
| | | | 2,655.73 Equipment hours | | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***07 New Chlorination Facilities*** | | | | | | | | | |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2734 | Remove Asphalt Pavement | 400.00 | sy | 621 | - | - | | 1,252 | 4.684 /sy | 1,873 |
| | 3006 | Demo Concrete Baffle Walls | 10.00 | cy | 24 | - | - | | 64 | 8.82 /cy | 88 |
| | | **Selective Site Demolition** | | | **646** | | | | **1,316** | | **1,962** |
| | | 39.50 Labor hours | | | | | | | | | |
| | | 30.90 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 780.00 | lf | 72 | | - | | - | 0.092 /lf | 72 |
| n | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 1,478.50 | cy | 2,990 | - | - | | 8,422 | 7.72 /cy | 11,412 |
| n | 3130 | Trench Bedding-Excavator- 130 HP | 60.68 | cy | 123 | - | - | | 357 | 7.901 /cy | 479 |
| n | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 295.90 | cy | 957 | - | - | | 2,783 | 12.641 /cy | 3,741 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 295.90 | cy | 268 | - | - | | 842 | 3.75 /cy | 1,110 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 356.58 | cy | - | 12,551 | - | | - | 35.20 /cy | 12,551 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 366.27 | cy | 514 | - | - | | 987 | 4.10 /cy | 1,501 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 366.27 | cy | 359 | - | - | | 597 | 2.61 /cy | 956 |
| n | 9616 | Trench Shield- 6x16 | 0.01 | u/mo | - | - | - | | 14 | 1,410.00 /u/mo | 14 |
| | A002 | Pipe Detectable/Non-Detectable Tape | 780.00 | lf | 72 | 43 | - | | - | 0.15 /lf | 115 |
| | A006 | Pipe Test | 780.00 | lf | 576 | 624 | - | | - | 1.54 /lf | 1,200 |
| | | **Trenching** | | | **5,930** | **13,218** | | | **14,003** | | **33,151** |
| | | 374.754 Labor hours | | | | | | | | | |
| | | 214.782 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 366.27 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 366.27 | cy | - | - | - | | - | | |
| | 46 | Bore & Jack Spoils Spoils (Summary) | 3.782 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 370.05 | cy | 597 | - | - | | 1,147 | 4.712 /cy | 1,744 |
| | A0A0 | Haul Spoils/Off Site 10cy Rear Dump 4.00 Hour/Load | 3.782 | cy | 17 | - | - | | 28 | 12.002 /cy | 45 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 366.27 | cy | 1,649 | - | - | | 2,746 | 12.001 /cy | 4,395 |
| | | **Excavation Spoils** | | | **2,263** | | | | **3,921** | | **6,184** |
| | | 133.121 Labor hours | | | | | | | | | |
| | | 66.560 Equipment hours | | | | | | | | | |
| **02445.000** | | **Boring & Jack Conduit** | | | | | | | | | |
| | 0 | Mob/Demob Bore & Jack Equipment | 1.00 | ea | - | - | 5,000 | | - | 5,000.00 /ea | 5,000 |
| | 100 | Excavate Jacking Pit | 41.481 | cy | 75 | - | - | | 204 | 6.731 /cy | 279 |
| | 105 | Excavate Recieving Pit | 20.741 | cy | 38 | - | - | | 102 | 6.73 /cy | 140 |
| | 200 | Shore Jacking/Receiving Pits | 644.00 | bsf | - | - | 9,660 | | - | 15.00 /bsf | 9,660 |
| | 300 | Backfill Jacking/Receiving Pits | 62.222 | cy | 305 | - | - | | 636 | 15.12 /cy | 941 |
| | 400 | Jacking Slab & Reaction Block | 2.66 | cy | 578 | 612 | - | | - | 447.372 /cy | 1,190 |
| n | 5012 | Bore & Jack Pipe 12 | 130.00 | lf | - | - | 15,600 | | - | 120.00 /lf | 15,600 |
| | 7000 | Grout Casing | 2.84 | cy | 12 | 489 | - | | 14 | 181.43 /cy | 515 |
| | | **Boring & Jack Conduit** | | | **1,008** | **1,101** | **30,260** | | **956** | | **33,324** |
| | | 52.20 Labor hours | | | | | | | | | |
| | | 15.791 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| n | 10 | Bitum Paving | 350.00 | sy | - | - | 5,530 | | - | 15.80 /sy | 5,530 |
| | | **Asphalt Paving - Location** | | | | | **5,530** | | | | **5,530** |
| **02750.100** | | **Concrete Paving** | | | | | | | | | |
| | z015 | Concrete Pavement, Walkways | 50.00 | sy | 102 | 572 | - | | 38 | 14.23 /sy | 711 |
| | | **Concrete Paving** | | | **102** | **572** | | | **38** | | **711** |
| | | 5.45 Labor hours | | | | | | | | | |
| | | 0.55 Equipment hours | | | | | | | | | |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 100.00 | sy | 21 | 219 | - | | 8 | 2.482 /sy | 248 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Lawns & Grasses** | | | **21** | **219** | | | **8** | | **248** |
| | | 1.00 Labor hours | | | | | | | | | |
| | | 0.20 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 140 | Concrete: Chlorination/Dechlorination Contact Basin | 1,300.00 | cy | 161,312 | 455,000 | - | | 65,559 | 524.52 /cy | 681,871 |
| | | **Concrete in Place** | | | **161,312** | **455,000** | | | **65,559** | | **681,871** |
| | | 7,800.000 Labor hours | | | | | | | | | |
| | | 1,300.00 Equipment hours | | | | | | | | | |
| **05600.115** | | **Manifolds** | | | | | | | | | |
| | z001 | 6T Cylinder Manifold System | 2.00 | ls | 835 | 3,450 | - | | | 2,142.50 /ls | 4,285 |
| | | **Manifolds** | | | **835** | **3,450** | | | | | **4,285** |
| | | 32.00 Labor hours | | | | | | | | | |
| | | 16.00 Equipment hours | | | | | | | | | |
| **06220.000** | | **Millwork** | | | | | | | | | |
| | z013 | Diffuser Support Brackets | 2.00 | ea | 186 | 369 | - | | - | 277.46 /ea | 555 |
| | | **Millwork** | | | **186** | **369** | | | | | **555** |
| | | 8.00 Labor hours | | | | | | | | | |
| **11240.500** | | **Chlorination Equipment** | | | | | | | | | |
| | 0 | Chlorine Residual Analyzer (Severn Trent CL 500) | 1.00 | ls | 3,000 | 6,190 | - | | 2,124 | 11,313.76 /ls | 11,314 |
| | A100 | Chlorinator | 2.00 | ea | 15,000 | 30,800 | - | | 10,618 | 28,209.20 /ea | 56,418 |
| | B100 | Chlorine Evaporator | 2.00 | ea | 20,000 | 43,200 | - | | 14,160 | 38,679.83 /ea | 77,360 |
| | F100 | Evaporator Electric-Operated Vacuum Regulator | 2.00 | ea | 4,000 | 8,600 | - | | - | 6,300.00 /ea | 12,600 |
| | S004 | Electronic 6T Cylinder Scale System | 2.00 | ea | 18,000 | 36,600 | - | | 12,742 | 33,671.08 /ea | 67,342 |
| | S004 | Trunnion Scale for 1T Chlorine Cylinders | 2.00 | ea | 1,500 | 3,000 | - | | 1,062 | 2,780.94 /ea | 5,562 |
| | f200 | Chlor-A-Vac Submersible Chemical Induction Unit | 3.00 | ea | 26,000 | 57,768 | - | | - | 27,922.793 /ea | 83,768 |
| | | **Chlorination Equipment** | | | **87,500** | **186,158** | | | **40,706** | | **314,364** |
| | | 4,291.241 Labor hours | | | | | | | | | |
| | | 475.404 Equipment hours | | | | | | | | | |
| **11284.000** | | **Sluice Gates** | | | | | | | | | |
| | 8484 | 84" x 84" Sluice Gate | 1.00 | ea | 14,003 | 27,000 | - | | - | 41,002.93 /ea | 41,003 |
| | 9696 | 96" x 96" Sluice Gate | 1.00 | ea | 15,997 | 33,000 | - | | - | 48,996.65 /ea | 48,997 |
| | | **Sluice Gates** | | | **30,000** | **60,000** | | | | | **90,000** |
| | | 1,257.60 Labor hours | | | | | | | | | |
| **13202.000** | | **Fiberglass Tanks** | | | | | | | | | |
| | GC00 | Sodium Bisulfite System | 1.00 | ls | 3,292 | 32,200 | - | | - | 40,666.60 /ls | 40,667 |
| | | **Fiberglass Tanks** | | | **3,292** | **32,200** | | | | | **40,667** |
| | | 120.000 Labor hours | | | | | | | | | |
| **15112.810** | | **Butterfly Valve PVC** | | | | | | | | | |
| n | 111P | Butterfly Valve, PVC, EPDM, Gear Operated, 6" | 1.00 | ea | 118 | 312 | - | | - | 430.49 /ea | 430 |
| | | **Butterfly Valve PVC** | | | **118** | **312** | | | | | **430** |
| | | 3.72 Labor hours | | | | | | | | | |
| **15117.810** | | **Ball Valve PVC** | | | | | | | | | |
| n | 300G | Ball Valve, PVC, True Union, 2.00" | 1.00 | ea | 30 | 33 | - | | - | 63.37 /ea | 63 |
| | | **Ball Valve PVC** | | | **30** | **33** | | | | | **63** |
| | | 0.95 Labor hours | | | | | | | | | |
| **15119.500** | | **Pressure Red/Reg Valve** | | | | | | | | | |
| n | 300G | Pressure Relief Valve | 2.00 | ea | 301 | 2,800 | - | | - | 1,550.35 /ea | 3,101 |
| | | **Pressure Red/Reg Valve** | | | **301** | **2,800** | | | | | **3,101** |
| | | 9.70 Labor hours | | | | | | | | | |
| **15210.010** | | **DIP Totals** | | | | | | | | | |
| | 0 | Total Weight (Zero Cost Item) | 340.00 | lbs | - | - | - | | - | | |
| | 2 | Weight of Fittings (Zero Cost Item) | 340.00 | lbs | - | - | - | | - | | |
| **15210.200** | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | 0 | Unload Care & Protect Push-on DIP & Fittings | 340.00 | lbs | 1 | - | - | | 2 | 0.01 /lbs | 3 |
| | 2 | Weight of Push-on Fittings (Zero Cost Item) | 340.00 | lbs | - | - | - | | - | | |
| n | 2APP | DIP CML, Push-on, 90 Bend, 12" | 2.00 | ea | 220 | 680 | - | | - | 450.19 /ea | 900 |

| | Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **DIP CML Push-On Pipe** | | | **221** | **680** | | | **2** | | **903** |
| | | | 9.28 Labor hours | | | | | | | | | |
| | | | 0.04 Equipment hours | | | | | | | | | |
| | **15220.302** | | **A53 CW Pipe PE/GE/T&C/SW** | | | | | | | | | |
| | | 0 | Unload Care & Protect Pipe/Fittings | 224.63 | lbs | 0 | - | - | | 1 | 0.01 /lbs | 2 |
| | | 1 | Weight of Pipe (Zero Cost Item) | 224.63 | lbs | - | - | - | | - | | |
| | | 10 | Layout Pipe & Fitting | 75.00 | lf | 18 | - | - | | - | 0.24 /lf | 18 |
| n | | 4009 | A53 CW Sch 40 Pipe PE, 1.00" | 25.00 | lf | 48 | 126 | - | | - | 6.95 /lf | 174 |
| n | 300P | | A53 CW Standard Pipe PE, 12" | 130.00 | lf | 1,674 | 19,328 | - | | - | 161.56 /lf | 21,003 |
| n | 400C | | A53 CW Sch 40 Pipe PE, 2.00" | 50.00 | lf | 131 | 549 | - | | - | 13.604 /lf | 680 |
| | | | **A53 CW Pipe PE/GE/T&C/SW** | | | **1,871** | **20,003** | | | **1** | | **21,876** |
| | | | 78.475 Labor hours | | | | | | | | | |
| | | | 0.025 Equipment hours | | | | | | | | | |
| | **15241.100** | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | | 0 | Unload Care & Protect Pipe/Fittings | 780.00 | lf | 2 | - | - | | 5 | 0.01 /lf | 6 |
| | | 10 | Layout Pipe & Fitting | 780.00 | lf | 186 | - | - | | - | 0.24 /lf | 186 |
| n | 40J0 | | PVC Schd. 40 Pipe, 6" | 130.00 | lf | 372 | 1,455 | - | | - | 14.053 /lf | 1,827 |
| n | 80E0 | | PVC Schd. 80 Pipe, 3.00" | 50.00 | lf | 95 | 312 | - | | - | 8.15 /lf | 407 |
| n | 80J0 | | PVC Schd. 80 Pipe, 6" | 730.00 | lf | 2,437 | 12,695 | - | | - | 20.73 /lf | 15,132 |
| | a010 | | PVC Joint Primer- Quart | 3.15 | qrt | - | 48 | - | | - | 15.35 /qrt | 48 |
| | a020 | | PVC Solvent Cement Low VOC- Quart | 3.15 | qrt | - | 69 | - | | - | 21.90 /qrt | 69 |
| | | | **PVC Schd Pipe & Fittings** | | | **3,093** | **14,579** | | | **5** | | **17,676** |
| | | | 129.69 Labor hours | | | | | | | | | |
| | | | 0.09 Equipment hours | | | | | | | | | |
| | **15500.001** | | **HVAC Equipment** | | | | | | | | | |
| | | 155 | Heating Equipment for FRP Storage Tank | 1.00 | ls | - | 4,840 | | | - | 4,840.00 /ls | 4,840 |
| | | | **HVAC Equipment** | | | | **4,840** | | | | | **4,840** |
| | | | ***07 New Chlorination Facilities*** | | | ***298,728*** | ***795,534*** | ***35,790*** | | ***126,515*** | | ***1,261,742*** |
| | | | 14,346.67 Labor hours | | | | | | | | | |
| | | | 2,120.34 Equipment hours | | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***08 Retrofit of Existing Effluent Outfall*** | | | | | | | | | |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Protect Existing Utilities (6" PW) | 1.00 | ls | - | - | 2,500 | | - | 2,500.00 /ls | 2,500 |
| | | **Sitework Allowance** | | | | | **2,500** | | | | **2,500** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2508 | Remove 84" RCP | 230.00 | lf | 375 | - | - | | 713 | 4.731 /lf | 1,088 |
| | 2508 | Remove 48" PCCP | 50.00 | lf | 82 | - | - | | 155 | 4.731 /lf | 237 |
| | 2508 | Remove 42" DIP | 600.00 | lf | 979 | - | - | | 1,860 | 4.731 /lf | 2,839 |
| | 2508 | Remove 36" DIP | 180.00 | lf | 294 | - | - | | 558 | 4.731 /lf | 852 |
| | | **Selective Site Demolition** | | | **1,730** | | | | **3,285** | | **5,015** |
| | | 106.00 Labor hours | | | | | | | | | |
| | | 53.00 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 600.00 | lf | 55 | | - | | - | 0.092 /lf | 55 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 4,170.833 | cy | 2,108 | - | - | | 9,224 | 2.72 /cy | 11,332 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 122.222 | cy | 185 | - | - | | 616 | 6.56 /cy | 801 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 647.762 | cy | 1,572 | - | - | | 5,225 | 10.492 /cy | 6,796 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 2,717.75 | cy | 2,458 | - | - | | 7,735 | 3.75 /cy | 10,193 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 769.984 | cy | - | 27,103 | - | | - | 35.20 /cy | 27,103 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 1,453.09 | cy | 2,038 | - | - | | 3,916 | 4.10 /cy | 5,954 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 1,453.09 | cy | 1,423 | - | - | | 2,368 | 2.61 /cy | 3,791 |
| n | 8367 | Trench Shores- Aluminum Hydraulic 36" width x 7' Rail | 2.00 | u/mo | | - | - | | 152 | 76.00 /u/mo | 152 |
| | C0j0 | Concrete Thrust Block, 72" | 1.00 | ea | 716 | 2,322 | - | | - | 3,037.80 /ea | 3,038 |
| | | **Trenching** | | | **10,554** | **29,425** | | | **29,237** | | **69,216** |
| | | 663.644 Labor hours | | | | | | | | | |
| | | 441.10 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 1,453.09 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 1,453.09 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 1,453.09 | cy | 2,343 | - | - | | 4,503 | 4.712 /cy | 6,847 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 1,453.09 | cy | 6,544 | - | - | | 10,894 | 12.001 /cy | 17,438 |
| | | **Excavation Spoils** | | | **8,887** | | | | **15,398** | | **24,285** |
| | | 522.734 Labor hours | | | | | | | | | |
| | | 261.37 Equipment hours | | | | | | | | | |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 3,000.00 | sy | 250 | 6,570 | - | | 251 | 2.36 /sy | 7,070 |
| | | **Lawns & Grasses** | | | **250** | **6,570** | | | **251** | | **7,070** |
| | | 12.00 Labor hours | | | | | | | | | |
| | | 6.00 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 140 | Concrete: Effluent Outfall Structure | 21.00 | cy | 2,606 | 7,350 | - | | 1,059 | 524.52 /cy | 11,015 |
| n | 140 | Concrete: Effluent Maintenance Structure | 50.00 | cy | 6,204 | 17,500 | - | | 2,522 | 524.52 /cy | 26,226 |
| | | **Concrete in Place** | | | **8,810** | **24,850** | | | **3,581** | | **37,241** |
| | | 426.000 Labor hours | | | | | | | | | |
| | | 71.00 Equipment hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 2.00 | ea | 153 | 2,553 | - | | - | 1,353.17 /ea | 2,706 |
| | | **Hatch, Aluminum, 300psf** | | | **153** | **2,553** | | | | | **2,706** |
| | | 6.40 Labor hours | | | | | | | | | |
| **15230.400** | | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | 0 | Unload Care & Protect PCCP & Fittings | 600.00 | lf | 1 | - | - | | 4 | 0.01 /lf | 5 |
| | 10 | Layout Pipe & Fitting | 600.00 | lf | 143 | - | - | | - | 0.24 /lf | 143 |
| | 325 | PCCP Equipment- Cat 325 Excavator | 133.00 | ch | 2,575 | - | - | | 14,727 | 130.091 /ch | 17,302 |
| n | B074 | Prestressed Concrete Cylinder Pipe (250#) 54 | 550.00 | lf | 27,558 | 104,500 | - | | - | 240.11 /lf | 132,058 |
| n | B084 | Prestressed Concrete Cylinder Pipe (250#) 84 | 50.00 | lf | 4,080 | 15,500 | - | | - | 391.601 /lf | 19,580 |
| n | K078 | PCCP 90 Bend 78 | 1.00 | ea | 560 | 2,800 | - | | - | 3,360.24 /ea | 3,360 |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | **Prestr Conc Cylind-(PCCP)** | | **34,918** | **122,800** | | | **14,731** | | **172,449** |
| | 1,488.56 Labor hours | | | | | | | | |
| | 133.07 Equipment hours | | | | | | | | |
| | ***08 Retrofit of Existing Effluent Outfall*** | | ***65,302*** | ***186,198*** | ***2,500*** | | ***66,482*** | | ***320,482*** |
| | 3,225.334 Labor hours | | | | | | | | |
| | 965.530 Equipment hours | | | | | | | | |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | ***09 I&C*** | | | | | | | | |
| **13000.005** | **Special Const Allowance** | | | | | | | | |
| 5 | I&C Allowance | 0.00 ls | 0 | 0 | - | | - | | |
| | ***09 I&C*** | | ***0*** | ***0*** | ***0*** | | ***0*** | | ***0*** |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | ***10 Electrical*** | | | | | | | | |
| **16000.005** | **Electrical Allowance** | | | | | | | | |
| 5 | Electrical Allowance | 0.00 ls | 0 | 0 | - | | - | | |
| | ***10 Electrical*** | | ***0*** | ***0*** | ***0*** | | ***0*** | | ***0*** |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***11 Chemical Feed*** | | | | | | | | | |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2510 | Demo 12'dia x 40'tall Steel Tank | 1.00 | ea | | - | 5,000 | | | 5,000.00 /ea | 5,000 |
| | 2734 | Remove Asphalt Pavement, 5"thk | 189.00 | sy | 518 | - | - | | 592 | 5.87 /sy | 1,109 |
| | 3012 | Demo Concrete Elevated Slab | 22.00 | cy | 50 | - | - | | 74 | 5.61 /cy | 123 |
| | | **Selective Site Demolition** | | | **567** | | **5,000** | | **665** | | **6,233** |
| | | 19.692 Labor hours | | | | | | | | | |
| | | 14.943 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 480.00 | lf | 55 | | - | | - | 0.12 /lf | 55 |
| n | 2090 | Trenching- Backhoe/Loader 95HP (15 cy/hr-120cy/day) Average Exc. | 583.87 | cy | 1,965 | - | - | | 2,098 | 6.96 /cy | 4,063 |
| n | 3090 | Trench Bedding-Backhoe/Loader 95HP | 36.543 | cy | 179 | - | - | | 148 | 8.95 /cy | 327 |
| n | 4090 | Trench Pipe Zone Backfill-Backhoe/Loader 95HP | 109.65 | cy | 645 | - | - | | 533 | 10.741 /cy | 1,178 |
| n | 5090 | Trench Native Backfill-Backhoe/Loader 95HP | 109.65 | cy | 588 | - | - | | 583 | 10.681 /cy | 1,171 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 146.193 | cy | - | 5,146 | - | | - | 35.20 /cy | 5,146 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 146.48 | cy | 370 | - | - | | 395 | 5.22 /cy | 765 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 146.48 | cy | 292 | - | - | | 239 | 3.624 /cy | 531 |
| | A002 | Pipe Detectable/Non-Detectable Tape | 480.00 | lf | 55 | 26 | - | | - | 0.17 /lf | 81 |
| | A006 | Pipe Test | 480.00 | lf | 461 | 384 | - | | - | 1.761 /lf | 845 |
| | | **Trenching** | | | **4,610** | **5,556** | | | **3,996** | | **14,163** |
| | | 179.20 Labor hours | | | | | | | | | |
| | | 91.695 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 146.48 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 146.48 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 146.48 | cy | 425 | - | - | | 454 | 6.002 /cy | 879 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 146.48 | cy | 1,344 | - | - | | 1,098 | 16.673 /cy | 2,442 |
| | | **Excavation Spoils** | | | **1,769** | | | | **1,552** | | **3,321** |
| | | 52.694 Labor hours | | | | | | | | | |
| | | 26.35 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| n | 10 | Bitum Paving | 189.00 | sy | - | - | 2,986 | | - | 15.80 /sy | 2,986 |
| | | **Asphalt Paving - Location** | | | | | **2,986** | | | | **2,986** |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 145 | Concrete: Elevated Slab - Flow Splitter Box | 22.00 | cy | 3,154 | 7,920 | - | | 1,109 | 553.82 /cy | 12,184 |
| | | **Concrete in Place** | | | **3,154** | **7,920** | | | **1,109** | | **12,184** |
| | | 121.000 Labor hours | | | | | | | | | |
| | | 22.00 Equipment hours | | | | | | | | | |
| **03150.010** | | **Concrete Core & Saw** | | | | | | | | | |
| | c 10 | Core Drill 1" to 12" depth - Dewatering Wall | 3.00 | ea | 58 | - | - | | | 19.28 /ea | 58 |
| | c 10 | Core Drill 1" to 12" depth - Flow Splitter Wall | 3.00 | ea | 58 | - | - | | | 19.28 /ea | 58 |
| | | **Concrete Core & Saw** | | | **116** | | | | | | **116** |
| | | 4.80 Labor hours | | | | | | | | | |
| **05000.001** | | **Metals Allowance** | | | | | | | | | |
| | 5 | Metals Allowance - Mount Chemical Induction System | 1.00 | ls | | | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | | **Metals Allowance** | | | | | **5,000** | | | | **5,000** |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL - Chem Induction | 1.00 | ea | 87 | 1,277 | - | | - | 1,363.12 /ea | 1,363 |
| | | **Hatch, Aluminum, 300psf** | | | **87** | **1,277** | | | | | **1,363** |
| | | 3.20 Labor hours | | | | | | | | | |
| **11220.100** | | **Chemical Mixing Units** | | | | | | | | | |
| | 02 | Polymer Supply Mechanical Mixer | 4.00 | ea | 3,778 | 6,000 | - | | - | 2,444.40 /ea | 9,778 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Chemical Mixing Units** | | | **3,778** | **6,000** | | | | | **9,778** |
| | | 120.000 Labor hours | | | | | | | | | |
| **11240.400** | | **Polymer Store/Feed Equip** | | | | | | | | | |
| | 0 | Metering Pump/Poly Blend and Feed Pump | 3.00 | ea | 21,182 | 42,000 | - | | 10,276 | 24,486.00 /ea | 73,458 |
| | 0 | First Fill of Polymer | 3.00 | day | 2,118 | 4,500 | - | | 1,028 | 2,548.60 /day | 7,646 |
| | | **Polymer Store/Feed Equip** | | | **23,301** | **46,500** | | | **11,303** | | **81,104** |
| | | 792.00 Labor hours | | | | | | | | | |
| | | 132.00 Equipment hours | | | | | | | | | |
| **11240.420** | | **Storage Tanks** | | | | | | | | | |
| f110 | | Submerged Chemical Induction System | 1.00 | ls | 23,536 | 40,000 | - | | - | 63,536.00 /ls | 63,536 |
| | | **Storage Tanks** | | | **23,536** | **40,000** | | | | | **63,536** |
| | | 800.000 Labor hours | | | | | | | | | |
| **13000.005** | | **Special Const Allowance** | | | | | | | | | |
| | 5 | SCADA Allowance | 1.00 | ls | | | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | 5 | Polymer Tote Containment | 4.00 | ea | 433 | 3,680 | - | | - | 1,028.20 /ea | 4,113 |
| | | **Special Const Allowance** | | | **433** | **3,680** | **5,000** | | | | **9,113** |
| | | 16.00 Labor hours | | | | | | | | | |
| **15115.810** | | **Diaphragm Valve PVC** | | | | | | | | | |
| n 130I | | PVC Diaphragm Valve, flg, 1" | 9.00 | ea | 615 | 8,640 | - | | - | 1,028.313 /ea | 9,255 |
| n 130K | | PVC Diaphragm Valve, flg, 2" | 6.00 | ea | 800 | 9,060 | - | | - | 1,643.34 /ea | 9,860 |
| | | **Diaphragm Valve PVC** | | | **1,415** | **17,700** | | | | | **19,115** |
| | | 38.73 Labor hours | | | | | | | | | |
| **15241.100** | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | 0 | Unload Care & Protect Pipe/Fittings | 680.00 | lf | 2 | - | - | | 4 | 0.01 /lf | 7 |
| | 10 | Layout Pipe & Fitting | 680.00 | lf | 214 | - | - | | - | 0.32 /lf | 214 |
| n | 8080 | PVC Schd. 80 Pipe, 1.00" | 600.00 | lf | 944 | 792 | - | | - | 2.894 /lf | 1,736 |
| n 80C0 | | PVC Schd. 80 Pipe, 2.00" | 80.00 | lf | 176 | 245 | - | | - | 5.264 /lf | 421 |
| n 8A80 | | PVC Sch 80. 90 Ell , 1.00" | 18.00 | ea | 96 | 79 | - | | - | 9.752 /ea | 176 |
| n 8AC0 | | PVC Sch 80. 90 Ell , 2.00" | 11.00 | ea | 93 | 84 | - | | - | 16.12 /ea | 177 |
| n 8F88 | | PVC Sch 80. Tee , 1.00" | 12.00 | ea | 87 | 95 | - | | - | 15.13 /ea | 182 |
| n 8FCC | | PVC Sch 80. Tee , 2.00" | 7.00 | ea | 82 | 190 | - | | - | 38.754 /ea | 271 |
| a010 | | PVC Joint Primer- Quart | 1.21 | qrt | - | 19 | - | | - | 15.35 /qrt | 19 |
| a020 | | PVC Solvent Cement Low VOC- Quart | 1.21 | qrt | - | 26 | - | | - | 21.90 /qrt | 26 |
| | | **PVC Schd Pipe & Fittings** | | | **1,695** | **1,529** | | | **4** | | **3,229** |
| | | 53.855 Labor hours | | | | | | | | | |
| | | 0.075 Equipment hours | | | | | | | | | |
| **15400.005** | | **Plumbing Allowance** | | | | | | | | | |
| | 5 | Plumbing Allowance - Hook Plant Water to Poly System | 1.00 | ls | | | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | | **Plumbing Allowance** | | | | | **5,000** | | | | **5,000** |
| **16000.005** | | **Electrical Allowance** | | | | | | | | | |
| | 5 | Electrical Allowance - Wire Chemical Induction to Controls | 1.00 | ls | | | 25,000 | | - | 25,000.00 /ls | 25,000 |
| | | **Electrical Allowance** | | | | | **25,000** | | | | **25,000** |
| | | 0.000 Labor hours | | | | | | | | | |
| | | ***11 Chemical Feed*** | | | ***64,460*** | ***130,162*** | ***47,986*** | | ***18,631*** | | ***261,239*** |
| | | 2,201.171 Labor hours | | | | | | | | | |
| | | 287.06 Equipment hours | | | | | | | | | |

