HRSD

May 19, 2020

Virginia Department of Environmental Quality
Clean Water Financing and Assistance Program
Michael Crocker, Jr.
Project Oversight Team Leader
1111 East Main Street, Suite 1400
Richmond, VA 23219

Procurement Certification Letter for: HRSD C-515663G-02 (Reference Project List Page 2)

Dear Mr. Crocker,

This letter serves as certification from Hampton Roads Sanitation District and the Engineering Department that all procurement related to the Virginia Clean Water Revolving Loan C-515663G-02 was conducted in accordance with the Virginia Public Procurement Act (VPPA).

If you have questions or need additional information, please contact me directly at 757-460-7012 or via email at bhusselbee@hrsd.com.

Sincerely,

Bruce W. Husselbee, P.E., DBIA
Director of Engineering

Project List

CIP Number	Project Name
PR_AD012100	Asset Management Implementation
PR_AT012920	Atlantic Treatment Plant Access Road Extension
PR_AT014500	Atlantic Treatment Plant Influent Screens (1-3) Replacement
PR_BH013020	Willard Avenue Pump Station Replacement
PR_BH014000	West Avenue and 35th Street Interceptor Force Main Replacement
PR_BH014220	Hampton Trunk Sewer Extension Divisions I and J Relocation Phase II
PR_BH014600	46th Street Diversion Sewer Rehabilitation Replacement
PR_BH014900	Hampton Trunk Sewer Extension Division K Gravity Improvements
PR_BH015600	Hampton Trunk A and B Replacement-Jefferson Avenue to Walnut Avenue
PR_BH015900	Bloxoms Corner Force Main Replacement
PR_GN013300	Treatment Plant Grease Handling Facilities
PR_GN014900	North Shore Gravity Sewer Improvements Phase I
PR_GN016360	James River SWIFT Facility
PR_GN016361	James River Recharge Wells
PR_JR010600	Lucas Creek Pump Station Upgrade
PR_JR011730	Jefferson Avenue Interceptor Force Main Replacement Phase III
PR_JR013400	James River Treatment Plant Advanced Nutrient Reduction Improvements
PR_MP013700	Middlesex Interceptor System Program Phase II–Urbanna to Mathews Transmission Force Main
PR_NP010620	Suffolk Pump Station Replacement
PR_NP014400	Nansemond Treatment Plant Influent Screen Replacement
PR_NP014600	West Road Interceptor Force Main Extension
PR_VP014020	Sanitary Sewer Project 1950 12 Inch Force Main and 24 and 18 Inch Gravity Replacement
PR_VP014700	Ingleside Road Pump Station Replacement
PR_VP015400	Lafayette Norview-Estabrook Pump Station Replacements
PR_VP018000	Park Avenue Pump Station Replacement
PR_YR010520	Magruder Mercury Interceptor Force Main Replacement - Section B
PR_YR010900	Tabb Pressure Reducing Station and Offline Storage Facility

9. **James River SWIFT Facility and James River Treatment Plant Advanced Nutrient Reduction Improvements**
Additional Appropriation, Comprehensive Agreement and Proposal Compensation

Actions:

a. **Appropriate additional funding in the amount of $88,367,184 to the James River SWIFT Facility project (GN016360).**

b. **Appropriate additional funding in the amount of $37,288,106 to the James River Treatment Plant Advanced Nutrient Reduction Improvements project (JR013400).**

c. **Approve a comprehensive agreement with Ulliman Schutte-Alberici Joint Venture (JV) Team (US-A) including a Contract Cost Limit (CCL) of $468,073,039.**

d. **Approve proposal compensation to Kiewit Infrastructure South Co. in the amount of $310,000.**

Moved: Vishnu Lakdawala
Seconded: Willie Levenston
Roll call vote: **Ayes:** 6 **Nays:** 0

CIP Project: GN016360

Budget	$182,246,000
Previous Expenditures	($4,429,203)
Available Balance	$177,816,797
Proposed Comprehensive Agreement with US-A	($251,710,621)
Proposed Contingency	($12,585,530)
Furniture, Fixtures and Equipment (FFE), Landscaping, Ops Relocation	($1,887,830)
Project Shortage/Requested Additional Funding	($88,367,184)
Revised Total Authorized Funding	$270,613,184

CIP Project: JR013400

Budget	$194,476,000
Previous Expenditures	($2,960,848)
Available Balance	$191,515,152
Proposed Comprehensive Agreement with US-A	($216,362,418)
Proposed Contingency	($10,818,120)
Furniture, Fixtures and Equipment (FFE), Landscaping, Ops Relocation	($1,622,720)
Project Shortage/Requested Additional Funding	($37,288,106)
Revised Total Authorized Funding	$231,764,106

Type of Procurement: Competitive Negotiation – Design-Build

Proposers	SOQ	Technical Proposal	Price Proposa l	Total Ranking	Recommended Selection Ranking
Ulliman Schutte-Alberici JV	16.58	32.28	40.00	88.86	1
Kiewit Infrastructure South Co.	16.57	32.54	35.80	84.91	2

Contract Description: The use of the Design-Build project delivery method was approved by the Commission on June 25, 2019. A Public Notice for the Request for Qualifications was issued on February 9, 2020. Four teams submitted Statements of Qualifications on March 10, 2020 and all teams were considered responsive and deemed fully qualified, responsible, and suitable to the requirements in the Request for Qualifications. Two Design-Build teams were short-listed. A Request for Proposals was issued on April 24, 2020 to the short-listed teams. Both short-listed teams submitted Technical Proposals on August 6, 2020 and interviews were held on August 19, 2020. Price proposals were submitted on October 2, 2020.

The Selection Committee recommends the top ranked team, comprised of Ulliman Schutte-Alberici Joint Venture (US-A) with HDR and Black & Veatch as the design engineering consultants. The team not selected was Kiewit Infrastructure South Co. They completed the selection process and was fully responsive to the procurement process. As approved at the January 28, 2020 Commission Meeting, proposal compensation in the amount of $310,000 is recommended for this team.

The comprehensive agreement is for design-build services to design, build and start up the necessary infrastructure as described in the project description below. The agreement includes the requirement to reach substantial completion no later than December 18, 2025 so that stable recharge operation can be achieved that informs the regional planning efforts and initiates contribution to regional benefits for SWIFT. This completion date in 2025 advances the goal of SWIFT to support the Chesapeake Bay restoration goals by reducing surface water discharge of treated effluent; to provide a sustainable source of groundwater to the Potomac Aquifer; and to protect the aquifer by increasing the hydrostatic pressure, which has the potential to prevent saltwater intrusion and to slow, stop or reverse land subsidence related to aquifer withdrawals

Project Description: The Project consisting of two HRSD capital projects: The James River SWIFT Facility (GN016360) project will include design, construction, and commissioning of new facilities that will apply advanced water treatment to highly treated wastewater from the James River Treatment Plant (JRTP). The resulting SWIFT Water will meet drinking water quality standards and be compatible with the Potomac Aquifer. The proposed facility is expected to have an advanced treatment capacity of 16 million gallons per day (MGD). The James River Treatment Plant Advanced Nutrient Reduction Improvements (JR013400) project will include the design, construction, and commissioning of improvements to the secondary treatment process at the JRTP. These advanced secondary treatment improvements, including new secondary clarifiers, will be required to provide stable source water quality that meets the influent requirements of the full scale JRTP SWIFT Facility.

Funding Description and Analysis of Cost: The proposed CCL of $468,073,040 reflects a complete facility. A five percent Owner's contingency to accommodate any additional unforeseen conditions is included in the total capital funding request. The request also includes $3,510,550 for Furniture, Fixtures and Equipment (FFE), Landscaping (not included in the Comprehensive Agreement), and assistance with relocation of Operations staff and temporary facilities. The Program Manager, AECOM, will provide Owner's Consultant services under the SWIFT Program Management project (GN016320) during the execution of the Comprehensive Agreement. The task order for these services is currently under negotiation and is expected to be approximately $16 million for the combined projects.

Both projects were appropriated in July 2019 based on Class 5 estimates. Both Price Proposals received from the short-listed teams were significantly higher than these estimates. An analysis conducted in November 2020 indicated that market factors including COVID-19 precautions, local bid environment, labor costs related to availability, and volatile material costs are likely to have increased price proposals. Additionally, the analysis also indicated rates used in the estimate preparation did not accurately reflect appropriate labor rates, escalation, and reasonable contingencies.

This highest ranked proposer had the lower cost estimate of the two received. The cost of construction is a large portion of the difference between the estimate and the Price Proposal. The relative engineering costs within a reasonable range when considered as a percent of construction cost. The project team has been working with the US-A team to develop an improved understanding of cost build up and identify opportunities for value engineering alternatives. The proposed CCL reflects approximately $20 million of value engineering savings included.

Staff provided a briefing to review this recommendation and impacts to the overall SWIFT Program.

Schedule:	Design-Build	February 2020
	Project Completion	December 2025

Discussion Summary: The revised cost will be factored into the long-range Capital Improvement budget as well as the updated financial model. Staff is committed to accommodating this cost in the existing financial model without any impact on the rates. The Consent Decree, as currently proposed and lower cost of financing will help minimize rate impacts in the out years. Projects will be reprioritized to keep the existing financial model and rates as planned.

Through research conducted at both the pilot plant and at the SWIFT Research Center, we learned consistent lower nitrogen levels were necessary to feed into the SWIFT processes. As part of the proposal for the full-scale SWIFT facilities, staff planned for additional facilities to be constructed to remove nitrogen upstream of SWIFT treatment. Initially, nitrogen removal was not necessary to meet the TMDL requirements. However, the WIP III now requires nitrogen removal to meet these new requirements. If the SWIFT facilities are not completed, we will still be required to make improvements to reduce nutrients.

Attachment: #5

Public Comment: None

General

General

Title:	GN016360 Design Build	Creator:	Bobbi Hermans
Record Number:	HRC-000001	Creation Date:	08/20/2020 02:20 PM (UTC-5)
Due Date:		Status:	Approved
EBS Change Order:	No	CIP Number:	GN016360

Vendor Information

Vendor Name:	ULLIMAN SCHUTTE - ALBERICI JOINT VENTURE		
Vendor Number:	104801		
General Liability Policy Number:	none	Worker's Comp Policy Number:	
GL Insurance Expiration Date:		WC Insurance Expiration Date:	
Ship-to Location:	168	Location Name:	Eng

Contract Information

Contract Description (240):	James River SWIFT Facility (GN016360)	Need by Date:	08/21/2020
Contract Number:		Notice to Proceed Date:	
Contract Type:		Substantial Completion Days:	0
Transaction Currency:	United States Dollar (USD)	Substantial Completion Date:	
Effective Date:		Final Completion Days:	0
StartDate:		Final Completion Date:	
FinishDate:			

Integrated EBS Fields

Contract / PO Type: Engineering	
Unifier Integration ID: 84192950	
Requisition Number: 3210784	PO Number: 6213036
Requisition Date: 08/21/2020	PO Issued Date: 03/22/2021
Creator for EBS:	Requestor for EBS: Bobbi Hermans
Sent via Integration? - Yes ADMIN ONLY:	

Task Details

Record has been closed.

Workflow Progress

Step Name	Assignee	Company	Status	Action	Completion Date
Creation (PM)	Bobbi Hermans	Hrsd	Completed	Send for Chief Review	08/20/2020 02:20 PM
Chief Review	Bobbi Hermans	Hrsd	Completed	Approve	08/20/2020 02:22 PM
I01 Int Hold (Req)	HRSD Administrator	Hrsd	Completed	Req Complete	08/21/2020 01:33 PM
I02 Int Hold (PO)	HRSD Administrator	Hrsd	Completed	PO Complete	03/23/2021 08:34 AM
Finalize Attachments	Shannon Rice	Hrsd	Completed	Send for Supplier or Engineer Notification	03/23/2021 08:50 AM
Supplier or Engineer Notification	Matt Schutte	UllimanSchutte	Completed	Accept and Close	03/23/2021 09:07 AM

Cost Items

2 Item(s)

No.	Line Number	EBS Task	Cost Code	Code Name	Short Description	Quantity	Unit Cost	Amount
002	2	Construction WIP	94160	CONSTRUCTION-DESIGN BUILD	Lump Sum Design-Build Contract: Construction Servi	0.0	0.00	234,080,624.00
001	1	Design WIP	92160	DESIGN BUILD	Lump Sum Design-Build Contract: Design Services	0.0	0.00	17,629,997.00

Total Amount 251,710,621.00

Change Orders

0 Item(s)

Record Number	Title	Vendor Name	Contract Number	PO Number	Amount	Status	Creator	Creation Date

Record - General Comments

1 Item(s)

03/23/2021 08:45 AM (UTC-5) Shannon Rice Hrsd

Comment Text
Approved Agreement via ERP on 03/22/2021.

3 Item(s)

File Name	Title	Revision No.	Size	Issue Date
JR SWIFT Facility (GN016360) JRTP Advanced NRI (JR013400) Approved Agreement.pdf			56 MB	

Comment Text

Attachments

File Name	Title	Revision No.	Size	Issue Date
JR SWIFT Facility (GN016360) JRTP Advanced NRI (JR013400) US-A Liability Policies.pdf			268 KB	

Comment Text

File Name	Title	Revision No.	Size	Issue Date
JR SWIFT Facility (GN016360) JRTP Advanced NRI (JR013400) US-A Pollution_Professional_UAV_Policies.pdf			436 KB	

Comment Text

<Cost Items> - Line item - details

Line Item No: 002

General

EBS Task:	Construction WIP
Cost Code:	94160
Code Name:	CONSTRUCTION-DESIGN BUILD
Short Description:	Lump Sum Design-Build Contract: Construction Servi
Line Item Description (240):	Lump Sum Design-Build Contract: Construction Services
Note to Buyer:	Lines Updated from EBS
Line Number:	2
Unit of Measure:	Each

Transaction Details

Select “Services” and use the Dollar Amount field only when labor type services are required such as installation, delivery, training, consulting etc. Select “Goods” and use Quantity & Unit Cost fields only when buying goods such as pumps, VFD’s, equipment, parts, etc.

Goods or Services?:

Quantity: 0.0

Unit Cost: 0.00

Dollar Amount: 234,080,624.00

Total Contract Value

Amount: 234,080,624.00

Line Item No: 001

General

EBS Task: Design WIP

Cost Code: 92160

Code Name: DESIGN BUILD

Short Description: Lump Sum Design-Build Contract: Design Services

Line Item Description (240): Lump Sum Design-Build Contract: Design Services

Note to Buyer: Lines Updated from EBS

Line Number: 1

Unit of Measure: Each

Transaction Details

Select “Services” and use the Dollar Amount field only when labor type services are required such as installation, delivery, training, consulting etc. Select “Goods” and use Quantity & Unit Cost fields only when buying goods such as pumps, VFD’s, equipment, parts, etc.

Goods or Services?:

Quantity: 0.0

Unit Cost: 0.00

Dollar Amount: 17,629,997.00

Total Contract Value

Amount: 17,629,997.00

Attachments (3) Linked Records (0) Linked Mail (0)

General

General

Title:	JRTP Advanced Nutrient Reduction Improv (JR013400)	Creator:	Bobbi Hermans
Record Number:	HRC-000002	Creation Date:	08/20/2020 02:53 PM (UTC-5)
Due Date:		Status:	Approved
EBS Change Order:	No	CIP Number:	JR013400

Vendor Information

Vendor Name:	ULLIMAN SCHUTTE - ALBERICI JOINT VENTURE		
Vendor Number:	104801		
General Liability Policy Number:	none	Worker's Comp Policy Number:	
GL Insurance Expiration Date:		WC Insurance Expiration Date:	
Ship-to Location:	168	Location Name:	Eng

Contract Information

Contract Description (240):	James River Treatment Plant Advanced Nutrient Reduction Improvements (JR013400)	Need by Date:	08/21/2020
Contract Number:		Notice to Proceed Date:	
Contract Type:		Substantial Completion Days:	0
Transaction Currency:	United States Dollar (USD)	Substantial Completion Date:	
Effective Date:		Final Completion Days:	0
StartDate:		Final Completion Date:	
FinishDate:			

Integrated EBS Fields

Contract / PO Type: Engineering	
Unifier Integration ID: 84243951	
Requisition Number: 3210783	PO Number: 6213037
Requisition Date: 08/21/2020	PO Issued Date: 03/22/2021
Creator for EBS:	Requestor for EBS: Bobbi Hermans
Sent via Integration? - Yes ADMIN ONLY:	

Task Details

Record has been closed.

Workflow Progress

Step Name	Assignee	Company	Status	Action	Completion Date
Creation (PM)	Bobbi Hermans	Hrsd	Completed	Send for Chief Review	08/20/2020 02:53 PM
Chief Review	Bobbi Hermans	Hrsd	Completed	Approve	08/20/2020 02:53 PM
I01 Int Hold (Req)	HRSD Administrator	Hrsd	Completed	Req Complete	08/21/2020 01:34 PM
I02 Int Hold (PO)	HRSD Administrator	Hrsd	Completed	PO Complete	03/23/2021 08:34 AM
Finalize Attachments	Shannon Rice	Hrsd	Completed	Send for Supplier or Engineer Notification	03/23/2021 08:59 AM
Supplier or Engineer Notification	Matt Schutte	UllimanSchutte	Completed	Accept and Close	03/23/2021 09:07 AM

Cost Items

2 Item(s)

No.	Line Number	EBS Task	Cost Code	Code Name	Short Description	Quantity	Unit Cost	Amount
002	2	Construction WIP	94160	CONSTRUCTION-DESIGN BUILD	Lump Sum Design-Build Contract: Construction Servi	0.0	0.00	202,591,500.00
001	1	Design WIP	92160	DESIGN BUILD	Lump Sum Design-Build Contract: Design Services	0.0	0.00	13,770,918.00

Total Amount 216,362,418.00

Change Orders

0 Item(s)

Record Number	Title	Vendor Name	Contract Number	PO Number	Amount	Status	Creator	Creation Date

Record - General Comments

1 Item(s)

03/23/2021 08:58 AM (UTC-5) Shannon Rice Hrsd

Comment Text
Approved Agreement via ERP on 03/22/2021.

3 Item(s)

File Name	Title	Revision No.	Size	Issue Date
JR SWIFT Facility (GN016360) JRTP Advanced NRI (JR013400) Approved Agreement.pdf			56 MB	

Comment Text
Attachments

File Name	Title	Revision No.	Size	Issue Date
JR SWIFT Facility (GN016360) JRTP Advanced NRI (JR013400) US-A Liability Policies.pdf			268 KB	

Comment Text

File Name	Title	Revision No.	Size	Issue Date
JR SWIFT Facility (GN016360) JRTP Advanced NRI (JR013400) US-A Pollution_Professional_UAV_Policies.pdf			436 KB	

Comment Text

<Cost Items> - Line item - details

Line Item No: 002

General

EBS Task: Construction WIP

Cost Code: 94160

Code Name: CONSTRUCTION-DESIGN BUILD

Short Description: Lump Sum Design-Build Contract: Construction Servi

Line Item Description (240): Lump Sum Design-Build Contract: Construction Services

Note to Buyer: Lines Updated from EBS

Line Number: 2

Unit of Measure: Each

Transaction Details

Select “Services” and use the Dollar Amount field only when labor type services are required such as installation, delivery, training, consulting etc. Select “Goods” and use Quantity & Unit Cost fields only when buying goods such as pumps, VFD’s, equipment, parts, etc.

Goods or Services?:

Quantity: 0.0

Unit Cost: 0.00

Dollar Amount: 202,591,500.00

Total Contract Value

Amount: 202,591,500.00

Line Item No: 001

General

EBS Task:	Design WIP
Cost Code:	92160
Code Name:	DESIGN BUILD
Short Description:	Lump Sum Design-Build Contract: Design Services
Line Item Description (240):	Lump Sum Design-Build Contract: Design Services
Note to Buyer:	Lines Updated from EBS
Line Number:	1
Unit of Measure:	Each

Transaction Details

Select “Services” and use the Dollar Amount field only when labor type services are required such as installation, delivery, training, consulting etc. Select “Goods” and use Quantity & Unit Cost fields only when buying goods such as pumps, VFD’s, equipment, parts, etc.

Goods or Services?:

Quantity: 0.0

Unit Cost: 0.00

Dollar Amount: 13,770,918.00

Total Contract Value

Amount: 13,770,918.00

Attachments (3) Linked Records (0) Linked Mail (0)

PROFESSIONAL SERVICES AGREEMENT

AMENDMENT NO. 2

for the

PROGRAM MANAGEMENT of SWIFT FULL SCALE IMPLEMENTATION (GN016320)

This AGREEMENT is entered into and becomes effective this twenty-third day of July, 2019, by and between Hampton Roads Sanitation District (hereinafter referred to as HRSD) and AECOM Technical Services, Inc. (hereinafter referred to as the FIRM) and amends the AGREEMENT entered into on July 31, 2018 by and between HRSD and FIRM as follows:

Item 1. Paragraph I. SCOPE OF WORK, add the following:

D. James River SWIFT Facility (GN016360):

1. The FIRM shall provide Design Services including developing the Bridging Documents, Project Management Services, and Additional Services as described in the attached scope of services document, titled "James River Treatment Plant SWIFT – Design Services Scope of Work" dated July 12, 2019.

Item 2. Paragraph VI. PAYMENTS TO FIRM, add the following:

H. For the work described in Paragraph I.D.I (James River SWIFT Facility), the Lump Sum of $3,390,775 for Design Services.

I. For the work described in Paragraph I.D.I (James River SWIFT Facility), a Maximum Authorization of $464,919 based on Time and Materials for Program Management.

J. For Additional Services authorized by HRSD for the James River SWIFT Facility, a Maximum Authorization of $372,985.

This amendment will be approved and executed using HRSD's Enterprise Resource Planning (ERP) system. Physical signatures will not be required if acknowledged by FIRM through the ERP system.

James River Treatment Plant - SWIFT

GN016360.1 Design Services

Scope of Work

Prepared by
AECOM+HAZEN

July 12, 2019

James River Treatment Plant – SWIFT
GN016360.1 Design Services

Task 1

James River Treatment Plant SWIFT
Design Services

Task 1 Design Services

1.1 James River Treatment Plant SWIFT Design Services

A. The FIRM shall provide design development services required for the planning, design, implementation and procurement of the James River Treatment Plant (JRTP) SWIFT Advanced Water Treatment (AWT) facilities resulting in the development of Bridging Documents. The design concepts developed from the Williamsburg Treatment Plant (WBTP) SWIFT facility will be utilized for developing the JRTP Bridging Documents. The FIRM will provide a primary role for the SWIFT design and secondary role for portions of the WW design. Bridging Documents will consist of:

- General Conditions
- Front end specifications
- Basis of Design Report
- Indicative Design

1. Any modifications to the existing wastewater treatment infrastructure at the JRTP will be coordinated with HRSD and Jacobs under separate Agreement. Modifications to existing infrastructure to convey water to and from the JRTP SWIFT facilities will be incorporated in the JRTP SWIFT facility design as coordinated with the JRTP wastewater (WW) design. Modifications to existing WW treatment process to manage influent water quality to the SWIFT facilities are not included in this scope.
2. Perform Quality Assurance and Quality Control (QA/QC) reviews on design deliverables.
3. Prepare for, conduct and document four **Design Progress Workshops** which will be coordinated with the JRTP WW design effort.
4. Prepare basis of design report (BODR), indicative design and supporting information to a level of sufficient detail to evaluate major design features prior to advancing to the procurement of design-builders of JRTP SWIFT including the following major components and work efforts described in the Design Services Scope of Work. The FIRM shall utilize the latest version of HRSD Design and Construction Standards and Building Information Modeling (BIM) requirements in the development of documents.
5. The design effort will utilize the conceptual information previously developed by HRSD and Jacobs for JRTP SWIFT.

B. Prepare, conduct and document **Kickoff and SWIFT Process Criteria Workshop** for Full-Scale Implementation at JRTP. The purpose of the Workshop is to:

1. Kickoff the project including major interconnected HRSD CIP projects SWIFT, WW and recharge wells.
2. Discuss the roles and responsibilities of the FIRM, HRSD and Jacobs.

3. Discuss WW and SWIFT flows considering the wastewater process flow design of secondary clarifiers and MBBR, potential flow diversions from other plants, SWIFT utilization goals and design flow rate, etc.
4. Discuss and finalize major process design requirements associated with any desired modifications to the JRTP AWT Process Criteria.
5. Discuss approach to future expandability, redundancy, backup power, instrumentation and control and electrical systems.
6. Discuss WW items as described in separate scope provided by Jacobs.
7. Discuss the approach for developing design requirements for major disciplines in consideration of a single design-build contract for JRTP SWIFT and WW efforts.

C. Coordinate Regulatory and Permitting Approach for JRTP SWIFT with HRSD and Jacobs.

1. The FIRM shall support HRSD’s efforts relating to the Underground Injection Control (UIC) permit. The FIRM shall support HRSD during engagement with Local, State and Federal agencies as required during design of the JRTP SWIFT facilities.
2. The FIRM will provide permitting support services specific to the JRTP SWIFT facility as described in Site Civil Design and Permitting task.
3. Additional services related to regulatory and permitting coordination in addition to those previously defined will be provided as additional services if required.

D. Hazard Analysis and Critical Control Points (HACCP)

1. Previous efforts by HRSD and others have established the HACCP approach for the UIC permit. The FIRM shall collaborate with HRSD Operations and P3 in identification of sewer discharge constituents within the JRTP sewer service area relative to potential contaminants that may impact JRTP SWIFT facility design and operation.
2. Conduct a **HACCP Workshop** to confirm JRTP SWIFT-specific critical control points (CCPs) and critical operating points (COPs) to inform control system operating approaches and UIC permitting efforts.
3. Provide a summary table of CCPs and COPs in the BODR.

E. Process Mechanical Design

1. SWIFT hydraulic analysis, profile and associated yard piping for the new SWIFT facilities and existing JRTP as related to interaction with SWIFT facilities and required interconnection of the facilities. Jacobs will perform SWIFT capture and utilization analysis of the WW equalization facilities to inform AWT treatment capacity. This scope of work and schedule assumes that the final AWT treatment capacity determination will be made within 45 days of the Notice to Proceed.
    a. Establish WW and SWIFT flows considering the wastewater process design of secondary clarifiers and MBBR, potential flow diversions from other

plants, SWIFT utilization goals, etc. in collaboration with HRSD, Jacobs and the FIRM.

b. Develop hydraulic profile from SWIFT influent pump station, rapid mix, flocculation, sedimentation, ozone contact, biofiltration, intermediate pump station, granular activated carbon adsorbers, ultraviolet disinfection, SWIFT water pump station, and recharge wells.

c. Perform analysis of hydraulic profile between existing JRTP WWTP and SWIFT AWT influent pump station to determine tank volume requirements and operating strategy.

d. Coordinate well backflush flows, recycle and Off-Spec Pump Station flow distribution to JRTP SWIFT and WW.

e. Develop yard piping design from tie in to JRTP WW and SWIFT, conveyance to recharge wells, corridors required for chemical feed piping, SWIFT process and recharge well interconnecting piping, recharge well backflush piping, drain, and residuals piping. Preliminary design shall be based on record drawings and SUE (as Additional Services) where required.

f. Coordinate with Jacobs and conduct **JRTP WW and JRTP SWIFT Hydraulics Workshop** for the advancement of hydraulic strategies and design basis.

2. JRTP SWIFT recycle and waste management approach shall be developed for the management of liquid and solids residuals streams. It is acknowledged that HRSD is independently performing a solids management master plan, with which the FIRM shall coordinate.

   a. Develop a design basis solids production rate (lbs. of dry solids per million gallons treated). The design flow range and anticipated unit treatment process performance will be used to calculate the solids production volumes for the SWIFT.

   b. Calculate the design basis liquid residuals volumes based on proposed backwash and filter-to-waste strategies for the BAF and GAC unit processes, and estimated flows related to facility operations and maintenance activities.

   c. Develop design for liquid and solid waste management systems for JRTP SWIFT (coordinated with JR013400.1 Design Services) including process control and P&IDs. It is assumed the residuals handling systems will include:

      i. Off-Spec PS, SWIFT Residuals PS, and associated yard piping, valves and instrumentation

      ii. If required (as Additional Services), residuals recycle piping, metering and valving to the first stage flocculation basins

3. Chemical Facilities: Develop design following evaluation of any proposed modifications to the chemical facility approach.

   a. A centralized Chemical Storage and Feed Facility shall be provided

b. Develop design for the Chemical Storage and Feed facilities. Confirm the selected chemicals to be used at SWIFT and define which chemical storage and feed systems should accommodate flexibility in design for alternate chemical selections in the future. Review the design SWIFT flow range as well as expected chemical dosage rates based on pilot testing and data from the SWIFT RC to establish the range of chemical feed rates required.

c. Develop preliminary equipment requirements for the following equipment in the chemical facility:

i. Chemical metering pumps

ii. Chemical storage tanks

iii. Liquid polymer systems

4. SWIFT AWT Influent Pump Station

a. Develop design of Influent Pump Station to accommodate SWIFT influent and recycle flows, maintenance of JRTP outfall, and JRTP NPW flow demand.

b. Develop control strategy for SWIFT AWT influent pump station

5. Rapid Mix, Flocculation, and Sedimentation

a. Develop design following evaluation of any proposed modifications to the rapid mix and flocculation approach. Review the design SWIFT flow range and define the appropriate number and configuration of basins. Define the rapid mix G and detention time, flocculation G, detention time and number of stages, and plate settler surface loading rate requirements. Define design requirements for the Rapid Mix and Flocculation facilities, including:

i. Provisions for future expandability of facilities to accommodate future expansions of SWIFT facilities.

ii. Define reliability and redundancy for facilities.

iii. Define acceptable materials of construction

iv. Coordinate with the upstream and downstream processes and consider a cover style/concept balancing the multiple objectives for algae control.

v. Define chemical feed locations and sampling points, and foam control strategies.

b. Develop design following evaluation of any proposed modifications to the sedimentation approach. Determine plate settler surface loading rate requirements, basin configuration, and design and equipment requirements. Define design requirements for the sedimentation facilities.

c. Define settled solids removal and control strategy requirements.

6. Ozone Generation

a. Develop design following evaluation of any proposed modifications to the approach for the Ozone Generation facilities. Review the design SWIFT flow range and define the appropriate number and configuration of reactors, generators, and injection methodology. Define the influent chemistry and target parameters including LRV for pathogen inactivation and will establish the design ozone dose range and contact time requirements.

i. Evaluate sidestream injection versus diffuser-style ozone deliver with consideration of oxygen carryover related to BAF.

ii. Define reliability and redundancy for ozone generation and contactor facilities, and other major ozone system facilities.

iii. Define acceptable materials of construction.

iv. Develop optimum contactor configuration to achieve the desired contact time and t10 given the design flow range and site constraints.

v. If requested as Additional Services, perform CFD modeling for scenarios considering with and without ozone delivery “on” to assess hydrodynamics associated with the contactor design to optimize the design for t10. The FIRM will coordinate with HRSD for third party review of all CFD modeling efforts.

vi. Develop off-gas collection and destruct equipment strategy and design.

vii. Identify sampling points for CT compliance monitoring.

viii. Define chemical injection and mixing requirements for post-ozone quenching of excess ozone.

ix. Identify methods of managing excess dissolved oxygen downstream of the ozone contactors.

x. Evaluate the overall life-cycle cost of purchased LOX storage equipment versus leased equipment. Design LOX facilities if required (as Additional Services).

xi. Bromate control strategy will be considered in conjunction with influent conditions and interaction with addition of other chemicals.

7. Biologically Active Filtration (BAF)

a. Develop design following evaluation of any proposed modifications to the approach for the BAF facilities. Review the design SWIFT flow range and define the appropriate number and configuration of filters. Define the filter loading rate, hydraulic requirements, media profile, and backwash requirements.

b. Define design considerations for the BAF facilities, including:

i. Provisions for future expandability of BAF facilities to accommodate future expansions of SWIFT facilities.

ii. Define reliability and redundancy for BAF filters and backwash facilities, and other major BAF system facilities.

iii. Define acceptable materials of construction.

iv. Define considerations to address off-gassing and potential air binding due to upstream ozone injection.

v. Define backwash and filter-to-waste system requirements.

vi. Define air scour system requirements.

vii. Define BAF operating control philosophy.

viii. Define backwash system sequence and control philosophy.

ix. Define chemical feed points for the BAF facilities.

c. Develop preliminary equipment requirements for the following primary process equipment:

i. Filter underdrains

ii. Filter media

iii. Wash troughs

iv. Valves and motor operators

8. GAC Contactors and Intermediate Pump Station

a. Develop design following evaluation of any proposed modifications to the approach for the GAC contactor facilities. Review the design SWIFT flow range and define the appropriate number and configuration of GAC contactors. Define the loading rate, empty bed contact time, hydraulic requirements, media profile, and backwash requirements.

b. Define design considerations for the GAC contactors, including:

i. Provisions for future expandability of GAC contactors to accommodate future expansions of SWIFT facilities.

ii. Define reliability and redundancy for GAC contactors and backwash facilities, and other major GAC contactor facilities.

iii. Define acceptable materials of construction.

iv. Define GAC replacement transfer system requirements in consideration of HRSD operations.

v. GAC and intermediate pump station operating control philosophy

vi. GAC backwash system sequence.

vii. Define chemical feed points for the GAC contactor facilities.

c. Develop preliminary equipment requirements for the following primary process equipment:

i. GAC contactor underdrains

ii. GAC media

iii. Wash troughs

iv. Valves and motor operators

v. Vertical turbine pumps

9. Ultraviolet Disinfection

   a. Develop design for the Ultraviolet (UV) Disinfection facilities based on a 4 LRV virus inactivation dose (186 mJ/cm^2). Review the design SWIFT flow range and define the appropriate number and configuration of UV reactors. Define the redundancy, technology (medium pressure or low pressure high output), and influent water characteristics.

      i. Provisions for expandability of UV reactors to accommodate future expansions of SWIFT facilities

      ii. Design for LPHO or MP based on life cycle cost analysis

      iii. Provide power requirements, building size and allocate space on the site plan for possible future UV AOP

      iv. Design for location in GAC contactor building with space allotted for maintainability, reactor and lamp removal and electrical supply and control panels

      v. Define reliability and redundancy for UV reactors, cleaning systems, and other major UV reactor facilities

      vi. Define acceptable materials of construction

      vii. Design (if required as Additional Services) power and space for UV AOP

      viii. UV reactor operating control philosophy

   b. Develop preliminary equipment requirements for the following primary process equipment:

      i. UV reactors

      ii. UVT monitoring instrumentation

10. SWIFT Water Pump Station

   a. Develop design of SWIFT Water pump station including facility layout, chemical addition, process piping layout, and recharge well downhole flow control philosophy concepts.

   b. Perform preliminary pump selections for SWIFT Water.

11. James River Potable Water System Improvements

   a. Determine potable water demand and fire flow requirements for JRTP WW (in coordination with Jacobs) and JRTP SWIFT. Evaluate the acceptability of available water quantity and pressure available to the plant to meet required plant flows.

   b. Develop design of potable water pipeline to facility as Additional Services if additional infrastructure is required.

F. Wellhead Considerations

1. Prepare, conduct and document **JRTP SWIFT Wellhead Workshop** to review and discuss documentation of all data developed to date, and through the future, of the monitoring and operations of the SWIFT Research Facility recharge well with HRSD and Jacobs.
2. Determine downhole flow control approach (active downhole flow/pressure control valve vs. passive flow/pressure control orifice) in coordination with Jacobs' overall JRTP SWIFT capacity analysis and flow balance efforts. Determination will consider each approach's impact on construction cost, maintenance costs, procurement, operational considerations, and SWIFT utilization and capture metrics.
3. Develop design of above ground recharge well and wellhead facilities in coordination with Jacobs. Provide a schematic drawing that is typical of all wellheads. The design shall be based on recharge and backflush flows as provided by HRSD.

G. Instrumentation and Control Systems

1. Develop design of SWIFT I&C systems including:
    a. The FIRM will advance the P&IDs developed during the WBTP SWIFT efforts for all JRTP AWT processes to show the monitoring and control requirements and equipment therein.
    b. Develop a control system architecture drawing for JRTP SWIFT showing the major hardware items, their general locations, the network connections among them and the methods by which the controls will be incorporated into the JRTP distributed control system (DCS) improvements.
    c. Define the requirements for specialized analytical process instrumentation to monitor the process.
    d. Provide functional control descriptions to define the overall control functions for the SWIFT Facility.
    e. Provide the estimate of quantity of I/O points to facilitate HRSD potential procurement of DCS equipment.
2. The following assumptions have been established for development of I&C scope:
    a. P&IDs will be developed to level of detail sufficient to advance functional control descriptions, process mechanical design, and set HRSD's design intent in the Bridging Documents.
    b. P&IDs will conform to Design and Construction, IT and all applicable HRSD standards
    c. Tagging of signals will not be included in the preliminary design beyond what is required for clarity of P&IDs
    d. Detailed specifications for specialty instruments will not be developed. General equipment guidelines will be developed to ensure proper monitoring of the process.

e. Requirements for more general process instrumentation (flow, pressure, level, etc.) may not be determined for all processes.

f. Vendor-supplied systems will be less developed with details to be obtained from the vendors during detailed design.

g. The monitoring and control systems for JRTP SWIFT will be incorporated into the existing Emerson Ovation DCS, although certain vendor-supplied systems will be provided with their own PLC-based control systems. The HRSD preference for independent control via I/O into the DCS will be required where possible. Supervisory control of PLC-based control systems will be required.

H. Electrical Systems

1. New JRTP main switchgear and backup power infrastructure are planned as part of the WW improvements. The FIRM shall coordinate with Jacobs and document requirements related to power distribution, backup power strategy and requirements for JRTP SWIFT.

2. Develop design of SWIFT Electrical systems including:

a. A basis of design narrative will be provided to outline the requirements for detailed design specific to JRTP that may not be included in the HRSD Design and Construction Standards. Requirements will be established for the following (minimum):

i. Power systems studies (coordination study, arc flash hazard analysis, etc)

ii. Lighting (interior and exterior) design

iii. Cable and raceways

iv. Acceptance testing

v. Non-major electrical equipment (equipment not covered by electrical requirements developed by the FIRM).

vi. Acceptable materials of construction for installation environment

vii. List of acceptable equipment manufacturers/vendors

b. Develop design drawings as follows:

i. Electrical site plans showing locations of all major equipment

ii. Single line diagrams and elevations of all electrical distribution equipment, including all relevant ratings and equipment sizes

c. Develop detailed technical equipment requirements for major electrical equipment.

d. Develop an initial electrical load summary list which will be coordinated with the JRTP WW electrical improvements.

i. Load summary list under various operating conditions (e.g. connected, operating, emergency backup) will be provided in the BODR.

ii. Load summary list will also be used as a basis for preliminary discussions between the FIRM, HRSD, Jacobs and Dominion Energy to coordinate capacity needed to serve the additional electrical loads associated with the SWIFT facility.

I. Architectural Building Design and Code Analysis

1. Develop design following evaluation of any proposed modifications to the approach for the architectural components of the SWIFT facilities. Coordinate architectural concepts for SWIFT and WW improvements with Jacobs which is responsible for architectural concepts of the Administration Building. Existing JRTP architectural styles, the HRSD Architectural Review Board and the City of Newport News community architecture requirements will provide basis for new facilities. The following elements will be included in the architectural documents:

   a. Establishment of applicable building codes

   b. Perform Building Code Analysis in accordance with the building code in force during the design

   c. The design of facilities will incorporate the HRSD energy efficiency goals

   d. Define acceptable finishes and materials of construction

J. Structural Design and Geotechnical Considerations

1. Prepare indicative structural design to provide design-build teams sufficient information to provide CCL while minimizing potential contingency due to unknown conditions

2. Geotechnical considerations (provided as Additional Services): Geotechnical investigations may not have been performed in all locations where new JRTP WW, SWIFT and recharge wells are proposed. The design effort will include the following provided by the FIRM for all aspects of JRTP SWIFT and WW for the following:

   a. Develop and execute a scope of services for Subsurface Investigations for the major structures including borings and geotechnical recommendations of foundation type, and lateral earth pressures imparted on subsurface structures.

   b. Review of historical subsurface investigations and inspection of existing structures related to indications of foundation deficiency

   c. Criteria for temporary excavation support systems

   d. Inspection of existing JRTP facilities related to any apparent foundation support issues that may be visible

3. As Additional Services, enhanced foundation design will be provided if the geotechnical investigations indicate deep foundations are required in order to provide clarity to design-builders in preparation of CCL based procurement

K. HVAC Systems: Develop design of SWIFT HVAC systems including:

1. A basis of design narrative will be provided to outline the requirements for detailed design.

2. Establish requirements for conditioned spaces and major HVAC components to be utilized for each conditioned facility

L. Site Civil Design and Permitting

1. Prepare a scope of work with supporting documentation for survey work as needed for the design of JRTP WW and SWIFT. The FIRM will solicit proposals from several surveyors (as approved by HRSD) and will subcontract with the surveying firm. Survey scope will include, but not be limited to:
    a. Topographic and planimetric survey of areas of the JRTP WW and SWIFT facilities, recharge well sites, transmission main alignment, and any adjacent areas as necessary for a complete survey
    b. Identify location, size, material, and inverts of all sanitary, storm, and other utilities as may be present
    c. Provide basic property boundary information, including any easements or rights-of-way as may existing within the limits of survey, zoning, and adjacent property owners, if a boundary survey is required for Site Plan Conditional Use approval, a complete boundary survey will be provided
    d. Flood zone, streams, and wetlands information
    e. Level B SUE survey to locate existing above ground utilities and any below-grade utilities as needed (Additional Services)
    f. Provide surface model based on topography of site
    g. Provide signed and sealed survey drawing (hard copy and Civil 3D base file) with statement of accuracy
2. Develop the following design items for the JRTP WW, SWIFT AWT and associated recharge well sites to a level sufficient for preliminary coordination with the City of Newport News for the site plan Conditional Use Permit:
    a. Site access and layout
    b. Site grading
    c. Identification of easements, flood zones, streams, wetlands, and steep slopes
    d. Building finished floor elevation
    e. Drainage and stormwater management plans
    f. Develop specifications as necessary for discussion of Conditional Use Permit application.
3. The FIRM will prepare all necessary plans, specifications, and calculations to submit for coverage under the VPDES Permit for Discharges of Stormwater from Construction Activities (VAR10), and approval of the Virginia Stormwater Management Permit (VSMP), and Virginia Erosion and Sediment Control Permit (VESCP).

4. Attend (as Additional Services) any necessary public meeting, planning board meeting, or other meetings as necessary for Site Plan and Conditional Use permit preliminary framework establishment.

5. The FIRM understands property acquisition and re-zoning may be required for this project. It is assumed for this scope of work these issues will be resolved by HRSD.

M. Sustainability and Envision Approach: The FIRM will collaborate with HRSD and Jacobs to develop Envision-based sustainability requirements for the bridging documents to including the following:

1. Prepare and conduct a **JRTP SWIFT Sustainability Workshop**. This Workshop will apply general guidance developed from the **SWIFT Program Sustainability Working Group**, and address project-specific considerations. The Workshop will be conducted with various project stakeholders throughout HRSD. The Envision Sustainable Infrastructure Rating System (version 3) will be the basis of the workshop discussion agenda.

2. Prepare a memorandum documenting the sustainability goals developed during the JRTP Sustainability Workshop.

3. Incorporate sustainability elements identified in JRTP SWIFT Sustainability Workshop into BODR documents in order to establish expectations of the design-builder to implement the features and practices for JRTP WW and SWIFT.

4. It is assumed HRSD will not pursue LEED certification for the Administration Building. Assistance with this effort should it be required would be Additional Services.

N. JRTP WW and SWIFT Engineers Opinion of Probable Construction Cost (EOPCC)

1. FIRM shall develop one estimate for the indicative design being developed as part of the Bridging Documents for JRTP WW and SWIFT

2. Provide one update to EOPCC prior to issuing final Bridging Documents.

3. Updated EOPCC shall be used to update CIP planning costs. It is understood HRSD requires this information early in the CIP planning process.

O. JRTP SWIFT Commissioning

1. Prepare for, conduct and document **JRTP SWIFT Commissioning Workshop** to provide an overview of all activities associated with checkout, testing, the commissioning process and start-up of the JRTP SWIFT facility (processes and equipment).

2. Develop JRTP Commissioning requirements in the Bridging Documents.

P. JRTP WW and SWIFT Procurement Support

1. The FIRM will prepare, schedule and conduct the **DCS Equipment Procurement Workshop** for HRSD personnel and will be used to discuss the procurement of DCS equipment.

Q. JRTP WW and SWIFT Bridging Document Consolidation

1. The FIRM will develop a comprehensive set of Bridging Documents to include all aspects of the project including but not limited to the HRSD CIP projects for JRTP WW, SWIFT facilities, recharge wellhead facilities and distribution / backflush conveyance for Design-Builder procurement.
2. Shoreline improvements, public trails and recharge well drilling will not be provided as part of this scope of services.

<u>Deliverables Task 1</u>

Memorandum of SWIFT Backup Power Requirements
Memorandum of Wellhead requirements
JRTP SWIFT Commissioning Management Plan
Draft Bridging Documents (Including JRTP WW)
Final Bridging Documents (Including JRTP WW)

<u>Workshops</u>

Kickoff and SWIFT Process Criteria Workshop
JRTP WW and JRTP SWIFT Hydraulics Workshop
HACCP Workshop
JRTP SWIFT Wellhead Workshop
SWIFT Design Review Workshop 1-4
JRTP Commissioning Workshop
Design-Build Workshop
DCS Equipment Procurement Workshop

Task 2

James River Treatment Plant SWIFT
Project Management Services

Task 2 Project Management

2.1 JRTP Project Management (PM) Services During Design

A. The PM will provide management and coordination of the services required for the planning, design, implementation and procurement of JRTP SWIFT and WW. Although the two project elements will be procured as a single DB, sufficient delineation will be included to enable accurate tracking of the costs associated with each element. For these projects, the PM will:

1. Provide regular reviews and coordination of the Basis of Design Reports (BODRs) for the JRTP SWIFT and WW facilities to verify the level of detail and supporting information provided is sufficient for Design-Builder (DB) design and pricing, but also allows for DB innovation. This work will also verify consistency between the two project elements and minimize potential gaps.

2. Lead the development of the procurement document General Requirements, (Divisions 00 and 01), based on HRSD Design and Construction Standards. The appropriate sections will be red-line updated and submitted for HRSD review and comment, along with recommended sections to be added.

3. Coordinate the Technical Components of the BODRs for both JRTP SWIFT and WW facilities for inclusion in the Bridging Documents. Review comments of deliverables will be collected, consolidated, resolved and distributed.

4. Coordinate the development of accurate terminal points separating the two elements for possible WIFIA and WQIF funding, prepare specific requirements for DB invoicing to reflect the separation, and track the costs from procurement document conceptual design, through DB design, construction and commissioning.

B. The PM will coordinate the preparation, reviews and comments on the Engineer's Opinion of Probable Construction Cost for JRTP SWIFT and WW.

C. The PM will participate in and lead SWIFT Design Workshops. The PM will coordinate with all parties to invite appropriate attendees and structure workshops such that attendees only needed for specific portions will be notified of their needed timeslots within longer workshops. Meeting minutes including decisions and action items will be developed and distributed.

D. The PM will coordinate and conduct weekly Design Progress Meetings with the FIRM and Jacobs design staff leads and managers.

E. The Project Management services also include the preparation of workshops and meetings at the James River Treatment Plant, including:

1. **Design-Build Workshop** to provide HRSD JRTP SWIFT staff with an overview of the design-build project delivery method, with the key characteristics, differences from traditional design-bid-build method and the roles and responsibilities of the design-build contracting parties.

2. **Maintenance of Plant Operations Workshop** to review the project areas and obtain JRTP specific requirements for site access and egress, `no-fly' zones, other construction activities, work hours, existing utility routings and DB connection

points and limitations. This information will be included in the DB procurement documents.

3. **Procurement Document and Schedule Update Meetings**, assumed for budgeting purposes to be on a bi-monthly basis. These meetings will be used to keep HRSD informed of the progress of the conceptual design and procurement documents, collect outstanding information, answer any project questions and provide responses to concerns or issues.

F. The PM will track the progress of the project components and provide updates to the project schedule.

G. The PM will coordinate reviews of all deliverables prior to submission for substance and quality.

Task 3

James River Treatment Plant SWIFT
Additional Services

Task 3 Additional Services

Additional Design Services may be required that are not currently scoped to the level of detail required to define an associated cost. Therefore an annual budget is provided to allow for these additional services to be executed, if required. These Design Services Additional Services shall be provided only on an as-authorized basis. Requests shall be made by the FIRM and submitted into SharePoint workflow for authorization of Additional Services. Requests shall define the objective, proposed staffing, schedule, duration, deliverable(s), and cost in accordance with the pre-approved rate tables. The authorization request must be submitted sufficiently in advance of the contemplated start date needed for proposed services to allow HRSD's Chief of Design & Construction – SWIFT to have adequate time for assessment without causing interruption or disruption of services required under this Agreement. The authorization shall be obtained in writing from the Chief of Design & Construction - SWIFT or other designee authorized by the Contracting Officer. Some of these tasks have been previously defined in Task 1 and others may include, but are not limited to, the following:

a. Surveying for JRTP SWIFT facilities
b. Subsurface Utility Exploration services as required for yard piping
c. Specialty professional services derived from Envision credits, identified during Workshops
d. 3D visualizations in addition to those required for detailed design
e. Environmental and archeological assessments beyond Phase 1 Environmental Assessment.
f. Preparation of design, and procurement assistance, if additional pre-purchase of selected equipment is required.

Hampton Roads Sanitation District
James River Treatment Plant - SWIFT
GN016360.1 DESIGN SERVICES

SWIFT concept becomes reality

		STAFFING HOURS									
	Program Classification		*Sr. Professional*		*Project Professional*		*Professional*	*Sr. Tech*	*Tech*	*Proj Admin*	**Total Labor**
	Task Classification	**Vice President**	**Sr. Associate**	**Associate**	**Senior Principal Engineer**	**Principal Engineer**	**Assistant Engineer**	**Sr. Principal Designer**	**Principal Designer**	**Technical Writer / Admin**	
	Average Raw Hourly Rate	$87.30	$75.70	$62.50	$52.50	$42.50	$36.50	$45.50	$35.50	$26.70	
Task 1.1 James River Treatment Plant SWIFT Design Services											
Task A - Design Development Support											
1	Project Management (Amos excluded)										$ -
2	QA/QC	240	240	180							$ 50,370
3	Design Progress Workshops (4) and Prep	48	72	72	144			48			$ 23,885
	Total Hours / Subtotal	288	312	252	144	0	0	48	0	0	$ 74,255
	ODCs										$ 24,012
	Task Subtotal										$ 98,267
Task B - Kickoff and SWIFT Criteria Workshop											
1	Kickoff and SWIFT Criteria Meeting and Prep	8	32	32	8	4	4				$ 5,857
	Total Hours / Subtotal	8	32	32	8	4	4	0	0	0	$ 5,857
	ODCs										$ 2,452
	Task Subtotal										$ 8,309
Task C - Regulatory and Permitting Assistance											
1	UIC and Local Permitting Support			40		80			40	16	$ 7,747
3	Additional Services: Additional Permitting Support										$ -
	Total Hours / Subtotal	0	0	40	0	80	0	0	40	16	$ 7,747
	ODCs										$ 5,080
	Task Subtotal										$ 12,827
Task D - Hazard Analysis and Critical Control Points											
1	Perform JRTP Sewershed Hazard Analysis	6	18		40		44				$ 5,592
2	HACCP Workshop and Prep	12	16	24							$ 3,759
3	Develop HACCP Section of BODR	2		8			40			8	$ 2,348
	Total Hours / Subtotal	20	34	32	40	0	84	0	0	8	$ 11,699
	ODCs										$ 1,340
	Task Subtotal										$ 13,039
Task E - Process Mechanical Design											
Task E.1 - SWIFT Hydraulics and Yard Piping											
a	Coordination to Finalize SWIFT AWT Capacity		8	60	10	10					$ 5,306
b	Hydraulic profile - SWIFT AWT	4	16	40	60	120			40		$ 13,730
c	Hydraulic analysis - JRTP WW to AWT IPS	2	8	40	60	60			20		$ 9,690
d	Coordinate return flows to WW, AWT IPS, and outfall	4		20		40	40		8		$ 5,043
e	Yard piping	4	16	80	60	120	100	20	180	8	$ 25,974
f	Workshop - hydraulics	4	4	8		8					$ 1,492
Task E.2 - JRTP Recycle and Waste Management											
a	Design basis solids production rate	4			8		24				$ 1,645
b	Design basis liquid residuals volumes	4			8		24				$ 1,645
c	Design development for liquid and solid residuals	32		16	40	60	100		120		$ 16,354
c.ii	Additional Services: settled solids recycle to flocculation										$ -
Task E.3 - Chemical Facilities											
b	Design chemical storage and feed systems	2	16	160	120		80			8	$ 20,819
c	Develop preliminary equipment requirements	4	24	180	120		240	90	240		$ 41,091
Task E.4 - SWIFT AWT Influent Pump Station											
a	Influent Pump Station Design and NPW approach	4	16	80	40	120		60	80	8	$ 19,544
b	Develop control strategy for AWT IPS		40	60		40	80				$ 11,398
Task E.5 - Rapid Mix, Flocculation, Sedimentation											
a	Rapid mix and flocculation design development	30		60	48	120	80	40	120	8	$ 23,203
b	Sedimentation design development	16		40		60	90	40	120		$ 15,812
c	Settled solids removal and control strategy development	16		20		60	40	12	60		$ 9,333
Task E.6 - Ozone Generation											
a	Ozone design development	60	90	150	140	130	160	80	240	8	$ 52,515
Task E.7 - Biologically Active Filtration											
a	BAF design criteria	4	32	20			60				$ 6,212
b	BAF design development	4	32	80		40	100	40	200		$ 22,042
c	Develop preliminary equipment requirements	2	16		40		60			8	$ 5,889
Task E.8 - GAC Contactors and Intermediate Pump Station											

Hampton Roads Sanitation District
James River Treatment Plant - SWIFT
GN016360.1 DESIGN SERVICES

	Program Classification / *Task Classification* / *Average Raw Hourly Rate*	STAFFING HOURS									Total Labor
	Program Classification		*Sr. Professional*		*Project Professional*		*Professional*	*Sr. Tech*	*Tech*	*Proj Admin*	
	Task Classification	**Vice President**	**Sr. Associate**	**Associate**	**Senior Principal Engineer**	**Principal Engineer**	**Assistant Engineer**	**Sr. Principal Designer**	**Principal Designer**	**Technical Writer / Admin**	
	Average Raw Hourly Rate	$87.30	$75.70	$62.50	$52.50	$42.50	$36.50	$45.50	$35.50	$26.70	
a	GAC and IPS design criteria	4	48	28	28		60				$ 9,393
b	GAC and IPS design development	18	80	140	80		120	40	200		$ 33,877
c	Develop preliminary equipment requirements	2	40	40	40		120			8	$ 12,396
Task E.9 - Ultraviolet Disinfection											
a	UV design criteria and development	32		40			40		30		$ 7,819
b	Develop preliminary equipment requirements	8	40	120	20		80	40	160	8	$ 22,910
Task E.10 - SWIFT Water PS											
a	Design criteria and development	16	40	40	80		60				$ 13,315
b	Develop preliminary equipment requirements		16	120	32	30	80	20	160		$ 21,176
Task E.11 - PW System											
a	Evaluate existing conditions and PW demand requirments		8	32							$ 2,606
b	Additional Services: design of potable water pipeline										$ -
Task E	**Total Hours / Subtotal**	280	590	1674	1034	1018	1838	482	1978	0	$ 432,228
	ODCs										$ 8,420
	Task Subtotal										$ 440,648
Task F - Wellhead Considerations											
1	JRTP SWIFT Wellhead Workshop	8	16	24		24					$ 4,430
2	Evaluate downhole flow control approaches		16	80	80	120					$ 15,511
3	Above-ground recharge well equipment design		16	320	20	320	80	16	200		$ 46,609
	Total Hours / Subtotal	8	48	424	100	464	80	16	200	0	$ 66,550
	ODCs										$ 10,158
	Task Subtotal										$ 76,708
Task G - Instrumentation and Control Systems											
1	I&C system design development		80	60	140	180			220		$ 32,616
	Total Hours / Subtotal	0	80	60	140	180	0	0	220	0	$ 32,616
	ODCs										$ 6,248
	Task Subtotal										$ 38,864
Task H - Electrical Systems											
1	JRTP Switchgear and backup power coordination	8	20	20		20	40				$ 5,772
2	Electrical system design development	8	110	180		360	220		320		$ 54,965
	Total Hours / Subtotal	16	130	200	0	380	260	0	320	0	$ 60,738
	ODCs										$ 10,656
	Task Subtotal										$ 71,394
Task I - Architectural Bulding Design and Code Analysis											
1	Develop architectural design concepts and requirements		340		372			400		16	$ 63,895
	Total Hours / Subtotal	0	340	0	372	0	0	400	0	16	$ 63,895
	ODCs										$ 8,616
	Task Subtotal										$ 72,511
Task J - Structural Design and Geotechnical Considerations											
1	Develop structural indicative design and requirements	8		240		220	284	312	264		$ 58,982
2	Additional Services: Geotechnical Subconsultant										$ -
3	Additional Services: Deep Foundation Indicative Design										$ -
	Total Hours / Subtotal	8	0	240	0	220	284	312	264	0	$ 58,982
	ODCs										$ 14,812
	Task Subtotal										$ 73,794
Task K - HVAC Systems											
1	Develop design requirements			20	60		80		60		$ 9,450
2	Develop equipment requirements			20	60		40		20		$ 6,570
	Total Hours / Subtotal	0	0	40	120	0	120	0	80	0	$ 16,020
	ODCs										$ -
	Task Subtotal										$ 16,020
Task L - Site Civil Design and Permitting											
1	Additional Services: Surveying										$ -
2	Site Civil Design to Anticipated CUP Requirements			120		180			80	32	$ 18,844
3	Prepare CUP Permitting Application		12			120			40		$ 7,428

Hampton Roads Sanitation District
James River Treatment Plant - SWIFT
GN016360.1 DESIGN SERVICES