## Estimate Totals

| | Description | Amount | Totals | Hours | Rate |
|---|---|---|---|---|---|
| | Labor | 3,847,263 | | 182,455 hrs | |
| | Material | 10,958,701 | | | |
| | Subcontract | 5,774,191 | | | |
| | Equipment | 2,693,382 | | 26,606 hrs | |
| | Other | 10,889 | | | |
| **Subtotal Direct Cost** | | **23,284,426** | **23,284,426** | | |
| | I&C | 2,328,442 | | | 10.00 % |
| | Electrical | 3,492,663 | | | 15.00 % |
| | | **5,821,105** | **29,105,531** | | |
| | Indirect Costs: | | | | |
| | Building Permits(% total cost) | 243.610 | | | 0.40 % |
| | Sales Tax (MEO) | | | | |
| | Builders Risk Ins % total cost | 152.256 | | | 0.25 % |
| | Gen Liability Ins % total cost | 1,218,051 | | | 2.00 % |
| | GC Bonds (% total cost) | 609,025 | | | 1.00 % |
| **Subtotal Prior to OH&P** | | **2,222,942** | **31,328,473** | | |
| | GC Field General Conditions | 3,132,847 | | | 10.00 % |
| | GC Indirects, OH & Profit | 3,132,847 | | | 10.00 % |
| **Subtotal** | | **6,265,694** | **37,594,167** | | |
| | Construction Contingency | 13,157,958 | | | 35.00 % |
| | **Total Construction Cost** | **13,157,958** | **50,752,125** | | |
| | Engineering, Permitting, Bond Financing, Legal and Administration | 10,150,424 | | | 20.00 % |
| **Total Program Cost** | | **10,150,424** | **60,902,549** | | |
| | ***Total*** | | ***60,902,549*** | | |

This is an Opinion of Probable Construction Cost only, as defined by the documents provided at the level of design indicated on the front sheet of this estimate.
There are not any costs provided for: Change Orders, Construction Oversight, land acquisition or temporary/permanent easements, Operations, or any other costs associated with this project that are not specifically part of the bidding contractor's proposed scope.
The total cost shown is valid to only two significant figures.

# *Knoxville, Tennessee*
# *Kuwahee WWTP - Options 7a*
# *Opinion of Probable Construction Cost, Prelim Design, March 2007*

| | |
|---|---|
| **Project name** | TN, Knoxville KWWTP |
| **Estimator** | MacIsaac |
| **Labor rate table** | TN07 Knoxville |
| **Equipment rate table** | 00 071H Equip Rental |
| **database version:** | V6.0 TES 9.4.22.0 |
| **ENR 20 City CCI** | March 2007: 7856 |
| **Notes** | This is an Opinion of Probable Construction Cost only, as defined by the documents provided at the level of design indicated above. CDM has no control over the cost of labor, materials, equipment, or services furnished, over schedules, over contractor's methods of determining prices, competitive bidding, market or negotiating conditions. CDM does not guarantee that this opinion will not vary from actual cost, or contractor's bids. There are not any costs provided for: Change Orders, Construction Oversight, Land Acquisition or temporary/permanent Easements, Operations, or any other costs associated with this project that are not specifically part of the bidding contractor's proposed scope.<br><br>The total cost shown is valid to only two significant figures<br><br>Assumptions:<br>Only nominal dewatering is needed.<br>No finishes are included.<br>Based on a 40 hour work week with no overtime.<br><br>This job is sales tax exempt. |
| **Report format** | Sorted by 'Proj Area/Phase'<br>'Detail' summary<br>Allocate addons<br>Round unit prices<br>Combine items<br>Paginate |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***01 UNOX Bypass*** | | | | | | | | | |
| **01010.000** | | **General Conditions** | | | | | | | | | |
| | 5 | Assumption of 20% of Excavated Material is Contaminated | 4,175.00 | cy | - | - | 104,375 | | - | 25.00 /cy | 104,375 |
| | | **General Conditions** | | | | | **104,375** | | | | **104,375** |
| **01590.000** | | **Traffic/Pollution Control** | | | | | | | | | |
| ---- | | Traffic Control | 1.00 | ls | | | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | | **Traffic/Pollution Control** | | | | | **10,000** | | | | **10,000** |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Protect Utilities (6"pw, 4"cw, 16" sludge, duct) | 1.00 | ls | - | - | 2,500 | | - | 2,500.00 /ls | 2,500 |
| | | **Sitework Allowance** | | | | | **2,500** | | | | **2,500** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2508 | Remove 48" DIP - 11' deep | 70.00 | lf | 114 | - | - | | 217 | 4.731 /lf | 331 |
| | 2512 | Demo Existing Secondary Aeratio Influent Structure (86cy concrete) | 1.00 | ea | | - | 1,200 | | | 1,200.00 /ea | 1,200 |
| | 2734 | Remove Pavement/Concrete Walk | 312.00 | sy | 485 | - | - | | 977 | 4.684 /sy | 1,461 |
| | | **Selective Site Demolition** | | | **599** | | **1,200** | | **1,194** | | **2,993** |
| | | 36.64 Labor hours | | | | | | | | | |
| | | 27.212 Equipment hours | | | | | | | | | |
| **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | 2 | Design Shoring System-Average | 1.00 | ls | - | - | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | 100 | Survey & Layout Shoring | 70.00 | lf | 1 | - | - | | - | 0.02 /lf | 1 |
| | 105 | Mobilize Pile Driving Equipment | 1.00 | ea | - | - | 25,000 | | - | 25,000.00 /ea | 25,000 |
| | 1030 | Steel Sheeting,20' x 27psf, pulled & salvage | 1,400.00 | sf | 7,255 | 9,016 | - | | 9,582 | 18.47 /sf | 25,853 |
| | 1045 | Install & Remove Wales/Struts/Connectors | 1.89 | ton | 459 | 1,739 | - | | 606 | 1,483.73 /ton | 2,804 |
| n | 1050 | Rent Steel Sheet Piling and Wales, first month | 20.79 | ton | - | 5,418 | - | | - | 260.59 /ton | 5,418 |
| | | **Sheet Piling** | | | **7,715** | **16,172** | **35,000** | | **10,188** | | **69,076** |
| | | 254.123 Labor hours | | | | | | | | | |
| | | 63.513 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 636.00 | cy | 536 | - | - | | 1,449 | 3.121 /cy | 1,985 |
| | | **Foundation Excavation** | | | **536** | | | | **1,449** | | **1,985** |
| | | 33.92 Labor hours | | | | | | | | | |
| | | 16.96 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 285.00 | lf | 26 | | - | | - | 0.092 /lf | 26 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 1,274.583 | cy | 644 | - | - | | 2,819 | 2.72 /cy | 3,463 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 53.951 | cy | 82 | - | - | | 272 | 6.56 /cy | 354 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 273.30 | cy | 663 | - | - | | 2,204 | 10.492 /cy | 2,867 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 681.13 | cy | 616 | - | - | | 1,939 | 3.751 /cy | 2,555 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 327.25 | cy | - | 11,519 | - | | - | 35.20 /cy | 11,519 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 593.46 | cy | 832 | - | - | | 1,599 | 4.10 /cy | 2,432 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 593.46 | cy | 581 | - | - | | 967 | 2.61 /cy | 1,548 |
| n | 8367 | Trench Shores- Aluminum Hydraulic 36" width x 7' Rail | 1.00 | u/mo | | - | - | | 76 | 76.00 /u/mo | 76 |
| | | **Trenching** | | | **3,445** | **11,519** | | | **9,876** | | **24,840** |
| | | 225.071 Labor hours | | | | | | | | | |
| | | 153.362 Equipment hours | | | | | | | | | |
| **02315.400** | | **Drilling & Blasting** | | | | | | | | | |
| | 1008 | Hydraulic Hoe Ram -Medium | 636.00 | cy | | - | 95,400 | | | 150.00 /cy | 95,400 |
| | | **Drilling & Blasting** | | | | | **95,400** | | | | **95,400** |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 1,229.46 | cy | - | - | - | | - | | |
| | 40 | Foundation Excavation Spoils (Summary) | 636.00 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 593.46 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 593.46 | cy | 957 | - | - | | 1,839 | 4.712 /cy | 2,796 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 636.00 | cy | 739 | - | - | | 2,083 | 4.44 /cy | 2,823 |
| A0A4 | | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 593.46 | cy | 2,672 | - | - | | 4,449 | 12.001 /cy | 7,122 |
| A0I7 | | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 636.00 | cy | 398 | - | - | | 919 | 2.071 /cy | 1,317 |