		STAFFING HOURS									
	Program Classification		*Sr. Professional*		*Project Professional*		*Professional*	*Sr. Tech*	*Tech*	*Proj Admin*	**Total Labor**
	Task Classification	**Vice President**	**Sr. Associate**	**Associate**	**Senior Principal Engineer**	**Principal Engineer**	**Assistant Engineer**	**Sr. Principal Designer**	**Principal Designer**	**Technical Writer / Admin**	
	Average Raw Hourly Rate	$87.30	$75.70	$62.50	$52.50	$42.50	$36.50	$45.50	$35.50	$26.70	
4	Site Civil Design to Site Stormwater Requirements		200			1880			200		$ 102,140
5	Additional Services: Attend Meetings to Support CUP										$ -
6	Additional Services: Respond to Permitting Comments										$ -
	Total Hours / Subtotal	0	212	120	0	2180	0	0	320	32	$ 128,413
	ODCs										$ 6,576
	Task Subtotal										$ 134,989
Task M - Sustainability and Envision Approach											
1	Workshop SWIFT Sustainability Workshop	4	8	16		16					$ 2,635
2	Memorandum of JRTP SWIFT Sustainability		4	24		80				16	$ 5,630
3	Develop sustainability requirements		4	24		120					$ 6,903
	Total Hours / Subtotal	4	16	64	0	216	0	0	0	16	$ 15,168
	ODCs										$ 2,768
	Task Subtotal										$ 17,936
Task N - Construction EOPCC											
1	Initial EOPCC - Indicitive Design		16	200	240	360					$ 41,611
2	EOPCC Update - Bridging Documents		16	120	120	180					$ 22,661
	Total Hours / Subtotal	0	32	320	360	540	0	0	0	0	$ 64,272
	ODCs										$ 1,088
	Task Subtotal										$ 65,360
Task O - JRTP SWIFT Commissioning											
1	JRTP Commissioning Workshop	16	16	32	16	16					$ 6,128
2	Develop commissioning requirements	8	8	80	40	80					$ 11,804
	Total Hours / Subtotal	24	24	112	56	96	0	0	0	0	$ 17,932
	ODCs										$ 18,752
	Task Subtotal										$ 36,684
Task P - JRTP SWIFT Procurement Support											
1	DCS Equipment Procurement Workshop	16		16	20		16				$ 4,031
	Total Hours / Subtotal	16	0	16	20	0	16	0	0	0	$ 4,031
	ODCs										$ 11,008
	Task Subtotal										$ 15,039
Task Q - JRTP WW and SWIFT Bridging Document Consolidation											
1	Consolidate Bridging Documents			120			120	120	240		$ 25,860
	Total Hours / Subtotal	0	0	120	0	0	120	120	240	0	$ 25,860
	ODCs										$ -
	Task Subtotal										$ 25,860
	Total Labor										$ 1,086,263
	Total ODCs										$ 131,986
	Total Hours	672	1850	3746	2394	5378	2806	1378	3662	152	22,038
										Total Raw Labor	$1,086,263
										Labor Multiplier	3.0
										TASK 1 - Total Estimated Fee	**$ 3,390,775**

Notes: Assumes lump sum

	Program Classification	STAFFING HOURS									Total Labor
			Sr. Professional		*Project Professional*		*Professional*	*Sr. Tech*	*Tech*	*Proj Admin*	
	Task Classification	**Project Manager**	**Technical Specialist**	**Sr. Project Prof**	**Project Prof**	**Project Prof**	**Project Prof**	**Sr. Tech**	**Tech**	**Technical Writer / Admin**	
	Average Raw Hourly Rate	$85.45	$85.45	$72.73	$40.00	$37.50	$35.00	$47.27	$34.55	$34.55	
Task 2.1 James River Treatment Plant SWIFT Project Management Services											
Task											
A	Project Management and Coordination	440	308	240	164					80	$ 90,696
B	Project and Element EOPCC	80			60						$ 9,236
C	Design Phase Workshops (11)	96	24		104				24		$ 15,243
D	PMO Progress Meetings	84			84						$ 10,538
E	JRTP Workshops	132			104						$ 15,439
F	Progress Tracking and Schedule Updates	120			40						$ 11,854
G	Deliverable Review Coordination	96			48						$ 10,123
	Total Hours / Subtotal	1048	332	240	604	0	0	0	24	80	$ 163,129
	ODCs										$ 16,313
	Total Hours	1048	332	240	604	0	0	0	24	80	2,328
										Total Raw Labor	$163,129
										Labor Multiplier	2.75
										TASK 2 - Total Estimated Fee	**$ 464,919**

Notes: Assumes cost plus

Task 3.1 James River Treatment Plant Design Additional Services											
	Additional Services (10% of Design Services)										$ 339,078
	Total Hours / Subtotal										$ 339,078
	ODCs										$ 33,908
	Total Hours										
										TASK 3 - Total Estimated Fee	**$ 372,985**

Notes: Utilize HRSD Reimbursable Schedule

James River Treatment Plant SWIFT - GN016360.1 Design Services											
Task											
1	Design Services										$ 3,390,775
2	Project Management										$ 464,919
3	Additional Services										$ 372,985
										GN016360.1 Design Services - Total Estimated Fee	**$ 4,228,679**

Rice, Shannon

From: Bodniewicz, Bohdan <Bohdan.Bodniewicz@aecom.com>
Sent: Friday, August 09, 2019 10:54 AM
To: Rice, Shannon; Watson, Ken
Cc: Zuravnsky, Lauren
Subject: RE: Program Management for SWIFT – Amendments

Nope. This looks good.

-bo

From: Rice, Shannon [mailto:SRice@hrsd.com]
Sent: Thursday, August 08, 2019 2:36 PM
To: Watson, Ken; Bodniewicz, Bohdan
Cc: Zuravnsky, Lauren
Subject: RE: Program Management for SWIFT – Amendments

Good afternoon,

I updated Amendment 2 with the corrected fee document.

Let me know if you need anything else.

Thank you. Shannon

From: Rice, Shannon
Sent: Wednesday, August 07, 2019 9:43 AM
To: Zuravnsky, Lauren; Bodniewicz, Bohdan
Subject: Program Management for SWIFT – Amendments

Good morning,

Please review the proposed Professional Services Agreement Amendments No. 2 (JR SWIFT Facility) and No. 3 (JRTP Advanced Nutrient Improvements) for the above referenced project and let me know via email whether the amendments are acceptable as written or if changes need to be made. I will upload to ERP and process for acknowledgement.

Please contact me if you have any questions or need to discuss the proposed Amendments.

Thank you. Shannon

Shannon Rice
HRSD Contract Specialist
Office: 757.460.7005
1434 Air Rail Avenue | Virginia Beach, VA 23455
P.O. Box 5911 | Virginia Beach, VA 23471-0911
srice@hrsd.com | www.hrsd.com
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PROFESSIONAL SERVICES AGREEMENT

AMENDMENT NO. 3

for the

PROGRAM MANAGEMENT of SWIFT FULL SCALE IMPLEMENTATION (GN016320)

This AGREEMENT is entered into and becomes effective this twenty-third day of July, 2019, by and between Hampton Roads Sanitation District (hereinafter referred to as HRSD) and AECOM Technical Services, Inc. (hereinafter referred to as the FIRM) and amends the AGREEMENT entered into on July 31, 2018 by and between HRSD and FIRM as follows:

Item 1. Paragraph I. SCOPE OF WORK, add the following:

E. James River Treatment Plant Advanced Nutrient Improvements (JR013400):

1. The FIRM shall provide Design Services including Technical Support for Bridging Documents, Project Management Services, and Additional Services as described in the attached scope of services document, titled "James River Treatment Plant Wastewater – Design Services Scope of Work" dated July 12, 2019.

Item 2. Paragraph VI. PAYMENTS TO FIRM, add the following:

K. For the work described in Paragraph I.E.I (James River Treatment Plant Advanced Nutrient Improvements), the Lump Sum of $227,272 for Design Services.

L. For the work described in Paragraph I.E.I (James River Treatment Plant Advanced Nutrient Improvements), a Maximum Authorization of $173,527 based on Time and Materials for Program Management.

M. For Additional Services authorized by HRSD for the James River Treatment Plant Advanced Nutrient Improvements, a Maximum Authorization of $110,000.

This amendment will be approved and executed using HRSD's Enterprise Resource Planning (ERP) system. Physical signatures will not be required if acknowledged by FIRM through the ERP system.

James River Treatment Plant - Wastewater

JR013400.1 Design Services

Scope of Work

Prepared by
AECOM+HAZEN

July 12, 2019

James River Treatment Plant – Wastewater

JR 013400.1 Design Services

Task 1

James River Treatment Plant Wastewater Improvements

Task 1 Design Services

1.1 James River Treatment Plant Wastewater (WW) Improvements Design Services

A. The FIRM shall provide design coordination and development services required for the planning, design, implementation and procurement of the James River Treatment Plant (JRTP) WW Improvements in conjunction with the overall SWIFT advanced water treatment facilities resulting in the development of Bridging Documents. Design Services provided under this Scope of Work will be performed on a cost-plus basis utilizing a 3.0 rate multiplier in accordance with Professional Services Agreement GN016320. The FIRM will be responsible for providing consistent and consolidated Bridging Documents including the JRTP SWIFT and WW Improvements as defined in JRTP SWIFT GN016360.1 Design Services. The interconnectivity of SWIFT and WW processes and supporting discipline elements requires collaboration between the FIRM and Jacobs. The FIRM and Jacobs roles scope responsibilities are defined as follows:

- Primary Design Role: Lead the development of design approach, standards and technical design for development of the Basis of Design Report (BODR) and Indicative Design.
- Secondary Design Role: Provide information, data, and review of technical design and as required to the Primary Designer as required for the development of the BODR and Indicative Design.

Table 1-1: Roles and Scope Responsibility

	Item	Primary	Secondary	Scope Comments (FIRM)
A1	Regulatory and Permitting	Jacobs	FIRM	Coordinate Local, State and Federal Regulatory and Permitting requirements.
A2	Site Civil Design	FIRM	Jacobs	Coordinate site and stormwater features with Jacobs for inclusion in Bridging Documents. Provide topographic survey and SUE investigations (Additional Services) as required by Jacobs.
A3	Wastewater Treatment Process	Jacobs	FIRM	Provide process engineering support for selection / optimization of treatment processes.
A4	Wastewater Hydraulics and Process Mechanical	Jacobs	FIRM	Coordinate interaction of hydraulic flows and process mechanical piping and coordinate equipment selection.
A5	SWIFT Recycle and Solids Management	FIRM		Design piping to and improvements for existing WW solids handling to accept SWIFT flows and loads.
A6	Chemical Facilities	Jacobs	FIRM	Coordinate storage and chemical feed approach to be consistent with SWIFT.
A7	NPW Operations	Jacobs	FIRM	Coordinate WW changes in NPW Operations approach as provided in SWIFT design.
A8	JRTP Effluent Disinfection and Discharge Characterization	Jacobs	FIRM	Coordinate WW impacts to effluent discharge due to intermittent SWIFT plant operation.

	Item	Primary	Secondary	Scope Comments (FIRM)
A9	Instrumentation and Control Systems	Jacobs	FIRM	Coordinate interaction of the SWIFT DCS components as a sub-system to the new DCS system design provided by Jacobs.
A10	Electrical Systems	Jacobs	FIRM	Coordinate interaction of the SWIFT electrical systems, power distribution and backup power as a sub-system to the new electrical system design provided by Jacobs.
A11	Architectural Design	Jacobs	FIRM	Coordinate overall SWIFT architectural approach to be integrated in Jacobs Administration and WW facilities.
A12	Structural Design and Geotechnical Considerations	Jacobs	FIRM	Coordinate overall SWIFT structural approach to be integrated in Jacobs facilities. Provide Geotechnical Engineering services (Additional Services) required for Jacobs design effort.
A13	HVAC Systems	Jacobs	FIRM	Coordinate overall SWIFT HVAC approach to be integrated in Jacobs Administration and WW facilities.
A14	Wastewater Commissioning	Jacobs	FIRM	Coordinate comprehensive Commissioning Plan framework, construction sequencing and startup of WW and SWIFT operations.
A15	Engineers Opinion of Probable Construction Cost (EOPCC)	FIRM	Jacobs	(Not Used) Provide EOPCC for WW improvements based on information provided by Jacobs.

Workshops

Attend JRTP WW Review Workshop 1-4 as required

Task 2

James River Treatment Plant WW
Project Management Services

Task 2 Project Management

2.1 JRTP WW Project Management (WW PM) Services During Indicative Design

A. The WW PM will provide management and coordination of the services required for the planning, design, implementation and procurement of the JRTP WW Upgrades. The WW PM will provide regular reviews and coordination of the Jacobs to include basis of design report (BODRs) for JRTP WW. The WW PM will coordinate with the lead overall JRTP SWIFT PM.

B. The PM will coordinate the preparation, reviews and comments on the Engineer's Opinion of Probable Construction Cost for JRTP WW. (Not Used)

C. The WW PM will attend and participate in Design Phase Workshops with HRSD, FIRM and Jacobs design staff. These workshops will be used to present design and procurement documents, resolve issues and collect comments.

D. The WW PM will coordinate and conduct weekly Design Progress Meetings with the PMC and Jacobs design staff leads and managers.

E. The WW PM will track the progress of the project components and provide updates to the project schedule.

F. The WW PM will coordinate reviews of all deliverables prior to submission for substance, and quality.

Task 3

James River Treatment Plant WW
Additional Services

Task 3 Additional Services

1. Additional Design Services may be required that are not currently scoped to the level of detail required to define an associated cost. Therefore, an annual budget is provided to allow for these additional services to be executed, if required. These Design Services Additional Services shall be provided only on an as-authorized basis. Requests shall be made by the FIRM and submitted into SharePoint workflow for authorization of Additional Services. Requests shall define the objective, proposed staffing, schedule, duration, deliverable(s), and cost in accordance with the pre-approved rate tables. The authorization request must be submitted sufficiently in advance of the contemplated start date needed for proposed services to allow HRSD’s Chief of Design & Construction – SWIFT to have adequate time for assessment without causing interruption or disruption of services required under this Agreement. The authorization shall be obtained in writing from the Chief of Design & Construction - SWIFT or other designee authorized by the Contracting Officer.

    a. Subsurface Utility Engineering
    b. Topographic Survey
    c. Geotechnical Engineering

Hampton Roads Sanitation District
James River Treatment Plant - WW
JR013400.1 DESIGN SERVICES

AECOM Hazen
SWIFT concept becomes reality

		STAFFING HOURS									
	Program Classification		*Sr. Professional*		*Project Professional*		*Professional*	*Sr. Tech*	*Tech*	*Proj Admin*	
	Task Classification	**Vice President**	**Sr. Associate**	**Associate**	**Senior Principal Engineer**	**Principal Engineer**	**Assistant Engineer**	**Sr. Principal Designer**	**Principal Designer**	**Technical Writer / Admin**	**Total Labor**
	Average Raw Hourly Rate	**$87.30**	**$75.70**	**$62.50**	**$52.50**	**$42.50**	**$36.50**	**$45.50**	**$35.50**	**$26.70**	
Task 1.1 James River Treatment Plant WW Improvements Design Services											
Task A - Design Development Support											
1	Regulatory and Permitting			24		24					$ 2,520
2	Site Civil Design		40	100		120			220		$ 22,188
3	Wastewater Treatment Process	80	80			80					$ 16,440
4	Wastewater Hydraulics and Process Mechanical			80		80			40		$ 9,820
5	SWIFT Recycle and Solids Management			24		48			60		$ 5,670
6	Chemical Facilities			24							$ 1,500
7	NPW Operations			24							$ 1,500
8	JRTP Effluent and Discharge Characterization	8		24		32					$ 3,558
9	Instrumentation and Control Systems			8		24					$ 1,520
10	Electrical Systems			16		16					$ 1,680
11	Architectural Design		8			24					$ 1,626
12	Structural Design and Geotechnical Considerations		8			24					$ 1,626
13	HVAC Systems				8						$ 420
14	Wastewater Commissioning		24			24			24		$ 3,689
15	Not Used										$ -
	Total Hours / Subtotal	88	160	324	8	496	0	0	344	0	$ 73,756
	ODCs										$ 6,003
	Total Hours	88	160	324	8	496	0	0	344	0	1,420
										Total Raw Labor	$73,756
										Labor Multiplier	3.0
										TASK 1 - Total Estimated Fee	**$ 227,272**

Notes: Assumes cost plus

AECOM Hazen SWIFT concept becomes reality		STAFFING HOURS									Total Labor
	Program Classification		*Sr. Professional*		*Project Professional*		*Professional*	*Sr. Tech*	*Tech*	*Proj Admin*	
	Task Classification	**Project Manager**	**Technical Specialist**	**Sr. Project Prof**	**Project Prof**	**Project Prof**	**Project Prof**	**Sr. Tech**	**Tech**	**Technical Writer / Admin**	
	Average Raw Hourly Rate	$85.45	$85.45	$72.73	$40.00	$37.50	$35.00	$47.27	$34.55	$34.55	
Task 2.1 James River Treatment Plant WW Improvements Project Management Services											
Task											
A	Project Management and Coordination	240			80					40	$ 25,090
B	Not Used										$ -
C	JRTP Workshops	40		24	24				24	8	$ 7,229
D	PMO Progress Meetings	96			24						$ 9,163
E	Progress Tracking and Schedule Updates	40			48						$ 5,338
F	Deliverable Review Coordination	60			80					24	$ 9,156
	Total Hours / Subtotal	476	0	24	256	0	0	0	24	72	$ 55,977
	ODCs										$ 5,598
	Total Hours	476	0	24	256	0	0	0	24	72	852
										Total Raw Labor	$55,977
										Labor Multiplier	3.00
										TASK 2 - Total Estimated Fee	**$ 173,527**
Notes: Assumes cost plus											

Task 3.1 James River Treatment Plant WW Design Additional Services											
	Additional Services										$ 100,000
	Total Hours / Subtotal										$ 100,000
	ODCs										$ 10,000
	Total Hours										
										TASK 3 - Total Estimated Fee	**$ 110,000**
Notes: Utilize HRSD Reimbursable Schedule											

James River Treatment Plant SWIFT - JR013400.1 Design Services											
Task											
1	Design Services										$ 227,272
2	Project Management										$ 173,527
3	Additional Services										$ 110,000
										GN016360.1 Design Services - Total Estimated Fee	**$ 510,799**

Rice, Shannon

From: Bodniewicz, Bohdan <Bohdan.Bodniewicz@aecom.com>
Sent: Friday, August 09, 2019 10:54 AM
To: Rice, Shannon; Watson, Ken
Cc: Zuravnsky, Lauren
Subject: RE: Program Management for SWIFT – Amendments

Nope. This looks good.

-bo

From: Rice, Shannon [mailto:SRice@hrsd.com]
Sent: Thursday, August 08, 2019 2:36 PM
To: Watson, Ken; Bodniewicz, Bohdan
Cc: Zuravnsky, Lauren
Subject: RE: Program Management for SWIFT – Amendments

Good afternoon,

I updated Amendment 2 with the corrected fee document.

Let me know if you need anything else.

Thank you. Shannon

From: Rice, Shannon
Sent: Wednesday, August 07, 2019 9:43 AM
To: Zuravnsky, Lauren; Bodniewicz, Bohdan
Subject: Program Management for SWIFT – Amendments

Good morning,

Please review the proposed Professional Services Agreement Amendments No. 2 (JR SWIFT Facility) and No. 3 (JRTP Advanced Nutrient Improvements) for the above referenced project and let me know via email whether the amendments are acceptable as written or if changes need to be made. I will upload to ERP and process for acknowledgement.

Please contact me if you have any questions or need to discuss the proposed Amendments.

Thank you. Shannon

Shannon Rice
HRSD Contract Specialist
Office: 757.460.7005
1434 Air Rail Avenue | Virginia Beach, VA 23455
P.O. Box 5911 | Virginia Beach, VA 23471-0911
srice@hrsd.com | www.hrsd.com
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PROFESSIONAL SERVICES AGREEMENT

AMENDMENT NO. 7

for the

PROGRAM MANAGEMENT of SWIFT FULL SCALE IMPLEMENTATION (GN016320)

This AGREEMENT is entered into and becomes effective this fifth day of May, 2020, by and between Hampton Roads Sanitation District (hereinafter referred to as HRSD) and AECOM Technical Services, Inc. (hereinafter referred to as the FIRM) and amends the AGREEMENT entered into on July 31, 2018 by and between HRSD and FIRM as follows:

Item 1. Amendment No. 2 (James River SWIFT Facility) Paragraph VI. PAYMENTS TO FIRM, make the following changes:

Q. Decrease the Lump Sum for Design Services by $72,549 from $3,390,775 to $3,318,226.

R. Increase the Maximum Authorization based on Time and Materials for Program Management by $72,549 from $464,919 to $537,468.

This amendment will be approved and executed using HRSD's Enterprise Resource Planning (ERP) system. Physical signatures will not be required if acknowledged by FIRM through the ERP system.

Rice, Shannon

From: Bodniewicz, Bohdan <Bohdan.Bodniewicz@aecom.com>
Sent: Tuesday, May 5, 2020 1:34 PM
To: Rice, Shannon
Cc: Zuravnsky, Lauren
Subject: [EXTERNAL] RE: JR SWIFT Facility - Reallocation

Yup – this looks good.

Thank you Shannon!

-bo

From: Rice, Shannon <SRice@hrsd.com>
Sent: Tuesday, May 05, 2020 10:37 AM
To: Bodniewicz, Bohdan <Bohdan.Bodniewicz@aecom.com>
Cc: Zuravnsky, Lauren <LZuravnsky@hrsd.com>
Subject: [EXTERNAL] JR SWIFT Facility - Reallocation
Importance: High

Hi Bo,

Please review the proposed Professional Services Agreement Amendment No. 7 for the above referenced project and let me know via email whether the amendment is acceptable as written or if changes need to be made. I will upload to ERP and process for acknowledgement, then Terri will be able to process the invoice in ERP.

Please contact me if you have any questions or need to discuss the proposed Amendment.

Thank you. Shannon

PROFESSIONAL SERVICES AGREEMENT

AMENDMENT NO. 9

for the

PROGRAM MANAGEMENT OF SWIFT FULL SCALE IMPLEMENTATION (GN016320)

This AGREEMENT is entered into and becomes effective this twenty-ninth day of June, 2019, by and between Hampton Roads Sanitation District (hereinafter referred to as HRSD) and AECOM Technical Services, Inc. (hereinafter referred to as the FIRM) and amends the AGREEMENT entered into on July 31, 2018 by and between HRSD and FIRM as follows:

Item 1. Amendment No. 7 (James River SWIFT Facility), Paragraph I.D., SCOPE OF WORK, add the following:

2. The FIRM shall provide Bid Phase Services and an Environmental Assessment as described in the attached scope of work, titled "James River Treatment Plant SWIFT Bid Phase Services" dated June 10, 2020.

Item 2. Amendment No. 7 (James River SWIFT Facility) Paragraph VI., PAYMENTS TO FIRM, add the following:

T. For the work described in Paragraph I.D.2 (James River SWIFT Facility), a Maximum Authorization of $151,140 based on Time and Materials for Bid Support Services.

U. For the work described in Paragraph I.D.2 (James River SWIFT Facility), a Maximum Authorization of $48,555 based on Time and Materials for an Environmental Assessment.

This Amendment will be approved and executed using HRSD's Enterprise Project Management (Unifier) system. Physical signatures will not be required if acknowledged by FIRM through the Unifier system.

James River Treatment Plant – ANRI and SWIFT

JR013400.PRC and GN016360.PRC Bid Phase Services

Scope of Work

Prepared by
AECOM+HAZEN

June 10, 2020

Task 1 Bid Phase Services

The FIRM shall provide services to support HRSD as required during the Design-Builder Procurement Phase for James River ANRI and SWIFT projects. This Scope of Work includes services exclusive of Program Management Team activities and may include support from Hazen's design team and AECOM's cost estimating and scheduling for JR SWIFT and JRTP ANRI projects.

All services are provided under James River SWIFT Facility (CIP GN016360.PRC) funding and shall be at the request of HRSD.

I. Overall Project Management
   A. Provide miscellaneous Project Management tasks that may entail any of the following (assumes 4 hours per week for 20 weeks of support until completion of DB negotiations):
      1. Monthly invoicing, progress reports, including any schedule updates
      2. Coordinating/supporting/answering RFI's and Addendum
      3. Coordinating with PMC schedule and cost estimating reviews
      4. Providing review of Addendum responses and PMC schedule and cost estimating reviews
      5. Support negotiation of Comprehensive Agreement as requested

II. RFP Design-Builder Selection Support Services:
   A. Respond to JR SWIFT and/or Div 01 related Requests for Information (RFIs) (assumes 10 RFI's at 8 hours of effort per RFI).
   B. Prepare JR SWIFT and/or Div 01 related Addendum (assumes 160 hours total for all Addendum).
   C. Review the Design-Builder's JRTP ANRI and JR SWIFT proposed schedules submitted in Design-Builder's Technical Proposals. FIRM shall provide a fact's only schedule comparison report between the submitted schedule and the Program Baseline Schedule (assumes a .pdf printout) (40 hours per DB Schedule for Each Project (160 hours total)).

III. Post-RFP Design-Builder Selection Support Services:
   A. Review the Design-Builder's technical alternatives for consideration to include in the Comprehensive Agreement. Review shall focus on JR SWIFT technical impacts and JRTP ANRI and JR SWIFT cost and schedule impacts. (assumes a total subtask allowance of $35,000, however, may require refinement upon final number of technical alternatives to be reviewed)
   B. Assist in the negotiation of the Comprehensive Agreement scope. Support will focus on Contract Cost Limit and schedule components. (assumes 60 hours total)

Hampton Roads Sanitation District
James River Treatment Plant - SWIFT
GN016360.1 - Bid Phase Services

	Task Classification	STAFFING HOURS									
		Prog Mgt	**Subj Matter Expert**	**Sr. Proj Prof**	**Project Prof**	**Senior Technician**	**Professional**	**Technician**	**Project Admin**	**Total Hours**	**Total Labor**
	FY 20 Billing Rate	**$250.00**	**$300.00**	**$235.00**	**$165.00**	**$120.00**	**$110.00**	**$80.00**	**$75.00**		
Task 1 - Bid Phase Services											
1.1 A	**Project Management Services**										
	Monthly Invoicing, Progress Reports, Schedule Update	20								20	$ 5,000
	Coordinating/Supporting RFI and Addendum Response	20								20	$ 5,000
	Coordinate PMC Cost Estimating and Schedule Reviews of DB Submittals	10								10	$ 2,500
	Reviewing Addendum and other PMC Reviews to HRSD as Required	20								20	$ 5,000
	Support Negotiation of DB Comprehensive Agreement as Requested	10								10	$ 2,500
	Total Hours / Subtotal	80	0	0	0	0	0	0	0		$ 20,000
1.1 B	**RFP Design-Builder Selection Support Services**										
	10 RFIs @ 8 hrs per RFI (Estimated)			24	40	16				80	$ 14,160
	Prepare Addenda (Assume max of 160 hours)		4	64	32	32	20		8	160	$ 28,160
	Review JR SWIFT and ANRI DB Schedules		40	80	40					160	$ 37,400
	Total Hours / Subtotal	0	44	168	112	48	20	0	8		$ 79,720
1.1 C	**Post-RFP Design-Builder Selection Support Services**										
	Technical Alternatives Review		12	60	48		80		8		$ 35,020
	Comprehensive Agreement Negotiation Assistance		20	40							$ 15,400
	Total Hours / Subtotal	0	32	100	48	0	80	0	8		$ 50,420
	ODCs										$ 1,000
	Subtotal										$ 1,000
	Total Labor	$20,000	$22,800	$62,980	$26,400	$5,760	$11,000	$0	$1,200		$ 150,140
	Total ODCs	0	0	0	0	0	0	0	0		$ 1,000
	Total Hours	80	76	268	160	48	100	0	16	748	
d Fee											**$ 151,140**

Notes: Assumes work is completed on a time and materials basis at 2.75 direct salary multiplier

JRTP SWIFT Additional Services Request for Phase II Environmental Investigation

Former Firing Range on Newport News-owned parcel east of the JRTP Facility

April 24th, 2020

Summary

AECOM completed a Phase I Environmental Site Assessment as due diligence for purchase of an approximately 10-acre parcel of land adjacent to the east side of the existing JRTP facility. The parcel is currently owned by the City of Newport News and is a portion of the ~258-ac Riverview Farm Park and located southwest of the intersection of City Farm Road and Riverview Parkway. The Phase I ESA identified a former small arms firing range with a soil backstop berm as a recognized environmental condition (REC) based on the potential for lead impacts on the property.

To evaluate potential lead in soil and groundwater at this site, AECOM recommends completing a Phase II environmental investigation. The goals of the proposed investigation are to:

- Determine whether the site is impacted by residual lead from former firing range operations at concentrations exceeding residential screening criteria (> 400 mg/Kg).
- If elevated lead is present, conduct additional sampling to define the lateral and vertical extent of impacts in soil in the backstop berm and adjacent areas.
- Develop a preliminary remediation approach and cost estimate.
- Note this investigation is intended to be an initial screening evaluation of site conditions to determine potential impacts, site constraints, and approximate remediation cost for planning purposes. Extensive investigation beyond the scope of work below or coordination with regulatory agencies are not included.

To address these goals, AECOM recommends the following scope of work.

Scope of Work

The proposed Scope of Work for the Phase II environmental investigation include the following general tasks:

Task 1 - Project Planning

- Conduct an initial site visit to identify constraints, evaluate site access options, and provide information for project planning.
- Develop a Health and Safety Plan for all field activities to define roles and responsibilities, proper personal protection equipment (PPE) and safe work procedures. All field staff will have current OSHA HAZWOPER training with medical monitoring.
- Develop a brief work plan to detail site work activities, sampling and analytical methods, and reporting requirements.
- Locate underground utilities in the vicinity of the former firing range using Miss Utility (811) and a private location service.

Task 2 – Initial Soil Sampling

- Mobilize two field personnel to the site to complete initial soil sampling.

- Visual reconnaissance and shallow excavation in the and around the berm to evaluate extent and depth of spent munitions/debris

- Establish an approximate grid pattern across the potentially impacted area based on the visual evidence. The grid could include a few temporary benchmarks, transects or approximate spacing for subsequent sample collection to collect representative samples across the area.
- Collect surface (0-1 ft) and subsurface (1-2 ft) soil samples from 20 locations (40 total samples) using a decontaminated shovel or hand auger.
- Soil samples will be transferred into laboratory-supplied containers and shipped overnight for analysis of lead by EPA Method 6010B on a 24-hour turnaround time.
- Sample locations will be measured from known points or located using handheld GPS units.

Task 3 – Additional Soil Sampling

- If the results from the initial field effort do not provide enough data to determine the extent of lead impacts, field staff will remobilize to the site to collect additional soil samples, if necessary. The level of effort assumes one additional day of soil sampling and analysis of up to 40 additional soil samples following the same approach as Task 2.
- If a 3^{rd} or additional mobilization or sampling are necessary, AECOM will provide a cost estimate for HRSD approval.

Task 4 – Groundwater Sampling

- If lead impacts are documented in soils at the site, AECOM recommends installing and sampling up to three temporary monitoring wells using direct push methods.
- AECOM will mobilize a field geologist and a drilling subcontractor to install temporary wells in accessible locations without excessive tree clearing.
- Wells depths are not expected to exceed 25 feet and will be constructed with one-inch diameter casing and five-foot sections of prepacked screen. No surveying of well elevations is included the scope of work.
- The temporary wells will be fully developed prior to sampling until turbidity levels are below 10 nephelometric turbidity units (NTUs).
- Groundwater samples will be collected at least 24 hrs. after development using low flow methods, measuring standard water quality parameters (pH, temperature, conductivity, and turbidity). Groundwater samples will be collected when parameters stabilizer and turbidity is below 10 NTUs. One duplicate sample and one equipment blank will also be collected for QA/QC purposes.
- The samples will be transferred into laboratory supplied sample containers and transferred to a Virginia certified laboratory for analysis of lead by EPA Method 6010C using 5-day turnaround times.
- Development and purge water will be containerized in a drum on site pending laboratory analyses prior to disposal. The cost estimate assumes one drum of water disposal as non-hazardous material.

Task 5 – Reporting

- Prepare letter report documenting field activities, sampling results, recommendations, and a remediation cost estimate. The report will include sample location maps, summary tables, and all laboratory analytical results.
- AECOM will submit a draft report for HRSD review, participate in a meeting or conference call to review the results and recommendations, and produce the final report in pdf format.

Schedule

AECOM estimates approximately 4 to 6 weeks following notice to proceed to complete the above scope of work. Initial results should be available within 2 weeks which will allow more accurate scheduling of final report. This schedule is also subject to change based on unforeseen delays due to site access, quarantine requirements, or other delays outside of AECOM's control.

Cost Estimate

AECOM assume the above scope of work will be completed in phases on a time and materials basis in accordance with our current contract with HRSD for an estimated cost of $48,555. As shown on the attached cost estimate, AECOM anticipates the following costs for each phase of work:

Task 1	Project Planning	$9,958
Task 2	Initial soil sampling	$7,170
Task 3	Additional soil sampling	$7,170
Task 4	Groundwater sampling	$11,017
Task 5	Reporting	$13,240
	Total Estimate	**$48,555**

Cost Estimate

Client	HRSD	Task:	TBD
Project:	Phase II environmental Investigation	AECOM Project No.	TBD
Site	JRTP NN parcel - former firing range	AECOM PM	Jack Moore
Contact:		Date	4/24/2020
Scope:	Soil and groundwater sampling		

Billing Category/AECOM code	Unit	Unit Rate	Task 1 Project Planning	Task 2 Initial Soil Sampling	Task 3 Additional Soil Sampling	Task 4 Groundwater Sampling	Task 5 Reporting		SUBTOTAL units	SUBTOTAL cost
LABOR										
Project Director 4	Hr	$220								
Principal (PD 3)	Hr	$210	16	4	4	4	16		44	$ 9,240
Program Manager (PD2)	Hr	$185								
Project Director 1 (PD1)	Hr	$175	8	4	4	2	8		26	$ 4,550
Project Manager 2 (PM2)	Hr	$165								
Senior Engineer (Engineer 4)	Hr	$140								
Engineer 3 / Scientist 4	Hr	$125	8	4	4		16		32	$ 4,000
Engineer 2 / Scientist 3	Hr	$115	16	16	16	24	40		112	$ 12,880
Engineer 1 / Scientist 2	Hr	$105								
Scientist I / Tech 3/ CADD	Hr	$95	8	16	16	12	8		60	$ 5,700
Tech 2 / Admin 2	Hr	$85								
Data Admin 1	Hr	$70	4	4	4	2	16		30	$ 2,100
Jr Construction Eng	Hr	$65								
Total Labor			$8,640	$5,680	$5,680	$5,230	$13,240	$0	304	**$ 38,470.00**
Travel										
Company Vehicle	day	$ 90.00								
Personal Vehicle	mile	$ 0.575	100	400	400	400			1300	$ 747.50
Per Diem (GSA)	day									
Hotel (est)	est									
Materials and Subcontractors										
Utility Location (est)	day	$ 1,200	1						1	$ 1,200.00
DPT rig	day	$ 1,700				2			2	$ 3,400.00
1" Well Construction	ft	$ 10.50				75			75	$ 787.50
Low -flow sample equipment	day	$ 500				1			1	$ 500.00
Drums	ea	$ 75				1			1	$ 75.00
Drum disposal (non-haz)	ea	$ 305				1			1	$ 305.00
GPS unit	day	$ 50		1	1				2	$ 100.00
Lab Analysis (Pb - 24 hr)	ea	$ 25		40	40	3			83	$ 2,075.00
Shipping	ea	$ 100		1	1	1			3	$ 300.00
Field Supplies, PPE	day	$ 50		1	1	1			3	$ 150.00
Markup		5%	$ 60.00	$ 60.00	$ 60.00	$ 264.63	$ -	$ -		$ 444.63
Total ODCs			$1,317.50	$1,490.00	$1,490.00	$5,787.13	$0.00	$0.00		**$ 10,085.00**
Cost Estimate per Task			$9,957.50	$7,170.00	$7,170.00	$11,017.13	$13,240.00	$0.00		
								TOTAL		**$48,555.00**

Notes:

Rice, Shannon

From: Bodniewicz, Bohdan <Bohdan.Bodniewicz@aecom.com>
Sent: Monday, June 29, 2020 5:13 PM
To: Rice, Shannon
Cc: Zuravnsky, Lauren; Jennifer Klages
Subject: [EXTERNAL] RE: JR SWIFT Facility (GN016360)

Hi Shannon –

Thanks for walking me through my questions! Confirming that Amendment 9 is acceptable as written.

-bo

From: Rice, Shannon <SRice@hrsd.com>
Sent: Monday, June 29, 2020 3:20 PM
To: Bodniewicz, Bohdan <Bohdan.Bodniewicz@aecom.com>
Cc: Zuravnsky, Lauren <LZuravnsky@hrsd.com>; Klages, Jennifer <jennifer.klages@aecom.com>
Subject: [EXTERNAL] RE: JR SWIFT Facility (GN016360)

Bo,

I spoke with Lauren, here are the updates.

Thank you. Shannon

From: Rice, Shannon
Sent: Monday, June 29, 2020 2:57 PM
To: Bo Bodniewicz (AECOM) <Bohdan.Bodniewicz@aecom.com>
Cc: Zuravnsky, Lauren <lzuravnsky@hrsd.com>; Jennifer Klages <jennifer.klages@aecom.com>
Subject: JR SWIFT Facility (GN016360)

Hi Bo,

Please review the proposed Professional Services Agreement Amendment No. 9 for the above referenced project and let me know via email whether the amendment is acceptable as written or if changes need to be made. I will upload in Unifier.

Please contact me if you have any questions or need to discuss the proposed Amendment.

As discussed earlier - we are in the process of making updates to the Contract Changes business process in Unifier and at this time the workflow for the Engineer/Contractor to accept Contract Changes it not available. I will send a screenshot \ showing that the Amendment has been fully integrated in the system once it is approved.

Thank you. Shannon

PROFESSIONAL SERVICES AGREEMENT

AMENDMENT NO. 13

for the

PROGRAM MANAGEMENT of SWIFT FULL SCALE IMPLEMENTATION (GN016320)

This AGREEMENT is entered into and becomes effective this twenty-third day of October, 2020, by and between Hampton Roads Sanitation District (hereinafter referred to as HRSD) and AECOM Technical Services, Inc. (hereinafter referred to as the FIRM) and amends the AGREEMENT entered into on July 31, 2018 by and between HRSD and FIRM as follows:

Item 1. Paragraph I. SCOPE OF WORK, add the following:

H. James River Treatment Plant Advanced Nutrient Reduction Improvements (JR013400) for Operations Relocation:

1. The FIRM shall provide Preliminary Engineering Report (PER) Services as described in the attached scope of services document, titled "JRTP OPS Relocation Tech Memo Services Scope of Work" dated September 28, 2020.

Item 2. Paragraph VI. PAYMENTS TO FIRM, add the following:

W. James River Treatment Plant Advanced Nutrient Reduction Improvements (JR013400) for Operations Relocation:

1. For the work described in Paragraph I.H.1 (James River Treatment Plant Advanced Nutrient Reduction Improvements for Operations Relocation), a Maximum Authorization of $32,000 based on Lump Sum for PER Services.

This amendment will be approved and executed using HRSD's Enterprise Resource Planning (ERP) system. Physical signatures will not be required if acknowledged by FIRM through the ERP system.

JRTP OPS Relocation

Tech Memo Services

Scope of Work

Prepared by
AECOM

September 28, 2020

JRTP OPS Relocation
Tech Memo Services

Task 1 – Tech Memo Services Scope of Work

Task 1

JRTP OPS Relocation
Tech Memo Services

Task 1 Technical Memorandum

The FIRM shall provide specified services required to confirm the design of JRTP Operations Relocation Project (referred to as the Project) required to relocate JRTP personnel in advance of Design-Builder mobilization in winter of 2021. The Project will include design of renovations to the existing Administration Building No. 2 and a Warehouse constructed on JRTP's site. Construction of the Project is required in advance of Design-Builder mobilization which will demolish the existing Administration Building currently housing JRTP Operations personnel. The proposed layout of Administration Building No. 2 and the Warehouse are provided as an attachment to this scope and fee to establish.

The engineering services shall include architectural, mechanical, electrical and fire protection. (Structural, Civil engineering and coordination services will be provided by a separate HRSD consultant). The FIRM will coordinate with the structural engineer hired by HRSD to provide one seamless design package. The design will include a Technical Memorandum with concept drawings~~.~~

Preliminary Design Development Phase:

1. Attend a virtual Kickoff Meeting. Kickoff the project and establish goals, introduce technical/delivery leads and key HRSD staff. Discuss the roles and responsibilities of the FIRM and HRSD. Discuss design criteria and existing documentation of associated projects and gain HRSD approval of project scope.
2. Field investigation of Administration Building No. 2 and areas as needed to document existing conditions to provide the documents. The FIRM will review existing record drawings, survey to develop the design documents for Administration Building No. 2 and areas needed to establish existing conditions.
3. Technical Memorandum shall sufficiently describe the proposed design while confirming the bidding of the buildings as a single or separate procurement. Concept drawings shall be provided.
    a. Administration Building No. 2:
        i. Existing building systems capacity (HVAC, electrical, lighting, plumbing and network) upgrades shall be identified supporting JRTP Operations relocation usage. Upgrades to the building will be prioritized.
        ii. Generator with an ATS shall be sized to support the building's usage as the ride out area during a power outage. A sizing analysis shall compare capacity for the building only versus capacity to support staff trailers (hot water heater for lockers, lighting, at least 4 hard wall offices, 12 seated office area). Identify generator diesel needs for up to 7 days in addition to a belly tank with at least 48 hours of usage during a power outage.
        iii. Ancillary modifications such as demolition requirements, replacement of carpet, flooring or walls shall be identified.

iv. Installation of a lightning protection system will be evaluated.
v. Review building codes to determine if renovations trigger any new code compliance.

b. Warehouse shall consist of Inventory Storage and Maintenance Shop. The Warehouse will be provided with roll-up doors, access doors, insulation, drains, building systems electrical, water and sewer, ventilation, plumbing and designated areas to include welding, unisex bathroom, office and consumables.
   i. Building Sizing: HRSD has preliminary sized the building as 165 feet length by 50 feet width, straight wall height 15’ to 19’ pitch with an awning (as preferred). Sizing and building selection shall be confirmed with vendors, constructability and setbacks from structures. HRSD’s structural engineer will provide the building sizing evaluation considering two types of buildings prefabricated concrete versus pre-engineered metal building. Codes will be reviewed to assist with code compliance placement of doors, openings, etc.
   ii. Ventilation: Fans, heating and cooling – the maintenance shop requires summer heat removal. Ventilation in maintenance areas to suit operations (e.g., welding table – possibly use portable fume extractor) may include exhaust fans. Heating is required for the maintenance and inventory area (natural gas unit heaters are preferred use of existing propane may be acceptable short-term). Cooling is preferred in the restroom and inventory computer area.
   iii. Electrical: An HRSD identified power source will be evaluated to support the Warehouse power demands. The existing drawings and survey will be reviewed to identify the spare pathway from the motor control center to the exterior of the dewatering building and to the Warehouse and coordinated with Collins civil engineering efforts. Electrical upgrades will support the Warehouse including but not limited to,
      1. Interior and exterior lighting layout and fixtures.
      2. A power distribution panel/system to support the building’s intended usage.
   iv. Fire Protection: Portable fire extinguishers and carbon monoxide alarms are the minimum required. Preliminary code analysis and review of the basis of design information will be completed to identify the fire protection requirements. A complete fire hydrant flow test will be coordinated by FIRM to verify fire flow adequacy for a non-sprinklered building. However, HRSD shall arrange for personnel to operate the hydrant

c. Cost Estimating and Schedule:
   i. Class 4 cost estimate as defined by Association for the Advancement of Cost Engineering (AACE).

ii. Support Collins in development of an overall project schedule.

d. Attend a virtual review meeting to discuss review of the draft document. Finalize Technical Memorandum for submission based on review comments and meeting.

Deliverables: The Following deliverables will be submitted in accordance with the scope of work.

1. Technical Memorandum with concept drawings.

Schedule:
The schedule will include 29 days from NTP (excluding HRSD review) and is outlined as follows (in calendar days):

NTP	0 days
Kick-off Meeting Prep/Field Investigation	7 days
Kick-off Meeting to get HRSD agreement on Scope	1 day
Draft Tech Memo submittal	14 days
HRSD review/Meeting	TBD
Final Tech Memo	7 days

Cost:
Thirty-two thousand dollars ($32,000)

Key Assumptions:

1. AECOM will not seal the Tech Memo.
2. Design will be in conformance with the Virginia Uniform Statewide Building Code and HRSD design Standards.
3. Any drawings will be in 11x17 format using AutoCAD.
4. No energy analyses or third part certification are included.
5. FIRM is not responsible for permits.
6. No hazardous material survey is included.

Additional Services

1. Upon the identification of services not included with this scope of work, HRSD and FIRM may negotiate mutually agreeable scope, schedule and fee for such additional services with a modification to the original contract.

Hampton Roads Sanitation District
James River Treatment Plant
OPS Relocation

		STAFFING HOURS									
	Program Classification	*Program Mgmt*	*Sr. Professional*		*Project Professional*		*Professional*	*Sr. Tech*	*Tech*	*Proj Admin*	Total Labor
	Task Classification	**Vice President**	**Sr. Associate**	**Associate**	**Senior Principal Engineer**	**Principal Engineer**	**Assistant Engineer**	**Sr. Principal Designer**	**Principal Designer**	**Technical Writer / Admin**	
		$250.00	**$235.00**	**$235.00**	**$165.00**	**$165.00**	**$110.00**	**$120.00**	**$80.00**	**$75.00**	
Task 1 - Land Acquisition Support Services											
Task 1.1 - General Services											
A	Project Management		24								$ 5,640
B	Architecture				12		48				$ 7,260
C	Mechanical (HVAC+Plumbing)				12		44				$ 6,820
C	Electrical				12		44				$ 6,820
E	Fire Protection				6		16				$ 2,750
F	Cost Estimate				16						$ 2,640
	Total Hours / Subtotal	0	24	0	58	0	152	0	0	0	234
	Total Labor	$0.00	$5,640.00	$0.00	$9,570.00	$0.00	$16,720.00	$0.00	$0.00	$0.00	$31,930.00
	ODCs										$ 250
									TASK 1 - Total Lump Sum Fee	**$**	**32,180**

SAY $32,000

Rice, Shannon

From: Bodniewicz, Bohdan <Bohdan.Bodniewicz@aecom.com>
Sent: Monday, October 26, 2020 10:08 AM
To: Rice, Shannon
Cc: Jennifer Klages; Zuravnsky, Lauren
Subject: [EXTERNAL] RE: JRTP Advanced NRI (JR013400) Ops Relocation

Hi Shannon – thanks for updating and sorry you had to hear it second-hand and not from me.

The Amendment is now acceptable as written.

-bo

From: Rice, Shannon <SRice@hrsd.com>
Sent: Friday, October 23, 2020 4:40 PM
To: Bodniewicz, Bohdan <Bohdan.Bodniewicz@aecom.com>
Cc: Klages, Jennifer <jennifer.klages@aecom.com>; Zuravnsky, Lauren <LZuravnsky@hrsd.com>
Subject: [EXTERNAL] RE: JRTP Advanced NRI (JR013400) Ops Relocation

Hi Bo,

During our invoice meeting today, Terri told me that the amount in the Amendment was incorrect. Sorry about that! Please find the updated Amendment and let me know whether the Amendment is acceptable as written or if changes need to be made. I will upload and process for acknowledgement in Unifier.

Thank you. Shannon

From: Rice, Shannon
Sent: Tuesday, October 20, 2020 10:28 AM
To: 'Bo Bodniewicz (AECOM)' <Bohdan.Bodniewicz@aecom.com>
Cc: Jennifer Klages <jennifer.klages@aecom.com>; Zuravnsky, Lauren <lzuravnsky@hrsd.com>
Subject: JRTP Advanced NRI (JR013400) Ops Relocation

Good morning Bo,

Please review the proposed Professional Services Agreement Amendment No. 13 for the above referenced project and let me know via email whether the amendment is acceptable as written or if changes need to be made. I will upload and process for acknowledgement in Unifier.

Please contact me if you have any questions or need to discuss the proposed Amendment.

Thank you. Shannon

Shannon Rice |HRSD Contract Specialist | Cell: 757.408.8558 |Office: 757.460.7005 |1434 Air Rail Avenue | Virginia Beach, VA 23455 |srice@hrsd.com | www.hrsd.com
Please consider the environment before printing this message.
NOTE: I am teleworking until further notice. My office phone has been forwarded to my cell phone.

PROFESSIONAL SERVICES AGREEMENT

AMENDMENT NO. 14

for the

PROGRAM MANAGEMENT of SWIFT FULL SCALE IMPLEMENTATION (GN016320)

This AGREEMENT is entered into and becomes effective this twenty-ninth day of October, 2020, by and between Hampton Roads Sanitation District (hereinafter referred to as HRSD) and AECOM Technical Services, Inc. (hereinafter referred to as the FIRM) and amends the AGREEMENT entered into on July 31, 2018 by and between HRSD and FIRM as follows:

Item 1. Amendment No. 3 (James River Treatment Plant Advanced Nutrient Improvements), Paragraph I.E. SCOPE OF WORK, add the following:

2. The FIRM shall provide Pre-Construction Program Management Services including land and easement acquisition support services as described in the attached scope of work, titled "James River Treatment Plant Land Acquisition Support Services" dated September 2020.

Item 2. Amendment No. 3 (James River Treatment Plant Advanced Nutrient Improvements), Paragraph VI. PAYMENTS TO FIRM, add the following:

X. James River Treatment Plant Advanced Nutrient Reduction Improvements (JR013400):

1. For the work described in Paragraph I.E.2, a Maximum Authorization of $74,860 based on Time and Materials for Pre-Construction Program Management Services.

2. For the Permit Application Fee authorized by HRSD, a Maximum Authorization of $10,0000.

This Amendment will be approved and executed using HRSD's Enterprise Project Management (Unifier) system. Physical signatures will not be required if acknowledged by FIRM through the online system.

JAMES RIVER TREATMENT PLANT
LAND ACQUISTION SUPPORT SERVICES

SCOPE OF WORK

Prepared by
AECOM+HAZEN

SEPTEMBER 2020

JAMES RIVER TREATMENT PLANT
LAND ACQUISTION SUPPORT SERVICES

TASK 1: LAND ACQUISTION SUPPORT SERVICES

TASK 2: ADDITIONAL SERVICES

JAMES RIVER TREATMENT PLANT

LAND ACQUISTION SERVICES SCOPE OF WORK

The *James River Treatment Plant – SWIFT Design Services* scope (Amendment 2) included preparation of site/civil design items to support preliminary coordination of the Conditional Use Permit (CUP) with the City of Newport News. The preliminary CUP was prepared based on City Code review and discussions with City Planning. Continuation of this effort will facilitate finalizing land acquisition CUP requirements providing an approvable package to the City of Newport News. As part of the land acquisition agreement HRSD will meet with the City's Planning Department (and other City entities) to finalize CUP requirements needed for approval leading to the property transfer.

Land acquisition support services are beyond the scope of the services provided under the initial design services scope. The scope of services described herein include engineering services provided during the due diligence period of the Agreement for the land acquisition of property from the City of Newport News to HRSD.

TASK 1: LAND ACQUISITION SUPPORT SERVICES

1.1 General Services

A. Perform general task management, invoicing, activity coordination, and schedule management associated with the permitting of land and easement acquisition support services.

1.2 Conditional Use Permit Submittal Support Services

A. Finalize the Conditional Use Permit (CUP) and associated forms, memos, and figures for the JRTP ANRI and SWIFT project. Submit completed CUP application package to the City of Newport News.

B. Prepare for and attend coordination/review meetings with the City of Newport News Planning Department or Parks and Recreation. (assumes 3 meetings)

C. Address City's comments during the CUP application process and submit amendments or revisions to CUP package as required during the review process.

D. Graphics support to provide construction schedule visualizations.

1.3 Land and Easement Acquisition Support Services

A. Provide general engineering support for HRSD land and easement acquisition efforts. Prepare and amend site plans, recharge well location figures, or other figures as required to support HRSD's effort.

TASK 2: ADDITIONAL SERVICES

Additional project support services may be required that cannot be scope to the level of detail required to define the complete cost. Therefore, a budget is provided to allow for these additional services should they become necessary and are authorized by HRSD. Project management or design support additional services shall only be provided when authorized via SharePoint by HRSD.

Additional Service requests will be submitted via a SharePoint workflow for review and authorization by HRSD. Requests shall define the objective, proposed staffing, schedule, duration, deliverable(s), and cost in accordance with the pre-approved rate tables. The Additional Services request must be submitted sufficiently in advance of the requested start date to provide HRSD's Chief of Design & Construction – SWIFT adequate time for assessment without causing interruption or disruption of services required under this Agreement. The authorization shall be obtained via the SharePoint workflow from the Chief of Design & Construction - SWIFT another designee authorized by the Contracting Officer.

2.1 Not able to define permit cost at this time.

Hampton Roads Sanitation District
James River Treatment Plant
Land Acquisition Support Services

	Program Classification	*Program Mgmt*	*Sr. Professional*		*Project Professional*		*Professional*	*Sr. Tech*	*Tech*	*Proj Admin*	Total Labor
	Task Classification	**Vice President**	**Sr. Associate**	**Associate**	**Senior Principal Engineer**	**Principal Engineer**	**Assistant Engineer**	**Sr. Principal Designer**	**Principal Designer**	**Technical Writer / Admin**	
	Budget Rate Billing	$250.00	$235.00	$235.00	$165.00	$165.00	$110.00	$120.00	$80.00	$75.00	
Task 1 - Land Acquisition Support Services											
Task 1.1 - General Services											
A	Project management (estimated 3 mos. @ 8 hrs per mo.)		24							4	$ 5,940
	Total Hours / Subtotal	0	24	0	0	0	0	0	0	4	$ 5,940
Task 1.2 - Conditional Use Permit Submittal Support Services											
A	Prepare and submit CUP		60	24		36		48			$ 31,440
B	City coordination/review meetings (estimated 3 meetings)		12	12							$ 5,640
C	Address City comments		40	20		20		30			$ 21,000
D	Graphics Support		24								$ 5,640
	Total Hours / Subtotal	0	136	56	0	56	0	78	0	0	$ 63,720
Task 1.3 - Land and Easement Acquisition Support Services											
A	Provide engineering support for land/easement acquistion		5	5		10		10			$ 5,200
	Total Hours / Subtotal	0	5	5	0	10	0	10	0	0	$ 5,200
	Task Subtotal	0	165	61	0	66	0	88	0	4	$ 74,860
Task 2 - Additional Services											
	Additional services										$ 10,000
	Total Labor										$ 74,860
	ODCs										$ -
	Total Hours	0	165	61	0	66	0	88	0	4	384
										Total Labor	$74,860
	TASK 1 - Total Estimated Not-to-Exceed Fee									**$**	**84,860**

Notes: Assumes work is completed on a time and materials basis.

Rice, Shannon

From: Bodniewicz, Bohdan <Bohdan.Bodniewicz@aecom.com>
Sent: Wednesday, November 4, 2020 3:12 PM
To: Rice, Shannon
Cc: Jennifer Klages; Zuravnsky, Lauren
Subject: [EXTERNAL] RE: JRTP Advanced NRI (JR013400)

Amendment 14 – Land Acquisition support is good to go.

-bo

From: Rice, Shannon <SRice@hrsd.com>
Sent: Wednesday, November 04, 2020 8:28 AM
To: Bodniewicz, Bohdan <Bohdan.Bodniewicz@aecom.com>
Cc: Klages, Jennifer <jennifer.klages@aecom.com>; Zuravnsky, Lauren <LZuravnsky@hrsd.com>
Subject: [EXTERNAL] RE: JRTP Advanced NRI (JR013400)

Good morning Bo,

I am following up on this, please let me know if you have any questions.

Thank you. Shannon

From: Rice, Shannon
Sent: Thursday, October 29, 2020 11:04 AM
To: 'Bo Bodniewicz (AECOM)' <Bohdan.Bodniewicz@aecom.com>
Cc: Jennifer Klages <jennifer.klages@aecom.com>; Zuravnsky, Lauren <lzuravnsky@hrsd.com>
Subject: JRTP Advanced NRI (JR013400)

Good morning Bo,

Please review the proposed Professional Services Agreement Amendment No. 14 for the above referenced project and let me know via email whether the Amendment is acceptable as written or if changes need to be made. I will upload and process for acknowledgement in Unifier.

Please contact me if you have any questions or need to discuss the proposed Amendment.

Thank you. Shannon

Shannon Rice |HRSD Contract Specialist | Cell: 757.408.8558 |Office: 757.460.7005 |1434 Air Rail Avenue | Virginia Beach, VA 23455 |srice@hrsd.com | www.hrsd.com
Please consider the environment before printing this message.
NOTE: I am teleworking until further notice. My office phone has been forwarded to my cell phone.

AGREEMENT
BETWEEN OWNER AND DESIGN-BUILDER
ON THE BASIS OF A STIPULATED PRICE

THIS AGREEMENT is by and between Hampton Roads Sanitation District (HRSD) (Owner), and Ulliman Schutte – Alberici Joint Venture (Design-Builder).

PROJECT INFORMATION

Design-Build Contract: James River SWIFT Facility (GN016360) and James River Treatment Plant Advanced Nutrient Reduction Improvements (JR013400) (Contract)

Owner's Consultant: AECOM Technical Services, Inc.

Engineer: Design-Builder has retained HDR Engineering Inc. (Engineer) for the performance of professional engineering services under this Contract.

Authorized Representatives: Owner and Design-Builder each hereby designates a specific individual authorized to act as representative with respect to the performance of responsibilities under this Contract. Such an individual shall have authority to transmit instructions, receive formal notices, receive information, and render decisions relative to this Contract on behalf of the respective party that the individual represents.