| | | | | | Labor | Material | Subcontract | | Equipment | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Item | | Description | Takeoff Qty | | Amount | Amount | Amount | Name | Amount | Unit Cost | Amount |
| | | **Excavation Spoils** | | | **4,767** | | | | **9,291** | | **14,058** |
| | | 278.851 Labor hours | | | | | | | | | |
| | | 139.43 Equipment hours | | | | | | | | | |
| **02720.100** | | **Aggregate Base Course** | | | | | | | | | |
| | 1180 | Crushed Rock 1" | 242.00 | cy | 184 | 2,474 | - | | 929 | 14.822 /cy | 3,587 |
| | 1230 | Granular Fill | 690.00 | cy | 197 | 8,252 | - | | 993 | 13.69 /cy | 9,442 |
| | | **Aggregate Base Course** | | | **380** | **10,726** | | | **1,922** | | **13,029** |
| | | 21.37 Labor hours | | | | | | | | | |
| | | 21.37 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| n | 10 | Bitum Paving | 242.00 | sy | - | - | 3,824 | | - | 15.80 /sy | 3,824 |
| | | **Asphalt Paving - Location** | | | | | **3,824** | | | | **3,824** |
| **02750.100** | | **Concrete Paving** | | | | | | | | | |
| | z015 | Concrete Pavement, Walkways | 70.00 | sy | 143 | 800 | - | | 53 | 14.23 /sy | 996 |
| | | **Concrete Paving** | | | **143** | **800** | | | **53** | | **996** |
| | | 7.63 Labor hours | | | | | | | | | |
| | | 0.77 Equipment hours | | | | | | | | | |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 303.00 | sy | 25 | 664 | - | | 25 | 2.36 /sy | 714 |
| | ---- | Restoration including plants & new trees | 303.00 | sy | | | 4,545 | | - | 15.00 /sy | 4,545 |
| | | **Lawns & Grasses** | | | **25** | **664** | **4,545** | | **25** | | **5,259** |
| | | 1.212 Labor hours | | | | | | | | | |
| | | 0.61 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 140 | Concrete: Secondary Aeration Influent Structure | 86.00 | cy | 10,671 | 30,100 | - | | 4,337 | 524.52 /cy | 45,108 |
| | | **Concrete in Place** | | | **10,671** | **30,100** | | | **4,337** | | **45,108** |
| | | 516.000 Labor hours | | | | | | | | | |
| | | 86.00 Equipment hours | | | | | | | | | |
| **03150.010** | | **Concrete Core & Saw** | | | | | | | | | |
| | e240 | Core Drill 66"dia | 1.00 | ea | 1,283 | - | - | | | 1,283.36 /ea | 1,283 |
| | | **Concrete Core & Saw** | | | **1,283** | | | | | | **1,283** |
| | | 104.000 Labor hours | | | | | | | | | |
| **04000.015** | | **Masonry Demolition** | | | | | | | | | |
| | 5 | Masonry Demolition | 320.00 | sf | 75 | - | - | | 95 | 0.531 /sf | 170 |
| | | **Masonry Demolition** | | | **75** | | | | **95** | | **170** |
| | | 4.80 Labor hours | | | | | | | | | |
| | | 4.80 Equipment hours | | | | | | | | | |
| **04210.000** | | **Clay Masonry Units** | | | | | | | | | |
| n | 8105 | Brick Mortar Type S | 24.312 | cf | 32 | 106 | - | | - | 5.684 /cf | 138 |
| | 8900 | Clean Brick | 320.00 | sf | 102 | 74 | - | | - | 0.55 /sf | 175 |
| n | 018A | Standard Face Brick - Common Bond | 2,026.00 | ea | 1,439 | 972 | - | | - | 1.19 /ea | 2,411 |
| | | **Clay Masonry Units** | | | **1,573** | **1,152** | | | | | **2,725** |
| | | 66.002 Labor hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | JD7 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type JD-AL | 1.00 | ea | 77 | 1,277 | - | | - | 1,353.20 /ea | 1,353 |
| | | **Hatch, Aluminum, 300psf** | | | **77** | **1,277** | | | | | **1,353** |
| | | 3.20 Labor hours | | | | | | | | | |
| **15230.400** | | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | 0 | Unload Care & Protect PCCP & Fittings | 285.00 | lf | 1 | - | - | | 2 | 0.01 /lf | 2 |
| | 10 | Layout Pipe & Fitting | 285.00 | lf | 68 | - | - | | - | 0.24 /lf | 68 |
| | 460 | PCCP Equipment- RT Crane 60 MT | 62.70 | ch | 1,134 | - | - | | 12,408 | 215.984 /ch | 13,542 |
| n | B072 | Prestressed Concrete Cylinder Pipe (250#) 66 | 285.00 | lf | 19,924 | 71,250 | - | | - | 319.910 /lf | 91,174 |
| n | K072 | PCCP 90 Bend 66 | 1.00 | ea | 517 | 2,500 | - | | - | 3,017.31 /ea | 3,017 |
| n | L066 | PCCP 45 Bend 66 | 2.00 | ea | 948 | 4,000 | - | | - | 2,474.14 /ea | 4,948 |
| n | m066 | PCCP-Restrained Joint (weld) 66 | 6.00 | ea | 143 | 480 | - | | - | 103.86 /ea | 623 |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | **Prestr Conc Cylind-(PCCP)** | | **22,735** | **78,230** | | | **12,410** | | **113,376** |
| | 968.081 Labor hours | | | | | | | | |
| | 62.731 Equipment hours | | | | | | | | |
| | ***01 UNOX Bypass*** | | ***54,024*** | ***150,640*** | ***256,844*** | | ***50,841*** | | ***512,350*** |
| | 2,520.90 Labor hours | | | | | | | | |
| | 576.745 Equipment hours | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***02 Primary Redirect*** | | | | | | | | | |
| **01590.000** | | **Traffic/Pollution Control** | | | | | | | | | |
| | 5 | Traffic Control | 1.00 | ls | | | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | | **Traffic/Pollution Control** | | | | | **10,000** | | | | **10,000** |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Protect Existing Utilities (6"CIP WS, 10"CIP SFPE, 48" RCP San) | 1.00 | ls | - | - | 2,500 | | - | 2,500.00 /ls | 2,500 |
| | 20 | Connect to Existing Basin | 1.00 | ls | - | - | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | | **Sitework Allowance** | | | | | **7,500** | | | | **7,500** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2508 | Remove 72" Steel Pipe (21vf) | 70.00 | lf | 114 | - | - | | 217 | 4.731 /lf | 331 |
| | 2514 | Demo Railroad Lines | 70.00 | lf | 343 | - | - | | 891 | 17.63 /lf | 1,234 |
| | 2734 | Remove Asphalt Pavement, 5"thk | 333.00 | sy | 517 | - | - | | 1,042 | 4.684 /sy | 1,560 |
| | 3006 | Demo Concrete Return Sludge Channel | 66.00 | cy | 5,386 | - | - | | 1,261 | 100.70 /cy | 6,646 |
| | | **Selective Site Demolition** | | | **6,360** | | | | **3,411** | | **9,771** |
| | | 389.64 Labor hours | | | | | | | | | |
| | | 45.71 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 35.00 | lf | 3 | | - | | - | 0.092 /lf | 3 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 136.111 | cy | 69 | - | - | | 301 | 2.72 /cy | 370 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 5.761 | cy | 9 | - | - | | 29 | 6.56 /cy | 38 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 26.80 | cy | 65 | - | - | | 216 | 10.492 /cy | 281 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 81.38 | cy | 74 | - | - | | 232 | 3.75 /cy | 305 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 32.56 | cy | - | 1,146 | - | | - | 35.20 /cy | 1,146 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 54.733 | cy | 77 | - | - | | 148 | 4.10 /cy | 224 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 54.733 | cy | 54 | - | - | | 89 | 2.61 /cy | 143 |
| n | 8367 | Trench Shores- Aluminum Hydraulic 36" width x 7' Rail | 1.00 | u/mo | | - | - | | 76 | 76.00 /u/mo | 76 |
| | | **Trenching** | | | **350** | **1,146** | | | **1,091** | | **2,586** |
| | | 22.772 Labor hours | | | | | | | | | |
| | | 15.72 Equipment hours | | | | | | | | | |
| **02315.400** | | **Drilling & Blasting** | | | | | | | | | |
| | 1008 | Hydraulic Hoe Ram -Medium | 144.00 | cy | | - | 21,600 | | | 150.00 /cy | 21,600 |
| | | **Drilling & Blasting** | | | | | **21,600** | | | | **21,600** |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 54.733 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 54.733 | cy | - | - | - | | - | | |
| | 46 | Bore & Jack Spoils Spoils (Summary) | 136.14 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 190.87 | cy | 308 | - | - | | 592 | 4.712 /cy | 899 |
| A0A0 | | Haul Spoils/Off Site 10cy Rear Dump 4.00 Hour/Load | 136.14 | cy | 613 | - | - | | 1,021 | 12.001 /cy | 1,634 |
| A0A4 | | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 54.733 | cy | 246 | - | - | | 410 | 12.001 /cy | 657 |
| | | **Excavation Spoils** | | | **1,167** | | | | **2,023** | | **3,190** |
| | | 68.663 Labor hours | | | | | | | | | |
| | | 34.332 Equipment hours | | | | | | | | | |
| **02445.000** | | **Boring & Jack Conduit** | | | | | | | | | |
| | 0 | Mob/Demob Bore & Jack Equipment | 1.00 | ea | - | - | 5,000 | | - | 5,000.00 /ea | 5,000 |
| | 100 | Excavate Jacking Pit | 453.333 | cy | 824 | - | - | | 2,227 | 6.731 /cy | 3,051 |
| | 105 | Excavate Recieving Pit | 75.56 | cy | 137 | - | - | | 371 | 6.731 /cy | 509 |
| | 200 | Shore Jacking/Receiving Pits | 2,720.00 | bsf | - | - | 40,800 | | - | 15.00 /bsf | 40,800 |
| | 300 | Backfill Jacking/Receiving Pits | 528.89 | cy | 2,589 | - | - | | 5,407 | 15.12 /cy | 7,996 |
| | 400 | Jacking Slab & Reaction Block | 11.971 | cy | 2,602 | 2,753 | - | | - | 447.373 /cy | 5,356 |
| n | 5072 | Bore & Jack Pipe 72 | 130.00 | lf | - | - | 120,900 | | - | 930.00 /lf | 120,900 |
| | 7000 | Grout Casing | 59.56 | cy | 244 | 10,274 | - | | 288 | 181.434 /cy | 10,806 |
| | | **Boring & Jack Conduit** | | | **6,397** | **13,027** | **166,700** | | **8,294** | | **194,418** |
| | | 346.16 Labor hours | | | | | | | | | |
| | | 137.19 Equipment hours | | | | | | | | | |
| **02720.100** | | **Aggregate Base Course** | | | | | | | | | |
| | 1180 | Crushed Rock | 222.00 | cy | 169 | 2,270 | - | | 852 | 14.822 /cy | 3,291 |
| | 1230 | Granular Fill | 144.00 | cy | 41 | 1,722 | - | | 207 | 13.69 /cy | 1,971 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Aggregate Base Course** | | | **210** | **3,992** | | | **1,060** | | **5,261** |
| | | 11.78 Labor hours | | | | | | | | | |
| | | 11.78 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| n | 10 | Bitum Paving | 333.00 | sy | - | - | 5,261 | | - | 15.80 /sy | 5,261 |
| | | **Asphalt Paving - Location** | | | | | **5,261** | | | | **5,261** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 311.00 | sy | 26 | 681 | - | | 26 | 2.36 /sy | 733 |
| | | **Lawns & Grasses** | | | **26** | **681** | | | **26** | | **733** |
| | | 1.244 Labor hours | | | | | | | | | |
| | | 0.622 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 140 | Concrete: Primary Redirect Junction Chamber | 75.00 | cy | 9,306 | 26,250 | - | | 3,782 | 524.52 /cy | 39,339 |
| n | 140 | Concrete: Wet Weather PS Effluent Junction Structure | 95.00 | cy | 11,788 | 33,250 | - | | 4,791 | 524.52 /cy | 49,829 |
| | | **Concrete in Place** | | | **21,095** | **59,500** | | | **8,573** | | **89,168** |
| | | 1,020.000 Labor hours | | | | | | | | | |
| | | 170.00 Equipment hours | | | | | | | | | |
| **04210.000** | | **Clay Masonry Units** | | | | | | | | | |
| n | 8105 | Brick Mortar Type S | 24.312 | cf | 32 | 106 | - | | - | 5.684 /cf | 138 |
| | 8900 | Clean Brick | 320.00 | sf | 102 | 74 | - | | - | 0.55 /sf | 175 |
| n | 018A | Standard Face Brick - Common Bond | 2,026.00 | ea | 1,439 | 972 | - | | - | 1.19 /ea | 2,411 |
| | | **Clay Masonry Units** | | | **1,573** | **1,152** | | | | | **2,725** |
| | | 66.002 Labor hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 2.00 | ea | 153 | 2,553 | - | | - | 1,353.17 /ea | 2,706 |
| | | **Hatch, Aluminum, 300psf** | | | **153** | **2,553** | | | | | **2,706** |
| | | 6.40 Labor hours | | | | | | | | | |
| **11284.000** | | **Sluice Gates** | | | | | | | | | |
| | 5454 | 54" x 54" Sluice Gate, MO | 2.00 | ea | 25,005 | 49,200 | - | | - | 37,102.64 /ea | 74,205 |
| | 6060 | 60" x 60" Sluice Gate, MO | 1.00 | ea | 15,008 | 30,000 | - | | - | 45,007.94 /ea | 45,008 |
| | | **Sluice Gates** | | | **40,013** | **79,200** | | | | | **119,213** |
| | | 1,677.00 Labor hours | | | | | | | | | |
| **13000.005** | | **Special Const Allowance** | | | | | | | | | |
| | 5 | SCADA Allowance for 3 gates & knife gate valve | 0.00 | ls | 0 | 0 | - | | - | | |
| **15113.450** | | **GV Knife Gate ValveCI/DI** | | | | | | | | | |
| n | 160b | Knife Gate Valve, Motor Oper, flg, 48" | 1.00 | ea | 1,452 | 24,750 | - | | - | 26,201.77 /ea | 26,202 |
| | | **GV Knife Gate ValveCI/DI** | | | **1,452** | **24,750** | | | | | **26,202** |
| | | 45.61 Labor hours | | | | | | | | | |
| **15220.302** | | **A53 CW Pipe PE/GE/T&C/SW** | | | | | | | | | |
| n | 300k | A53 CW Standard Pipe PE, 72" | 130.00 | lf | 7,919 | 128,827 | - | | - | 1,051.90 /lf | 136,746 |
| n | 300p | A53 CW Standard Pipe PE, 84" | 110.00 | lf | 7,830 | 127,269 | - | | - | 1,228.172 /lf | 135,099 |
| | | **A53 CW Pipe PE/GE/T&C/SW** | | | **15,749** | **256,096** | | | | | **271,845** |
| | | 574.155 Labor hours | | | | | | | | | |
| **15230.400** | | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | 0 | Unload Care & Protect PCCP & Fittings | 35.00 | lf | 0 | - | - | | 0 | 0.01 /lf | 0 |
| | 10 | Layout Pipe & Fitting | 35.00 | lf | 8 | - | - | | - | 0.24 /lf | 8 |
| | 325 | PCCP Equipment- Cat 325 Excavator | 6.30 | ch | 122 | - | - | | 698 | 130.09 /ch | 820 |
| n | B060 | Prestressed Concrete Cylinder Pipe (250#) 60 | 35.00 | lf | 2,087 | 7,350 | - | | - | 269.63 /lf | 9,437 |
| n | K060 | PCCP 90 Bend 60 | 1.00 | ea | 431 | 2,100 | - | | - | 2,531.15 /ea | 2,531 |
| | | **Prestr Conc Cylind-(PCCP)** | | | **2,648** | **9,450** | | | **698** | | **12,796** |
| | | 112.224 Labor hours | | | | | | | | | |
| | | 6.304 Equipment hours | | | | | | | | | |
| **16000.005** | | **Electrical Allowance** | | | | | | | | | |
| | 5 | Electrical Allowance for 3 gates & knife gate valve | 0.00 | ls | 0 | 0 | - | | - | | |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | ***02 Primary Redirect*** | | ***97,192*** | ***451,547*** | ***211,061*** | | ***25,174*** | | ***784,976*** |
| | 4,341.64 Labor hours | | | | | | | | |
| | 421.642 Equipment hours | | | | | | | | |

| | Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ***03 Return Activiated Sludge*** | | | | | | | | | |
| | **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | | 20 | Allowance to repair retaining wall after direction drilling | 1.00 | ls | - | - | 1,500 | | - | 1,500.00 /ls | 1,500 |
| | | | **Sitework Allowance** | | | | | **1,500** | | | | **1,500** |
| | **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | | 101 | Structural Allowance for Misc. Demo to access RAS Pipe Gallery | 1.00 | ls | 0 | - | 5,000 | | 0 | 5,000.00 /ls | 5,000 |
| | | | **Selective Site Demolition** | | | | | **5,000** | | | | **5,000** |
| | **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | | 1 | Design Shoring System-Minor | 1.00 | ls | - | - | 1,000 | | - | 1,000.00 /ls | 1,000 |
| | | 2 | Design Shoring System-Average | 1.00 | ls | - | - | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | | 100 | Survey & Layout Shoring | 288.00 | lf | 4 | - | - | | - | 0.02 /lf | 4 |
| | | 105 | Mobilize Pile Driving Equipment | 2.00 | ea | - | - | 50,000 | | - | 25,000.00 /ea | 50,000 |
| n | | 1025 | Steel Sheeting,15' x 22psf, pulled & salvage | 3,420.00 | sf | 17,723 | 19,870 | - | | 23,407 | 17.84 /sf | 61,000 |
| | | 1045 | Install & Remove Wales/Struts/Connectors | 3.762 | ton | 914 | 3,461 | - | | 1,207 | 1,483.73 /ton | 5,582 |
| n | | 1050 | Rent Steel Sheet Piling and Wales, first month | 41.382 | ton | - | 12,564 | - | | - | 303.60 /ton | 12,564 |
| | | | **Sheet Piling** | | | **18,641** | **35,895** | **61,000** | | **24,614** | | **140,150** |
| | | | 614.064 Labor hours | | | | | | | | | |
| | | | 153.444 Equipment hours | | | | | | | | | |
| | **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 464.45 | cy | 391 | - | - | | 1,058 | 3.121 /cy | 1,450 |
| | 461C | | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 175.41 | cy | 299 | - | - | | 580 | 5.011 /cy | 879 |
| n | A000 | | IMPORT MATERIAL (Summary) | 12.00 | CY | - | - | - | | - | | |
| n | A015 | | Import Gravel Fill | 52.222 | cy | - | 783 | 292 | | - | 20.60 /cy | 1,076 |
| | | | **Foundation Excavation** | | | **690** | **783** | **292** | | **1,639** | | **3,405** |
| | | | 45.82 Labor hours | | | | | | | | | |
| | | | 26.42 Equipment hours | | | | | | | | | |
| | **02315.300** | | **Trenching** | | | | | | | | | |
| | | 0 | Survey & Stake Pipeline | 700.00 | lf | 65 | | - | | - | 0.092 /lf | 65 |
| n | | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 403.09 | cy | 408 | - | - | | 1,148 | 3.86 /cy | 1,556 |
| n | | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 162.60 | cy | 164 | - | - | | 719 | 5.434 /cy | 884 |
| n | | 2242 | Trenching Excavator- 240 HP (45 cy/hr-360cy/day) Difficult Exc. | 959.852 | cy | 647 | - | - | | 2,830 | 3.623 /cy | 3,477 |
| n | | 3130 | Trench Bedding-Excavator- 130 HP | 30.741 | cy | 62 | - | - | | 181 | 7.901 /cy | 243 |
| n | | 3240 | Trench Bedding-Excavator- 240 HP | 36.67 | cy | 56 | - | - | | 185 | 6.56 /cy | 240 |
| n | | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 104.911 | cy | 339 | - | - | | 987 | 12.641 /cy | 1,326 |
| n | | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 115.14 | cy | 279 | - | - | | 929 | 10.492 /cy | 1,208 |
| n | | 5130 | Trench Native Backfill- Loader C938 3cy | 1,163.351 | cy | 1,052 | - | - | | 3,311 | 3.751 /cy | 4,363 |
| | | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 287.46 | cy | - | 10,119 | - | | - | 35.20 /cy | 10,119 |
| | | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 362.19 | cy | 508 | - | - | | 976 | 4.10 /cy | 1,484 |
| | | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 362.19 | cy | 355 | - | - | | 590 | 2.61 /cy | 945 |
| n | | 8367 | Trench Shores- Aluminum Hydraulic 36" width x 7' Rail | 1.00 | u/mo | | - | - | | 76 | 76.00 /u/mo | 76 |
| n | | 9616 | Trench Shield- 6x16 | 0.35 | u/mo | - | - | - | | 494 | 1,410.00 /u/mo | 494 |
| | A006 | | Pipe Test | 700.00 | lf | 517 | 560 | - | | - | 1.54 /lf | 1,077 |
| | A008 | | Pipe Locates (Pot Hole) | 3.00 | ea | 456 | 150 | - | | 81 | 228.96 /ea | 687 |
| | C0R0 | | Concrete Thrust Block, 16" | 3.00 | ea | 286 | 99 | - | | - | 128.44 /ea | 385 |
| | C0T0 | | Concrete Thrust Block, 20" | 4.00 | ea | 429 | 224 | - | | - | 163.37 /ea | 653 |
| | C0V0 | | Concrete Thrust Block, 24" | 8.00 | ea | 859 | 688 | - | | - | 193.37 /ea | 1,547 |
| | | | **Trenching** | | | **6,483** | **11,840** | | | **12,507** | | **30,829** |
| | | | 361.45 Labor hours | | | | | | | | | |
| | | | 178.292 Equipment hours | | | | | | | | | |
| | **02315.400** | | **Drilling & Blasting** | | | | | | | | | |
| | | 1008 | Hydraulic Hoe Ram | 476.00 | cy | 1,328 | - | 71,400 | | | 152.79 /cy | 72,728 |
| | | | **Drilling & Blasting** | | | **1,328** | | **71,400** | | | | **72,728** |
| | | | 76.16 Labor hours | | | | | | | | | |
| | | | 38.08 Equipment hours | | | | | | | | | |
| | **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | | 0 | EXCAVATION SPOILS (Grand Total) | 651.222 | cy | - | - | - | | - | | |
| | | 40 | Foundation Excavation Spoils (Summary) | 289.04 | cy | - | - | - | | - | | |
| | | 45 | Trenching Spoils (Summary) | 362.19 | cy | - | - | - | | - | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 362.19 | cy | 584 | - | - | | 1,123 | 4.712 /cy | 1,707 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 289.04 | cy | 336 | - | - | | 947 | 4.44 /cy | 1,283 |
| A0A4 | | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 362.19 | cy | 1,631 | - | - | | 2,715 | 12.001 /cy | 4,346 |
| A0I7 | | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 289.04 | cy | 181 | - | - | | 418 | 2.071 /cy | 599 |
| | | **Excavation Spoils** | | | **2,732** | | | | **5,202** | | **7,934** |
| | | 160.00 Labor hours | | | | | | | | | |
| | | 80.00 Equipment hours | | | | | | | | | |
| **02446.000** | | **Drainage Outflow To Head** | | | | | | | | | |
| n | 0 | Mob/Demob Directional Drilling Equipment | 1.00 | ea | - | - | 2,500 | | - | 2,500.00 /ea | 2,500 |
| n | 1024 | Install 24" Pipe N.O.C. | 900.00 | lf | - | - | 180,000 | | - | 200.00 /lf | 180,000 |
| | | **Drainage Outflow To Head** | | | | | **182,500** | | | | **182,500** |
| **02639.020** | | **Storm Drainage Manholes** | | | | | | | | | |
| | 0 | Unload Care & Protect Manhole | 1.00 | ea | 18 | - | - | | - | 17.52 /ea | 18 |
| | 6000 | Place & Shape Manhole Base & Inverts- 60" | 1.00 | ea | 210 | - | - | | - | 436.44 /ea | 436 |
| | 6010 | Manhole 60" x 10' Deep | 1.00 | ea | 274 | 4,048 | - | | 496 | 4,818.80 /ea | 4,819 |
| | | **Storm Drainage Manholes** | | | **502** | **4,048** | | | **496** | | **5,273** |
| | | 29.00 Labor hours | | | | | | | | | |
| | | 4.00 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| | 20 | Bitum Paving Parking Lots | 312.00 | sy | - | - | 2,496 | | - | 8.00 /sy | 2,496 |
| | | **Asphalt Paving - Location** | | | | | **2,496** | | | | **2,496** |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 110 | Concrete: Slab on Grade - Wet Well | 24.00 | cy | 1,737 | 7,440 | - | | 654 | 409.62 /cy | 9,831 |
| n | 110 | Concrete: Pump Support Pad - Wet Well | 1.00 | cy | 72 | 310 | - | | 27 | 409.61 /cy | 410 |
| n | 110 | Concrete: Slab on Grade - Valve Vault | 13.00 | cy | 941 | 4,030 | - | | 354 | 409.611 /cy | 5,325 |
| n | 140 | Concrete: Wall - Wet Well | 142.00 | cy | 17,620 | 49,700 | - | | 7,161 | 524.52 /cy | 74,481 |
| n | 140 | Concrete: Wall - Valve Vault | 71.00 | cy | 8,810 | 24,850 | - | | 3,581 | 524.52 /cy | 37,241 |
| n | 145 | Concrete: Elevated Slab - Wet Well | 24.00 | cy | 2,730 | 8,640 | - | | 1,210 | 524.18 /cy | 12,580 |
| n | 145 | Concrete: Elevated Slab - Valve Vault | 13.00 | cy | 1,479 | 4,680 | - | | 656 | 524.18 /cy | 6,814 |
| n | 180 | Concrete: Grout Fill - to avoid grit deposits | 10.00 | cy | 414 | 1,000 | - | | 50 | 146.41 /cy | 1,464 |
| | | **Concrete in Place** | | | **33,803** | **100,650** | | | **13,693** | | **148,146** |
| | | 1,634.500 Labor hours | | | | | | | | | |
| | | 271.52 Equipment hours | | | | | | | | | |
| **03150.010** | | **Concrete Core & Saw** | | | | | | | | | |
| c240 | | Core Drill 24" to 12" depth | 1.00 | ea | 68 | - | - | | | 67.87 /ea | 68 |
| | | **Concrete Core & Saw** | | | **68** | | | | | | **68** |
| | | 5.50 Labor hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n J07 | | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 8.00 | ea | 613 | 10,212 | - | | - | 1,353.173 /ea | 10,825 |
| | | **Hatch, Aluminum, 300psf** | | | **613** | **10,212** | | | | | **10,825** |
| | | 25.60 Labor hours | | | | | | | | | |
| **11210.000** | | **PUMPS** | | | | | | | | | |
| ---- | | 25HP Pump & VFD | 3.00 | ea | 47,921 | 96,501 | - | | - | 48,140.76 /ea | 144,422 |
| | | **PUMPS** | | | **47,921** | **96,501** | | | | | **144,422** |
| | | 2,112.00 Labor hours | | | | | | | | | |
| **11217.100** | | **Submersible Sump Pumps** | | | | | | | | | |
| | 50 | Sump Pump 50 HP | 1.00 | ea | 2,903 | 6,000 | - | | 2,055 | 10,957.92 /ea | 10,958 |
| | | **Submersible Sump Pumps** | | | **2,903** | **6,000** | | | **2,055** | | **10,958** |
| | | 144.00 Labor hours | | | | | | | | | |
| | | 24.00 Equipment hours | | | | | | | | | |
| **13000.005** | | **Special Const Allowance** | | | | | | | | | |
| | 5 | SCADA Allowance to Operate Motorized Plug Valve | 0.00 | ls | 0 | 0 | 0 | | - | | |
| | 5 | SCADA Allowance for Pumps and Flow meter | 0.00 | ls | 0 | 0 | 0 | | - | | |
| | 5 | SCADA Allowance to Operate Motorized Plug Valve | 0.00 | ls | 0 | 0 | 0 | | - | | |