1. Owner's Authorized Representative:

   Bruce Husselbee, Director of Engineering
   1434 Air Rail Avenue, Virginia Beach, Virginia 23455
   (757) 460-7012; bhusselbee@hrsd.com

2. Design-Builder's Authorized Representative:

   Matt Schutte, Vice President
   9111 Springboro Pike, Miamisburg, OH 45342
   (937) 910-9900; mschutte@ullimanschutte.com

Owner and Design-Builder further agree as follows:

ARTICLE 1 – THE WORK

1.01 *General Description of Work*

A. Design-Builder shall complete all Work as specified or indicated in the Contract. The Work is generally described as the design and construction of the following:

   1. James River SWIFT Facility (GN01360) project includes the design, supply, construction, and commissioning of the following major new elements:

      a. Rapid-Mix/Flocculation/Sedimentation Facilities

      b. Solids Handling Equipment and Piping

      c. Ozone Generation Equipment and Reactor Facilities

      d. Biologically Active Filter Facilities

      e. Intermediate Pump Station

f. Granular Activated Carbon Contactor Facilities

g. Ultraviolet Disinfection System Facilities

h. SWIFT Influent Equalization Tank and Pumping Station

i. SWIFT Water Pumping Station

j. SWIFT Chemical Storage and Feed Equipment

k. SWIFT Power Distribution Equipment and Facilities

l. SWIFT Distributed Control System (DCS) Programming and Equipment

m. Mechanical, Electrical, and Plumbing

n. Site Work including Stormwater Management

o. SWIFT Water and Well Backflush Pipelines

p. Recharge and Monitoring Well Equipment and Facilities

q. SWIFT Equalization of Well Backflush Water

2. James River Treatment Plant Advanced Nutrient Reduction Improvements (JR013400) project includes the design, supply, construction, and commissioning of the following major new elements:

   a. Administration Building

   b. Maintenance Building

   c. Electrical Building

   d. Main Power Distribution Equipment and Facilities

   e. Generator and Fuel Storage Facilities

   f. Wastewater Chemical Storage and Feed Equipment Facilities

   g. Integrated Fixed Film Activated Sludge (IFAS) Effluent Channel

   h. Secondary Clarifier Equipment and Facilities

   i. Moving Bed Bioreactor Equipment and Facilities

   j. Hydraulic Connection to Existing Chlorine Contact Facilities

   k. Main DCS Programming and Equipment

   l. Mechanical, Electrical, and Plumbing

   m. Site Work including Stormwater Management

   n. The project may include demolition of the following existing facilities as needed to complete the Work:

      1) Incoming Power Distribution

      2) Portions of Secondary Clarifier Facilities

ARTICLE 2 – CONTRACT TIMES

2.01 *Time is of the Essence*

A. All time limits for Design-Builder's attainment of Milestones, if any, Substantial Completion, and completion and readiness for final payment, as stated in the Contract, are of the essence of the Contract.

2.02 *Contract Times*

A. Design-Builder will substantially complete the Work on or before January 24, 2026.

B. Design-Builder will have the Work completed and ready for final payment, in accordance with Paragraph 14.06 of the General Conditions, on or before July 25, 2026.

2.03 *Liquidated Damages*

A. Design-Builder and Owner recognize that time is of the essence as stated in Paragraph 2.01 above, and that Owner will suffer financial and other losses if the Work is not completed and Milestones, if applicable, not achieved within the times specified in Paragraph 2.02 above, plus any extensions thereof allowed in accordance with the Contract. The parties also recognize the delays, expense, and difficulties involved in proving, in a lawsuit or arbitration proceeding, the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Design-Builder agree that as liquidated damages for delay (but not as a penalty):

1. *Substantial Completion*: Design-Builder shall pay Owner $10,600 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified in Paragraph 2.02 above for Substantial Completion, until the Work is substantially complete.

2. *Completion of Remaining Work*: After Substantial Completion, if Design-Builder shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Design-Builder shall pay Owner $3,600 for each day that expires after such time until the Work is completed and ready for final payment.

3. Liquidated damages for failing to timely attain Substantial Completion, final completion, and Milestones, if applicable, are not additive, and will not be imposed concurrently. Liquidated damages for failing to attain Substantial Completion shall take precedence.

ARTICLE 3 – CONTRACT PRICE

3.01 *Stipulated Sums*

A. Owner shall pay Design-Builder for completion of the Work in accordance with the Contract Documents the amounts that follow, subject to adjustment under the Contract:

1. James River SWIFT Facility (GN016360)

   a. For Design Services, a lump sum of $13,927,850 (thirteen million, nine hundred twenty-seven thousand, eight hundred fifty dollars).

   b. For Builder Support During Design, a lump sum of $2,172,604 (two million, one hundred seventy-two thousand, six hundred four dollars).

   c. For Engineering Services During Construction, a lump sum of $8,139,655 (eight million, one hundred thirty-nine thousand, six hundred fifty-five dollars).

d. For General Requirements, Bonds, Insurance, Mobilization, and Demobilization, a lump sum of $28,034,507 (twenty-eight million, thirty-four thousand, five hundred seven dollars).

e. For Construction, a lump sum of $177,506,773 (one hundred seventy-seven million, five hundred six thousand, seven hundred seventy-three dollars).

f. For Overhead and Profit at 9.5% (percent), a lump sum of $21,829,232 (twenty-one million, eight hundred twenty-nine thousand, two hundred thirty-two dollars).

g. For the Chemical Purchase for Process Startup Allowance, a lump sum of $100,000 (one hundred thousand dollars).

h. For all Work for the James River SWIFT Facility (GN016360) (totals for items 3.01.A.1.a through 3.01.A.1.g) equals $251,710,621 (two hundred fifty-one million, seven hundred ten thousand, six hundred twenty-one dollars), which is also known as the Contract Cost Limit (CCL) as defined in the Supplementary Conditions.

2. James River Treatment Plant Advanced Nutrient Reduction Improvements (JR013400)

a. For Design Services, a lump sum of $10,461,997 (ten million, four hundred sixty-one thousand, nine hundred ninety-seven dollars).

b. For Builder Support During Design, a lump sum of $2,114,184 (two million, one hundred fourteen thousand, one hundred eighty-four dollars).

c. For Engineering Services During Construction, a lump sum of $6,870,450 (six million, eight hundred seventy thousand, four hundred fifty dollars).

d. For General Requirements, Bonds, Insurance, Mobilization, and Demobilization, a lump sum of $23,129,745 (twenty-three million, one hundred twenty-nine thousand, seven hundred forty-five dollars).

e. For Construction, a lump sum of $149,392,486 (one hundred forty-nine million, three hundred ninety-two thousand, four hundred eighty-six dollars).

f. For the Administration and Maintenance Building, a lump sum of $5,531,063 (five million, five hundred thirty-one thousand, sixty-three dollars).

g. For Overhead and Profit at 9.5% (percent), a lump sum of $18,762,493 (eighteen million, seven hundred sixty-two thousand, four hundred ninety-three dollars).

h. For the Chemical Purchase for Process Startup Allowance, a lump sum of $100,000 (one hundred thousand dollars).

i. For all Work for the James River Treatment Plant Advanced Nutrient Reduction Improvements (JR013400) (totals for items 3.01.A.2.a through 3.01.A.2.h) equals $216,362,418 (two hundred sixteen million, three hundred sixty-two thousand, four hundred eighteen dollars), which is also known as the CCL as defined in the Supplementary Conditions.

ARTICLE 4 – PAYMENT PROCEDURES

4.01 *Submittal and Processing of Payments*

A. Design-Builder shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Owner will process Applications for Payment as provided in the General

Conditions.

4.02 *Progress Payments; Retainage*

A. Owner shall make progress payments on account of the Contract Price on the basis of Design-Builder's Applications for Payment monthly during performance of the Work as provided in Paragraph 4.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract.

a. 95 percent of Work completed (with the balance being retainage); and

b. 95 percent of cost of materials and equipment not incorporated in the Work but delivered, suitably stored, and accompanied by documentation satisfactory to Owner as provided in Paragraph 14.01.B of the General Conditions (with the balance being retainage).

B. Upon Substantial Completion, the retainage shall be further reduced below 5 percent to that amount necessary to assure completion as determined by the Owner. The determination of any such reduction shall be at the sole discretion of the Owner.

C. Notwithstanding the provisions above, no retainage shall be withheld with respect to the portion of a payment application pertaining to engineering, design, and other professional services.

4.03 *Diversity Procurement*

A. The Design-Builder and Suppliers are encouraged to provide the participation of small, women-owned, minority-owned or service-disabled veteran-owned businesses in this Agreement. With each monthly Application for Payment, the Design-Builder shall document the following:

1. if the Design-Builder is designated by the Commonwealth of Virginia as a small, women-owned, minority-owned or service-disabled veteran-owned business, the designation type and the dollar value of work completed by the Design-Builder;

2. dollar value of work completed by Subcontractors designated by the Commonwealth of Virginia as small business;

3. dollar value of work completed by Subcontractors designated by the Commonwealth of Virginia as women-owned business;

4. dollar value of work completed by Subcontractors designated by the Commonwealth of Virginia as minority-owned business; and

5. dollar value of work completed by Subcontractors designated by the Commonwealth of Virginia as service-disabled veteran-owned business.

4.04 *Subcontractor Payments*

A. Within 7 calendar days of each payment by Owner to Design-Builder under this Agreement, Design-Builder shall either: (1) pay the Subcontractor for the proportionate share of the total payment received, attributable to the work performed by the Subcontractor; or (2) notify the Owner in writing of the intention to withhold all or part of the Subcontractor's payment with the reason for nonpayment.

B. Design-Builder shall pay interest to its Subcontractors on all amounts owed by the Design-Builder that remain unpaid 7 calendar days after receipt of the Design-Builder of payment from Owner for work performed by the Subcontractor, except of amounts withheld as allowed above and unless otherwise provided under the terms of this Agreement. Unless otherwise provided under the terms of this Agreement, interest shall accrue at the rate of 1 percent per month.

C. Design-Builder shall include in each its subcontracts a provision requiring each Subcontractor to include or otherwise be subject to the same payment and interest requirements set forth in this paragraph. A contract modification or cost reimbursement claim shall not include any amounts for reimbursement of such interest charges.

4.05 *Final Payment*

A. Upon final completion and acceptance of the Work in accordance with Paragraph 14.06 of the General Conditions, Owner shall pay the remainder of the Contract Price.

4.06 *Consent of Surety*

A. Owner may withhold final payment or return or release retainage at Substantial Completion or any other time, unless Design-Builder submits written consent of the surety to such payment, return or release.

ARTICLE 5 – REPRESENTATIONS, CERTIFICATIONS, AND STIPULATIONS

5.01 *Design-Builder's Representations*

A. Design-Builder makes the following representations for Owner's reliance:

1. Design-Builder has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.
2. Design-Builder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
3. Design-Builder is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
4. Design-Builder has carefully studied all: (a) reports of explorations and tests of subsurface conditions at or adjacent to the Site, and all drawings of physical conditions relating to existing surface or subsurface structures at the Site, if any, that Owner has identified or made available to Design-Builder, especially with respect to Technical Data in such reports and drawings, and (b) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site, that Owner has identified or made available to Design-Builder, especially with respect to Technical Data in such reports and drawings.

5. Design-Builder has considered the information known to Design-Builder itself, and to Construction Subcontractors and Project Design Professionals that Design-Builder has selected as of the Effective Date; information commonly known to design professionals, design-builders, and contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings, if any, identified in the Contract Documents or otherwise made available to Design-Builder, with respect to the effect of such information, observations, and documents on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Design-Builder; and (c) Design-Builder's safety precautions and programs.

6. Based on the information and observations referred to in the preceding paragraph, Design-Builder agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary prior to entry into the Contract at the Contract Price, subject to the Contract Times.

7. Design-Builder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

8. Design-Builder has submitted online discussions through HRSD's Online Oracle Enterprise Resource Planning (ERP) system as written notice of all conflicts, errors, ambiguities, or discrepancies that Design-Builder has discovered in the Contract Documents, and the written response from Owner is acceptable to Design-Builder.

9. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

10. Design-Builder's entry into this Contract constitutes an incontrovertible representation by Design-Builder that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents

11. Design-Builder is organized or authorized to transact business in the Commonwealth of Virginia in accordance with Title 13.1 and/or Title 50 of the Code of Virginia. Design-Builder shall not allow its existence to lapse or its certificate of authority or registration to transact business in the Commonwealth of Virginia, if so, required under Title 13.1 and/or Title 50 of the Code of Virginia, to be revoked or cancelled at any time during the term of this Agreement. If the Design-Builder fails to remain in compliance with the provisions of this section, Owner reserves the right to cancel this Agreement.

12. Design-Builder does not, and shall not during the performance of the contract, knowingly employ an unauthorized alien as defined in the Federal Immigration Reform and Control Act of 1986, in accordance with §2.2-4311.1 of the Code of Virginia.

5.02 *Design-Builder's Certifications*

A. Design-Builder certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Agreement. For the purposes of this Section:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Agreement's execution;

2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or in the Agreement execution to the detriment of Owner,

(b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. “collusive practice” means a scheme or arrangement between 2 or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid or Contract prices at artificial, non-competitive levels; and

4. “coercive practice” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or in the Agreement’s execution.

5.03 *Anti-Discrimination Requirements*

A. For all contracts over $10,000 the Design-Builder shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin, age, disability or other basis prohibited by state law relating to discrimination in employment. During the performance of this Agreement, the Design-Builder shall:

1. post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause;

2. in all solicitations or advertisements for employees placed by or on behalf of the Design-Builder, will state that such Design-Builder is an equal opportunity employer. Notices, advertisements and solicitations placed in accordance with federal law, rule or regulation shall be deemed sufficient for the purpose of meeting the requirements of this section; and

3. include the provisions of the foregoing clauses in every construction subcontract or purchase order over $10,000, so that the provisions will be binding upon each construction subcontractor or vendor, all in accordance with §2.2-4311 of the Code of Virginia.

B. Further, in accordance with §2.2-4343.1 of the Code of Virginia, the Design-Builder shall not discriminate against a faith-based organization on the basis of the organization’s religious character or impose conditions that restrict the religious character of the faith-based organization, except in accord with §2.2-4343.1.F of the Code of Virginia, that no funds shall be expended on contracts for religious worship, instruction, or proselytizing, or impair, diminish, or discourage the exercise of religious freedom by the recipients of such goods, services, or disbursements.

C. In accordance with the Virginia Human Rights Act §2.2-3900 of the Code of Virginia, the Firm shall safeguard all individuals within the Commonwealth from unlawful discrimination in employment because of race, color, religion, national origin, sex, pregnancy, childbirth or related medical conditions, age, marital status, sexual orientation, gender identity, disability, or status as a veteran; preserve the public safety, health, and general welfare; further the interests, rights, and privileges of individuals within the Commonwealth; and protect citizens of the Commonwealth against unfounded charges of unlawful discrimination.

5.04 *Drug Free Workplace Requirements*

A. For all contracts over $10,000 the Design-Builder shall maintain a drug-free workplace. During the performance of this Agreement, the Design-Builder shall:

1. provide a drug-free workplace for the Design-Builder’s employees;

2. post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana is prohibited in the Design-Builder's workplace and specifying the actions that will be taken against employees for violations of such prohibition;

3. state in all solicitations or advertisements for employees placed by or on behalf of the Design-Builder that the Design-Builder maintains a drug-free workplace; and

4. include the provisions of the foregoing clauses in every subcontract or purchase order over $10,000, so that the provisions will be binding upon each subcontractor or vendor, all in accordance with §2.2-4312 of the Code of Virginia.

ARTICLE 6 – CONTRACT DOCUMENTS

6.01 *Contents*

A. The Contract Documents consist of the following:

1. This Agreement (pages 1 to 11, inclusive).
2. General Conditions (pages 1 to 62, inclusive; not attached but incorporated by reference).
3. Supplementary Conditions (pages 1 to 24, inclusive; not attached but incorporated by reference).
4. Revisions to the Supplementary Conditions (pages 1 to 3, inclusive; attached).
5. Division 01 Requirements (pages 1 to 152, inclusive; not attached but incorporated by reference).
6. Conceptual Documents identified in the Request for Proposals (not attached but incorporated by reference).
7. Addenda (numbers 1 to 8, inclusive; not attached but incorporated by reference).
8. Exhibits to this Agreement (enumerated as follows):
   a. Design-Builder's Statement of Qualifications submitted in HRSD's Online Oracle ERP system (Solicitation 404567,2: Response 516303; not attached but incorporated by reference).
   b. Design-Builder's Technical Proposal submitted in HRSD's Online Oracle ERP system (Solicitation 404776,6: Response 516749; not attached but incorporated by reference).
   c. Design-Builder's Price Proposal submitted in HRSD's Online Oracle ERP system (Solicitation 404776-2,2: Response 516923; not attached but incorporated by reference).
   d. Proposal Amendment dated March 18, 2021 (pages 1 to 320, inclusive; attached).
9. The following shall be delivered or issued after the Effective Date of this Agreement and are not attached hereto:
   a. Notice to Proceed.
   b. Performance Bond (together with power of attorney; shall be delivered prior to

acceptance of the Stipulated Price).

c. Payment Bond (together with power of attorney; shall be delivered within 5 business days of the executed Agreement).

d. Insurance Certificates.

1) Project Specific Professional Liability Policy shall be delivered no later than May 31, 2021.

2) Builder's Risk Insurance shall be delivered prior to acceptance of the Stipulated Price.

e. Work Change Directives (if applicable).

f. Change Orders (if applicable).

10. Other Exhibits to this Agreement (enumerated as follows):

a. Exhibit Number 1: Budgetary Estimate to HRSD dated April 2, 2020, prepared by Emerson Power and Water Solutions, Pittsburgh, Pennsylvania, entitled: "James River Advanced Nutrient Reduction Improvements and SWIFT Facility", consisting of 22 pages.

B. The Contract Documents listed in Paragraph 6.01.A are attached to this Agreement (except as expressly noted otherwise above).

C. There are no Contract Documents other than those listed above in this Article 6.

D. The Contract Documents may only be amended, modified, or supplemented as provided in the General Conditions.

ARTICLE 7 – TERMINATION PROVISIONS

7.01 *Termination of Agreement*

A. Suspension of work or termination of the Agreement shall be in accordance with Article 15 of the General Conditions.

B. Execution of this Agreement and the performance of any services provided hereunder shall not require or bind HRSD to retain the Design-Builder for the construction phase of the project. Final negotiations and an amendment to the Agreement will occur at a time when the final scope and total cost of the construction effort can be more accurately defined. If a Scope of Work and compensation for the construction related activities cannot be successfully negotiated, HRSD reserves the right to compensate the Design-Builder to complete the design related efforts associated with this Project and use the record specifications and record drawings to bid and construct the needed improvements associated with the Project. HRSD will then have the right to use the documents as defined in Paragraph 3.04 of the General Conditions and as further modified in the Supplementary Conditions. In negotiating the cost to complete the design related efforts, the Design-Builder hereby commits to negotiate a reasonable price in relation to the cost of the services provided. HRSD may, in its sole discretion, elect to cancel the Project and compensate the Design-Builder for design related services completed.

ARTICLE 8 – MISCELLANEOUS

8.01 *Terms:* Terms used in this Agreement will have the meanings stated in the General Conditions and Supplementary Conditions.

8.02 *Assignment of Contract:* Unless expressly agreed to elsewhere in the Contract, no assignment by a party hereto of any rights under or interests in the Contract will be binding on the other party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, money that may become due and money that is due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract.

8.03 *Successors and Assigns:* Owner and Design-Builder each binds itself, its successors, assigns, and legal representatives to the other party hereto, and its successors, assigns, and legal representatives, in respect to all covenants, agreements, and obligations contained in the Contract.

8.04 *Severability:* Any provision or part of the Contract held to be void or unenforceable under any applicable law or regulations shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Design-Builder, who agree that the Contract shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

8.05 *Permission to Use HRSD Name and Social Media Release:* The Design-Builder or any of its employees or agents shall not use HRSD's name, logo, proprietary information, or site photographs in any format for any personal or professional marketing or public relations material or social media use without prior review and approval from HRSD. These materials include, but are not limited to, advertisements, news releases, published articles, customer lists, social media posts, advertorials or any other promotional purposes. HRSD's Director of Communications shall be provided with any material to be shared with the public at least 7 calendar days prior to the planned release of the information.

This Agreement will be effective on January 26, 2021 (which is the Effective Date of the Contract).

The Agreement and all subsequent changes to the Agreement will be approved and executed using HRSD's Enterprise Project Management (Unifier) system. Physical signatures (on the Agreement and future change orders) will not be required if acknowledged by Design-Builder through the online system.

REVISIONS TO THE SUPPLEMENTARY CONDITIONS

The following changes, additions and/or deletions are hereby made part of the Supplementary Conditions of the Contract Between Owner and Design-Builder:

1.01 *Defined Terms*

SC-1.01 Modify subparagraph 1.01.A.56 by replacing the words, “Conceptual Documents” with the words “Contract Documents”.

2.03 *Conceptual Documents*

SC-2.03 Delete subparagraph 2.03.A.4 and replace it with the following:

4. Upon receipt of a report from Design-Builder that there is a conflict, error, ambiguity, or discrepancy in the Conceptual Documents, Owner shall either provide a written interpretation, clarification, or correction to the Design-Builder, or authorize Design-Builder to correct or resolve the issue under a Change Order providing an equitable adjustment in Contract Times or Contract Price, or both, in accordance with the requirements of the Contract Documents.

SC-2.03 Amend Paragraph 2.03.B by adding the following to the end of the sentence:

, subject to the Owner’s responsibility as stated in Section 01 11 00 Summary of Work 1.01.C.

4.04 *Delays in Design-Builder’s Progress*

SC-4.04 Delete Paragraph 4.04.F and replace it with the following:

F. Design-Builder shall not be entitled to an adjustment in Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Design-Builder.

5.04 *Differing Site Conditions:*

SC-5.04 Delete subparagraph 5.04.1.a.1) and replace it with the following:

1) Intentionally Omitted.

SC-5.04 Delete subparagraph 5.04.2.a.1) and replace it with the following:

1) Intentionally Omitted.

5.06 *Hazardous Environmental Conditions at Site:*

SC-5.06 Delete subparagraph 5.06.1.a.1) and replace it with the following:

1) Intentionally Omitted.

SC-5.06 Delete subparagraph 5.06.1.b.1) and replace it with the following:

1) Intentionally Omitted.

6.03 *Design-Builder’s Insurance*

SC-6.03 Amend subparagraph 6.03.C.4 by adding the following new sentence:

Insured-versus-insured and cross liability exclusions do not apply to Owner.

SC-6.03 Delete subparagraph 6.03.I.1 and replace it with the following:

1. Design-Builder shall be responsible for purchasing and maintaining professional liability insurance. Design-Builder's corporate $15,000,000 Professional Liability policy shall be in place for any claims related to professional design or related services not covered by the Engineer's project-specific policy. Design-Builder shall purchase and maintain $15,000,000 Project Specific Professional Liability through the Engineer. This insurance shall be project specific, primary, and non- contributory. This insurance shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which Design-Builder is legally liable.

SC-6.03 Delete Paragraph 6.03.L and replace it with the following:

L. The limits of liability for the insurance required by Paragraph 6.03 of the General Conditions for the Design-Builder shall provide coverage for not less than the following amounts, or greater where required by Laws and Regulations:

SC-6.03 Delete subparagraph 6.03.L.4 and replace it with the following:

4. Umbrella or Excess Liability under Paragraph 6.03.F of the General Conditions:

Per Occurrence:	$75,000,000
General Aggregate:	$75,000,000

6.05 Property Insurance

SC-6.05 Delete Paragraph 6.05.A and replace it with the following:

A. *Builder's Risk*: Design-Builder shall purchase and maintain builder's risk insurance upon the Work, evidence of which shall be submitted to Owner prior to acceptance of Stipulated Price, on a completed value basis for $100,000,000 Limit including materials, labor, overhead and profit, subject to such deductible amounts described herein. The Design-Builder shall be responsible for payment of any and all deductibles. Design-Builder shall have full property insurance coverage in all situations including "Named Storm" events. This insurance shall:

SC-6.05 Delete Paragraph 6.05.C and replace it with the following:

C. *Deductibles*: The Design-Builder shall be responsible for all policy deductibles on Builder's Risk or property insurance. Maximum property deductibles permitted without prior agreement with the Owner shall be $100,000 all other perils, 2 percent of insured value for wind and hail and 5 percent of insured value for flood and $100,000 for earthquake, as commercially available at the time coverage is placed. The Design-Builder shall be responsible for any and all deductibles under such insurance.

SC-6.06 Waiver of Rights

SC-6.06 Delete in their entirety Supplementary Conditions Paragraphs 6.06.B and 6.06.C and refer to the Standard General Conditions of the Contract Between Owner and Design-Builder.

9.04 *Claims Between Contractors*

SC-9.04 Delete the last sentence of Paragraph 9.04.B replace it with the following:

Should another contractor, not under the control of the Owner, cause damage to the Work or property of Design-Builder or should the performance of work by any other contractor, not under the control of the Owner, at the Site give rise to any other Claim, Design-Builder shall not institute any action, legal or equitable, against Owner or permit any action to be maintained and continued in its name or for its benefit in any court or before any arbiter which seeks to impose liability on or to recover damages from Owner on account of any such damage or Claim.

SC-9.04 Delete the first sentence of Paragraph 9.04.C replace it with the following:

If Design-Builder is delayed at any time in performing or furnishing Work by any act or negligence of another contractor, not under the control of the Owner, and Owner and Design-Builder are unable to agree as to the extent of any adjustment in Contract Times attributable thereto, Design-Builder may make a Claim for an extension of times in accordance with Article 11.

11.07 *Execution of Change Orders*

SC-11.07 Delete in its entirety Paragraph 11.07.B and replace it with the following:

B. Intentionally Omitted.

16.01 *Methods and Procedures*

SC-16.01 Amend subparagraph 16.01.F.2 by adding the following to the end of the sentence:

, or

SC-16.01 Add new subparagraph immediately after subparagraph 16.01.F.2:

3. agrees with the other party in writing to extend the time for commencing a claim in court or in another dispute resolution process.

Proposal Amendment
March 18, 2021

Proposal Amendment

To the AGREEMENT between HRSD and Ulliman Schutte-Alberici (US-A) Joint Venture
For the Design/Build of
GN016360 James River SWIFT Facility and JR013400 James River Treatment Plant Advanced Nutrient Reduction Improvements
Newport News, VA

Proposal Amendment includes the following:

1. The Summary of Negotiations itself, 2 pages
2. Revised pages of the Price Proposal Form, 1 page
3. Value Engineering Alternatives Summary Attachment A
4. Value Engineering Alternatives Concept Design Document Attachment B
5. Value Engineering Alternatives Concept Design Drawings Attachment C
6. Value Engineering Alternatives Preliminary CPM Schedule Attachment D
7. Value Engineering Alternatives Division 01 Requirements Supplement Attachment E
8. Ulliman Schutte – Alberici (US-A) Joint Venture Agreed Upon Deviations from Technical Proposal Attachment F

Summary of Negotiations

This provides a summary of the negotiations with the Design/Build team and documents the deviations from the-Conceptual Documents, Addenda No.1 through 8 and the Technical Proposal that have been incorporated into the revised Contract Cost Limit and comprehensive Agreement. Several meetings were held with the design/build team to review the scope of work and to make modifications to the scope of work to reduce the estimated cost.

Cost saving alternatives had been proposed by Ulliman Schutte-Alberici (US-A) Joint Venture (with HDR and Black and Veatch) within their Technical Proposal, which was submitted on August 6, 2020. The value of the cost savings associated with the Proposal Alternatives was submitted as part of the team's Price Proposal on October 2, 2020. The Proposal Alternatives are not considered as alternatives in this Proposal Amendment.

Additional value engineering (VE) alternatives were developed during the negotiation period between October 22, 2020 and March 17, 2021. Descriptions of only the selected Value Engineering Alternatives are included in the Value Engineering Alternatives Summary.

Value Engineering Alternatives that are to be incorporated and accepted into the Contract Cost Limit and the Agreement are:

- Alt 4A: Circular Secondary Clarifiers
- Alt 10A: SWIFT Process Building No. 1 and Chemical Building No. 1 Changes
- Alt 11A: SWIFT Process Building No. 2 Changes
- Alt 12A: UV Equipment Changes w/ Reduced Footprint

Included with this Proposal Amendment are Attachments A through F as follows; Attachment A summarizes the scope and cost of the alternatives, Attachment B and C provide the conceptual design for the alternatives, Attachment D provides the updated preliminary CPM schedule associated with the alternatives, Attachment E provides the changes to Division 01 associated with the alternatives and Attachment F is the agreed upon deviations to the Technical Proposal.

HRSD requested that US-A provide a revised Contract Cost Limit based on the included Value Engineering Alternatives. US-A provided a revised Price Proposal Form (included in this Proposal Amendment) to document the agreed to revised Contract Cost Limit for the Agreement. The revised Contract Cost Limit table reflects a cost savings associated with the alternatives listed.

Revised construction Cost Limit (CCL)

James River SWIFT Facility (GN016360)		
Item No.	Item Description	Price
A	Design Services	$ 13,927,850
B	Builder Support During Design	$ 2,172,604
C	Engineering Services During Construction	$ 8,139,655
D	General Requirements, Bonds, Insurance, Mobilization, Demobilization	$ 28,034,507
E	Construction[1]	$ 177,506,773
F	Overhead and Profit: 9.5%	$ 21,829,232
G	Allowance: Chemical Purchase for Process Startup	$ 100,000
CONTRACT COST LIMIT (CCL): Sum of Items A-G		251,710,621

1. Exclusive of ‘G’.

James River Treatment Plant Advanced Nutrient Reduction Improvements (JR013400)		
Item No.	Item Description	Price
A	Design Services	$ 10,461,997
B	Builder Support During Design	$ 2,114,184
C	Engineering Services During Construction	$ 6,870,450
D	General Requirements, Bonds, Insurance, Mobilization, Demobilization	$ 23,129,745
E	Construction[1]	$ 149,392,486
F	Administration and Maintenance Building Construction[2]	$ 5,531,063
G	Overhead and Profit: 9.5%	$ 18,762,493
H	Allowance: Chemical Purchase for Process Startup	$ 100,000
CONTRACT COST LIMIT (CCL): Sum of Items A-H		$ 216,362,418

1. Exclusive of ‘F’ and ‘H’.
2. Inclusive of any Work within and attached to the structure; do not include site work.

Attachment A

Alternative-4A
Circular Secondary Clarifier

James River Swift Facility (GN016360) and James River Treatment Plant
Advanced Nutrient Reduction Improvements (JR013400)

US-A
Ulliman Schutte – Alberici Joint Venture

Date: **January 12, 2021**

JAMES RIVER SWIFT FACILITY and
JAMES RIVER TREATMENT PLANT ADVANCED NUTRIENT REDUCTION IMPROVEMENTS
CIP No. GN016360 and JR013400
VALUE ENGINEERING ALTERNATIVES

Value Engineering Number: 4A Circular Secondary Clarifiers

DESCRIPTION OF CHANGES

Install two new 130' diameter circular clarifiers, retrofit existing Secondary Clarifier No. 5, delete Chemical Building No. 2, delete Interim Electric Facility, delete Junction / Splitter Box attached to the Chlorine Contact Tanks, relocate the MBBR to SWIFT site, eliminate MBBR elevator, simplify MBBR layout, construct new 21-mgd MBBR Influent Pump Station (replaces the SWIFT Influent PS) with Junction/Splitter Box, new SWIFT Influent Equalization Tank at SWIFT site, new Well Backflush Equalization Tank at SWIFT site, new IFAS pumped drain system, existing sodium hypochlorite and sodium bisulfite facilities to remain with new feed systems and provides all associated modifications to the site and related facilities. The New Administration and Maintenance Building footprint will be increased to accommodate a larger laboratory. Temporary pumping is included to accommodate MBBR and SWIFT startup to meet the revised Project Substantial Completion Date.

SUPPLEMENT TO HRSD PROPOSAL DOCUMENTS DATED APRIL 2020, VOLUME 1 OF 3

1. Value Engineering Alternatives Division 01 Requirements Supplement Attachment E.

SUPPLEMENT TO HRSD PROPOSAL DOCUMENTS DATED APRIL 2020, VOLUME 2 OF 3

1. Value Engineering Alternatives Concept Design Document Attachment B.
2. Value Engineering Alternatives Concept Design Drawings Attachment C.

SUPPLEMENT TO HRSD PROPOSAL DOCUMENTS DATED APRIL 2020, VOLUME 3 OF 3

1. No change.

CHANGES TO PROJECT SCHEDULE

1. Refer to Preliminary CPM Schedule Attachment D.

REFERENCE TO THE PRICE PROPOSAL ADJUSTMENTS:

James River SWIFT Facility (GN016360)		
Item No.	**Item Description**	**Price**
A	Design Services	$50,000
B	Builder Support During Design	$101,391
C	Engineering Services During Construction	$0
D	General Requirements, Bonds, Insurance, Mobilization, Demobilization	$158,564
E	Construction	$6,015,460
F	Overhead and Profit: 9.5%	$600,915
G	Allowance: Chemical Purchase for Process Startup	$0
CONTRACT COST LIMIT (CCL) ADJUSTMENT: Sum of Items A-G		**$6,926,330**

James River Treatment Plant Advanced Nutrient Reduction Improvements (JR013400)		
Item No.	**Item Description**	**Price**
A	Design Services	$350,000
B	Builder Support During Design	$97,434
C	Engineering Services During Construction	$0
D	General Requirements, Bonds, Insurance, Mobilization, Demobilization	($946,255)
E	Construction	($16,600,021)
F	Administration and Maintenance Building	$443,250
G	Overhead and Profit: 9.5%	($1,582,281)
H	Allowance: Chemical Purchase for Process Startup	$0
CONTRACT COST LIMIT (CCL) ADJUSTMENT: Sum of Items A-H		**($18,237,873)**

SUMMARY OF ADVANTAGES AND DISADVANTAGES

1. Advantages
   a. Site utilization allows the existing Administration Building, Sodium Hypochlorite Storage and Feed Facility, and Sodium Bisulfite Storage and Feed Facility to remain and eliminates interim electrical facilities all providing a cost savings.
   b. MBBR relocation to the SWIFT site area allows the facility to be constructed above grade providing a cost savings.
   c. Circular secondary clarifier equipment is similar to other HRSD plants. HRSD's familiarity with the circular secondary clarifier equipment will improve operability and maintainability, and subsequently system reliability. Circular tank equipment also requires less O&M cost as compared to rectangular tank equipment.
2. Disadvantages
   a. MBBR Influent Pump Station rated capacity will be approximately 25 percent higher than the SWIFT Influent Pump Station proposed in the BODR.

Attachment A

Alternative-10A
Mods to SWIFT Process Building No. 1 and Chemical Building No. 1

James River Swift Facility (GN016360) and James River Treatment Plant Advanced Nutrient Reduction Improvements (JR013400)

Ulliman Schutte – Alberici Joint Venture

Date: January 12, 2021

JAMES RIVER SWIFT FACILITY and
JAMES RIVER TREATMENT PLANT ADVANCED NUTRIENT REDUCTION IMPROVEMENTS
CIP No. GN016360 and JR013400
VALUE ENGINEERING ALTERNATIVES

Value Engineering Number: 10A SWIFT Process Building No. 1 and Chemical Building No. 1 Changes

DESCRIPTION OF CHANGES

Delete Chemical Building 1 and relocate Chemical Storage and Feed to SWIFT Process Buildings 1 & 2. Eliminate the superstructure above Flocculation/Sedimentation Tanks and provide a canopy. Eliminate enclosed stair towers at SWIFT Process Building 1 and provide exterior metal staircases. Reconfigure SWIFT Process Building 1 to incorporate chemical storage. Furnish pipe supports at interior, dry SWIFT Process Building 1&2 locations as hot dip galvanized. Rotate SWIFT Process Building 2 to improve chemical systems access. Deletion of Chemical Building 1 is required to accommodate the revised site layout of those alternatives in 4A.

SUPPLEMENT TO HRSD PROPOSAL DOCUMENTS DATED APRIL 2020, VOLUME 1 OF 3

1. Value Engineering Alternatives Division 01 Requirements Supplement Attachment E.

SUPPLEMENT TO HRSD PROPOSAL DOCUMENTS DATED APRIL 2020, VOLUME 2 OF 3

1. Value Engineering Alternatives Concept Design Document Attachment B.
2. Value Engineering Alternatives Concept Design Drawings Attachment C.

SUPPLEMENT TO HRSD PROPOSAL DOCUMENTS DATED APRIL 2020, VOLUME 3 OF 3

1. No change.

CHANGES TO PROJECT SCHEDULE

1. Refer to Preliminary CPM Schedule Attachment D.

REFERENCE TO THE PRICE PROPOSAL ADJUSTMENTS:

James River SWIFT Facility (GN016360)		
Item No.	**Item Description**	**Price**
A	Design Services	$816,900
B	Builder Support During Design	$0
C	Engineering Services During Construction	$0
D	General Requirements, Bonds, Insurance, Mobilization, Demobilization	($175,530)
E	Construction	($6,034,973)
F	Overhead and Profit: 9.5%	($512,392)
G	Allowance: Chemical Purchase for Process Startup	$0
CONTRACT COST LIMIT (CCL) ADJUSTMENT: Sum of Items A-G		**($5,905,995)**

James River Treatment Plant Advanced Nutrient Reduction Improvements (JR013400)		
Item No.	**Item Description**	**Price**
A	Design Services	$0
B	Builder Support During Design	$0
C	Engineering Services During Construction	$0
D	General Requirements, Bonds, Insurance, Mobilization, Demobilization	$0
E	Construction	$0
F	Administration and Maintenance Building	$0
G	Overhead and Profit: 9.5%	$0
H	Allowance: Chemical Purchase for Process Startup	$0
CONTRACT COST LIMIT (CCL) ADJUSTMENT: Sum of Items A-H		**$0**

SUMMARY OF ADVANTAGES AND DISADVANTAGES

1. Advantages
    a. Construction cost reduction.
    b. Accommodates relocation of MBBR which offers cost reduction.
    c. Energy costs reduction with elimination of enclosed spaces.
    d. Carbon footprint reduction with less construction materials.
    e. Maintenance costs reduction due to less equipment and chemical piping.
    f. Use of free chlorine residual allows deletion of preformed chloramine and a water softening storage tank.
2. Disadvantages
    a. Outdoor storage tanks require stormwater control.
    b. Potential for algae growth in Flocculation/Sedimentation may increase with a canopy.
    c. Increase design cost for facility changes.

Attachment A

Alternative-11A
Mods to SWIFT Process Building No. 2

James River Swift Facility (GN016360) and James River Treatment Plant Advanced Nutrient Reduction Improvements (JR013400)

Ulliman Schutte – Alberici Joint Venture

Date: **January 12, 2021**

JAMES RIVER SWIFT FACILITY and
JAMES RIVER TREATMENT PLANT ADVANCED NUTRIENT REDUCTION IMPROVEMENTS
CIP No. GN016360 and JR013400
VALUE ENGINEERING ALTERNATIVES

Value Engineering Number: 11A SWIFT Process Building No. 2 Changes

DESCRIPTION OF CHANGES

SWIFT Process Building No. 2 changes including elimination of superstructure above Biological Filters and replace with a canopy. Includes provisions for future propane addition at Biological Filters.

SUPPLEMENT TO HRSD PROPOSAL DOCUMENTS DATED APRIL 2020, VOLUME 1 OF 3

1. Value Engineering Alternatives Division 01 Requirements Supplement Attachment E.

SUPPLEMENT TO HRSD PROPOSAL DOCUMENTS DATED APRIL 2020, VOLUME 2 OF 3

1. Value Engineering Alternatives Concept Design Document Attachment B.
2. Value Engineering Alternatives Concept Design Drawings Attachment C.

CHANGES TO HRSD PROPOSAL DOCUMENTS DATED APRIL 2020, VOLUME 3 OF 3

1. No change.

CHANGES TO PROJECT SCHEDULE

1. Refer to Preliminary CPM Schedule Attachment D.

REFERENCE TO THE PRICE PROPOSAL ADJUSTMENTS:

James River SWIFT Facility (GN016360)		
Item No.	**Item Description**	**Price**
A	Design Services	$79,000
B	Builder Support During Design	$0
C	Engineering Services During Construction	$0
D	General Requirements, Bonds, Insurance, Mobilization, Demobilization	($2,257)
E	Construction	($175,301)
F	Overhead and Profit: 9.5%	($9,363)
G	Allowance: Chemical Purchase for Process Startup	$0
CONTRACT COST LIMIT (CCL) ADJUSTMENT: Sum of Items A-G		**($107,921)**

James River Treatment Plant Advanced Nutrient Reduction Improvements (JR013400)		
Item No.	**Item Description**	**Price**
A	Design Services	$0
B	Builder Support During Design	$0
C	Engineering Services During Construction	$0
D	General Requirements, Bonds, Insurance, Mobilization, Demobilization	$0
E	Construction	$0
F	Administration and Maintenance Building	$0
G	Overhead and Profit: 9.5%	$0
H	Allowance: Chemical Purchase for Process Startup	$0
CONTRACT COST LIMIT (CCL) ADJUSTMENT: Sum of Items A-H		**$0**

SUMMARY OF ADVANTAGES AND DISADVANTAGES

1. Advantages
   a. Construction cost reduction.
   b. Energy costs reduction with elimination of enclosed spaces.
   c. Carbon footprint reduction with less construction materials.
   d. Facilitates future addition of propane feed system.

2. Disadvantages
   a. Potential for algae growth may slightly increase with canopy usage over BAF.
   b. Increase design cost for facility changes.

Attachment A

Alternative-12A UV Equipment Changes with Reduced Footprint

James River Swift Facility (GN016360) and James River Treatment Plant Advanced Nutrient Reduction Improvements (JR013400)

Ulliman Schutte – Alberici Joint Venture

Date: **December 30, 2020**

JAMES RIVER SWIFT FACILITY and
JAMES RIVER TREATMENT PLANT ADVANCED NUTRIENT REDUCTION IMPROVEMENTS
CIP No. GN016360 and JR013400
VALUE ENGINEERING ALTERNATIVES

Value Engineering Number: 12A UV Equipment Changes w/ Reduced Footprint

<u>DESCRIPTION OF CHANGES</u>
SWIFT Process Building No. 2 changes include elimination of UV-AOP requirements, reduction in the number of UV reactors from 3 to 2, and the UV reactors furnished based on 4-log virus inactivation with 1 unit in standby. These changes accommodate building footprint reduction. The chloramine mixer, enclosed fire-rated stairwell, UV effluent channel baffle walls, and elevator are all removed as part of this alternative.

<u>SUPPLEMENT TO HRSD PROPOSAL DOCUMENTS DATED APRIL 2020, VOLUME 1 OF 3</u>
1. Value Engineering Alternatives Division 01 Requirements Supplement Attachment E.

<u>SUPPLEMENT TO HRSD PROPOSAL DOCUMENTS DATED APRIL 2020, VOLUME 2 OF 3</u>
1. Value Engineering Alternatives Concept Design Document Attachment B.
2. Value Engineering Alternatives Concept Design Drawings Attachment C.

<u>CHANGES TO HRSD PROPOSAL DOCUMENTS DATED APRIL 2020, VOLUME 3 OF 3</u>
1. No change.

<u>CHANGES TO PROJECT SCHEDULE</u>
1. Refer to Preliminary CPM Schedule Attachment D.

REFERENCE TO THE PRICE PROPOSAL ADJUSTMENTS:

James River SWIFT Facility (GN016360)		
Item No.	**Item Description**	**Price**
A	Design Services	$252,400
B	Builder Support During Design	$0
C	Engineering Services During Construction	($1,025)
D	General Requirements, Bonds, Insurance, Mobilization, Demobilization	($58,740)
E	Construction	($2,695,850)
F	Overhead and Profit: 9.5%	($237,805)
G	Allowance: Chemical Purchase for Process Startup	$0
CONTRACT COST LIMIT (CCL) ADJUSTMENT: Sum of Items A-G		**($2,741,020)**

James River Treatment Plant Advanced Nutrient Reduction Improvements (JR013400)		
Item No.	**Item Description**	**Price**
A	Design Services	$0
B	Builder Support During Design	$0
C	Engineering Services During Construction	$0
D	General Requirements, Bonds, Insurance, Mobilization, Demobilization	$0
E	Construction	$0
F	Administration and Maintenance Building	$0
G	Overhead and Profit: 9.5%	$0
H	Allowance: Chemical Purchase for Process Startup	$0
CONTRACT COST LIMIT (CCL) ADJUSTMENT: Sum of Items A-H		**$0**

SUMMARY OF ADVANTAGES AND DISADVANTAGES

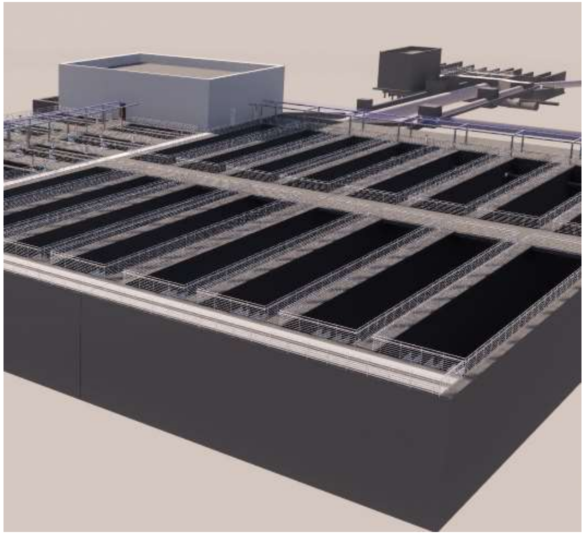
1. Advantages
   a. Construction cost reduction.
   b. O&M cost reduction of over 50%.
   c. Carbon footprint reduction with less construction materials and operational energy.
   d. Chemical systems removed as a result of HRSD's process changes.

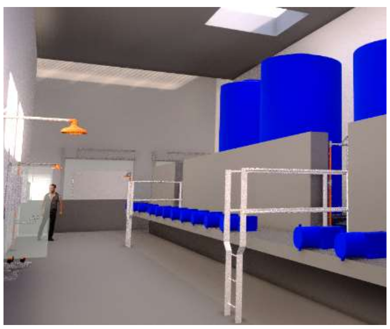
2. Disadvantages
   a. Relies on BAF for primary NDMA removal, partial capacity for NDMA removal in the UV system is maintained.
   b. Increase design cost for facility changes.

Attachment B

Value Engineering Alternative Concept Design Narrative

James River Swift Facility (GN016360) and James River Treatment Plant Advanced Nutrient Reduction Improvements (JR013400)





James River Treatment Plant Advanced Nutrient Reduction Improvements (CIP No. JR013400)
and
James River SWIFT Facility (CIP No. GN016360)
Value Engineering Alternatives Concept Design

Prepared for:

Hampton Roads Sanitation District

HRSD swift

Value Engineering Alternatives Included:
ANRI VE ALT No. 4A – Circular Secondary Clarifiers
SWIFT VE ALT No. 10A – SPB No. 1 & Chem Building No. 1 Changes
SWIFT VE ALT No. 11A – SPB No. 2 Changes
SWIFT VE ALT No. 12A – UV Equipment Changes w/ Reduced Footprint

DOCUMENT INTENT AND ORGANIZATION

Summary

The Ulliman Schutte-Alberici Joint Venture team (US-A) submitted a proposal for the James River SWIFT and Advanced Nutrient Reduction Improvement (ANRI) projects that was accepted by HRSD on October 2, 2020. The proposal required two separate submittals: Technical Proposal and a Price Proposal. The proposers were encouraged to include in the proposal alternative design and construction concepts in the Technical Proposal, the Price Proposal was to include add or deducts for the scope of work alternatives.

US-A's Technical Proposal identified potential alternatives, none-of which were selected for the revised Price Proposal. Following discussions and negotiations with HRSD four alternatives were selected that include:

- 4A Circular Secondary Clarifiers
- 10A SWIFT Process Building No. 1 and Chemical Building No. 1 Changes
- 11A SWIFT Process Building No. 2 Changes
- 12A UV Equipment Changes w/ Reduced Footprint

The change in scope required deletions and additions to the conceptual design outlined in the Basis of Design Report (BODR). In order to maintain the BODR as defined in the proposal documents the Value Engineering Alternatives Concept Document was developed.

Value Engineering Alternatives Concept Document Intent

The Intent of the JRTP ANRI (CIP No. JR013400) and JR SWIFT Facility (CIP No. GN016360) Value Engineering Alternatives Concept Document is to establish the design and other technical concepts sufficient to convey the design intent and to support the Design-Builder's development of its Price Proposal for the alternatives. The design requirements within this document are not intended to be inclusive of all of the design information and details needed to complete the work for the alternative design and construction concepts.

Value Engineering Alternatives Concept Design Document Format

HRSD, US-A and Program Management Team collaborated on finalizing the scope for the alternatives accepted by HRSD. The BODR was edited to capture the mutually agreed upon scope changes for the accepted alternatives. Specifically, the Value Engineering Concept Design Document was developed as follows:

- BODR concepts and information not changed are referenced in the document
- All changed language is highlighted (grey)
- BODR deletions are struck out and

- new language is bold and underlined and
- In order to provide clarity when applicable BODR language was included with the changed language

The Value Engineering Alternatives Concept Document includes a table of contents that provides the BODR contents and the updated sections of the Value Engineering Alternatives. Also listed in the table of contents is a list of the BODR appendices. The appendices were not updated for the Design-Builder Value Engineering Alternatives. The appendices will be updated during the design phase and will be revised to comply with the functional and design intent requirements of the Conceptual Documents.

Not all modifications to the Contract Documents via Addendum issued during the procurement phase have been incorporated into this document. It is the responsibility of the Design-Builder to incorporate the Addendum changes into the Contract Documents.

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Acronyms and Abbreviations

μg/L	micrograms per liter
°C	degrees Celsius
°F	degrees Fahrenheit
μS/cm	micro-Siemens per centimeter
AA	Average Annual
AASHTO	American Association of State Highway and Transportation Officials
ACH	aluminum chlorohydrate
ACI	American Concrete Institute
ADA	Americans with Disabilities Act
ADM	Aluminum Design Manual
AHJ	Authority Having Jurisdiction
AHU	air handling unit
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANRI	Advanced Nutrient Reduction Improvements
ANSI	American National Standards Institute
AOP	advanced oxidation
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning
ASPE	American Society of Plumbing Engineers
ASTM	ASTM International
ATS	automatic transfer switch
AWS	American Welding Society
AWT	advanced water treatment
AWWA	American Water Works Association
bgs	below ground surface
BODR	Basis of Design Report
$CaCO_3$	calcium carbonate
CCP	Critical Control Point
CCT	Chlorine Contact Tank
cf	cubic feet
CFD	computational fluid dynamics
cfm	cubic feet per minute
CFR	Code of Federal Regulations
CIP	Capital Improvement Program
City	City of Newport News
Cl	chlorine
CMS	combination motor starter
CMU	concrete masonry unit
COD	chemical oxygen demand
COP	Critical Operating Point
CPVC	chlorinated polyvinyl chloride
CUP	Conditional Use Permit
db	dry bulb
DCS	Distributed Control System
DCU	Distributed Control Unit
DHS	Department of Homeland Security
DL	dead load
DX	direct expansion
EBCT	empty bed contact time
EDS	Enterprise Data Server
EWRI	Environmental and Water Resources Institute
EWS	Engineer Work Station
f'c	compressive strength of concrete
f'm	compressive strength of masonry
fbg	feet below grade
FC	foot candles
FCV	flow control valve
FDN	full denitrification
FE/FIT	flow element and flow-indicating transmitter
FEMA	Federal Emergency Management Agency
FFE	finished floor elevation
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FRP	fiberglass reinforced plastic
FSIP	Full-Scale Implementation Program
ft/s	feet per second
ft^2	square feet
FWIS	Fish and Wildlife Information Service
$g/m^2/d$	grams per meter squared per day
GAC	granular activated carbon

gph	gallons per hour
gpm	gallons per minute
GSP	gravity thickener supernatant
G-value	velocity gradient
HACCP	Hazard Analysis and Critical Control Point
HDPE	high density polyethylene
HGL	hydraulic grade line
HI	Hydraulic Institute
hp	horse power
HRSD	Hampton Roads Sanitation District
HVAC	heating, ventilation, and air conditioning
HW	hot water
Hz	hertz
I&C	instrumentation and control
I/O	input / output
IBC	International Building Code
ICC	International Code Council
ICEA	Insulated Cable Engineers Association
IEEE	Institute of Electrical and Electronic Engineers
IESNA	Illuminating Engineering Society of North America
IFAS	integrated fixed-film activated sludge
IFC	International Fire Code
IFM	influent force main
IP	internet protocol
IPC	International Plumbing Code
ISA	International Society of Automation
IT	Information Technology
JR	James River
JR SWIFT	James River SWIFT Facility
JRTP	James River Treatment Plant
kg	kilogram
kV	kilovolt
kVA	kilovolt amperes
kW	kilowatt
LAS	liquid ammonium sulfate
lb	pound(s)
LED	light-emitting diode
LOX	liquid oxygen
LPHO	low pressure high output
LRV	Log Removal Value
mA	milliamp
MBBR	moving bed biofilm reactor
MCC	motor control center
MD	Maximum Day
MERV	Minimum Efficiency Reporting Value
mg	milligram
MG	(NEMA) Motors and Generators
mg N/L FDN	milligrams per nitrogen per liter full denitrification
mg/L	milligrams per liter
mgd	million gallons per day
mJ/cm^2	millijoule per square centimeter
MLSS	mixed-liquor suspended solids
mM	micron
MM	Maximum Month
MOCP	main ozone control panel
MOP	Manual of Practice
MOPO	Maintenance of Plant Operations
MVA	mega volt ampere
MVSWGR	medium voltage switchgear
MW	Maximum Week
N/A	not applicable
N/L	nitrogen per liter
NAVD88	North American Vertical Datum of 1988
NDL	No Dollar Limit
NDMA	N-nitrosodimethylamine
NEC	National Electrical Code (NFPA 70)
NEMA	National Electrical Manufacturers Association
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
NG	natural gas
NH2CL	Monochloramine
NH_3	ammonia
NH_3-N	ammonia-nitrogen
nm	nanometers
NNWW	City of Newport News Waterworks
NOx	nitrogen oxides
NPW	non-potable water

NSF	NSF International
NTU	nephelometric turbidity unit
O&M	operations and maintenance
oc	on center
OHE	overhead electrical
OIS	Operator Interface Station
OP	orthophosphate
OSHA	Occupational Safety and Health Administration
P	phosphorus
P&ID	piping and instrumentation diagram
PCB	polychlorinated biphenyl
pcf	pounds per cubic foot
PCI	Precast/Prestressed Concrete Institute
PdN-A	partial denitrification with anammox
PJD	Preliminary Jurisdictional Determination
PLC	Programable Logic Computer
POR	Preferred Operated Region
PPCP	precast prestressed concrete piles
PPE	personal protective equipment
ppmv	parts per million by volume
PPV	peak particle velocity
psf	pound-force per square foot
psi	pounds per square inch
psig	pounds per square in gauge
PVC	polyvinyl chloride
PVDF	polyvinylidene fluoride or polyvinylidene difluoride
RAS	return activated sludge
RD	roof drain
RFP	Request for Proposals
RHW	recirculating hot water
RIO	remote I/O
RMA	Resource Management Area
ROD	roof overflow drain
RPA	Resource Protection Area
rpm	revolutions per minute
RTW	recirculating tempered water
s	second
SCADA	Supervisory Control and Data Acquisition
SCFM	standard cubic feet per minute
SES	settled effluent solids
SIP	Sustainability Implementation Plan
SNPW	SWIFT non-potable water
SOV	Schedule of Values
SRT	solids retention time
SSI	sidestream injection
SVI	sludge volume index
SWGR	switchgear
SWIFT	Sustainable Water Initiative for Tomorrow
TBD	to be determined
TC	tray cable
TDH	Total Dynamic Head
TEFC	totally enclosed, fan-cooled
TIN	total inorganic nitrogen
TKN	total Kjeldahl nitrogen
TOC	total organic carbon
TP	total phosphorus
TS	total solids
TSS	total suspended solids
TSS/L	total suspended solids per liter
TW	tempered water
UFC	Unified Facilities Criteria
UL	Underwriters Laboratories
UP	unit process
UPS	uninterruptible power supply
USACE	U.S. Army Corps of Engineers
USB	universal serial bus
USBC	Uniform Statewide Building Code
USFWS	U.S. Fish & Wildlife Service
UV	ultraviolet
UVDGM	UV Disinfection Guidance Manual
UVT	UV transmittance
UW	utility water
VAC	Virginia Administrative Code
VAV	variable air volume
VCC	Virginia Construction Code
VDEQ	Virginia Department of Environmental Quality
VDH	Virginia Department of Health
VDOT	Virginia Department of Transportation
VEBC	Virginia Existing Building Code

VECC	Virginia Energy Conservation Code
VESCH	Virginia Erosion and Sediment Control Handbook
VFD	variable frequency drive
VIP	Virginia Initiative Plant
VSFP	Virginia Statewide Fire Prevention Code
W1	potable
W2	non-potable
WAS	waste-activated sludge
wb	wet bulb
WCLT	Witness Combined Loop Test
WIFIA	Water Infrastructure Finance and Information Act
WQIF	Water Quality Improvement Fund
WSEL	water surface elevation
WWTP	wastewater treatment plant

1. Common Project Elements

1.1 Introduction

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.1.1 Charter of the Combined Design-Build Project

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.1.2 Project Components

The Work described in this BODR consists of two projects that will be completed by a single Design-Builder—the JRTP ANRI project (CIP No. JR013400) and the JR SWIFT project (CIP No. GN016360). The Design-Builder shall maintain separate Schedules of Values (SOVs) and invoicing balances for each project.