| | Item | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **13420.000** | **Instruments** | | | | | | | | | |
| | c116 | Level Sensor | 1.00 | ea | 274 | 1,725 | - | | - | 1,999.30 /ea | 1,999 |
| n | e424 | 24" Magnetic Flow Meter - Flanged | 1.00 | ea | 597 | 13,800 | - | | - | 14,397.15 /ea | 14,397 |
| | | **Instruments** | | | **871** | **15,525** | | | | | **16,396** |
| | | 31.77 Labor hours | | | | | | | | | |
| | **15111.650** | **Plug Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | 103U | Plug Valve, Gear & Wheel Operated, flg, 16" | 3.00 | ea | 1,443 | 12,810 | - | | - | 4,750.95 /ea | 14,253 |
| n | 200W | Plug Valve, MJ, 20" | 1.00 | ea | 581 | 3,600 | - | | - | 4,180.58 /ea | 4,181 |
| n | 200X | Plug Valve, MJ, 24" | 1.00 | ea | 643 | 4,600 | - | | - | 5,243.40 /ea | 5,243 |
| | | **Plug Valve (CI/DI/IBBM)** | | | **2,667** | **21,010** | | | | | **23,677** |
| | | 83.79 Labor hours | | | | | | | | | |
| | **15114.500** | **Check Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | 310U | Check Valve, Swing, flg, 16" | 3.00 | ea | 1,311 | 19,470 | - | | - | 6,926.89 /ea | 20,781 |
| | | **Check Valve (CI/DI/IBBM)** | | | **1,311** | **19,470** | | | | | **20,781** |
| | | 41.19 Labor hours | | | | | | | | | |
| | **15119.600** | **Air/Vacuum Relief Valve** | | | | | | | | | |
| n | 100J | Air Release Valve, 24" | 1.00 | ea | 94 | 200 | - | | - | 293.93 /ea | 294 |
| | | **Air/Vacuum Relief Valve** | | | **94** | **200** | | | | | **294** |
| | | 3.03 Labor hours | | | | | | | | | |
| | **15120.300** | **Bolt & Gaskets Sets** | | | | | | | | | |
| n | 111S | 16-0/0" 150# A307 Steel Bolt Sets | 3.00 | ea | - | 225 | - | | - | 75.00 /ea | 225 |
| n | 111V | 24-0/0" 150# A307 Steel Bolt Sets | 4.50 | ea | - | 833 | - | | - | 185.00 /ea | 833 |
| | 222S | 16-0/0" Full Faced Red Rubber (SBR) Gasket 1/8" | 3.00 | ea | - | 32 | - | | - | 10.74 /ea | 32 |
| | 222V | 24-0/0" Full Faced Red Rubber (SBR) Gasket 1/8" | 4.50 | ea | - | 77 | - | | - | 17.22 /ea | 77 |
| | | **Bolt & Gaskets Sets** | | | | **1,167** | | | | | **1,167** |
| | **15210.010** | **DIP Totals** | | | | | | | | | |
| | 0 | Total Weight (Zero Cost Item) | 88,835.00 | lbs | - | - | - | | - | | |
| | 1 | Weight of Pipe (Zero Cost Item) | 67,340.00 | lbs | - | - | - | | - | | |
| | 2 | Weight of Fittings (Zero Cost Item) | 21,495.00 | lbs | - | - | - | | - | | |
| | **15210.100** | **DIP CML FL & GV CL53/250** | | | | | | | | | |
| | 0 | Unload Care & Protect Flanged/PE DIP & Fittings | 6,255.00 | lbs | 12 | - | - | | 39 | 0.01 /lbs | 51 |
| | 2 | Weight of Flanged Fittings (Zero Cost Item) | 6,255.00 | lbs | - | - | - | | - | | |
| | 10 | Layout Flanged/PE DIP & Fitting | 26.49 | lf | 6 | - | - | | - | 0.23 /lf | 6 |
| | 1CU0 | DI, CML, 45 Bend, FL, 16" | 3.00 | ea | 646 | 2,100 | - | | - | 915.22 /ea | 2,746 |
| | 1HXU | DI, CML, 45 Wye Lateral, FL, 24"x 16" | 3.00 | ea | 1,457 | 13,538 | - | | - | 4,998.09 /ea | 14,994 |
| | | **DIP CML FL & GV CL53/250** | | | **2,120** | **15,638** | | | **39** | | **17,797** |
| | | 89.093 Labor hours | | | | | | | | | |
| | | 0.69 Equipment hours | | | | | | | | | |
| | **15210.200** | **DIP CML Push-On Pipe** | | | | | | | | | |
| | 0 | Unload Care & Protect Push-on DIP & Fittings | 82,580.00 | lbs | 159 | - | - | | 520 | 0.01 /lbs | 679 |
| | 1 | Weight of Push-on Pipe (Zero Cost Item) | 67,340.00 | lbs | - | - | - | | - | | |
| | 2 | Weight of Push-on Fittings (Zero Cost Item) | 15,240.00 | lbs | - | - | - | | - | | |
| | 5 | Layout Push-on DIP & Fitting | 700.00 | lf | 159 | - | - | | - | 0.23 /lf | 159 |
| | 11 | DIP Equipment- Cat 325 Excavator | 19.20 | ch | 372 | - | - | | 2,126 | 130.091 /ch | 2,498 |
| n | 216 | DIP CML, Push-On, Class 52, 16" | 100.00 | lf | 835 | 4,185 | - | | - | 50.20 /lf | 5,020 |
| n | 220 | DIP CML, Push-On, Class 52, 20" | 300.00 | lf | 2,720 | 16,379 | - | | - | 63.662 /lf | 19,099 |
| n | 224 | DIP CML, Push-On, Class 52, 24" | 1,200.00 | lf | 11,453 | 83,402 | - | | - | 79.05 /lf | 94,855 |
| n | 2ATT | DIP CML, Push-on, 90 Bend, 20" | 2.00 | ea | 367 | 3,400 | - | | - | 1,883.72 /ea | 3,767 |
| n | 2AUU | DIP CML, Push-on, 90 Bend, 24" | 2.00 | ea | 434 | 5,325 | - | | - | 2,879.30 /ea | 5,759 |
| n | AARR | DIP CML, Push-on, 45 Bend, 16" | 3.00 | ea | 401 | 2,850 | - | | - | 1,083.56 /ea | 3,251 |
| n | AAUU | DIP CML, Push-on, 45 Bend, 24" | 2.00 | ea | 426 | 4,000 | - | | - | 2,213.11 /ea | 4,426 |
| n | DATT | DIP CML, Push-on, 11-1/4 Bend, 20" | 3.00 | ea | 542 | 4,050 | - | | - | 1,530.523 /ea | 4,592 |
| n | DAUU | DIP CML, Push-on, 11-1/4 Bend, 24" | 4.00 | ea | 852 | 8,100 | - | | - | 2,238.11 /ea | 8,952 |
| n | FAWW | DIP CML, Push-on, Tee BxB, 20"x 20" | 1.00 | ea | 236 | 2,638 | - | | - | 2,873.24 /ea | 2,873 |
| n | FAXX | DIP CML, Push-on, Tee BxB, 24"x 24" | 2.00 | ea | 550 | 8,250 | - | | - | 4,400.23 /ea | 8,800 |
| n | KAUQ | DIP, CML, Push-on, Reducer BxB, 16"x 8" | 3.00 | ea | 386 | 2,063 | - | | - | 816.29 /ea | 2,449 |

| Item | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|
| | **DIP CML Push-On Pipe** | | | **19,892** | **144,641** | | | **2,646** | | **167,179** |
| | 840.144 Labor hours | | | | | | | | | |
| | 28.284 Equipment hours | | | | | | | | | |
| **15241.100** | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| 0 | Unload Care & Protect Pipe/Fittings | 100.00 | lf | 0 | - | - | | 1 | 0.01 /lf | 1 |
| 10 | Layout Pipe & Fitting | 100.00 | lf | 24 | - | - | | - | 0.24 /lf | 24 |
| n 80E0 | PVC Schd. 80 Pipe, 3.00" | 100.00 | lf | 191 | 624 | - | | - | 8.15 /lf | 815 |
| a010 | PVC Joint Primer- Quart | 0.11 | qrt | - | 2 | - | | - | 15.40 /qrt | 2 |
| a020 | PVC Solvent Cement Low VOC- Quart | 0.11 | qrt | - | 2 | - | | - | 21.90 /qrt | 2 |
| | **PVC Schd Pipe & Fittings** | | | **215** | **628** | | | **1** | | **844** |
| | 9.011 Labor hours | | | | | | | | | |
| | 0.011 Equipment hours | | | | | | | | | |
| **16000.005** | **Electrical Allowance** | | | | | | | | | |
| 5 | Electrical Allowance - Motorized Plug Valve | 0.00 | ls | 0 | 0 | 0 | | - | | |
| 5 | Electrical Allowance - Pumps & Flow Meter | 0.00 | ls | 0 | 0 | 0 | | - | | |
| 5 | Electrical Allowance - Operate Motorized Plug Valve | 0.00 | ls | 0 | 0 | 0 | | - | | |
| | ***03 Return Activiated Sludge*** | | | ***142,854*** | ***484,207*** | ***324,188*** | | ***62,892*** | | ***1,014,368*** |
| | 6,306.12 Labor hours | | | | | | | | | |
| | 804.735 Equipment hours | | | | | | | | | |

| | Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ***04 Gravity Thickener*** | | | | | | | | | |
| | **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | | 2734 | Remove Asphalt Pavement | 1,000.00 | sy | 1,553 | - | - | | 3,130 | 4.684 /sy | 4,684 |
| | | | **Selective Site Demolition** | | | **1,553** | | | | **3,130** | | **4,684** |
| | | | 95.00 Labor hours | | | | | | | | | |
| | | | 76.000 Equipment hours | | | | | | | | | |
| | **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | | 2 | Design Shoring System-Average | 1.00 | ls | - | - | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | | 100 | Survey & Layout Shoring | 28.00 | lf | 0 | - | - | | - | 0.02 /lf | 0 |
| | | 105 | Mobilize Pile Driving Equipment | 1.00 | ea | - | - | 25,000 | | - | 25,000.00 /ea | 25,000 |
| | | 1025 | Steel Sheeting,15' x 22psf, pulled & salvage | 420.00 | sf | 2,176 | 2,083 | - | | 2,875 | 16.99 /sf | 7,134 |
| | | 1045 | Install & Remove Wales/Struts/Connectors | 0.462 | ton | 112 | 425 | - | | 148 | 1,483.77 /ton | 686 |
| n | | 1050 | Rent Steel Sheet Piling and Wales, first month | 5.082 | ton | - | 1,324 | - | | - | 260.58 /ton | 1,324 |
| | | | **Sheet Piling** | | | **2,289** | **3,833** | **35,000** | | **3,023** | | **44,144** |
| | | | 75.404 Labor hours | | | | | | | | | |
| | | | 18.844 Equipment hours | | | | | | | | | |
| | **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 4,849.47 | cy | 3,982 | - | - | | 10,765 | 3.041 /cy | 14,747 |
| | 461C | | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 1,528.284 | cy | 2,602 | - | - | | 5,056 | 5.011 /cy | 7,659 |
| n | A000 | | IMPORT MATERIAL (Summary) | 2.00 | CY | - | - | - | | - | | |
| n | A015 | | Import Gravel Fill | 215.111 | cy | - | 3,227 | 1,205 | | - | 20.60 /cy | 4,431 |
| | | | **Foundation Excavation** | | | **6,584** | **3,227** | **1,205** | | **15,822** | | **26,837** |
| | | | 435.37 Labor hours | | | | | | | | | |
| | | | 248.25 Equipment hours | | | | | | | | | |
| | **02315.300** | | **Trenching** | | | | | | | | | |
| | | 0 | Survey & Stake Pipeline | 930.00 | lf | 86 | | - | | - | 0.092 /lf | 86 |
| n | | 2090 | Trenching- Backhoe/Loader 95HP (15 cy/hr-120cy/day) Average Exc. | 1,292.870 | cy | 2,418 | - | - | | 4,646 | 5.463 /cy | 7,063 |
| n | | 3090 | Trench Bedding-Backhoe/Loader 95HP | 74.76 | cy | 201 | - | - | | 303 | 6.74 /cy | 504 |
| n | | 4090 | Trench Pipe Zone Backfill-Backhoe/Loader 95HP | 396.51 | cy | 1,278 | - | - | | 1,928 | 8.09 /cy | 3,206 |
| n | | 5090 | Trench Native Backfill-Backhoe/Loader 95HP | 803.70 | cy | 2,346 | - | - | | 4,276 | 8.24 /cy | 6,622 |
| | | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 471.262 | cy | - | 16,588 | - | | - | 35.20 /cy | 16,588 |
| | | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 489.174 | cy | 686 | - | - | | 1,318 | 4.10 /cy | 2,004 |
| | | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 489.174 | cy | 479 | - | - | | 797 | 2.61 /cy | 1,276 |
| | A006 | | Pipe Test | 930.00 | lf | 687 | 744 | - | | - | 1.54 /lf | 1,431 |
| | A008 | | Pipe Locates (Pot Hole) | 1.00 | ea | 152 | 50 | - | | 27 | 228.96 /ea | 229 |
| | | | **Trenching** | | | **8,332** | **17,382** | | | **13,295** | | **39,010** |
| | | | 582.33 Labor hours | | | | | | | | | |
| | | | 334.39 Equipment hours | | | | | | | | | |
| | **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | | 0 | EXCAVATION SPOILS (Grand Total) | 3,310.36 | cy | - | - | - | | - | | |
| | | 40 | Foundation Excavation Spoils (Summary) | 2,821.19 | cy | - | - | - | | - | | |
| | | 45 | Trenching Spoils (Summary) | 489.174 | cy | - | - | - | | - | | |
| | | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 489.174 | cy | 789 | - | - | | 1,516 | 4.712 /cy | 2,305 |
| | | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 3,321.19 | cy | 3,425 | - | - | | 9,651 | 3.94 /cy | 13,076 |
| | A0A4 | | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 489.174 | cy | 2,203 | - | - | | 3,668 | 12.001 /cy | 5,870 |
| | A0I7 | | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 3,321.19 | cy | 2,079 | - | - | | 4,800 | 2.071 /cy | 6,879 |
| | | | **Excavation Spoils** | | | **8,496** | | | | **19,634** | | **28,130** |
| | | | 492.29 Labor hours | | | | | | | | | |
| | | | 246.143 Equipment hours | | | | | | | | | |
| | **02446.000** | | **Drainage Outflow To Head** | | | | | | | | | |
| n | | 0 | Mob/Demob Directional Drilling Equipment | 2.00 | ea | - | - | 5,000 | | - | 2,500.00 /ea | 5,000 |
| n | | 1008 | Install 8" Pipe DIP | 60.00 | lf | - | - | 2,700 | | - | 45.00 /lf | 2,700 |
| n | | 1010 | Install 10" Pipe DIP | 120.00 | lf | - | - | 7,200 | | - | 60.00 /lf | 7,200 |
| | | | **Drainage Outflow To Head** | | | | | **14,900** | | | | **14,900** |
| | **02720.150** | | **Aggregate Base- Roads** | | | | | | | | | |
| | | 1116 | Aggregate Base | 300.00 | cy | 85 | 2,691 | - | | 432 | 10.70 /cy | 3,208 |