The projects consist of the following components:

- JRTP ANRI (CIP No. JR013400):
    - Facilities and equipment associated with treating wastewater such as secondary clarifiers, integrated fixed-film activated sludge (IFAS) basin effluent channels, and a moving bed biofilm reactor (MBBR)
    - ~~New JRTP Chemical Building (Chemical Building No. 2)~~ *{ANRI VE Alt No. 4A}*
    - Piping and facility interconnections associated with conveying wastewater to the Chlorine Contact Tanks (CCTs) and outfall
    - Related electrical improvements including the new Main Electrical Building, Electrical Building No. 2, and the permanent backup power system that serves the combined JRTP ANRI and JR SWIFT projects)
    - ANRI-related Distributed Control System (DCS) and instrumentation improvements
    - New Administration/Maintenance Building
    - Temporary and permanent incoming services from Dominion Energy
    - Temporary/interim facilities needed to support maintenance of plant operations during construction~~, including backup power~~ *{ANRI VE Alt No. 4A}*
    - Associated site/civil improvements
- JR SWIFT (CIP No. GN016360):
    - SWIFT Influent Equalization (EQ) Facilities **shall be a new equalization tank** ~~(shown as existing Secondary Clarifier 5 retrofit)~~ *{ANRI VE Alt No. 4A}*
    - New SWIFT AWT facilities such as the ~~SWIFT~~ **MBBR** *{ANRI VE Alt No. 4A}* Influent Pump Station; SWIFT Process Building No. 1, which includes rapid mix, flocculation,

sedimentation, and ozone-advanced oxidation facilities; SWIFT Process Building No. 2, which includes biofilters, granular activated carbon [GAC], and ultraviolet-~~advanced oxidation~~ (UV~~-AOP~~) **disinfection** facilities *{SWIFT VE Alt No. 12A}*; and SWIFT Water Pump Station

- ~~New SWIFT Chemical Building (Chemical Building No. 1)~~ **New SWIFT Chemical Facilities to be incorporated into SWIFT Process Buildings No. 1 and 2** *{SWIFT VE Alt No. 10A}*
- Recharge Well Buildings (10 total), including related control valves and backflush pumps
- Recharge Well Backflush Equalization Facilities **shall be a new equalization tank** ~~(shown as an existing Secondary Clarifier 4 retrofit)~~ *{ANRI VE Alt No. 4A}*
- SWIFT-related DCS and instrumentation improvements
- SWIFT-related electrical improvements
- Piping and facility interconnections associated with conveying water to and from SWIFT facilities and recharge wells
- Associated site/civil improvements

1.1.3 Basis of Design Report Organization

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.1.4 Conceptual Documents Approach and Purpose

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.2 Site/Civil Requirements

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.2.1 Existing Site Conditions

1.2.1.1 General Description of Properties

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Figure 1-1: Properties affected by the Project
[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.2.1.1.1 James River Treatment Plant Property

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.2.1.1.2 JR SWIFT Property

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.2.1.1.3 Riverview Farm Park Property – HRSD Purchase

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.2.1.2 Easements

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.2.1.3 Zoning

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.2.1.4 Topographic Survey

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.2.1.5 Asbestos-Containing Material, Lead-Based Paint, and Polychlorinated Biphenyls

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.2.1.6 Floodplain

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Figure 1-2: Excerpt of FEMA FIRM Number 5101030108D, panels 108D and 109D
[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.2.1.7 Phase I Environmental Site Assessment

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.2.1.8 Historic and Archaeological Resources

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.2.1.9 Waters of the United States

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.2.1.10 Chesapeake Bay Preservation Act

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.2.1.11 Federally Protected Species

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.2.1.11.1 Plant Access and Vehicle Entry Control

HRSD's acquisition of the Riverview Farm Park property will require relocating perimeter security facilities and vehicle entry control operations and extending the plant access roadway. The Design-Builder shall develop a plant access and vehicle entry control plan for HRSD's approval that incorporates a reconfiguration of the intersection of City Farm Road and the Riverview Farm Park property access road.

The Design-Builder shall consider the following in the plan:

- JRTP site access road and control shall be dedicated to HRSD vehicles and staff only and relocated by the Design-Builder if necessary to facilitate construction.
- Plant traffic is estimated to be approximately 150 passenger vehicle trips per day and up to 10 service vehicles per day, including AASHTO WB-62 standard trucks, which are used for chemical deliveries and solids handling removal.
- As shown on BODR **except where superseded by the Value Engineering Alternatives Concept Design drawings as applicable** C206 and C207, the primary JRTP utility corridor includes the existing JRTP access road, a transition buffer to the fence line, and property that is being acquired. Any construction in the utility corridor requires coordination for maintenance-of-plant access as well as relocation of existing utilities.
    - Existing utilities in the utility corridor that may require relocation are a 42-inch influent force main (IFM), an 8-inch potable waterline, Verizon communications handholes and fiber, and the overhead primary electrical power supply line.
    - New utilities proposed within the utility corridor include five new JR SWIFT process pipelines, a new potable waterline, telecommunications ductbank, interim power, and permanent power.

- The Design-Builder must allow continuous access to the JRTP, Gymnastics Center, and Visitor Center throughout construction while performing the required improvements/utility relocations impacting access to these facilities. The new Gymnastics Center access road shown on the BODR **except where superseded by the Value Engineering Alternatives Concept Design drawings as applicable** shall be constructed to avoid disrupting access. Temporary access roads to the Gymnastics Center will not be allowed.

1.2.1.12 Site Layout Requirements

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.2.1.13 Stormwater Improvements

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.2.1.14 Sewer Improvements

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.2.1.15 Potable Water Improvements

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.2.1.16 Site Power Improvements

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.2.1.16.1 Temporary/Interim Electrical Service

The existing electrical service is delivered via pole-mounted overhead electrical (OHE) lines that are parallel to the northern edge of City Farm Road. This alignment conflicts with the proposed new utility work and must be moved temporarily until the new permanent service is constructed. ~~A potential location for the relocated temporary/interim service is within the proposed utility corridor north of the existing plant entrance gate.~~ *{ANRI VE Alt No. 4A}*

1.2.1.17 Natural Gas Service

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.2.1.18 Other Utility Improvements and Coordination

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.2.1.19 Earthwork

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 1-1: Final Grade Requirements [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Item	Required Slope

1.2.1.20 Fencing

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.2.1.21 Screening

Screening shall feature a transitional buffer where designated on the BODR **except where superseded by the Value Engineering Alternatives Concept Design drawings as applicable**. If desired, the Design-Builder may replace any existing berm material that must be removed for construction with suitable excavation, but it is not required.

Screening between the JRTP, JR SWIFT and residential properties, the Gymnastics Center, and other portions of the Riverview Farm Park shall be constructed in accordance with the following regulations and standards:

- City of Newport News Code of Ordinances Chapter 45, Article XXXIII, Section 45-2802, Modifications to Yard Regulations
- *HRSD Design and Construction Standards*

1.2.1.22 Paving, Curbs, and Sidewalks

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.2.1.22.1 Pavement

Asphalt and concrete pavement are required as shown on the BODR **except where superseded by the Value Engineering Alternatives Concept Design drawings as applicable**, and widths and radii shall be incorporated to accommodate HRSD operational requirements along with all other requirements.

Concrete paving in accordance with NFPA 55 is required at the southwestern corner of the proposed JR SWIFT facilities around the liquid oxygen (LOX) storage area.

Asphalt and concrete paving shall be designed and constructed considering on-site subgrade properties to accommodate HS-20 vehicle loading and in accordance with the following specifications and standards:

- 2016 VDOT Road and Bridge Specifications
- City of Newport News Design Criteria Manual

Gravel is acceptable for the roads to the off-site recharge wells, but the Design-Builder must design the gravel roads such that they will support the fire apparatus.

1.2.1.22.2 Curb and Sidewalks

Curb and gutter shall be installed only where required by the City or for design and containment reasons. Sidewalks shall be a minimum of 3 feet wide at the locations detailed on the BODR **except where superseded by the Value Engineering Alternative Concept Design drawings as applicable**. The Design-Builder shall provide sidewalks that support loadings, particularly from a subgrade compaction standpoint, for plant maintenance equipment traversing the sidewalks.

Curb, gutter, and sidewalks shall be designed and constructed in accordance with the following standards, regulations, and specifications:

- *HRSD Design and Construction Standards*
- City of Newport News Code of Ordinances
- 2016 VDOT Road and Bridge Specifications

If there are conflicts with above standards, the most stringent standard shall apply.

1.2.1.23 Flood Elevation Requirements

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.2.1.24 Landscaping

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.2.1.25 Site Signage

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.2.2 Permitting

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.3 Structural and Geotechnical

1.3.1 Structural Basis of Design

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.3.2 Geotechnical Basis of Design

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.3.3 Codes, Standards, and References

1.3.3.1 Governing Code

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.3.3.2 Supplemental Codes

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.3.3.3 Codes and Standards for Specific Materials

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.3.3.3.1 All Materials

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.3.3.3.2 Concrete

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.3.3.3.3 Masonry

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.3.3.3.4 Steel

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.3.3.3.5 Stainless Steel

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.3.3.3.6 Aluminum

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.3.3.3.7 Fiberglass Reinforced Plastic

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.3.3.4 References

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.3.4 Design Loads

1.3.4.1 Dead Loads

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 1-2: Dead Loads [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Material	Dead Load

1.3.4.2 Live Loads

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 1-3: Live Loads [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Area	Live Load

1.3.4.3 Equipment Loads

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.3.4.4 Piping Loads

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.3.4.5 HVAC, Ducts, Plumbing, and Electrical Raceway Loads

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.3.4.6 Process Liquid Loads

Wastewater and SWIFT liquids loads shall be based on ~~a density of 70 and 63 pcf respectively~~ **standard engineering practices to be defined by the Design-Builder** *{ANRI VE Alt No. 4A}*. For liquids in chemical storage tanks, the specific density of the stored chemical shall be used. Wastewater and SWIFT process liquids and chemical loads shall be calculated for the greater of the following two scenarios:

- Liquid surface at normal maximum operating level or, where applicable, at the design overflow level where overflow is controlled (such as at overflow pipes or weirs). For these conditions, normal allowable stresses shall be used if using the working stress design method, or the load factor for dead loads (including the environmental durability factor required by ACI 350 for concrete structures) shall be used if using the ultimate strength design method.
- Liquid surface at the maximum level possible before liquid spills out of the structure (uncontrolled overflow conditions). For this scenario, a 33% increase in allowable stresses shall be used, or the load factor for dead loads (excluding the environmental durability factor of ACI 350 for concrete structures) shall be used if the ultimate strength design method is used.

Seismic load calculations from process liquids (i.e., liquid surfaces at normal operating level) are provided in Section 1.3.4.10 (Seismic Loads).

1.3.4.7 External Soil and Groundwater Loads

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.3.4.8 Wind Loads

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.3.4.9 Snow Loads

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.3.4.10 Seismic Loads

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.3.5 General Basis for Design

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 1-4: Load Combinations for Design Basis

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.3.5.1 Safety Factors

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 1-5: Safety Factors[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Parameter	Safety Factor

1.3.6 Serviceability Considerations

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.3.6.1 Deflection

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 1-6: Maximum Allowable Deflection[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Structures	Deflections

1.3.6.2 Vibration

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.3.7 Seismic Design

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.3.8 Concrete Design

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 1-7: Material Properties for Concrete Design and Construction
[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Concrete Class	Property	Requirement

1.3.9 Masonry Design

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 1-8: Minimum Material Properties for Masonry Design and Construction
[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Property	Minimum Requirement or Standard

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.3.10 Structural Metals Design

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 1-9: Minimum Material Properties for Structural Metal Design and Construction[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Material	Standard

1.4 Architectural

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.4.1 Building Codes

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.4.2 Building Design Concepts

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.4.3 Typical Building Materials

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.5 Process Mechanical Design

The following are general guidelines associated with the process mechanical design of the Project.

- Facility design shall be in accordance with the latest edition of *HRSD Design and Construction Standards* unless otherwise specified herein.
- Equipment and piping assemblies shall be generally arranged to permit clear ingress and egress paths, provide aisle widths to allow for equipment removal and maintenance (including any required materials handling aids such as gantry cranes or davit cranes), and provide access in accordance with all manufacturer recommendations for maintenance, removal, and replacement of equipment.
- SWIFT non-potable water (SNPW) washdown hydrants shall be located where washdown of equipment and facilities is expected to require high SNPW flows. The BODR **except where superseded by the Value Engineering Alternatives Concept Design drawings as applicable** may not reflect all anticipated hydrant locations. Hose bibb requirements are provided in Section 1.6 (Building Services) of this BODR.
- Floor drains shall be located in the vicinity of piping and equipment that may be drained or release water during maintenance. The Design-Builder is responsible for routing and final coordination of all piping.
- Pipe trenches, equipment vaults, and other subgrade facilities shall include drainage sumps, permanently installed sump pumps, and water-level alarms. The BODR **except where superseded by the Value Engineering Alternatives Concept Design drawings as applicable** may not show all equipment required for a complete system. The Design-Builder is responsible for routing and final coordination of all piping.
- SWIFT process wetted components, coatings, and similar features shall be NSF 61 approved for use in drinking water systems.
- SNPW is defined as SWIFT Water that is used for various plant operations and maintenance (O&M) activities around the SWIFT facilities.

- Utility water (UW) is water that originates from the domestic potable water supply but is isolated from the potable water system by a backflow prevention device. UW is used for various plant O&M activities but is not considered potable water due to the potential for contamination from backflow and/or cross connections downstream of a backflow prevention device.
- SNPW is a supply of chlorinated JRTP secondary clarifier effluent that is used for various plant O&M activities. The SNPW supply will not extend to any SWIFT facilities.

The following summarizes the construction material requirements associated with the Project.

- Materials of construction for major piping systems are described in Appendix D (Pipe Schedule). Materials of construction for major pieces of equipment are described in the respective treatment process narratives. The materials of construction that are described are provided for the development of the Design-Builder's Construction Cost Limit.
- The Design-Builder shall determine and use suitable materials of construction considering the water characteristics, material compatibility, and potential for microbially induced corrosion through the JRTP ANRI and JR SWIFT treatment systems. The Design-Builder shall propose modifications to any indicated materials of construction as required to deliver the expected useful life for the treatment equipment. Chemical equipment materials and fittings shall be suitable for the intended service and resistant to corrosion by the specified chemical.

The following summarizes the pumping system design requirements for the Project.

- Total dynamic head (TDH) values provided in the BODR **except where superseded by the Value Engineering Alternatives concept design narrative as applicable** are estimated values for informational purposes and conceptual motor sizing. The Design-Builder is solely responsible for providing a complete and comprehensive hydraulic design, including analysis of hydraulic transients/surges.
- Layouts for pump intakes and wet wells shall be in accordance with the latest version of the following Hydraulic Institute standards unless design justification is provided:
    - ANSI/HI 9.8, Pump Intake Design (1998)
    - ANSI/HI 9.6.6-2016, Rotodynamic Pumps for Pump Piping
- Pumps shall be selected and designed to operate within the Preferred Operated Region (POR), as defined by HI 9.6.3-2017 – Rotodynamic (Centrifugal and Vertical) Pumps – Guideline for Allowable Operating Region.
- Pump and motor systems shall be non-overloading across the full operating range of the pump.
- Pump rotational speeds shall be compatible with the respective application and are subject to approval by the Owner but shall be greater than 1,800 rpm.
- Analog pressure gauges of an appropriate range and size shall be provided on the discharge fitting for all pumps.

- Taps for temporary gauges shall be provided in suction piping immediately upstream of all pumps with the exception of chemical metering pumps and submersible pumps.
- Chemical metering pump systems shall be selected and designed to feed over the full range required for each application point. The Design-Builder is solely responsible for providing a complete and comprehensive system that includes consideration of specified chemical properties.

The following summarizes the piping design requirements for the Project.

- Pipe-coating systems shall be in accordance with *HRSD Design and Construction Standards* unless otherwise noted.
- The Design-Builder shall use Induron Ceramapure or approved equal for the interior of SWIFT process water piping systems indicated in Appendix D (Pipe Schedule).
- For SWIFT process water piping systems indicated in Appendix D (Pipe Schedule), that are not located inside tanks, the Design-Builder shall use HRSD System #27 or #28 on the exterior of the pipe.
- For SWIFT process water piping systems indicated in Appendix D (Pipe Schedule), that ARE located inside tanks, the Design-Builder shall prime with zinc then coat with two coats of NSF-approved epoxy, such as Tnemec Series 20 or Series N140 or an approved equal, on the exterior of the pipe.
- BODR **except where superseded by the Value Engineering Alternatives Concept Design Drawings as applicable** do not indicate all piping required for a fully functioning system.
- Piping assemblies shall be kept clear of openings and positioned clear overhead or along walls. Piping shall be run in neat clusters, plumb and level along walls, and parallel to overhead beams.
- Dismantling joints shall be provided to facilitate equipment maintenance, removal, and replacement. BODR **except where superseded by the Value Engineering Alternatives Concept Design Drawings as applicable** do not indicate all anticipated dismantling joint locations.
- Piping shall be provided with low-point drains and high-point vents to facilitate dewatering and refilling during maintenance and as required for facility operation.
- All wall pipe penetrations shall be designed to account for expansion, contraction, and structure settlement.
- Pipe fluid velocities shall be 6 ft/s or less unless otherwise approved by the Owner.
- Fittings and appurtenances required to allow for projected differential settlement between structures and yard piping shall be provided.
- Heat tracing and/or insulation shall be provided as required on any piping systems vulnerable to freezing.

- All piping below structures shall be encased with reinforced concrete with the encasement rigidly connected to the structure foundation via adequate embedment of reinforcement.
- The Design-Builder shall design and provide a piping support system that uses 316L stainless steel unless otherwise approved by HRSD. **Hot dip galvanized piping supports may be installed indoors in dry spaces within SWIFT Process Building Nos. 1 and 2.** *{SWIFT VE Alt No. 10A}*
- The Design-Builder shall perform pressure testing of all piping systems. Test pressure shall be 150% of the highest anticipated operating pressure for the piping system being tested.
- Disinfection of piping systems shall be completed for all piping and wetted equipment between the JR SWIFT sedimentation basins and recharge wells. Disinfection procedures shall be in accordance with American Water Works Association (AWWA) standards. Well backflush piping is not required to be disinfected.
- Each analytical instrument shall have a dedicated sample withdrawal location and sample piping unless otherwise indicated on the BODR **except where superseded by the Value Engineering Alternatives Concept Design Drawings as applicable**.

The following summarizes the general equipment design requirements for the Project.

- Lifting lugs shall be provided for equipment heavier than 100 pounds.
- Equipment shall be provided with all safeguards in accordance with safety codes of the United States and the Commonwealth of Virginia.
- Dissimilar metals shall be isolated to the satisfaction of the Owner.

1.6 Building Services (Plumbing, HVAC, and Fire Protection)

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.6.1 General Plumbing Requirements

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.6.2 Piping Materials

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.6.2.1 Piping Insulation

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.6.2.2 Barrier-Free Plumbing Fixtures

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.6.3 General HVAC Requirements

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 1-10: Design Data: Indoor Design Conditions[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Location	Condition
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Table 1-11: Weather Design Conditions[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Item	Design Criteria

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.6.4 General Fire Protection Requirements

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.6.4.1 Piping Materials

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.7 Electrical

This section describes the electrical system, both temporary and permanent, that is included in the Basis of Design and shown on the BODR **except where superseded by the Value Engineering Alternatives Concept Design Drawings as applicable.**

1.7.1 Codes and Standards

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.7.2 Power Supply

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.7.3 Electrical Distribution Equipment Identification

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.7.4 Distribution System Protection

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.7.5 Electrical Loads

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.7.6 Electrical System Description

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.7.6.1 4.16 kV System

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.7.6.2 480-volt System

The following shall be used for the 480-volt system:

- In the electrical room of each major building, a main-tie-main low voltage switchgear **or MCC** *{ANRI VE Alt No. 4A}* arrangement shall be provided.
- An ATS shall be provided for critical loads (e.g., lighting, instruments) that need power when the upstream MCC is not in service or is not powered.

1.7.6.3 Variable Frequency Drive

The following variable frequency drive (VFD) measures shall be used:

- Mount all VFDs in individual enclosures.
- For VFDs for motors rated 75 hp and larger:
  - Mount in individual freestanding enclosures and not in MCCs.
  - Power from individual breakers in the respective facility low voltage switchgear **or MCC** *{ANRI VE Alt No. 4A}*.

- For VFDs for motors rated less than 75 hp:
  - Mount in individual enclosures that are wall or rack mounted.
  - Power from individual breakers located in the respective facility MCC.
- Provide all VFDs with an Ethernet connection.
- Meet the requirements of IEEE 519 for harmonics, and treat each SWGR bus as a point of common coupling.

1.7.6.4 Lighting

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 1-12: Room Lighting Requirements[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Room/Space	Average Foot-candles

1.7.6.5 Ductbanks and Manholes

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.7.6.6 Generators

Fully supported JRTP backup power is required during construction from the moment the existing distribution system and/or generator is removed from service until the new permanent system has been tested, approved, and placed into service. The existing, fully supported JRTP electrical loads are powered from TX-1A, TX-1B, TX-2A, TX-2B, TX-3, TX-4A, TX-4B, TX-7A, and TX-7B. The Design-Builder shall confirm the required generator backup power load during construction.

Permanent backup power generation facilities are required for the entire JRTP, including all new ANRI facilities, and the JR SWIFT elements summarized in **Table 1-13**. These permanent backup power generation facilities are shown as two diesel generators in the Main Electrical Building with remote radiators outside, and each is anticipated to have a rating of 2,250 kW prime, 2,500 kW standby, 4.16 kV. Existing transformer TX-4, which is used to connect the existing JRTP temporary generator, shall be relocated at the western end of the Main Electrical Building and connected to MVSWGR-C for HRSD to mobilize a temporary trailer-mounted 480-volt, 2,000 kW generator when needed.

The JR SWIFT processes listed in **Table 1-13** require backup power.

Table 1-13: JR SWIFT Processes Requiring Backup Power Generator

Building	Process
SWIFT Process Building No. 1	• Rapid Mix 1 • Rapid Mix 2 • Train 1 Flow Control Valve • Train 2 Flow Control Valve • Train 3 Flow Control Valve • Train 4 Flow Control Valve • Train 1 Floc Zone 1 Mixer • Train 1 Floc Zone 2 Mixer • Train 1 Floc Zone 3 Mixer • Train 2 Floc Zone 1 Mixer • Train 2 Floc Zone 2 Mixer • Train 2 Floc Zone 3 Mixer • Train 3 Floc Zone 1 Mixer • Train 3 Floc Zone 2 Mixer • Train 3 Floc Zone 3 Mixer • Train 4 Floc Zone 1 Mixer • Train 4 Floc Zone 2 Mixer • Train 4 Floc Zone 3 Mixer • Train 1 Sludge Collector Drive • Train 2 Sludge Collector Drive • Train 3 Sludge Collector Drive • Train 4 Sludge Collector Drive • Settled Solids Pump 1 • Settled Solids Pump 2 • Settled Solids Pump 3 • Settled Solids Pump 4 • Settled Solids Pump 5 • SWIFT Sanitary Grinder Pump 1 • SWIFT Sanitary Grinder Pump 2 • Instrumentation, Receptacles, and Misc Loads • Lighting • HVAC

Building	Process
~~Chemical Building No. 1~~ **Chemical Systems Located in SWIFT Process Building Nos. 1 and 2.** *{SWIFT VE Alt No. 10A}*	• Aluminum Chlorohydrate Transfer Pump 1 (Duty) • Aluminum Chlorohydrate Transfer Pump 2 (Standby) • Aluminum Chlorohydrate Feed Pump 1 (Duty – Rapid Mix) • Aluminum Chlorohydrate Feed Pump 2 (Standby) • Aluminum Chlorohydrate Sump Pump • Sodium Hypochlorite Transfer Pump 1 (Duty) • Sodium Hypochlorite Transfer Pump 2 (Standby) • Sodium Hypochlorite Feed Pump 1 (Duty – Rapid Mix) • Flocculation Aid Polymer Tote Scale 1 • Flocculation Aid Polymer Tote Scale 2 • Flocculation Aid Polymer Activation Unit 1 (Duty) • Flocculation Aid Polymer Activation Unit 2 (Standby) • Flocculation Aid Polymer Feed Pump 1 (Duty – Train 1) • Flocculation Aid Polymer Feed Pump 2 (Duty – Train 2) • Flocculation Aid Polymer Feed Pump 3 (Duty – Train 3) • Flocculation Aid Polymer Feed Pump 4 (Duty – Train 4) • Flocculation Aid Polymer Feed Pump 5 (Standby) • Flocculation Aid Polymer Sump Pump • Instrumentation, Receptacles, Misc loads • Lighting • HVAC
SWIFT Process Building No. 2	• Biofilter 1 Influent Valve • Biofilter 2 Influent Valve • Biofilter 3 Influent Valve • Biofilter 4 Influent Valve • Biofilter 5 Influent Valve • Biofilter 6 Influent Valve • Biofilter 7 Influent Valve • Instrumentation, Receptacles, Misc. • Lighting • HVAC

1.8 Instrumentation and Control

1.8.1 Design Criteria

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.8.1.1 Environmental Conditions

Instrumentation equipment and enclosures shall be suitable for the specified ambient conditions. All system elements shall operate properly in the presence of telephone lines, power lines, and electrical equipment.

Field equipment including instrumentation and panels may be subjected to wind, rain, lightning, and corrosives in the environment, with ambient temperatures from −20 to 40ºC and relative humidity from 10 to 100%. All supports, brackets, interconnecting hardware, and fasteners shall be aluminum, Type 316 stainless steel, or metal alloy as otherwise suitable for chemical resistance in chemical feed/storage areas shown on the BODR **except where superseded by the Value Engineering Alternative Concept Design Drawings as applicable**. Sun shields shall be provided for instrumentation and panels mounted outside.

1.8.2 Naming, Numbering, and Tagging

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.8.3 Data Communications Networks

HRSD Design and Construction Standards shall be followed for the I&C design considerations for the business network only. The Design-Builder shall provide multi-mode 62.5/125 mM tight buffered fiber cable with ST connections for Emerson equipment. The Design-Builder shall acknowledge any exceptions or deviations to the standards listed.

- The Design-Builder shall coordinate with HRSD on the moving of DCS and business network systems as provided in Division 01 – Maintenance of Plant Operations (MOPO).
- The Design-Builder shall ensure the total functionality of the DCS and business network once the equipment has been moved and shall provide efforts by Emerson if needed to move the equipment.
- The Design-Builder shall provide conduit, cabling, fiber optic cabling, patch panels, and all peripheral equipment to ensure the functionality of the DCS network and business network.
- The Design-Builder shall provide the required fiber optic capable Cisco Series IE 2000 network switches in all vendor-provided equipment that will connect third-party equipment, such as an internet protocol (IP) switch or a router, to the DCS.
- If CAT-6 type tray cable (TC) is used, it shall be terminated to a patch panel and not directly connected to network equipment due to mechanical stress on connectors.
- The Design-Builder shall use Ethernet CAT-6 and hardwired I/O to all VFDs to the DCS (excluding chemical pumps, which will be hardwired I/O only).
- The Design-Builder shall provide HRSD corporate network hardwire connections or WiFi at remote locations at Recharge Well Buildings, Main Electrical Building, SWIFT Process Building No. 1, and SWIFT Process Building No. 2 to allow troubleshooting via the Enterprise Data Server (EDS).
- The Design-Builder shall provide seven fixed IP-based Avigilon cameras in SWIFT Process Building No. 2 for visual monitoring of the biofilters. The Design-Builder will provide all network switches, fiber optics, and CAT-6 cabling to have these cameras be placed on HRSD's existing Avigilon camera network.

- The Design-Builder shall provide supervisory access card control as the Basis of Design to all exterior doors in the new Administration/Maintenance Building, new Main Electrical Building, Administration Building No. 2, and the new JR SWIFT buildings (Process Buildings No. 1 and No. 2, ~~Chemical Building No. 1,~~ *{ANRI VE Alt. No. 10A}* and SWIFT Water Pump Station) in addition to the DCS room, network room, conference room, and interior lobby doors in the new Administration/Maintenance Building. All door hardware should match existing HRSD hardware.
- The Design-Builder will provide an I-Star system for that will tie into the existing HRSD business network. The Design-Builder will provide cabling, conduits, connectors, and all peripheral equipment needed to make this system fully functional.
- The Design-Builder shall use fiber optic cable in lieu of type TC CAT-6 cable for all new connections between buildings or for any Ethernet connections over 100 meters.

1.8.3.1 ~~Temporary~~ HRSD Corporate/DCS Networks *{ANRI VE Alt. No. 4A}*

The Design-Builder is responsible for moving the existing JRTP DCS network equipment system from Administration Building No. 1 to ~~Administration Building No. 2 for JRTP operation by HRSD during Design-Builder construction. The Design-Builder shall then move this equipment to~~ the new Administration/Maintenance Building as a permanent location. *{ANRI VE Alt. No. 4A}*

~~The major Design-Builder-required activities for the temporary HRSD corporate/DCS networks are as follows:~~

- ~~Providing detailed MOPOs and coordinating with HRSD before any equipment is moved~~
- ~~Ensuring the total functionality of the DCS network and business network once the equipment has been moved~~
- ~~Providing conduit, cabling, fiber optic cabling, patch panels, and all peripheral equipment to ensure functionality of the DCS network and business network~~
- ~~Providing the following for temporary DCS system:~~
  - ~~2-inch Schedule 40 PVC conduit from the temporary network room in Administration Building No. 2 to the Remote I/O (RIO) Cabinet (RIO-14) in the Headworks Building.~~
  - ~~2-inch Schedule 40 PVC conduit from RIO-14 (Headworks Building) to new Electrical Building No. 2 to Distributed Control Unit (DCU)-1. The Design-Builder shall provide a pull box in this run and install 2-inch Schedule 40 PVC conduit from pull box to the old electrical shop building.~~
  - ~~2-inch Schedule 40 PVC conduit from DCU-1 to DCU-2 in the IFAS control room.~~
  - ~~One 12-pair 62.5 multi-mode fiber cable with ST connections from Administration Building No. 2 to DCU-2.~~
  - ~~One 6-pair 62.5 multi-mode fiber cable with ST connections from DCU-1 to RIO-14 Headworks Building.~~

- ~~One 6-pair 62.5 multi-mode fiber cable with ST connections from temporary network room in Administration Building No. 2 to old electrical shop for business network.~~

  {ANRI VE Alt. No. 4A}

1.8.3.2 ~~Relocation of Temporary HRSD Corporate/DCS Networks~~

~~The Design-Builder shall perform the following with the temporary HRSD Corporate/DCS networks for the permanent HRSD corporate/DCS networks.~~

- ~~Relocate DCU-1 from Administration Building No. 1 to new Electrical Building No. 2.~~
- ~~Install new Emerson network communications cabinet adjacent to DCU-1 in new Electrical Building No. 2 and coordinate with Emerson on fiber optic and CAT-6 terminations between the cabinets.~~
- ~~Relocate HRSD DCS network server cabinet from Administration Building No. 1 to Administration Building No. 2 network room.~~
- ~~Relocate all HRSD business network/DCS network appurtenances in the hallway closet of Administration Building No. 1 to the Administration Building No. 2 network room.~~
- ~~Relocate HRSD communications antenna for Supervisory Control and Data Acquisition (SCADA) antenna on roof from Administration Building No. 1 to the roof of Administration Building No. 2.~~ *{ANRI VE Alt No. 4A}*

The Design-Builder shall move all ~~remaining temporary HRSD~~ *{ANRI VE Alt No. 4A}* corporate/DCS networks from Administration Building No. ~~2~~ **1** *{ANRI VE Alt No. 4A}* to new Administration/Maintenance Building upon completion of construction.