| | | Item | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **Aggregate Base- Roads** | | | **85** | **2,691** | | | **432** | | **3,208** |
| | | | 4.80 Labor hours | | | | | | | | | |
| | | | 4.80 Equipment hours | | | | | | | | | |
| | | **02740.020** | **Asphalt Paving - Location** | | | | | | | | | |
| | | 20 | Bitum Paving | 1,000.00 | sy | - | - | 8,000 | | - | 8.00 /sy | 8,000 |
| | | | **Asphalt Paving - Location** | | | | | **8,000** | | | | **8,000** |
| | | **02920.010** | **Lawns & Grasses** | | | | | | | | | |
| n | | z004 | Loam & Seeding w/Imported Material, 4"thk | 15,000.00 | sy | 1,248 | 32,850 | - | | 1,253 | 2.36 /sy | 35,351 |
| | | | **Lawns & Grasses** | | | **1,248** | **32,850** | | | **1,253** | | **35,351** |
| | | | 60.00 Labor hours | | | | | | | | | |
| | | | 30.00 Equipment hours | | | | | | | | | |
| | | **03000.005** | **Concrete in Place** | | | | | | | | | |
| n | | 110 | Concrete: Slab on Grade | 60.00 | cy | 4,343 | 18,600 | - | | 1,634 | 409.62 /cy | 24,577 |
| n | | 120 | Concrete: Slab on Grade Circular | 353.954 | cy | 29,280 | 109,726 | - | | 9,637 | 419.951 /cy | 148,643 |
| n | | 140 | Concrete: Wall | 290.00 | cy | 35,985 | 101,500 | - | | 14,625 | 524.52 /cy | 152,110 |
| | | | **Concrete in Place** | | | **69,608** | **229,826** | | | **25,896** | | **325,330** |
| | | | 3,365.82 Labor hours | | | | | | | | | |
| | | | 513.54 Equipment hours | | | | | | | | | |
| | | **11000.015** | **Equipment Demolition** | | | | | | | | | |
| | | 101 | Demo Selective Items-Each - Gravity Thickener | 1.00 | ea | 119 | - | - | | | 119.28 /ea | 119 |
| | | 3335 | Wash Down/Disinfect Tank -Gravity THickener | 200.00 | sf | 21 | 10 | - | | 4 | 0.18 /sf | 35 |
| | | | **Equipment Demolition** | | | **141** | **10** | | | **4** | | **155** |
| | | | 6.67 Labor hours | | | | | | | | | |
| | | | 1.67 Equipment hours | | | | | | | | | |
| | | **11225.100** | **Gravity Thickener** | | | | | | | | | |
| | | 0 | Unload & Protect Gravity Thickener | 2.00 | ea | 549 | - | - | | 792 | 670.52 /ea | 1,341 |
| | | 00 | Warehouse & Care of Gravity Thickener | 2.00 | u/mo | 127 | - | - | | - | 63.66 /u/mo | 127 |
| n | | 70 | Gravity Thickener 70' Diameter | 2.00 | ea | 136,811 | 270,000 | - | | 197,108 | 301,959.48 /ea | 603,919 |
| | | 6091 | 90 Ton Crane w/1cy Bucket | 47.512 | cy | 29 | - | - | | 367 | 8.33 /cy | 396 |
| | | F000 | Swept-in Grout | 47.512 | cy | 1,447 | - | - | | - | 105.46 /cy | 5,011 |
| | | G100 | Test & Check Gravity Thickener | 2.00 | ea | 509 | - | - | | - | 254.64 /ea | 509 |
| | | z900 | Gravity Thickener Manufacturers Representative | 6.00 | day | - | | 4,800 | | - | 950.00 /day | 5,700 |
| | | | **Gravity Thickener** | | | **139,472** | **270,000** | **4,800** | | **198,267** | | **617,003** |
| | | | 6,116.61 Labor hours | | | | | | | | | |
| | | | 1,003.17 Equipment hours | | | | | | | | | |
| | | **11310.100** | **Submersible Sludge Pumps** | | | | | | | | | |
| | | 05 | Thickened Sludge Pump | 2.00 | ea | 1,935 | 4,000 | - | | 1,370 | 3,652.64 /ea | 7,305 |
| | | | **Submersible Sludge Pumps** | | | **1,935** | **4,000** | | | **1,370** | | **7,305** |
| | | | 96.00 Labor hours | | | | | | | | | |
| | | | 16.00 Equipment hours | | | | | | | | | |
| | | **13121.000** | **Pre-Engineered Metal Bldg** | | | | | | | | | |
| | | z001 | Pre-Engineered Metal Bldg - Sludge Pump Shelter | 300.00 | sf | | | 22,500 | | | 75.00 /sf | 22,500 |
| | | | **Pre-Engineered Metal Bldg** | | | | | **22,500** | | | | **22,500** |
| | | **15111.650** | **Plug Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | | 200P | Plug Valve, MJ, 6" | 6.00 | ea | 1,058 | 2,550 | - | | - | 601.283 /ea | 3,608 |
| n | | 200Q | Plug Valve, MJ, 8" | 2.00 | ea | 450 | 1,150 | - | | - | 800.04 /ea | 1,600 |
| | | | **Plug Valve (CI/DI/IBBM)** | | | **1,508** | **3,700** | | | | | **5,208** |
| | | | 47.38 Labor hours | | | | | | | | | |
| | | **15114.500** | **Check Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | | C20Q | Check Valve, Double Disc, MJ, 8" | 2.00 | ea | 430 | 600 | - | | - | 514.86 /ea | 1,030 |
| n | | C20R | Check Valve, Double Disc, MJ, 10" | 2.00 | ea | 556 | 1,000 | - | | - | 778.11 /ea | 1,556 |
| | | | **Check Valve (CI/DI/IBBM)** | | | **986** | **1,600** | | | | | **2,586** |
| | | | 30.98 Labor hours | | | | | | | | | |
| | | **15210.010** | **DIP Totals** | | | | | | | | | |
| | | 0 | Total Weight (Zero Cost Item) | 30,141.00 | lbs | - | - | - | | - | | |
| | | 1 | Weight of Pipe (Zero Cost Item) | 29,331.00 | lbs | - | - | - | | - | | |
| | | 2 | Weight of Fittings (Zero Cost Item) | 810.00 | lbs | - | - | - | | - | | |

| | Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **15210.200** | | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | | 0 | Unload Care & Protect Push-on DIP & Fittings | 30,141.00 | lbs | 58 | - | - | | 190 | 0.01 /lbs | 248 |
| | | 1 | Weight of Push-on Pipe (Zero Cost Item) | 29,331.00 | lbs | - | - | - | | - | | |
| | | 2 | Weight of Push-on Fittings (Zero Cost Item) | 810.00 | lbs | - | - | - | | - | | |
| | | 5 | Layout Push-on DIP & Fitting | 930.00 | lf | 211 | - | - | | - | 0.23 /lf | 211 |
| n | | 208 | DIP CML, Push-On, Class 52, 8" | 630.00 | lf | 3,756 | 10,668 | - | | - | 22.90 /lf | 14,424 |
| n | | 210 | DIP CML, Push-On, Class 52, 10" | 300.00 | lf | 2,004 | 6,638 | - | | - | 28.81 /lf | 8,642 |
| n | FAQQ | | DIP CML, Push-on, Wye BxB, 8"x 8" | 2.00 | ea | 199 | 540 | - | | - | 369.46 /ea | 739 |
| n | FAQQ | | DIP CML, Push-on, Tee BxB, 8"x 8" | 4.00 | ea | 398 | 1,080 | - | | - | 369.46 /ea | 1,478 |
| | | | **DIP CML Push-On Pipe** | | | **6,626** | **18,925** | | | **190** | | **25,742** |
| | | | 279.14 Labor hours | | | | | | | | | |
| | | | 3.32 Equipment hours | | | | | | | | | |
| **16000.005** | | | **Electrical Allowance** | | | | | | | | | |
| | | 5 | Electrical Allowance | 0.00 | ls | 0 | 0 | 0 | | - | | |
| | | | ***04 Gravity Thickener*** | | | ***248,864*** | ***588,044*** | ***86,405*** | | ***282,316*** | | ***1,210,092*** |
| | | | 11,687.77 Labor hours | | | | | | | | | |
| | | | 2,496.11 Equipment hours | | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***05 Headworks*** | | | | | | | | | |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Demo Allowance of Old Admin Building (1 story) | 9,000.00 | sf | - | - | 45,000 | | - | 5.00 /sf | 45,000 |
| | 20 | Architectural Rehab Allowance for Outer Walls of Bldg Connected to Admin Bldg | 1.00 | ls | - | - | 10,000 | | - | 10,000.00 /ls | 10,000 |
| | | **Sitework Allowance** | | | | | **55,000** | | | | **55,000** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2720 | Demo Curb & Gutter | 80.00 | lf | 196 | - | - | | 509 | 8.82 /lf | 705 |
| | 2734 | Remove Asphalt Pavement, 5"thk | 641.56 | sy | 997 | - | - | | 2,008 | 4.684 /sy | 3,005 |
| | | **Selective Site Demolition** | | | **1,192** | | | | **2,518** | | **3,710** |
| | | 72.95 Labor hours | | | | | | | | | |
| | | 52.76 Equipment hours | | | | | | | | | |
| **02250.250** | | **Sheet Piling** | | | | | | | | | |
| | 1 | Design Shoring System-Minor | 1.00 | ls | - | - | 1,000 | | - | 1,000.00 /ls | 1,000 |
| | 100 | Survey & Layout Shoring | 270.00 | lf | 4 | - | - | | - | 0.02 /lf | 4 |
| | 105 | Mobilize Pile Driving Equipment | 1.00 | ea | - | - | 25,000 | | - | 25,000.00 /ea | 25,000 |
| n | 1025 | Steel Sheeting,15' x 22psf, pulled & salvage | 2,700.00 | sf | 13,992 | 15,687 | - | | 18,479 | 17.84 /sf | 48,158 |
| | 1045 | Install & Remove Wales/Struts/Connectors | 2.97 | ton | 721 | 2,732 | - | | 953 | 1,483.734 /ton | 4,407 |
| n | 1050 | Rent Steel Sheet Piling and Wales, first month | 32.67 | ton | - | 9,919 | - | | - | 303.600 /ton | 9,919 |
| | | **Sheet Piling** | | | **14,717** | **28,338** | **26,000** | | **19,432** | | **88,487** |
| | | 484.83 Labor hours | | | | | | | | | |
| | | 121.14 Equipment hours | | | | | | | | | |
| **02315.200** | | **Foundation Excavation** | | | | | | | | | |
| | 2314 | Excavate- Excavator 138HP/1.25cy (50.00cy/ch-400cy/Day) | 3,314.003 | cy | 2,793 | - | - | | 7,552 | 3.121 /cy | 10,344 |
| | 461C | Backfill- Loader 2cy/Trench Compactor (25.00cy/ch-200cy/Day) | 7,021.45 | cy | 11,956 | - | - | | 23,231 | 5.011 /cy | 35,187 |
| n | A000 | IMPORT MATERIAL (Summary) | 10.00 | CY | - | - | - | | - | | |
| n | A015 | Import Gravel Fill | 102.52 | cy | - | 1,538 | 574 | | - | 20.60 /cy | 2,112 |
| | | **Foundation Excavation** | | | **14,749** | **1,538** | **574** | | **30,782** | | **47,643** |
| | | 1,019.32 Labor hours | | | | | | | | | |
| | | 650.09 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 555.00 | lf | 51 | | - | | - | 0.092 /lf | 51 |
| n | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 599.54 | cy | 1,212 | - | - | | 3,415 | 7.72 /cy | 4,628 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 1,488.194 | cy | 752 | - | - | | 3,291 | 2.72 /cy | 4,043 |
| n | 3130 | Trench Bedding-Excavator- 130 HP | 45.68 | cy | 92 | - | - | | 269 | 7.901 /cy | 361 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 26.90 | cy | 41 | - | - | | 136 | 6.56 /cy | 176 |
| n | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 202.51 | cy | 655 | - | - | | 1,905 | 12.642 /cy | 2,560 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 93.834 | cy | 228 | - | - | | 757 | 10.492 /cy | 985 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 1,528.594 | cy | 1,382 | - | - | | 4,351 | 3.75 /cy | 5,733 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 368.92 | cy | - | 12,986 | - | | - | 35.20 /cy | 12,986 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 559.14 | cy | 784 | - | - | | 1,507 | 4.10 /cy | 2,291 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 559.14 | cy | 547 | - | - | | 911 | 2.61 /cy | 1,459 |
| n | 8367 | Trench Shores- Aluminum Hydraulic 36" width x 7' Rail | 3.00 | u/mo | | - | - | | 228 | 76.00 /u/mo | 228 |
| n | 9616 | Trench Shield- 6x16 | 1.00 | u/mo | - | - | - | | 1,410 | 1,410.00 /u/mo | 1,410 |
| | A006 | Pipe Test | 255.00 | lf | 188 | 204 | - | | - | 1.54 /lf | 392 |
| | C0V0 | Concrete Thrust Block, 24" | 5.00 | ea | 537 | 430 | - | | - | 193.37 /ea | 967 |
| | C0Y0 | Concrete Thrust Block, 30" | 1.00 | ea | 119 | 188 | - | | - | 307.30 /ea | 307 |
| | C0c0 | Concrete Thrust Block, 48" | 7.00 | ea | 1,670 | 4,816 | - | | - | 926.60 /ea | 6,486 |
| | | **Trenching** | | | **8,260** | **18,624** | | | **18,179** | | **45,064** |
| | | 473.42 Labor hours | | | | | | | | | |
| | | 254.31 Equipment hours | | | | | | | | | |
| **02315.400** | | **Drilling & Blasting** | | | | | | | | | |
| | 1008 | Hydraulic Hoe Ram | 346.00 | cy | | - | 51,900 | | | 150.00 /cy | 51,900 |
| | 1008 | Hydraulic Hoe Ram - Knife Gate Vault | 16.00 | cy | | - | 2,400 | | | 150.00 /cy | 2,400 |
| | 1008 | Hydraulic Hoe Ram -Medium | 6,152.00 | cy | | - | 922,800 | | | 150.00 /cy | 922,800 |
| | | **Drilling & Blasting** | | | | | **977,100** | | | | **977,100** |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 2,992.582 | cy | - | - | - | | - | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 40 | Foundation Excavation Spoils (Summary) | 2,433.444 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 559.14 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 559.14 | cy | 902 | - | - | | 1,733 | 4.712 /cy | 2,635 |
| | 1120 | Load Spoils Cat 320 Excavator 140hp (120cy/ch) | 2,433.444 | cy | 2,829 | - | - | | 7,971 | 4.44 /cy | 10,800 |
| A0A4 | | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 559.14 | cy | 2,518 | - | - | | 4,192 | 12.001 /cy | 6,710 |
| A0I7 | | Haul Spoils/Off Site 18cy Rear Dump 4 Load/Hour | 2,433.444 | cy | 1,523 | - | - | | 3,517 | 2.071 /cy | 5,040 |
| | | **Excavation Spoils** | | | **7,772** | | | | **17,413** | | **25,185** |
| | | 451.23 Labor hours | | | | | | | | | |
| | | 225.612 Equipment hours | | | | | | | | | |
| **02639.020** | | **Storm Drainage Manholes** | | | | | | | | | |
| | 0 | Unload Care & Protect Manhole | 1.00 | ea | 18 | - | - | | - | 17.51 /ea | 18 |
| C010 | | Manhole 120" x 10' Deep | 1.00 | ea | 343 | 7,729 | - | | 496 | 8,568.58 /ea | 8,569 |
| E000 | | Place & Shape Manhole Base & Inverts- 144" | 1.00 | ea | 245 | - | - | | - | 1,095.22 /ea | 1,095 |
| | | **Storm Drainage Manholes** | | | **606** | **7,729** | | | **496** | | **9,681** |
| | | 35.00 Labor hours | | | | | | | | | |
| | | 4.00 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| | 20 | Bitum Paving Parking Lots | 386.00 | sy | - | - | 3,088 | | - | 8.00 /sy | 3,088 |
| | | **Asphalt Paving - Location** | | | | | **3,088** | | | | **3,088** |
| **02740.110** | | **Asphalt Curbs** | | | | | | | | | |
| | 16 | Bituminous Curb & Gutter | 80.00 | lf | - | - | 320 | | - | 4.00 /lf | 320 |
| | | **Asphalt Curbs** | | | | | **320** | | | | **320** |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n z004 | | Loam & Seeding w/Imported Material, 4"thk | 255.56 | sy | 21 | 560 | - | | 21 | 2.36 /sy | 602 |
| | | **Lawns & Grasses** | | | **21** | **560** | | | **21** | | **602** |
| | | 1.022 Labor hours | | | | | | | | | |
| | | 0.511 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 15 | Concrete: Grade Beam | 83.56 | cy | 6,048 | 27,573 | - | | 2,275 | 429.62 /cy | 35,897 |
| n | 110 | Concrete: Diversion Structure Bottom Slab | 33.00 | cy | 2,389 | 10,230 | - | | 898 | 409.61 /cy | 13,517 |
| n | 110 | Concrete: Slab on Grade - Diversion Structure | 16.37 | cy | 1,185 | 5,075 | - | | 446 | 409.62 /cy | 6,705 |
| n | 110 | Concrete: Slab on Grade - Knife Gate Vault | 1.00 | cy | 72 | 310 | - | | 27 | 409.61 /cy | 410 |
| n | 110 | Concrete: Slab on Grade - Wet Well | 86.00 | cy | 6,225 | 26,660 | - | | 2,342 | 409.62 /cy | 35,227 |
| n | 110 | Concrete: Pump Support Pad | 4.00 | cy | 290 | 1,240 | - | | 109 | 409.62 /cy | 1,638 |
| n | 110 | Concrete: Slab on Grade - Valve Vault | 55.00 | cy | 3,981 | 17,050 | - | | 1,497 | 409.61 /cy | 22,529 |
| n | 140 | Concrete: Diversion Structure Wall | 282.00 | cy | 34,992 | 98,700 | - | | 14,221 | 524.52 /cy | 147,914 |
| n | 140 | Concrete: Influent Trough | 5.00 | cy | 620 | 1,750 | - | | 252 | 524.52 /cy | 2,623 |
| n | 140 | Concrete: Wall - Knife Gate Vault | 18.00 | cy | 2,234 | 6,300 | - | | 908 | 524.52 /cy | 9,441 |
| n | 140 | Concrete: Wall - Wet Well | 466.00 | cy | 57,824 | 163,100 | - | | 23,500 | 524.52 /cy | 244,424 |
| n | 140 | Concrete: Wall - Valve Vault | 133.00 | cy | 16,503 | 46,550 | - | | 6,707 | 524.52 /cy | 69,761 |
| n | 145 | Concrete: Diversion Structure - Top Slab | 33.00 | cy | 3,754 | 11,880 | - | | 1,664 | 524.18 /cy | 17,298 |
| n | 145 | Concrete: Elevated Slab - Diversion Structure | 10.97 | cy | 1,248 | 3,948 | - | | 553 | 524.17 /cy | 5,749 |
| n | 145 | Concrete: Elevated Slab - Knife Gate Vault | 1.00 | cy | 114 | 360 | - | | 50 | 524.18 /cy | 524 |
| n | 145 | Concrete: Elevated Slab - Wet Well | 86.00 | cy | 9,782 | 30,960 | - | | 4,337 | 524.18 /cy | 45,079 |
| n | 145 | Concrete: Elevated Slab - Valve Vault | 55.00 | cy | 6,256 | 19,800 | - | | 2,774 | 524.18 /cy | 28,830 |
| n | 180 | Concrete: Grout Fill - avoid Grit Deposits | 5.00 | cy | 207 | 500 | - | | 25 | 146.404 /cy | 732 |
| n | 180 | Concrete: Grout Fill - avoid grit deposits | 4.00 | cy | 165 | 400 | - | | 20 | 146.41 /cy | 586 |
| | | **Concrete in Place** | | | **153,889** | **472,387** | | | **62,608** | | **688,883** |
| | | 7,441.07 Labor hours | | | | | | | | | |
| | | 1,241.49 Equipment hours | | | | | | | | | |
| **03150.010** | | **Concrete Core & Saw** | | | | | | | | | |
| c240 | | Core Drill 30" to 12" depth | 1.00 | ea | 68 | - | - | | | 67.87 /ea | 68 |
| | | **Concrete Core & Saw** | | | **68** | | | | | | **68** |
| | | 5.50 Labor hours | | | | | | | | | |
| **04910.000** | | **Unit Masonry Restoration** | | | | | | | | | |
| n | 9010 | Repair Brick Facade - Admin Bldg | 1,200.00 | sf | 3,717 | 624 | - | | - | 3.62 /sf | 4,341 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Unit Masonry Restoration** | | | **3,717** | **624** | | | | | **4,341** |
| | | 156.00 Labor hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 14.00 | ea | 1,073 | 17,871 | - | | - | 1,353.172 /ea | 18,944 |
| | | **Hatch, Aluminum, 300psf** | | | **1,073** | **17,871** | | | | | **18,944** |
| | | 44.80 Labor hours | | | | | | | | | |
| **06600.110** | | **FRP Weirs & Baffles** | | | | | | | | | |
| | 10 | Rectangular Weir | 18.00 | lf | 108 | 621 | - | | - | 40.52 /lf | 729 |
| | | **FRP Weirs & Baffles** | | | **108** | **621** | | | | | **729** |
| | | 4.50 Labor hours | | | | | | | | | |
| **11210.000** | | **PUMPS** | | | | | | | | | |
| ---- | | 90hp pump & vfd | 5.00 | ea | 250,498 | 500,000 | - | | - | 150,099.52 /ea | 750,498 |
| | | **PUMPS** | | | **250,498** | **500,000** | | | | | **750,498** |
| | | 11,040.00 Labor hours | | | | | | | | | |
| **11217.100** | | **Submersible Sump Pumps** | | | | | | | | | |
| | 25 | Sump Pump - 100gpm | 1.00 | ea | 3,387 | 7,000 | - | | 2,398 | 12,784.24 /ea | 12,784 |
| | | **Submersible Sump Pumps** | | | **3,387** | **7,000** | | | **2,398** | | **12,784** |
| | | 168.00 Labor hours | | | | | | | | | |
| | | 28.00 Equipment hours | | | | | | | | | |
| **13121.000** | | **Pre-Engineered Metal Bldg** | | | | | | | | | |
| | z001 | Brick Bldg - Pump Controls | 900.00 | sf | | | 225,000 | | | 250.00 /sf | 225,000 |
| | z001 | Brick Bldg - Office Building | 5,000.00 | sf | | | 1,250,000 | | | 250.00 /sf | 1,250,000 |
| | | **Pre-Engineered Metal Bldg** | | | | | **1,475,000** | | | | **1,475,000** |
| **13400.005** | | **Measurement & Ctrl Instr** | | | | | | | | | |
| | ---- | SCADA allowance for Motorized Valves - Knife Valve | 1.00 | LS | | | 1,500 | | - | 1,500.00 /LS | 1,500 |
| | ---- | Level Sensor | 1.00 | ea | 310 | 1,500 | - | | - | 1,810.00 /ea | 1,810 |
| | ---- | SCADA Allowance for LS | 1.00 | ls | | | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | | **Measurement & Ctrl Instr** | | | **310** | **1,500** | **6,500** | | | | **8,310** |
| | | 10.00 Labor hours | | | | | | | | | |
| **13420.200** | | **I&C Instruments** | | | | | | | | | |
| n | 05-FE-m048 | 48" Magnetic Flow Meter | 1.00 | ea | 1,123 | 46,000 | - | | - | 47,122.71 /ea | 47,123 |
| | | **I&C Instruments** | | | **1,123** | **46,000** | | | | | **47,123** |
| | | 40.93 Labor hours | | | | | | | | | |
| **15111.650** | | **Plug Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | 200X | Plug Valve, MJ, 24" | 5.00 | ea | 3,218 | 23,000 | - | | - | 5,243.602 /ea | 26,218 |
| | | **Plug Valve (CI/DI/IBBM)** | | | **3,218** | **23,000** | | | | | **26,218** |
| | | 101.10 Labor hours | | | | | | | | | |
| **15113.450** | | **GV Knife Gate ValveCI/DI** | | | | | | | | | |
| n | 160Y | Knife Gate Valve, Motor Oper, 30" | 1.00 | ea | 1,011 | 11,000 | - | | - | 12,010.92 /ea | 12,011 |
| | | **GV Knife Gate ValveCI/DI** | | | **1,011** | **11,000** | | | | | **12,011** |
| | | 31.77 Labor hours | | | | | | | | | |
| **15114.500** | | **Check Valve (CI/DI/IBBM)** | | | | | | | | | |
| n | C20X | Check Valve, Double Disc, MJ, 24" | 5.00 | ea | 3,266 | 40,000 | - | | - | 8,653.152 /ea | 43,266 |
| | | **Check Valve (CI/DI/IBBM)** | | | **3,266** | **40,000** | | | | | **43,266** |
| | | 102.600 Labor hours | | | | | | | | | |
| **15210.010** | | **DIP Totals** | | | | | | | | | |
| | 0 | Total Weight (Zero Cost Item) | 38,045.50 | lbs | - | - | - | | - | | |
| | 1 | Weight of Pipe (Zero Cost Item) | 30,970.50 | lbs | - | - | - | | - | | |
| | 2 | Weight of Fittings (Zero Cost Item) | 7,075.00 | lbs | - | - | - | | - | | |
| **15210.200** | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | 0 | Unload Care & Protect Push-on DIP & Fittings | 38,045.50 | lbs | 73 | - | - | | 240 | 0.01 /lbs | 313 |
| | 1 | Weight of Push-on Pipe (Zero Cost Item) | 30,970.50 | lbs | - | - | - | | - | | |
| | 2 | Weight of Push-on Fittings (Zero Cost Item) | 7,075.00 | lbs | - | - | - | | - | | |
| | 5 | Layout Push-on DIP & Fitting | 255.00 | lf | 58 | - | - | | - | 0.23 /lf | 58 |

| | Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **15210.200** | | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | | 11 | DIP Equipment- Cat 325 Excavator | 24.65 | ch | 477 | - | - | | 2,729 | 130.081 /ch | 3,207 |
| n | | 224 | DIP CML, Push-On, Class 52, 24" | 200.00 | lf | 1,909 | 13,900 | - | | - | 79.05 /lf | 15,809 |
| n | | 230 | DIP CML, Push-On, Class 52, 30" | 50.00 | lf | 525 | 4,898 | - | | - | 108.453 /lf | 5,423 |
| n | | 236 | DIP CML, Push-On, Class 52, 36" | 5.00 | lf | 60 | 670 | - | | - | 145.98 /lf | 730 |
| n | 2AUU | | DIP CML, Push-on, 90 Bend, 24" | 5.00 | ea | 1,084 | 13,313 | - | | - | 2,879.39 /ea | 14,397 |
| n | 2AVV | | DIP CML, Push-on, 90 Bend, 30" | 1.00 | ea | 255 | 5,250 | - | | - | 5,505.06 /ea | 5,505 |
| | | | **DIP CML Push-On Pipe** | | | **4,441** | **38,031** | | | **2,969** | | **45,441** |
| | | | 192.03 Labor hours | | | | | | | | | |
| | | | 28.84 Equipment hours | | | | | | | | | |
| **15230.400** | | | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | | 0 | Unload Care & Protect PCCP & Fittings | 300.00 | lf | 1 | - | - | | 2 | 0.01 /lf | 2 |
| | | 10 | Layout Pipe & Fitting | 300.00 | lf | 72 | - | - | | - | 0.24 /lf | 72 |
| | | 325 | PCCP Equipment- Cat 325 Excavator | 48.00 | ch | 929 | - | - | | 5,315 | 130.091 /ch | 6,244 |
| n | B048 | | Prestressed Concrete Cylinder Pipe (250#) 48 | 300.00 | lf | 13,457 | 51,000 | - | | - | 214.86 /lf | 64,457 |
| n | K054 | | PCCP 90 Bend 54 | 1.00 | ea | 388 | 2,000 | - | | - | 2,387.800 /ea | 2,388 |
| n | L048 | | PCCP 45 Bend 48 | 6.00 | ea | 2,070 | 10,200 | - | | - | 2,045.02 /ea | 12,270 |
| n | Q048 | | PCCP Wye 48 | 1.00 | ea | 478 | 1,700 | - | | - | 2,177.68 /ea | 2,178 |
| n | U048 | | PCCP Reducer 48 | 1.00 | ea | 258 | 1,700 | - | | - | 1,957.58 /ea | 1,958 |
| | | | **Prestr Conc Cylind-(PCCP)** | | | **17,652** | **66,600** | | | **5,317** | | **89,569** |
| | | | 748.873 Labor hours | | | | | | | | | |
| | | | 48.033 Equipment hours | | | | | | | | | |
| **15241.100** | | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | | 0 | Unload Care & Protect Pipe/Fittings | 100.00 | lf | 0 | - | - | | 1 | 0.01 /lf | 1 |
| | | 10 | Layout Pipe & Fitting | 100.00 | lf | 24 | - | - | | - | 0.24 /lf | 24 |
| n | 80E0 | | PVC Schd. 80 Pipe, 3.00" | 100.00 | lf | 191 | 624 | - | | - | 8.15 /lf | 815 |
| | a010 | | PVC Joint Primer- Quart | 0.11 | qrt | - | 2 | - | | - | 15.40 /qrt | 2 |
| | a020 | | PVC Solvent Cement Low VOC- Quart | 0.11 | qrt | - | 2 | - | | - | 21.90 /qrt | 2 |
| | | | **PVC Schd Pipe & Fittings** | | | **215** | **628** | | | **1** | | **844** |
| | | | 9.011 Labor hours | | | | | | | | | |
| | | | 0.011 Equipment hours | | | | | | | | | |
| **15500.001** | | | **HVAC Equipment** | | | | | | | | | |
| | | 155 | HVAC Allowance - Pump Control Bldg | 900.00 | sf | - | - | 36,000 | | - | 40.00 /sf | 36,000 |
| | | 155 | HVAC Allowance - Office | 5,000.00 | sf | - | - | 200,000 | | - | 40.00 /sf | 200,000 |
| | | | **HVAC Equipment** | | | | | **236,000** | | | | **236,000** |
| **16000.005** | | | **Electrical Allowance** | | | | | | | | | |
| | | 5 | Electrical Allowance for LS | 1.00 | ls | | | 0 | | - | | |
| | | 5 | Electrical Allowance - Pump Control Bldg | 0.00 | sf | 0 | 0 | 0 | | - | | |
| | | 5 | Electrical Upgrade - Office | 5,000.00 | sf | | | 118,000 | | - | 23.60 /sf | 118,000 |
| | ---- | | Electrical Allowance for Motorized Valve | 0.00 | LS | 0 | 0 | - | | - | | |
| | | | **Electrical Allowance** | | | | | **118,000** | | | | **118,000** |
| | | | 0.000 Labor hours | | | | | | | | | |
| | | | ***05 Headworks*** | | | ***491,293*** | ***1,282,050*** | ***2,897,582*** | | ***162,134*** | | ***4,833,909*** |
| | | | 22,633.94 Labor hours | | | | | | | | | |
| | | | 2,654.79 Equipment hours | | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***06 Actiflo*** | | | | | | | | | |
| **01560.000** | | **Const Equip & Small Tools** | | | | | | | | | |
| DM31 | | Crawler Mounted Lattice Boom Crane-Manitowoc 4600-5 317.5MT@334HP | 36.00 | wk | | - | - | | 690,264 | 19,174.00 /wk | 690,264 |
| | | **Const Equip & Small Tools** | | | | | | | **690,264** | | **690,264** |
| | | 1,440.00 Labor hours | | | | | | | | | |
| | | 1,440.00 Equipment hours | | | | | | | | | |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Structural Rehab Allowance | 1.00 | ls | - | - | 2,000,000 | | - | 2,000,000.00 /ls | 2,000,000 |
| | | **Sitework Allowance** | | | | | **2,000,000** | | | | **2,000,000** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2734 | Remove Asphalt Pavement, 5"thk | 1,000.00 | sy | 1,553 | - | - | | 3,130 | 4.684 /sy | 4,684 |
| | 2842 | Remove Baffle Walls | 60.00 | sy | 131 | 16 | - | | 205 | 5.86 /sy | 351 |
| | | **Selective Site Demolition** | | | **1,684** | **16** | | | **3,335** | | **5,035** |
| | | 103.04 Labor hours | | | | | | | | | |
| | | 79.30 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 1,380.00 | lf | 127 | | - | | - | 0.092 /lf | 127 |
| n | 2090 | Trenching- Backhoe/Loader 95HP (15 cy/hr-120cy/day) Average Exc. | 61.512 | cy | 115 | - | - | | 221 | 5.463 /cy | 336 |
| n | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 246.771 | cy | 499 | - | - | | 1,406 | 7.72 /cy | 1,905 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 684.151 | cy | 346 | - | - | | 1,513 | 2.72 /cy | 1,859 |
| n | 3090 | Trench Bedding-Backhoe/Loader 95HP | 58.11 | cy | 156 | - | - | | 235 | 6.74 /cy | 391 |
| n | 3130 | Trench Bedding-Excavator- 130 HP | 21.30 | cy | 43 | - | - | | 125 | 7.901 /cy | 168 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 42.43 | cy | 64 | - | - | | 214 | 6.56 /cy | 278 |
| n | 4090 | Trench Pipe Zone Backfill-Backhoe/Loader 95HP | 130.902 | cy | 422 | - | - | | 637 | 8.09 /cy | 1,058 |
| n | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 62.974 | cy | 204 | - | - | | 592 | 12.642 /cy | 796 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 215.613 | cy | 523 | - | - | | 1,739 | 10.492 /cy | 2,262 |
| n | 5090 | Trench Native Backfill-Backhoe/Loader 95HP | -137.545 | cy | (401) | - | - | | (732) | 8.24 /cy | (1,133) |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 358.27 | cy | 324 | - | - | | 1,020 | 3.75 /cy | 1,344 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 531.32 | cy | - | 18,702 | - | | - | 35.20 /cy | 18,702 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 771.714 | cy | 873 | - | - | | 1,677 | 3.31 /cy | 2,550 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 771.714 | cy | 755 | - | - | | 1,258 | 2.61 /cy | 2,013 |
| n | 9616 | Trench Shield- 6x16 | 0.30 | u/mo | - | - | - | | 423 | 1,410.00 /u/mo | 423 |
| A006 | | Pipe Test | 1,150.00 | lf | 850 | 920 | - | | - | 1.54 /lf | 1,770 |
| A008 | | Pipe Locates (Pot Hole) | 1.00 | ea | 152 | 50 | - | | 27 | 228.96 /ea | 229 |
| C0R0 | | Concrete Thrust Block, 16" | 6.00 | ea | 573 | 198 | - | | - | 128.44 /ea | 771 |
| | | **Trenching** | | | **5,625** | **19,870** | | | **10,355** | | **35,851** |
| | | 335.061 Labor hours | | | | | | | | | |
| | | 167.33 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 771.714 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 771.714 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 771.714 | cy | 1,004 | - | - | | 1,929 | 3.80 /cy | 2,933 |
| A0A4 | | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 771.714 | cy | 3,475 | - | - | | 5,786 | 12.001 /cy | 9,261 |
| | | **Excavation Spoils** | | | **4,479** | | | | **7,715** | | **12,194** |
| | | 262.69 Labor hours | | | | | | | | | |
| | | 131.344 Equipment hours | | | | | | | | | |
| **02720.150** | | **Aggregate Base- Roads** | | | | | | | | | |
| | 1118 | Aggregate Base | 453.00 | cy | 129 | 4,063 | - | | 652 | 10.70 /cy | 4,845 |
| | | **Aggregate Base- Roads** | | | **129** | **4,063** | | | **652** | | **4,845** |
| | | 7.25 Labor hours | | | | | | | | | |
| | | 7.25 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| n | 10 | Bitum Paving | 1,369.00 | sy | - | - | 21,630 | | - | 15.80 /sy | 21,630 |
| | | **Asphalt Paving - Location** | | | | | **21,630** | | | | **21,630** |
| **02750.100** | | **Concrete Paving** | | | | | | | | | |
| z015 | | Concrete Pavement, Walkways | 100.00 | sy | 204 | 1,143 | - | | 76 | 14.23 /sy | 1,423 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Concrete Paving** | | | **204** | **1,143** | | | **76** | | **1,423** |
| | | 10.90 Labor hours | | | | | | | | | |
| | | 1.10 Equipment hours | | | | | | | | | |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 100.00 | sy | 8 | 219 | - | | 8 | 2.36 /sy | 236 |
| | | **Lawns & Grasses** | | | **8** | **219** | | | **8** | | **236** |
| | | 0.40 Labor hours | | | | | | | | | |
| | | 0.20 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 110 | Concrete: Pad for HRC | 306.00 | cy | 22,149 | 94,860 | - | | 8,333 | 409.62 /cy | 125,342 |
| n | 110 | Concrete: Pump Support Slab | 1.00 | cy | 72 | 310 | - | | 27 | 409.61 /cy | 410 |
| n | 140 | Concrete: Wall | 1,320.00 | cy | 163,794 | 462,000 | - | | 66,568 | 524.52 /cy | 692,361 |
| n | 140 | Concrete: Wall | 1,020.00 | cy | 126,568 | 714,000 | - | | 51,439 | 874.52 /cy | 892,006 |
| n | 140 | Concrete: Influent & Effluent Channel | 120.00 | cy | 14,890 | 120,000 | - | | 6,052 | 1,174.52 /cy | 140,942 |
| n | 140 | Concrete: Wet Well Top Slab & Wall | 90.00 | cy | 11,168 | 31,500 | - | | 4,539 | 524.52 /cy | 47,206 |
| n | 180 | Concrete: Grout Fill | 280.00 | cy | 11,581 | 28,000 | - | | 1,412 | 146.41 /cy | 40,993 |
| | | **Concrete in Place** | | | **350,222** | **1,450,670** | | | **138,369** | | **1,939,261** |
| | | 16,934.500 Labor hours | | | | | | | | | |
| | | 2,743.78 Equipment hours | | | | | | | | | |
| **05510.000** | | **Metal Ladders** | | | | | | | | | |
| | 10 | Straight Ladder-Aluminum | 700.00 | lf | 12,438 | 32,112 | - | | - | 63.642 /lf | 44,550 |
| | | **Metal Ladders** | | | **12,438** | **32,112** | | | | | **44,550** |
| | | 350.00 Labor hours | | | | | | | | | |
| **05520.000** | | **Handrail/Railing** | | | | | | | | | |
| | 103 | 3 Rail-Handrail Alum. w/Toe | 800.00 | lf | 7,107 | 55,200 | - | | - | 77.884 /lf | 62,307 |
| | | **Handrail/Railing** | | | **7,107** | **55,200** | | | | | **62,307** |
| | | 200.00 Labor hours | | | | | | | | | |
| **05530.200** | | **Alum. Grating-Riveted** | | | | | | | | | |
| 6 K | | 1-1/4x3/16 Riveted Grate-Stnd. | 3,500.00 | sf | 21,145 | 122,360 | - | | - | 41.001 /sf | 143,505 |
| | | **Alum. Grating-Riveted** | | | **21,145** | **122,360** | | | | | **143,505** |
| | | 595.00 Labor hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 4.00 | ea | 307 | 5,106 | - | | - | 1,353.173 /ea | 5,413 |
| | | **Hatch, Aluminum, 300psf** | | | **307** | **5,106** | | | | | **5,413** |
| | | 12.80 Labor hours | | | | | | | | | |
| **11210.000** | | **PUMPS** | | | | | | | | | |
| ---- | | Pumps (low lift) | 5.00 | ea | 130,694 | 250,000 | - | | - | 76,138.88 /ea | 380,694 |
| | | **PUMPS** | | | **130,694** | **250,000** | | | | | **380,694** |
| | | 5,760.00 Labor hours | | | | | | | | | |
| **11217.100** | | **Submersible Sump Pumps** | | | | | | | | | |
| | 05 | Sump Pump | 1.00 | ea | 2,903 | 6,000 | - | | 2,055 | 10,957.92 /ea | 10,958 |
| | | **Submersible Sump Pumps** | | | **2,903** | **6,000** | | | **2,055** | | **10,958** |
| | | 144.00 Labor hours | | | | | | | | | |
| | | 24.00 Equipment hours | | | | | | | | | |
| **11218.400** | | **Chemical Metering Pumps** | | | | | | | | | |
| | 10 | Polymer Metering Pump and control panel | 12.00 | ea | 10,308 | 18,000 | - | | - | 2,358.96 /ea | 28,308 |
| | 10 | Coagulant Metering Pump and control panel | 4.00 | ea | 3,436 | 6,000 | - | | - | 2,358.96 /ea | 9,436 |
| | | **Chemical Metering Pumps** | | | **13,743** | **24,000** | | | | | **37,743** |
| | | 576.00 Labor hours | | | | | | | | | |
| **11225.300** | | **ACTIFLO System** | | | | | | | | | |
| n | 05 | Coagulation Mixer | 6.00 | ea | 2,322,240 | 7,596,000 | - | | 1,644,096 | 1,927,056.00 /ea | 11,562,336 |
| n | 05 | Maturation Tank VFD | 6.00 | ea | 43,542 | 90,000 | - | | 30,827 | 27,394.80 /ea | 164,369 |
| n | 05 | Scraper VFD | 6.00 | ea | 43,542 | 90,000 | - | | 30,827 | 27,394.80 /ea | 164,369 |
| | 1005 | Injection Tank Mixer | 0.00 | ea | 0 | - | - | | 0 | | |
| | 2005 | Maturation Tank Mixer | 0.00 | ea | 0 | - | - | | 0 | | |
| D408 | | Settling | 0.00 | ea | 0 | - | - | | - | | |
| D408 | | Coagulation Feed | 0.00 | ea | 0 | - | - | | - | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **11225.300** | | **ACTIFLO System** | | | | | | | | | |
| D408 | | Polymer Feed | 0.00 | ea | 0 | - | - | | - | | |
| D408 | | Coagulant Storage | 4.00 | ea | 42,022 | 85,800 | - | | - | 31,958.60 /ea | 127,834 |
| | | **ACTIFLO System** | | | **2,451,346** | **7,861,800** | | | **1,705,750** | | **12,018,908** |
| | | 121,480.00 Labor hours | | | | | | | | | |
| | | 19,920.000 Equipment hours | | | | | | | | | |
| **11240.410** | | **Dry Poly Store/Feed Equip** | | | | | | | | | |
| | 0 | Automatic Dry Polymer Preparation Systems | 1.00 | ea | 968 | - | - | | 685 | 1,652.64 /ea | 1,653 |
| | | **Dry Poly Store/Feed Equip** | | | **968** | | | | **685** | | **1,653** |
| | | 48.00 Labor hours | | | | | | | | | |
| | | 8.00 Equipment hours | | | | | | | | | |
| **11282.000** | | **Slide Gates** | | | | | | | | | |
| | 3636 | 36" x 36" Slide Gate, MO | 3.00 | ea | 16,320 | 32,400 | - | | - | 16,240.08 /ea | 48,720 |
| | 6060 | 60" x 60" Slide Gate, MO | 13.00 | ea | 185,488 | 390,000 | - | | - | 44,268.28 /ea | 575,488 |
| | | **Slide Gates** | | | **201,808** | **422,400** | | | | | **624,208** |
| | | 8,458.00 Labor hours | | | | | | | | | |
| **11330.100** | | **Barscreens** | | | | | | | | | |
| n A 50 | | Fine Screenings for 65mgd Influent | 2.00 | ea | 260,265 | 500,000 | - | | - | 380,132.44 /ea | 760,265 |
| B 5 | | Screen Conveyor | 1.00 | ea | 100,212 | 200,000 | - | | - | 300,212.00 /ea | 300,212 |
| f200 | | Rolloff Dumpster & Cover (40cy) | 1.00 | ea | 95 | 3,500 | - | | - | 3,595.44 /ea | 3,595 |
| | | **Barscreens** | | | **360,572** | **703,500** | | | | | **1,064,072** |
| | | 15,112.00 Labor hours | | | | | | | | | |
| **11375.300** | | **Fine Bubble Aeration Sys** | | | | | | | | | |
| n | 0 | Pre-Aeration Equipment | 1.00 | ls | 9,676 | - | - | | 6,850 | 16,526.400 /ls | 16,526 |
| | | **Fine Bubble Aeration Sys** | | | **9,676** | | | | **6,850** | | **16,526** |
| | | 480.00 Labor hours | | | | | | | | | |
| | | 80.00 Equipment hours | | | | | | | | | |
| **13121.000** | | **Pre-Engineered Metal Bldg** | | | | | | | | | |
| z001 | | Pre-Engineered Metal Bldg - Chemical | 1,000.00 | sf | | | 75,000 | | | 75.00 /sf | 75,000 |
| z001 | | Pre-Engineered Metal Bldg - Barscreens | 1,200.00 | sf | | | 90,000 | | | 75.00 /sf | 90,000 |
| | | **Pre-Engineered Metal Bldg** | | | | | **165,000** | | | | **165,000** |
| **13400.005** | | **Measurement & Ctrl Instr** | | | | | | | | | |
| -sub | | Pressure Sensor on Pump | 2.00 | ea | 274 | 3,450 | | | - | 1,861.90 /ea | 3,724 |
| | | **Measurement & Ctrl Instr** | | | **274** | **3,450** | | | | | **3,724** |
| | | 20.00 Labor hours | | | | | | | | | |
| **15210.010** | | **DIP Totals** | | | | | | | | | |
| | 0 | Total Weight (Zero Cost Item) | 40,110.00 | lbs | - | - | - | | - | | |
| | 1 | Weight of Pipe (Zero Cost Item) | 37,100.00 | lbs | - | - | - | | - | | |
| | 2 | Weight of Fittings (Zero Cost Item) | 3,010.00 | lbs | - | - | - | | - | | |
| **15210.200** | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | 0 | Unload Care & Protect Push-on DIP & Fittings | 40,110.00 | lbs | 77 | - | - | | 253 | 0.01 /lbs | 330 |
| | 1 | Weight of Push-on Pipe (Zero Cost Item) | 37,100.00 | lbs | - | - | - | | - | | |
| | 2 | Weight of Push-on Fittings (Zero Cost Item) | 3,010.00 | lbs | - | - | - | | - | | |
| | 5 | Layout Push-on DIP & Fitting | 1,150.00 | lf | 261 | - | - | | - | 0.23 /lf | 261 |
| n | 206 | DIP CML, Push-On, Class 52, 6" | 700.00 | lf | 3,674 | 8,668 | - | | - | 17.632 /lf | 12,343 |
| n | 208 | DIP CML, Push-On, Class 52, 8" | 200.00 | lf | 1,193 | 3,387 | - | | - | 22.90 /lf | 4,580 |
| n | 216 | DIP CML, Push-On, Class 52, 16" | 250.00 | lf | 2,087 | 10,462 | - | | - | 50.194 /lf | 12,548 |
| n 2ARR | | DIP CML, Push-on, 90 Bend, 16" | 4.00 | ea | 561 | 4,650 | - | | - | 1,302.80 /ea | 5,211 |
| n CARR | | DIP CML, Push-on, 22-1/2 Bend, 16" | 2.00 | ea | 267 | 1,925 | - | | - | 1,096.12 /ea | 2,192 |
| | | **DIP CML Push-On Pipe** | | | **8,121** | **29,091** | | | **253** | | **37,465** |
| | | 342.132 Labor hours | | | | | | | | | |
| | | 4.412 Equipment hours | | | | | | | | | |
| **15221.120** | | **Fab 304L Stainless Pipe** | | | | | | | | | |
| | 0 | Unload Care & Protect Pipe/Fittings | 920.00 | lbs | 2 | - | - | | 6 | 0.01 /lbs | 8 |
| | 1 | Weight of Pipe (Zero Cost Item) | 920.00 | lbs | - | - | - | | - | | |
| | 10 | Layout Pipe & Fitting | 400.00 | lf | 95 | - | - | | - | 0.24 /lf | 95 |
| 107A | | Install Fabricated 304L SS Pipe, 1-1/4" | 400.00 | lf | 764 | - | - | | - | 1.91 /lf | 764 |
| n 50A0 | | 304L Sch 40s Stainless Pipe, 1.25" | 400.00 | lf | - | 3,728 | - | | - | 9.32 /lf | 3,728 |

| | Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **Fab 304L Stainless Pipe** | | | **861** | **3,728** | | | **6** | | **4,595** |
| | | | 36.101 Labor hours | | | | | | | | | |
| | | | 0.101 Equipment hours | | | | | | | | | |
| | **15230.400** | | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | | 0 | Unload Care & Protect PCCP & Fittings | 230.00 | lf | 0 | - | - | | 1 | 0.01 /lf | 2 |
| | | 10 | Layout Pipe & Fitting | 230.00 | lf | 55 | - | - | | - | 0.24 /lf | 55 |
| | | 325 | PCCP Equipment- Cat 325 Excavator | 44.800 | ch | 867 | - | - | | 4,961 | 130.091 /ch | 5,828 |
| n | B048 | | Prestressed Concrete Cylinder Pipe (250#) 48 | 130.00 | lf | 5,829 | 22,100 | - | | - | 214.84 /lf | 27,929 |
| n | B084 | | Prestressed Concrete Cylinder Pipe (250#) 84 | 100.00 | lf | 8,160 | 31,000 | - | | - | 391.601 /lf | 39,160 |
| | | | **Prestr Conc Cylind-(PCCP)** | | | **14,912** | **53,100** | | | **4,962** | | **72,974** |
| | | | 633.53 Labor hours | | | | | | | | | |
| | | | 44.83 Equipment hours | | | | | | | | | |
| | **15241.100** | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | | 0 | Unload Care & Protect Pipe/Fittings | 3,500.00 | lf | 7 | - | - | | 22 | 0.01 /lf | 29 |
| | | 10 | Layout Pipe & Fitting | 3,500.00 | lf | 835 | - | - | | - | 0.24 /lf | 835 |
| n | 80E0 | | PVC Schd. 80 Pipe, 3.00" | 2,400.00 | lf | 4,581 | 14,976 | - | | - | 8.15 /lf | 19,557 |
| n | 80G0 | | PVC Schd. 80 Pipe, 4.00" | 400.00 | lf | 954 | 3,644 | - | | - | 11.50 /lf | 4,598 |
| n | 80L0 | | PVC Schd. 80 Pipe, 8" | 400.00 | lf | 1,813 | 10,692 | - | | - | 31.263 /lf | 12,505 |
| n | 80R0 | | PVC Schd. 80 Pipe, 16" | 300.00 | lf | 2,863 | 35,094 | - | | - | 126.524 /lf | 37,957 |
| | a010 | | PVC Joint Primer- Quart | 29.03 | qrt | - | 446 | - | | - | 15.35 /qrt | 446 |
| | a020 | | PVC Solvent Cement Low VOC- Quart | 29.03 | qrt | - | 636 | - | | - | 21.90 /qrt | 636 |
| | | | **PVC Schd Pipe & Fittings** | | | **11,054** | **65,487** | | | **22** | | **76,563** |
| | | | 463.39 Labor hours | | | | | | | | | |
| | | | 0.39 Equipment hours | | | | | | | | | |
| | **15500.001** | | **HVAC Equipment** | | | | | | | | | |
| | | 155 | HVAC Allowance - Chem Feed Bldg | 1,000.00 | sf | - | - | 40,000 | | - | 40.00 /sf | 40,000 |
| | | | **HVAC Equipment** | | | | | **40,000** | | | | **40,000** |
| | | | ***06 Actiflo*** | | | ***3,610,281*** | ***11,113,316*** | ***2,226,630*** | | ***2,571,357*** | | ***19,521,596*** |
| | | | 173,804.78 Labor hours | | | | | | | | | |
| | | | 24,652.022 Equipment hours | | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***07 New Chlorination Facilities*** | | | | | | | | | |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2734 | Remove Asphalt Pavement | 400.00 | sy | 621 | - | - | | 1,252 | 4.684 /sy | 1,873 |
| | 3006 | Demo Concrete Baffle Walls | 10.00 | cy | 816 | - | - | | 191 | 100.70 /cy | 1,007 |
| | | **Selective Site Demolition** | | | **1,437** | | | | **1,443** | | **2,880** |
| | | 88.00 Labor hours | | | | | | | | | |
| | | 31.90 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 780.00 | lf | 72 | | - | | - | 0.092 /lf | 72 |
| n | 2131 | Trenching Excavator- 130 HP (40 cy/hr-320cy/day) Average Exc. | 1,478.50 | cy | 2,990 | - | - | | 8,422 | 7.72 /cy | 11,412 |
| n | 3130 | Trench Bedding-Excavator- 130 HP | 60.68 | cy | 123 | - | - | | 357 | 7.901 /cy | 479 |
| n | 4130 | Trench Pipe Zone Backfill-Excavator- 130 HP | 295.90 | cy | 957 | - | - | | 2,783 | 12.641 /cy | 3,741 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 295.90 | cy | 268 | - | - | | 842 | 3.75 /cy | 1,110 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 356.58 | cy | - | 12,551 | - | | - | 35.20 /cy | 12,551 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 366.27 | cy | 514 | - | - | | 987 | 4.10 /cy | 1,501 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 366.27 | cy | 359 | - | - | | 597 | 2.61 /cy | 956 |
| n | 9616 | Trench Shield- 6x16 | 0.01 | u/mo | - | - | - | | 14 | 1,410.00 /u/mo | 14 |
| | A002 | Pipe Detectable/Non-Detectable Tape | 780.00 | lf | 72 | 43 | - | | - | 0.15 /lf | 115 |
| | A006 | Pipe Test | 780.00 | lf | 576 | 624 | - | | - | 1.54 /lf | 1,200 |
| | | **Trenching** | | | **5,930** | **13,218** | | | **14,003** | | **33,151** |
| | | 374.754 Labor hours | | | | | | | | | |
| | | 214.782 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 366.27 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 366.27 | cy | - | - | - | | - | | |
| | 46 | Bore & Jack Spoils Spoils (Summary) | 3.782 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 370.05 | cy | 597 | - | - | | 1,147 | 4.712 /cy | 1,744 |
| | A0A0 | Haul Spoils/Off Site 10cy Rear Dump 4.00 Hour/Load | 3.782 | cy | 17 | - | - | | 28 | 12.002 /cy | 45 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 366.27 | cy | 1,649 | - | - | | 2,746 | 12.001 /cy | 4,395 |
| | | **Excavation Spoils** | | | **2,263** | | | | **3,921** | | **6,184** |
| | | 133.121 Labor hours | | | | | | | | | |
| | | 66.560 Equipment hours | | | | | | | | | |
| **02445.000** | | **Boring & Jack Conduit** | | | | | | | | | |
| | 0 | Mob/Demob Bore & Jack Equipment | 1.00 | ea | - | - | 5,000 | | - | 5,000.00 /ea | 5,000 |
| | 100 | Excavate Jacking Pit | 41.481 | cy | 75 | - | - | | 204 | 6.731 /cy | 279 |
| | 105 | Excavate Recieving Pit | 20.741 | cy | 38 | - | - | | 102 | 6.73 /cy | 140 |
| | 200 | Shore Jacking/Receiving Pits | 644.00 | bsf | - | - | 9,660 | | - | 15.00 /bsf | 9,660 |
| | 300 | Backfill Jacking/Receiving Pits | 62.222 | cy | 305 | - | - | | 636 | 15.12 /cy | 941 |
| | 400 | Jacking Slab & Reaction Block | 2.66 | cy | 578 | 612 | - | | - | 447.372 /cy | 1,190 |
| n | 5012 | Bore & Jack Pipe 12 | 130.00 | lf | - | - | 15,600 | | - | 120.00 /lf | 15,600 |
| | 7000 | Grout Casing | 2.84 | cy | 12 | 489 | - | | 14 | 181.43 /cy | 515 |
| | | **Boring & Jack Conduit** | | | **1,008** | **1,101** | **30,260** | | **956** | | **33,324** |
| | | 52.20 Labor hours | | | | | | | | | |
| | | 15.791 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| n | 10 | Bitum Paving | 350.00 | sy | - | - | 5,530 | | - | 15.80 /sy | 5,530 |
| | | **Asphalt Paving - Location** | | | | | **5,530** | | | | **5,530** |
| **02750.100** | | **Concrete Paving** | | | | | | | | | |
| | z015 | Concrete Pavement, Walkways | 50.00 | sy | 102 | 572 | - | | 38 | 14.23 /sy | 711 |
| | | **Concrete Paving** | | | **102** | **572** | | | **38** | | **711** |
| | | 5.45 Labor hours | | | | | | | | | |
| | | 0.55 Equipment hours | | | | | | | | | |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 100.00 | sy | 21 | 219 | - | | 8 | 2.482 /sy | 248 |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Lawns & Grasses** | | | **21** | **219** | | | **8** | | **248** |
| | | 1.00 Labor hours | | | | | | | | | |
| | | 0.20 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 140 | Concrete: Chlorination/Dechlorination Contact Basin | 1,300.00 | cy | 161,312 | 455,000 | - | | 65,559 | 524.52 /cy | 681,871 |
| | | **Concrete in Place** | | | **161,312** | **455,000** | | | **65,559** | | **681,871** |
| | | 7,800.000 Labor hours | | | | | | | | | |
| | | 1,300.00 Equipment hours | | | | | | | | | |
| **05600.115** | | **Manifolds** | | | | | | | | | |
| z001 | | 6T Cylinder Manifold System | 2.00 | ls | 835 | 3,450 | - | | | 2,142.50 /ls | 4,285 |
| | | **Manifolds** | | | **835** | **3,450** | | | | | **4,285** |
| | | 32.00 Labor hours | | | | | | | | | |
| | | 16.00 Equipment hours | | | | | | | | | |
| **06220.000** | | **Millwork** | | | | | | | | | |
| z013 | | Diffuser Support Brackets | 2.00 | ea | 372 | 369 | - | | - | 370.34 /ea | 741 |
| | | **Millwork** | | | **372** | **369** | | | | | **741** |
| | | 16.00 Labor hours | | | | | | | | | |
| **11240.500** | | **Chlorination Equipment** | | | | | | | | | |
| | 0 | Chlorine Residual Analyzer (Severn Trent CL 500) | 1.00 | ls | 3,000 | 6,190 | - | | 2,124 | 11,313.18 /ls | 11,313 |
| A100 | | Chlorinator | 2.00 | ea | 14,998 | 30,800 | - | | 10,618 | 28,207.96 /ea | 56,416 |
| B100 | | Chlorine Evaporator | 2.00 | ea | 19,998 | 43,200 | - | | 14,158 | 38,677.96 /ea | 77,356 |
| F100 | | Evaporator Electric-Operated Vacuum Regulator | 2.00 | ea | 4,000 | 8,600 | - | | - | 6,299.88 /ea | 12,600 |
| S004 | | Electronic 6T Cylinder Scale System | 2.00 | ea | 17,997 | 36,600 | - | | 12,742 | 33,669.550 /ea | 67,339 |
| S004 | | Trunnion Scale for 1T Chlorine Cylinders | 2.00 | ea | 1,500 | 3,000 | - | | 1,062 | 2,780.80 /ea | 5,562 |
| f200 | | Chlor-A-Vac Submersible Chemical Induction Unit | 3.00 | ea | 1,451 | 57,768 | - | | - | 19,739.80 /ea | 59,219 |
| | | **Chlorination Equipment** | | | **62,944** | **186,158** | | | **40,703** | | **289,805** |
| | | 3,073.04 Labor hours | | | | | | | | | |
| | | 475.34 Equipment hours | | | | | | | | | |
| **11284.000** | | **Sluice Gates** | | | | | | | | | |
| | 8484 | 84" x 84" Sluice Gate | 1.00 | ea | 14,006 | 27,000 | - | | - | 41,005.82 /ea | 41,006 |
| | 9696 | 96" x 96" Sluice Gate | 1.00 | ea | 16,010 | 33,000 | - | | - | 49,010.06 /ea | 49,010 |
| | | **Sluice Gates** | | | **30,016** | **60,000** | | | | | **90,016** |
| | | 1,258.00 Labor hours | | | | | | | | | |
| **13202.000** | | **Fiberglass Tanks** | | | | | | | | | |
| GC00 | | Sodium Bisulfite System | 1.00 | ls | 3,292 | 32,200 | - | | - | 40,666.60 /ls | 40,667 |
| | | **Fiberglass Tanks** | | | **3,292** | **32,200** | | | | | **40,667** |
| | | 120.000 Labor hours | | | | | | | | | |
| **15112.810** | | **Butterfly Valve PVC** | | | | | | | | | |
| n 111P | | Butterfly Valve, PVC, EPDM, Gear Operated, 6" | 1.00 | ea | 118 | 312 | - | | - | 430.49 /ea | 430 |
| | | **Butterfly Valve PVC** | | | **118** | **312** | | | | | **430** |
| | | 3.72 Labor hours | | | | | | | | | |
| **15117.810** | | **Ball Valve PVC** | | | | | | | | | |
| n 300G | | Ball Valve, PVC, True Union, 2.00" | 1.00 | ea | 30 | 33 | - | | - | 63.37 /ea | 63 |
| | | **Ball Valve PVC** | | | **30** | **33** | | | | | **63** |
| | | 0.95 Labor hours | | | | | | | | | |
| **15119.500** | | **Pressure Red/Reg Valve** | | | | | | | | | |
| n 300G | | Pressure Relief Valve | 2.00 | ea | 301 | 2,800 | - | | - | 1,550.35 /ea | 3,101 |
| | | **Pressure Red/Reg Valve** | | | **301** | **2,800** | | | | | **3,101** |
| | | 9.70 Labor hours | | | | | | | | | |
| **15210.010** | | **DIP Totals** | | | | | | | | | |
| | 0 | Total Weight (Zero Cost Item) | 340.00 | lbs | - | - | - | | - | | |
| | 2 | Weight of Fittings (Zero Cost Item) | 340.00 | lbs | - | - | - | | - | | |
| **15210.200** | | **DIP CML Push-On Pipe** | | | | | | | | | |
| | 0 | Unload Care & Protect Push-on DIP & Fittings | 340.00 | lbs | 1 | - | - | | 2 | 0.01 /lbs | 3 |
| | 2 | Weight of Push-on Fittings (Zero Cost Item) | 340.00 | lbs | - | - | - | | - | | |
| n 2APP | | DIP CML, Push-on, 90 Bend, 12" | 2.00 | ea | 220 | 680 | - | | - | 450.19 /ea | 900 |

| | Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **DIP CML Push-On Pipe** | | | **221** | **680** | | | **2** | | **903** |
| | | | 9.28 Labor hours | | | | | | | | | |
| | | | 0.04 Equipment hours | | | | | | | | | |
| | **15220.302** | | **A53 CW Pipe PE/GE/T&C/SW** | | | | | | | | | |
| | | 0 | Unload Care & Protect Pipe/Fittings | 224.63 | lbs | 0 | - | - | | 1 | 0.01 /lbs | 2 |
| | | 1 | Weight of Pipe (Zero Cost Item) | 224.63 | lbs | - | - | - | | - | | |
| | | 10 | Layout Pipe & Fitting | 75.00 | lf | 18 | - | - | | - | 0.24 /lf | 18 |
| n | | 4009 | A53 CW Sch 40 Pipe PE, 1.00" | 25.00 | lf | 48 | 126 | - | | - | 6.95 /lf | 174 |
| n | 300P | | A53 CW Standard Pipe PE, 12" | 130.00 | lf | 1,674 | 19,328 | - | | - | 161.56 /lf | 21,003 |
| n | 400C | | A53 CW Sch 40 Pipe PE, 2.00" | 50.00 | lf | 131 | 549 | - | | - | 13.604 /lf | 680 |
| | | | **A53 CW Pipe PE/GE/T&C/SW** | | | **1,871** | **20,003** | | | **1** | | **21,876** |
| | | | 78.475 Labor hours | | | | | | | | | |
| | | | 0.025 Equipment hours | | | | | | | | | |
| | **15241.100** | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | | 0 | Unload Care & Protect Pipe/Fittings | 780.00 | lf | 2 | - | - | | 5 | 0.01 /lf | 6 |
| | | 10 | Layout Pipe & Fitting | 780.00 | lf | 186 | - | - | | - | 0.24 /lf | 186 |
| n | 40J0 | | PVC Schd. 40 Pipe, 6" | 130.00 | lf | 372 | 1,455 | - | | - | 14.053 /lf | 1,827 |
| n | 80E0 | | PVC Schd. 80 Pipe, 3.00" | 50.00 | lf | 95 | 312 | - | | - | 8.15 /lf | 407 |
| n | 80J0 | | PVC Schd. 80 Pipe, 6" | 730.00 | lf | 2,437 | 12,695 | - | | - | 20.73 /lf | 15,132 |
| | a010 | | PVC Joint Primer- Quart | 3.15 | qrt | - | 48 | - | | - | 15.35 /qrt | 48 |
| | a020 | | PVC Solvent Cement Low VOC- Quart | 3.15 | qrt | - | 69 | - | | - | 21.90 /qrt | 69 |
| | | | **PVC Schd Pipe & Fittings** | | | **3,093** | **14,579** | | | **5** | | **17,676** |
| | | | 129.69 Labor hours | | | | | | | | | |
| | | | 0.09 Equipment hours | | | | | | | | | |
| | **15500.001** | | **HVAC Equipment** | | | | | | | | | |
| | | 155 | Heating Equipment for FRP Storage Tank | 1.00 | ls | - | 4,840 | | | - | 4,840.00 /ls | 4,840 |
| | | | **HVAC Equipment** | | | | **4,840** | | | | | **4,840** |
| | | | ***07 New Chlorination Facilities*** | | | ***275,164*** | ***795,534*** | ***35,790*** | | ***126,640*** | | ***1,238,304*** |
| | | | 13,185.371 Labor hours | | | | | | | | | |
| | | | 2,121.272 Equipment hours | | | | | | | | | |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***08 Retrofit of Existing Effluent Outfall*** | | | | | | | | | |
| **02000.005** | | **Sitework Allowance** | | | | | | | | | |
| | 20 | Protect Existing Utilities (6" PW) | 1.00 | ls | - | - | 2,500 | | - | 2,500.00 /ls | 2,500 |
| | | **Sitework Allowance** | | | | | **2,500** | | | | **2,500** |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2508 | Remove 84" RCP | 230.00 | lf | 375 | - | - | | 713 | 4.731 /lf | 1,088 |
| | 2508 | Remove 48" PCCP | 50.00 | lf | 82 | - | - | | 155 | 4.731 /lf | 237 |
| | 2508 | Remove 42" DIP | 600.00 | lf | 979 | - | - | | 1,860 | 4.731 /lf | 2,839 |
| | 2508 | Remove 36" DIP | 180.00 | lf | 294 | - | - | | 558 | 4.731 /lf | 852 |
| | | **Selective Site Demolition** | | | **1,730** | | | | **3,285** | | **5,015** |
| | | 106.00 Labor hours | | | | | | | | | |
| | | 53.00 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 600.00 | lf | 55 | | - | | - | 0.092 /lf | 55 |
| n | 2241 | Trenching Excavator- 240 HP (60 cy/hr-480cy/day) Average Exc. | 4,170.833 | cy | 2,108 | - | - | | 9,224 | 2.72 /cy | 11,332 |
| n | 3240 | Trench Bedding-Excavator- 240 HP | 122.222 | cy | 185 | - | - | | 616 | 6.56 /cy | 801 |
| n | 4240 | Trench Pipe Zone Backfill-Excavator- 240 HP | 647.762 | cy | 1,572 | - | - | | 5,225 | 10.492 /cy | 6,796 |
| n | 5130 | Trench Native Backfill- Loader C938 3cy | 2,717.75 | cy | 2,458 | - | - | | 7,735 | 3.75 /cy | 10,193 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 769.984 | cy | - | 27,103 | - | | - | 35.20 /cy | 27,103 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 1,453.09 | cy | 2,038 | - | - | | 3,916 | 4.10 /cy | 5,954 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 1,453.09 | cy | 1,423 | - | - | | 2,368 | 2.61 /cy | 3,791 |
| n | 8367 | Trench Shores- Aluminum Hydraulic 36" width x 7' Rail | 2.00 | u/mo | | - | - | | 152 | 76.00 /u/mo | 152 |
| | C0j0 | Concrete Thrust Block, 72" | 1.00 | ea | 716 | 2,322 | - | | - | 3,037.80 /ea | 3,038 |
| | | **Trenching** | | | **10,554** | **29,425** | | | **29,237** | | **69,216** |
| | | 663.644 Labor hours | | | | | | | | | |
| | | 441.10 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 1,453.09 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 1,453.09 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 1,453.09 | cy | 2,343 | - | - | | 4,503 | 4.712 /cy | 6,847 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 1,453.09 | cy | 6,544 | - | - | | 10,894 | 12.001 /cy | 17,438 |
| | | **Excavation Spoils** | | | **8,887** | | | | **15,398** | | **24,285** |
| | | 522.734 Labor hours | | | | | | | | | |
| | | 261.37 Equipment hours | | | | | | | | | |
| **02920.010** | | **Lawns & Grasses** | | | | | | | | | |
| n | z004 | Loam & Seeding w/Imported Material, 4"thk | 3,000.00 | sy | 250 | 6,570 | - | | 251 | 2.36 /sy | 7,070 |
| | | **Lawns & Grasses** | | | **250** | **6,570** | | | **251** | | **7,070** |
| | | 12.00 Labor hours | | | | | | | | | |
| | | 6.00 Equipment hours | | | | | | | | | |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 140 | Concrete: Effluent Outfall Structure | 21.00 | cy | 2,606 | 7,350 | - | | 1,059 | 524.52 /cy | 11,015 |
| n | 140 | Concrete: Effluent Maintenance Structure | 50.00 | cy | 6,204 | 17,500 | - | | 2,522 | 524.52 /cy | 26,226 |
| | | **Concrete in Place** | | | **8,810** | **24,850** | | | **3,581** | | **37,241** |
| | | 426.000 Labor hours | | | | | | | | | |
| | | 71.00 Equipment hours | | | | | | | | | |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL | 2.00 | ea | 153 | 2,553 | - | | - | 1,353.17 /ea | 2,706 |
| | | **Hatch, Aluminum, 300psf** | | | **153** | **2,553** | | | | | **2,706** |
| | | 6.40 Labor hours | | | | | | | | | |
| **15230.400** | | **Prestr Conc Cylind-(PCCP)** | | | | | | | | | |
| | 0 | Unload Care & Protect PCCP & Fittings | 600.00 | lf | 1 | - | - | | 4 | 0.01 /lf | 5 |
| | 10 | Layout Pipe & Fitting | 600.00 | lf | 143 | - | - | | - | 0.24 /lf | 143 |
| | 325 | PCCP Equipment- Cat 325 Excavator | 133.00 | ch | 2,575 | - | - | | 14,727 | 130.091 /ch | 17,302 |
| n | B074 | Prestressed Concrete Cylinder Pipe (250#) 54 | 550.00 | lf | 27,558 | 104,500 | - | | - | 240.11 /lf | 132,058 |
| n | B084 | Prestressed Concrete Cylinder Pipe (250#) 84 | 50.00 | lf | 4,080 | 15,500 | - | | - | 391.601 /lf | 19,580 |
| n | K078 | PCCP 90 Bend 78 | 1.00 | ea | 560 | 2,800 | - | | - | 3,360.24 /ea | 3,360 |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | **Prestr Conc Cylind-(PCCP)** | | **34,918** | **122,800** | | | **14,731** | | **172,449** |
| | 1,488.56 Labor hours | | | | | | | | |
| | 133.07 Equipment hours | | | | | | | | |
| | ***08 Retrofit of Existing Effluent Outfall*** | | ***65,302*** | ***186,198*** | ***2,500*** | | ***66,482*** | | ***320,482*** |
| | 3,225.334 Labor hours | | | | | | | | |
| | 965.530 Equipment hours | | | | | | | | |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | ***09 I&C*** | | | | | | | | |
| **13000.005** | **Special Const Allowance** | | | | | | | | |
| 5 | I&C Allowance | 0.00 ls | 0 | 0 | - | | - | | |
| | ***09 I&C*** | | ***0*** | ***0*** | ***0*** | | ***0*** | | ***0*** |

| Item | Description | Takeoff Qty | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|
| | ***10 Electrical*** | | | | | | | | |
| **16000.005** | **Electrical Allowance** | | | | | | | | |
| 5 | Electrical Allowance | 0.00 ls | 0 | 0 | - | | - | | |
| | ***10 Electrical*** | | ***0*** | ***0*** | ***0*** | | ***0*** | | ***0*** |

| Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***11 Chemical Feed*** | | | | | | | | | |
| **02220.030** | | **Selective Site Demolition** | | | | | | | | | |
| | 2510 | Demo 12'dia x 40'tall Steel Tank | 1.00 | ea | | - | 5,000 | | | 5,000.00 /ea | 5,000 |
| | 2734 | Remove Asphalt Pavement, 5"thk | 189.00 | sy | 518 | - | - | | 592 | 5.87 /sy | 1,109 |
| | 3012 | Demo Concrete Elevated Slab | 22.00 | cy | 50 | - | - | | 74 | 5.61 /cy | 123 |
| | | **Selective Site Demolition** | | | **567** | | **5,000** | | **665** | | **6,233** |
| | | 19.692 Labor hours | | | | | | | | | |
| | | 14.943 Equipment hours | | | | | | | | | |
| **02315.300** | | **Trenching** | | | | | | | | | |
| | 0 | Survey & Stake Pipeline | 480.00 | lf | 55 | | - | | - | 0.12 /lf | 55 |
| n | 2090 | Trenching- Backhoe/Loader 95HP (15 cy/hr-120cy/day) Average Exc. | 583.87 | cy | 1,965 | - | - | | 2,098 | 6.96 /cy | 4,063 |
| n | 3090 | Trench Bedding-Backhoe/Loader 95HP | 36.543 | cy | 179 | - | - | | 148 | 8.95 /cy | 327 |
| n | 4090 | Trench Pipe Zone Backfill-Backhoe/Loader 95HP | 109.65 | cy | 645 | - | - | | 533 | 10.741 /cy | 1,178 |
| n | 5090 | Trench Native Backfill-Backhoe/Loader 95HP | 109.65 | cy | 588 | - | - | | 583 | 10.681 /cy | 1,171 |
| | 7804 | 3/8 Stone Bedding/Zone/Engineered Fill Material | 146.193 | cy | - | 5,146 | - | | - | 35.20 /cy | 5,146 |
| | 7905 | Load Trench Spoils/Stockpile Cat 466 Loader/Backhoe 95hp (80cy/ch) | 146.48 | cy | 370 | - | - | | 395 | 5.22 /cy | 765 |
| | 7910 | Haul Trench Spoils/Stockpile- 10cy Rear Dump 4 Load/Hour | 146.48 | cy | 292 | - | - | | 239 | 3.624 /cy | 531 |
| | A002 | Pipe Detectable/Non-Detectable Tape | 480.00 | lf | 55 | 26 | - | | - | 0.17 /lf | 81 |
| | A006 | Pipe Test | 480.00 | lf | 461 | 384 | - | | - | 1.761 /lf | 845 |
| | | **Trenching** | | | **4,610** | **5,556** | | | **3,996** | | **14,163** |
| | | 179.20 Labor hours | | | | | | | | | |
| | | 91.695 Equipment hours | | | | | | | | | |
| **02315.500** | | **Excavation Spoils** | | | | | | | | | |
| | 0 | EXCAVATION SPOILS (Grand Total) | 146.48 | cy | - | - | - | | - | | |
| | 45 | Trenching Spoils (Summary) | 146.48 | cy | - | - | - | | - | | |
| | 1080 | Load Spoils Cat 466 Loader/Backhoe 95hp (80cy/ch) | 146.48 | cy | 425 | - | - | | 454 | 6.002 /cy | 879 |
| | A0A4 | Haul Spoils/Off Site 10cy Rear Dump 1 Load/Hour | 146.48 | cy | 1,344 | - | - | | 1,098 | 16.673 /cy | 2,442 |
| | | **Excavation Spoils** | | | **1,769** | | | | **1,552** | | **3,321** |
| | | 52.694 Labor hours | | | | | | | | | |
| | | 26.35 Equipment hours | | | | | | | | | |
| **02740.020** | | **Asphalt Paving - Location** | | | | | | | | | |
| n | 10 | Bitum Paving | 189.00 | sy | - | - | 2,986 | | - | 15.80 /sy | 2,986 |
| | | **Asphalt Paving - Location** | | | | | **2,986** | | | | **2,986** |
| **03000.005** | | **Concrete in Place** | | | | | | | | | |
| n | 145 | Concrete: Elevated Slab - Flow Splitter Box | 22.00 | cy | 3,154 | 7,920 | - | | 1,109 | 553.82 /cy | 12,184 |
| | | **Concrete in Place** | | | **3,154** | **7,920** | | | **1,109** | | **12,184** |
| | | 121.000 Labor hours | | | | | | | | | |
| | | 22.00 Equipment hours | | | | | | | | | |
| **03150.010** | | **Concrete Core & Saw** | | | | | | | | | |
| | c 10 | Core Drill 1" to 12" depth - Dewatering Wall | 3.00 | ea | 58 | - | - | | | 19.28 /ea | 58 |
| | c 10 | Core Drill 1" to 12" depth - Flow Splitter Wall | 3.00 | ea | 58 | - | - | | | 19.28 /ea | 58 |
| | | **Concrete Core & Saw** | | | **116** | | | | | | **116** |
| | | 4.80 Labor hours | | | | | | | | | |
| **05000.001** | | **Metals Allowance** | | | | | | | | | |
| | 5 | Metals Allowance - Mount Chemical Induction System | 1.00 | ls | | | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | | **Metals Allowance** | | | | | **5,000** | | | | **5,000** |
| **05585.205** | | **Hatch, Aluminum, 300psf** | | | | | | | | | |
| n | J07 | 48"x 48" Aluminum Bilco Floor Hatch, 300psf, Type J-AL - Chem Induction | 1.00 | ea | 87 | 1,277 | - | | - | 1,363.09 /ea | 1,363 |
| | | **Hatch, Aluminum, 300psf** | | | **87** | **1,277** | | | | | **1,363** |
| | | 3.20 Labor hours | | | | | | | | | |
| **11220.100** | | **Chemical Mixing Units** | | | | | | | | | |
| | 02 | Polymer Supply Mechanical Mixer | 4.00 | ea | 3,778 | 6,000 | - | | - | 2,444.40 /ea | 9,778 |

| | Item | | Description | Takeoff Qty | | Labor Amount | Material Amount | Subcontract Amount | Subcontract Name | Equipment Amount | Total Unit Cost | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **Chemical Mixing Units** | | | **3,778** | **6,000** | | | | | **9,778** |
| | | | 120.000 Labor hours | | | | | | | | | |
| | **11240.400** | | **Polymer Store/Feed Equip** | | | | | | | | | |
| | | 0 | Metering Pump/Poly Blend and Feed Pump | 3.00 | ea | 21,182 | 42,000 | - | | 10,276 | 24,486.00 /ea | 73,458 |
| | | 0 | First Fill of Polymer | 3.00 | day | 2,118 | 4,500 | - | | 1,028 | 2,548.60 /day | 7,646 |
| | | | **Polymer Store/Feed Equip** | | | **23,301** | **46,500** | | | **11,303** | | **81,104** |
| | | | 792.00 Labor hours | | | | | | | | | |
| | | | 132.00 Equipment hours | | | | | | | | | |
| | **11240.420** | | **Storage Tanks** | | | | | | | | | |
| | f110 | | Submerged Chemical Induction System | 1.00 | ls | 23,536 | 40,000 | - | | - | 63,536.00 /ls | 63,536 |
| | | | **Storage Tanks** | | | **23,536** | **40,000** | | | | | **63,536** |
| | | | 800.000 Labor hours | | | | | | | | | |
| | **13000.005** | | **Special Const Allowance** | | | | | | | | | |
| | | 5 | SCADA Allowance | 1.00 | ls | | | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | | 5 | Polymer Tote Containment | 4.00 | ea | 433 | 3,680 | - | | - | 1,028.20 /ea | 4,113 |
| | | | **Special Const Allowance** | | | **433** | **3,680** | **5,000** | | | | **9,113** |
| | | | 16.00 Labor hours | | | | | | | | | |
| | **15115.810** | | **Diaphragm Valve PVC** | | | | | | | | | |
| n | 130I | | PVC Diaphragm Valve, flg, 1" | 9.00 | ea | 615 | 8,640 | - | | - | 1,028.313 /ea | 9,255 |
| n | 130K | | PVC Diaphragm Valve, flg, 2" | 6.00 | ea | 800 | 9,060 | - | | - | 1,643.34 /ea | 9,860 |
| | | | **Diaphragm Valve PVC** | | | **1,415** | **17,700** | | | | | **19,115** |
| | | | 38.73 Labor hours | | | | | | | | | |
| | **15241.100** | | **PVC Schd Pipe & Fittings** | | | | | | | | | |
| | | 0 | Unload Care & Protect Pipe/Fittings | 680.00 | lf | 2 | - | - | | 4 | 0.01 /lf | 7 |
| | | 10 | Layout Pipe & Fitting | 680.00 | lf | 214 | - | - | | - | 0.32 /lf | 214 |
| n | | 8080 | PVC Schd. 80 Pipe, 1.00" | 600.00 | lf | 944 | 792 | - | | - | 2.894 /lf | 1,736 |
| n | 80C0 | | PVC Schd. 80 Pipe, 2.00" | 80.00 | lf | 176 | 245 | - | | - | 5.264 /lf | 421 |
| n | 8A80 | | PVC Sch 80. 90 Ell , 1.00" | 18.00 | ea | 96 | 79 | - | | - | 9.752 /ea | 176 |
| n | 8AC0 | | PVC Sch 80. 90 Ell , 2.00" | 11.00 | ea | 93 | 84 | - | | - | 16.12 /ea | 177 |
| n | 8F88 | | PVC Sch 80. Tee , 1.00" | 12.00 | ea | 87 | 95 | - | | - | 15.13 /ea | 182 |
| n | 8FCC | | PVC Sch 80. Tee , 2.00" | 7.00 | ea | 82 | 190 | - | | - | 38.754 /ea | 271 |
| | a010 | | PVC Joint Primer- Quart | 1.21 | qrt | - | 19 | - | | - | 15.35 /qrt | 19 |
| | a020 | | PVC Solvent Cement Low VOC- Quart | 1.21 | qrt | - | 26 | - | | - | 21.90 /qrt | 26 |
| | | | **PVC Schd Pipe & Fittings** | | | **1,695** | **1,529** | | | **4** | | **3,229** |
| | | | 53.855 Labor hours | | | | | | | | | |
| | | | 0.075 Equipment hours | | | | | | | | | |
| | **15400.005** | | **Plumbing Allowance** | | | | | | | | | |
| | | 5 | Plumbing Allowance - Hook Plant Water to Poly System | 1.00 | ls | | | 5,000 | | - | 5,000.00 /ls | 5,000 |
| | | | **Plumbing Allowance** | | | | | **5,000** | | | | **5,000** |
| | **16000.005** | | **Electrical Allowance** | | | | | | | | | |
| | | 5 | Electrical Allowance - Wire Chemical Induction to Controls | 1.00 | ls | | | 25,000 | | - | 25,000.00 /ls | 25,000 |
| | | | **Electrical Allowance** | | | | | **25,000** | | | | **25,000** |
| | | | 0.000 Labor hours | | | | | | | | | |
| | | | ***11 Chemical Feed*** | | | ***64,460*** | ***130,162*** | ***47,986*** | | ***18,631*** | | ***261,239*** |
| | | | 2,201.171 Labor hours | | | | | | | | | |
| | | | 287.06 Equipment hours | | | | | | | | | |

## Estimate Totals

| | Description | Amount | Totals | Hours | Rate |
|---|---|---|---|---|---|
| | Labor | 5,049,436 | | 239,907 hrs | |
| | Material | 15,181,699 | | | |
| | Subcontract | 6,088,987 | | | |
| | Equipment | 3,366,468 | | 34,980 hrs | |
| | Other | 10,727 | | | |
| **Subtotal Direct Cost** | | **29,697,317** | **29,697,317** | | |
| | I&C | 2,969,707 | | | 10.00 % |
| | Electrical | 4,454,561 | | | 15.00 % |
| | | **7,424,268** | **37,121,585** | | |
| | Indirect Costs: | | | | |
| | Building Permits(% total cost) | 310,702 | | | 0.40 % |
| | Sales Tax (MEO) | | | | |
| | Builders Risk Ins % total cost | 194,189 | | | 0.25 % |
| | Gen Liability Ins % total cost | 1,553,508 | | | 2.00 % |
| | GC Bonds (% total cost) | 776,754 | | | 1.00 % |
| **Subtotal Prior to OH&P** | | **2,835,153** | **39,956,738** | | |
| | GC Field General Conditions | 3,995,649 | | | 10.00 % |
| | GC Indirects, OH & Profit | 3,995,649 | | | 10.00 % |
| **Subtotal** | | **7,991,298** | **47,948,036** | | |
| | Construction Contingency | 16,781,727 | | | 35.00 % |
| | **Total Construction Cost** | **16,781,727** | **64,729,763** | | |
| | Engineering, Permitting, Bond Financing, Legal and Administration | 12,945,904 | | | 20.00 % |
| **Total Program Cost** | | **12,945,904** | **77,675,667** | | |
| | ***Total*** | | ***77,675,667*** | | |

This is an Opinion of Probable Construction Cost only, as defined by the documents provided at the level of design indicated on the front sheet of this estimate.
There are not any costs provided for: Change Orders, Construction Oversight, land acquisition or temporary/permanent easements, Operations, or any other costs associated with this project that are not specifically part of the bidding contractor's proposed scope.
The total cost shown is valid to only two significant figures.