1.8.4 Functional Control Descriptions

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.8.5 Field Instruments

1.8.5.1 Loop Drawings

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.8.5.2 Interposing Relays

The Design-Builder shall provide interposing relays for field connections in a separate enclosure adjacent to the DCU and/or RIO and shall be easy to access. The Design-Builder shall refer to the BODR **except where superseded by the Value Engineering Alternatives Concept Design Drawings as applicable** for design locations of these relay enclosures.

1.8.5.3 Molex Connectors

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.8.5.4 Wiring Terminations

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.8.5.5 Variable Frequency Drive Cabinet Construction

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.8.5.6 Instrument General

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.8.5.7 Instrumentation Piping Methods Sample Piping

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.8.5.8 Drain Piping

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.8.5.9 General

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.8.6 DCU Programming Coordination/DCU Programming

1.8.6.1 System General

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.8.7 Hardware General

The following are general requirements to be provided for the DCS for the Project.

- DCS block diagram – See the control system functional block diagram in the BODR **except where superseded by the Value Engineering Alternatives Concept Design drawings as applicable**. Interconnecting lines shown on the block diagram imply information flow and not necessarily wiring.

- Control Room Layout – See the BODR **except where superseded by the Value Engineering Alternatives Concept Design Drawings as applicable**.
- Equipment Mounting – Unless otherwise noted, mount all DCS components in NEMA-rated cabinets.
- Color – Manufacturer's standard.
- Cables – Required for interconnection between all DCS components, except where leased telephone lines are shown.
- Fiber Optics Cables – As shown on BODR **except where superseded by the Value Engineering Alternatives Concept Design Drawings as applicable** for interconnection between DCS components.
- Data Highway and Local Area Network – Fiber optics, meeting HRSD and DCS manufacturer's specifications.
- For cables less than 50 feet long, the DCS supplier will provide prefabricated cables with connectors and factory tested with DCS.
- The Design-Builder shall furnish and install communications cables.
- The Design-Builder shall provide power to DCS equipment with the following:
    - Isolation transformers for all DCS equipment to protect DCS from damage by electrical transients induced in cables by lighting discharges or electrical equipment.
    - From isolation transformers provided by the Design-Builder and the UPS units provided by the DCS supplier, the Design-Builder shall:
        - Provide dual-feed circuits
        - Provide dedicated circuit breaker panelboard at each DCU and RIO location
    - See Appendix G (DCS Power Area) for the DCS power layout.

1.8.7.1 DCS Components

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

1.8.8 Hardware and Furniture

1.8.8.1 Control Room Console

The Design-Builder shall provide the following:

- 3-position console.
- Integrated multiple bay enclosures suitable for sit-down operation: House OISs, Engineer Work Stations (EWSs), printers, communications processors, data highway communications equipment, and power supplies.

- EWS components shall be made of high-impact, durable plastic top. Desktops shall be capable of supporting 400 pounds, minimum, on extended surfaces. There shall be bushed holes for power and signal cables to devices on the desktop. Edges of desktops shall be beveled or rounded.
- Operator station layouts – Provide layouts for each operator station as shown on the BODR **except where superseded by the Value Engineering Alternatives Concept Design Drawings as applicable** and listed below.

1.8.8.2 Console Bay Requirements

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2. James River Treatment Plant Advanced Nutrient Reduction Improvements

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.1 Influent Flows, Design Loadings, and Effluent Design Criteria

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.1.1 Influent Flows

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 2-1: Summary of Peaking Factors and Design Flows for the JRTP ANRI Project [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Description	Peaking Factor	Design Flow (mgd)

2.1.2 Design Loadings

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 2-2: JRTP Flow and Load Peaking Factors (Ratio to Design Average Annual) [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Design Condition	Flow Peaking Factor	Load Peaking Factor				
		Chemical Oxygen Demand	Total Suspended Solids	Total Kjeldahl Nitrogen	Ammonia-Nitrogen	Total Phosphorus

Table 2-3: JRTP Design Flows and Loads [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Parameter	Unit	Historical	Design				Peak Hydraulic Capacity
		AA	AA	MM	MW	MD	

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 2-4: JRTP Effluent Nitrogen Criteria [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Criterion	Value

2.2 JRTP ANRI and JR SWIFT Influent and Well Backflush Equalization Facilities Project Elements

The JRTP ANRI Flow Diagram (see the BODR **except where superseded by the Value Engineering Alternatives Concept Design Drawings as applicable**) identifies proposed upgrades for the wastewater liquid treatment processes and JR SWIFT influent and Well Backflush Equalization and Pumping Facilities. Because these JR SWIFT improvements are interrelated with the JRTP ANRI project, they are described in Section 2 of the BODR rather than in Section 3 of the BODR. The major elements of the proposed upgrades for the JRTP ANRI and directly related JR SWIFT Equalization and Pumping Facilities are listed below.

- JRTP ANRI Project Elements (CIP No. JR013400)
  - New integrated fixed-film activated sludge (IFAS) Effluent Channel to convey water from the IFAS Reactors to the new secondary clarifiers
  - New secondary clarifiers with associated return activated sludge (RAS) pumping:
    - Up to 21 mgd of secondary clarifier effluent directed to the moving bed biofilm reactor (MBBR) **via new MBBR Influent Pump Station** *{ANRI VE Alt No. 4A}*
    - All secondary clarifier effluent greater than 21 mgd diverted to the plant outfall. ~~**via the MBBR bypass channel.**~~ *{ANRI VE Alt No. 4A}*
    - RAS flow returned to upstream of the existing IFAS Reactors through a connection to existing RAS piping
  - New MBBR and associated piping to provide the following effluent flow distribution locations:
    - A portion of the flow volume continuously diverted to the plant outfall via the ~~MBBR bypass channel~~ **process overflow line** *{ANRI VE Alt No. 4A}*.
    - ~~The balance of the flow volume typically conveyed to the SWIFT Influent Pump Station Influent Channel~~. **MBBR effluent in excess of the operating capacity of SWIFT Process Building No. 1 will either be diverted to the SWIFT Influent EQ or to the Chlorine Contact Tanks and Outfall via the process overflow line.** *{ANRI VE ALT No. 4A}*. This flow may also be diverted to the plant outfall via the ~~MBBR bypass channel~~ **process overflow line** *{ANRI VE Alt No. 4A}*.
  - New Junction/Splitter Box that receives and distributes flow to the Chlorine Contact Tanks (CCTs)
- JR SWIFT Facility Project Elements (CIP No. GN016360)
  - New ~~SWIFT~~ **MBBR** Influent Pump Station to convey ~~MBBR~~ **secondary clarifier** effluent to **MBBR**~~JR SWIFT. This pump station includes:~~

- ~~Piping connecting the SWIFT Influent Pump Station's Influent Channel and the SWIFT Influent Equalization Tank for flow equalization~~
- ~~for flow equalization~~
- ~~An overflow channel that conveys excess flow to the JRTP outfall~~

  - New SWIFT Influent Equalization Tank ~~(shown as existing Secondary Clarifier 5)~~ that will equalize flows between JRTP and JR SWIFT
  - A new Well Backflush Equalization Tank (~~shown as existing Secondary Clarifier 4~~) that will equalize SWIFT recharge well backflush flows *{ANRI VE Alt No. 4A}*

2.3 Hydraulic Profile

HRSD expects the improvements required for the JRTP ANRI project to continue to allow gravity flow through the entire JRTP **(note the influent flow to the MBBR will be pumped)** *{ANRI VE ALT No. 4A}*. The Design-Builder shall confirm all JRTP and ANRI-related hydraulics from the influent of the JRTP to the outfall and ensure that water levels in existing and new tanks are no less than 6 inches from top of concrete at 57 mgd JRTP influent flow with no manhole overflows at a river elevation of 4.0 feet. The Design-Builder will be required to evaluate JRTP hydraulics for river level conditions up to elevation 10.0 feet and coordinate final improvements with future HRSD outfall piping and diffuser header improvements.

For reference, the JRTP Hydraulic Profile, including both the existing JRTP facilities and the proposed JRTP ANRI-related improvements, is provided on **drawing G5 in the** BODR **except where superseded by Value Engineering Alternatives Concept Design drawings as applicable.**

2.4 JRTP ANRI Treatment Process Improvements

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.4.1 New IFAS Effluent Channel

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.4.1.1 Process Summary

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 2-5: Process Summary for the New IFAS Effluent Channel

Element	Objective / Design Element
Purpose	• New channel for conveying IFAS effluent to the new secondary clarifiers while minimizing headloss

Element	Objective / Design Element
Redundancy	• The Design-Builder shall include provisions for stop-log installation for isolation of channel sections and individual or pairs of IFAS Reactors as well as the secondary clarifiers.
Design/Construction Approach	• No more than two IFAS Reactors can be offline at one time during construction, **unless approved by Owner. The following factors may allow for three IFAS Reactors to be taken offline at one time:** **1.) Time of year considering cold weather conditions and meeting nutrient requirements – plant must hold TP, more flexibility with TN.** **2.) Time of year considering typical high flow events in August and September.** **3.) Owner will need to increase media fill fraction to 65%** **4.) Design-Builder to provide length of time the three IFAS Reactors will be offline for approval** **5.) Owner will consider time to reestablish growth on the media, which will be dependent on time of the year.** **6.) Design-Builder will need to consider a High Flow Management Plan for Owner approval that may include the following:** **a. Block off effluent pipe and bring weir wall up accommodating usage of out of service tanks as EQ tanks. Design-Builder shall provide ability to pump out, as needed.** **b. With three IFAS Reactors out of service, plan shall utilize one IFAS Reactor as overflow and provide ability to pump around to clarifiers.** *{ANRI VE Alt No. 4A}* • See Division 1 – General Requirements for criteria for allowing IFAS Reactors to be placed back into service.
Operations and Control Philosophy	• No changes to the existing IFAS operating mode(s) are anticipated to be required except modifications to the aeration blower control system to accommodate the new IFAS Effluent Channel aeration demands for mixing.
Facility Layout Concepts	• The Work required by the Design-Builder for the new IFAS Effluent Channel, as proposed, includes: ○ Open top with grating **at walkways** ~~except at the road crossing where the channel will require a concrete cover with a minimum of HS-20 design loading~~. *{ANRI VE Alt No. 4A}* ○ Minimal headloss under peak hydraulic flow conditions. ○ Channel aeration mixing system: ▪ Diffuser drop legs provided with manual isolation/control valves and taps for use with a portable airflow-measuring device to “tune” air flow. ▪ Except where the channel crosses the plant road, drop legs and diffusers shall be designed to allow removal and re-installation from the top while keeping the channel in service. ○ ~~Incorporate a rotating barrel scum skimmer at the downstream end of the end of the channel to dispose of any scum that does not migrate into the secondary clarifiers.~~ *{ANRI Alt No. 4A}* ○ ~~Matching canopy over the channel adjacent to the IFAS Reactors and over the channel adjacent to the new secondary clarifiers.~~ *{ANRI Alt No. 4A}* • No changes are proposed to the equipment, controls, or lighting on the IFAS Reactors. Provide power for lighting new canopies and power a Distributed Control System (DCS) connection for the new channel air flowmeter and pressure transmitter. • No new chemicals are required for the IFAS Effluent Channel. • ~~New IFAS Reactor drain valves, located outside the reactor and channel footprint, will be required.~~ **The IFAS Reactor/Tanks will be disconnected from the process drain system. Standpipes will be installed in each tank that extend above the top of the tanks and will be used for draining with a portable pump. The standpipes will be located over existing sumps and will dewater the tank contents that drain to the**

Element	Objective / Design Element
	sump. Design-Builder shall demonstrate performance of IFAS Reactor dewatering system on at least one completed installation. *{ANRI VE Alt No. 4A}*

2.4.1.2 Existing Facility/Structure Modifications

At a minimum, the Design-Builder will be required to modify or relocate the following existing facilities/structures to accommodate construction of the IFAS Effluent Channel:

- Modify/relocate the existing foam control vault near the northeastern corner of IFAS Reactor 1 as required to accommodate the channel.
- ~~Cut the new drain valves into the drain pipe for each IFAS Reactor beyond the footprint of the new channel.~~ *{ANRI VE Alt No. 4A}*
- ~~Partially demolish the existing IFAS Reactor effluent pipes and yard piping as the new IFAS Effluent Channel is constructed and completely remove them once the conversion to the new secondary clarifiers is complete.~~
- Relocate/modify all other impacted utilities.

2.4.2 Modifications to the IFAS Aeration System

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.4.2.1 Process Summary

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 2-6: Process Summary for IFAS Blower Modifications [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Element	Objective/Design Element

2.4.3 New Secondary Clarifiers

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.4.3.1 Process Summary

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 2-7: Process Summary for New Secondary Clarifiers

Element	Objective / Design Element
Purpose	Secondary clarification separates mixed-liquor suspended solids from the suspended-growth system effluent. Clarified supernatant continues downstream for additional treatment with settled solids returned to the suspended growth system except for a portion that is wasted.
~~Redundancy~~	~~Solids loading rate, surface overflow rate, and weir loading rate in accordance with WEF/ASCE/EWRI's Design of Water Resource Recovery Facilities Manual of Practice (MOP) 8 at max day flow with one clarifier out of service.~~ *{ANRI VE Alt No. 4A}*
Design/Construction Approach	• The preliminary design of the secondary clarifiers includes the following assumptions: ○ Max month flow: 20.9 mgd ○ Max day flow: 36.4 mgd ○ Peak hydraulic flow: 57 mgd plus 16 mgd of RAS ○ Sludge settleability, sludge volume index (SVI): 150 ○ Mixed-liquor suspended solids (MLSS): ~~2,400~~ **2,000** *{ANRI VE Alt No. 4A}* mg TSS/L for solids retention time (SRT) of 4 days to treat max month flows and loads ○ Minimum total surface area: ~~29,400~~ **39,820** *{ANRI VE Alt No. 4A}* square feet ○ Minimum side-water depth: ~~18~~ **16** *{ANRI VE Alt No. 4A}* feet ○ Surface overflow and weir loading rates ~~in accordance with Design of Water Resource Recovery Facilities MOP 8.~~ **Based on minimum total surface area.** *{ANRI VE Alt No. 4A}* • Mixed-liquor feed channel **(proposed in the IFAS Effluent Channel)** *{ANRI VE Alt No. 4A}*: ○ Aerated to keep mixed liquor solids in suspension ○ ~~Maximum velocity of approximately 1.5 ft/s to minimize headloss~~ *{ANRI VE Alt No. 4A}* • **Includes low headloss inlet configuration.** *{ANRI VE Alt No. 4A}* ○ Provide uniform flow distribution between the secondary clarifiers, defined as flow rate to each secondary clarifier within 10% of the average to all secondary clarifiers. Design-Builder shall perform computational fluid dynamics (CFD) modeling to verify even flow distribution for all flow conditions. • ~~Inlet orifices and weirs shall dissipate energy, minimize the effects of density currents, distribute flow across the tank width, and promote flocculation.~~ *{ANRI VE Alt No. 4A}* • ~~Chain-and-flight scraper systems for sludge removal, including provisions for mid-tank hoppers for collection and removal.~~ ○ ~~Collector drive mechanisms equipped with ball-detent or approved alternate torque protection device.~~ ○ ~~Collector drive chains equipped with HRSD-approved tensioning devices.~~ ○ ~~Flight chains supported on the surface with type 316/316L stainless steel rails with replaceable plastic wear strips. Replaceable plastic wear strips on the collector floors.~~ ○ ~~Fiberglass reinforced plastic (FRP) or plastic flights, chain, wear shoes, wear strips, and sprockets inside the tanks. Steel driving shafts, plastic or FRP allowable for other shafts.~~ ○ ~~Sludge hoppers containing a RAS suction manifold.~~ *{ANRI VE Alt No. 4A}* • **Tow-Bro style suction header type solids collection mechanism as manufactured by Evoqua, Ovivo, or WesTech.** *{ANRI VE Alt No. 4A}*

Element	Objective / Design Element
	• ~~Rotating barrel scum skimmers for scum removal at the influent end of each clarifier.~~ *{ANRI VE Alt No. 4A}* ○ ~~Electrically actuated and designed to dip in both forward and back directions on timer control.~~ *{ANRI VE Alt No. 4A}* • ~~Effluent launders designed to prevent wash-boarding under all design flow conditions on each tank.~~ *{ANRI VE Alt No. 4A}* • Fiberglass clarifier weirs, launders, and weir covers in accordance with *HRSD Design and Construction Standards*.
Operations and Control Philosophy	• Secondary clarifier effluent will be directed to the MBBR ~~influent channel~~ **Influent Pump Station** *{ANRI VE Alt No. 4A}*. The maximum allowable flow to MBBR is 21 mgd. • ~~An overflow weir in the~~ Secondary Clarifier effluent ~~channel will direct flow~~ in excess of 21 mgd **will be directed** to the Junction/Splitter Box *{ANRI VE Alt No. 4A}*. • ~~Each collector shall be equipped with a monitoring device to alert staff to misalignment via the DCS system~~ *{ANRI VE Alt No. 4A}*. • Sludge blanket level detectors shall be connected to the DCS system.
Facility Layout Concepts	• Secondary clarifiers are shown in a ~~rectangular configuration~~ **circular configuration.** ~~Due to limited available land area and construction sequencing considerations.~~ *{ANRI VE Alt No. 4A}* • ~~Deep sidewall depth is required to maximize solids retention during high flow events.~~ *{ANRI VE Alt No. 4A}* A mechanical scum removal system ~~via slotted rotating barrel skimmers~~ *{ANRI VE Alt No. 4A}* with scum holding ~~tanks~~ **pits** ~~in the RAS pump station.~~ *{ANRI VE Alt No. 4A}* • **The equipment in existing Secondary Clarifier No. 5 will be replaced in-kind with the exception of the sludge collection mechanism, which will be replaced with a Tow-Bro style mechanism. The scum removal system for Secondary Clarifier No. 5 may be limited to a rotating trough in the influent raceway to match the existing system configuration**. *{ANRI VE Alt No. 4A}* ○ ~~Scum holding tanks (pits) shall be equipped with mechanical mixers.~~ **Submersible chopper pumps will be used to pump scum.** *{ANRI VE Alt No. 4A}* • ~~A pumped drain system shall be provided for the secondary clarifiers to pump drained flow to the IFAS Effluent Channel upstream of the secondary clarifiers~~ **The RAS pumps will be used to dewater tanks.** *{ANRI VE Alt No. 4A}*

2.4.3.2 Design Criteria

The design criteria for the new secondary clarifiers are summarized in **Table 2-8**.

Table 2-8: Design Criteria for New Secondary Clarifiers

Design Element	Value
Quantity	~~8~~ **2 new tanks and reuse of existing SC No. 5** *{ANRI VE Alt No. 4A}*
Tank configuration	~~Rectangular~~ **Circular** *{ANRI VE Alt No. 4A}* (as shown)
Dimensions (each tank)	

Design Element	Value
~~Width~~ **Diameter** *{ANRI VE Alt No. 4A}*	~~18~~ **130** *{ANRI VE Alt No. 4A}* feet
Length	~~204~~ **N/A** *{ANRI VE Alt No. 4A}* feet
Surface area	Each tank: ~~3,700~~ **13,273** *{ANRI VE Alt No. 4A}* ft^2 Total: ~~29,400~~ **39,820** *{ANRI VE Alt No. 4A}* ft^2
Side water depth	~~18~~ **16** *{ANRI VE Alt No. 4A}* feet
Number of inlet gates	~~1~~ **as required** *{ANRI VE Alt No. 4A}* for each tank
~~Number of inlet orifices~~ *{ANRI VE Alt No. 4A}*	~~9 for each tank~~ *{ANRI VE Alt No. 4A}*
~~Inlet orifice size~~ *{ANRI VE Alt No. 4A}*	~~8 inches~~ *{ANRI VE Alt No. 4A}*
Effluent launder length	~~18 feet each~~ **as required** *{ANRI VE Alt No. 4A}*
Surface overflow rate at 36.4 mgd maximum day flow (all tanks in service)	~~1,240~~ **914** *{ANRI VE Alt No. 4A}* gallon/day-ft^2
Design RAS capacity	16 mgd
Design waste activated sludge (WAS) capacity	0.6 mgd

2.4.3.3 Equipment Summary Tables

The equipment for the new secondary clarifiers is listed in **Table 2-9**.

Table 2-9: JRTP ANRI ~~New~~ Secondary Clarifier Equipment Summary

Equipment	Element	Value
Sludge Collector System	Type	~~Gould type II chain and flight system~~ **Tow-Bro Style Circular Solids Collection Mechanism** *{ANRI VE Alt No. 4A}*
	Quantity	~~8 (each system has 2 collectors and 2 drives per tank)~~ **3 total, 2 new and reuse/rehab of existing SC No. 5** *{ANRI VE Alt No. 4A}*
RAS Pumping	Number of pumps	~~12~~ **4** ~~(1 per clarifier and 1 swing pump per 2 secondary clarifiers)~~ *{ANRI VE Alt No. 4A}*
	Pump capacity	• ~~2.1~~ **5.5** *{ANRI VE Alt No. 4A}* mgd per pump • 16.6 mgd total (16 mgd RAS capacity plus 0.6 mgd WAS capacity)
	Type	Screw-induced flow centrifugal pumps with variable speed drives
Scum Pumping	Number of pumps	~~4~~ **6** (~~1~~ **2** per scum pit with each serving as ~~a backup to another scum pit~~ **duty / standby**)*{ANRI VE Alt No. 4A}*

Equipment	Element	Value
	Minimum pump capacity	4 gpm per pump
Scum Pit Mixers	Type	~~Top-mounted mixers, designed to homogenize tank contents~~ **Not Required** *{ANRI VE Alt No. 4A}*
	Number of mixers	~~4 (1 per scum pit)~~ **Not Required** *{ANRI VE Alt No. A4}*
Effluent Launders	Type	~~Double-sided~~ **Single sided** *{ANRI VE Alt No. 4A}* launders with V-notched weirs
	Quantity	~~32 (4 per clarifier)~~ **As required** *{ANRI VE Alt No. 4A}*
Effluent Weirs	Type	~~Adjustable~~ **Fixed** *{ANRI VE Alt No. 4A}* V-notch
	Quantity	~~64 (8 per clarifier)~~ **As required** *{ANRI VE Alt No. 4A}*
	Notch angle	90 degrees
	Max notch depth	~~2.5~~ **3** *{ANRI VE Alt No. 4A}* inches
	Notch spacing	6 inches
~~Clarifier Drain Pumps~~	~~Number of pumps~~	~~2 (manifold piping from all clarifiers with individual plug valves at each clarifier to isolate each pump)~~ *{ANRI VE Alt No. 4A}*
	~~Pump capacity~~	~~650 gpm per pump~~ *{ANRI VE Alt No. 4A}*
	~~Type~~	~~Constant speed centrifugal~~ *{ANRI VE Alt No. 4A}*
RAS Pump Station, Sump Pumps	Number of pumps	4 (2 duplex sumps)
	Type	Per *HRSD Design and Construction Standards,* finalize selection based on required head conditions for discharge location.

2.4.3.4 New Secondary Clarifier Inlet Configuration

Flow will enter each new secondary clarifier ~~through a single gate~~ *{ANRI VE Alt No. 4A}* from the new IFAS Effluent Channel. ~~When flow passes through the gate, it will enter a distribution launder that will distribute the flow across the width of the clarifier. Inlet flow will discharge through a combination of evenly spaced orifices in the bottom of the trough. The top of the trough will be set at an elevation that allows it to be overtopped during a normal diurnal high-flow rate to regularly flush out any scum that accumulates in the trough.~~ **Secondary clarifier influent weir boxes will be provided to distribute flow between the clarifiers.** *{ANRI VE Alt No. 4A}*

2.4.3.5 Secondary Clarifier Drainage

~~Each new secondary clarifier shall have a drainage sump incorporated into the sludge hopper bottom. The sump shall contain a plug valve connected to a pipe that leads to the Sludge Pump Station. A header inside the pump station will connect each secondary clarifier drain to a pair of secondary clarifier drain pumps that will pump to the IFAS Effluent Channel.~~ **The RAS pumping system will be used for the clarifier drain system.** *{ANRI VE Alt No. 4A}*

2.4.3.6 Additional Requirements

Additional requirements to improve secondary clarifier performance, reliability, and ease of maintenance include providing:

- Metallic components inside or within 4 feet of top of tanks shall be Type 316/316L stainless steel, **except the bridge may be painted steel and walkway, grating and handrail may be aluminum** *{ANRI VE Alt No. 4A}*
- RAS chlorination shall be provided with an injection point in the RAS discharge header downstream of the last RAS pump in the ~~Sludge~~ **RAS** *{ANRI VE Alt No. 4A}* Pump Station
- ~~Utility water (UW)~~ **NPW** *{ANRI VE Alt No. 4A}* system to meet cleaning and tank filling needs
- ~~UW~~ **NPW** *{ANRI VE Alt No. 4A}* hydrants and hose racks to facilitate tank cleaning along with warning signs near each ~~UW~~ **NPW** outlet and color-coded ~~UW~~ **NPW** lines
- Guardrail system meeting all applicable standards, including Occupational Safety and Health Administration (OSHA) Standard 29 CFR Part 1910, around the clarifier tanks
- Layout that provides convenient and safe access to routine maintenance items and routine sampling

2.4.4 Moving Bed Biofilm Reactor (MBBR)

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.4.4.1 Background and Treatment Objectives

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 2-10: Post-Denitrification MBBR Basis of Design Criteria [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Parameter	Value

Table 2-11: Post-Denitrification MBBR Basis of Design Criteria per Reactor Zone [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report] [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Zones	Anoxic	Swing(1)	Anoxic	Aerobic

Table 2-12: Process Summary for MBBR System

Element	Description/Requirement
Purpose	• Tertiary nitrogen removal

Element	Description/Requirement
Operation Modes	• Full (conventional) denitrification (FDN) • Partial denitrification with anammox (PdN-A)
Redundancy	• ~~One cell may be taken out of service while all remaining cells remain in service.~~ **Individual cells cannot be taken out of service. Only an entire tank treatment train can be taken out of service.** *{ANRI VE Alt No. 4A}*
Design Approach	• Process capacity based on SWIFT, JRTP non-potable water (NPW), and outfall maintenance demands • MBBR influent flow exceeding MBBR treatment capacity passively diverted to CCTs. • MBBR effluent flow in excess of SWIFT demands passively diverted to SWIFT Influent Equalization Tank or to CCTs if SWIFT Influent Equalization Tank is full
Operations and Control Philosophy	• All dry weather flow is normally treated by MBBR, but MBBR influent is controlled by **the MBBR Influent Pump Station** ~~a control valve~~ and flowmeter ~~in the MBBR room~~. *{ANRI VE Alt No. 4A}* • Secondary effluent flow above 21 mgd will passively divert around MBBR **Influent Pump Station** to CCTs. *{ANRI VE Alt No. 4A}* • Continuous discharge of up to 2.5 mgd to CCTs must be maintained to supply existing JRTP NPW system and provide a constant flow through the plant outfalls.
Facility Layout Concepts	• ~~Four rows of two parallel cells.~~ **Two trains of four cells each.** *{ANRI VE Alt No. 4A}* • First pair of cells are anoxic with two top-mounted mechanical mixers in each cell. • Second pair of cells are swing zones and provided with aeration grid systems and two top-mounted mechanical mixers in each cell. • Third pair of cells are anoxic zones and provided with two top-mounted mechanical mixers in each cell. • Fourth pair of cells are aerobic zones and provided with aeration grid systems but no mechanical mixing.

2.4.4.2 Design Criteria

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 2-13: Major Design Criteria for MBBR Treatment System

Design Element		Value		
MBBR Cells (as shown)	Number	8 cells (4 anoxic, 2 swing, 2 aerobic)		
	Zone (Cells)	Length (feet)	Width (feet)	Volume (gal, each)
	1st anoxic (1A, 1B)	32	60	256,510
	Swing (2A, 2B)	20	32	86,170
	2nd anoxic (3A, 3B)	20	32	86,170
	Aerobic (4A, 4B)	20	32	86,170
	Side water depth	18 feet		
	Top of wall, elevation	22 feet		
	Total volume	1.03 million gallons		

Design Element		Value
MBBR Media Retention Screens	Purpose	Media retention prevents media from traveling between cells and/or to downstream processes.
	Design type Anoxic zones Swing zones Aerobic zones	 ~~Perforated plate~~ **As Per Supplier** *{Addendum No. 2}* ~~Perforated plate~~ **As Per Supplier***{Addendum No. 2}* ~~Cylindrical sieves~~ **As Per Supplier** *{Addendum No. 2}*
	Installation type	Flat sieves and cylinder sieves
	Material	316/316L stainless steel, minimum 14 gauge sheet
	~~Screen opening size~~	~~5/8 inch with 13/16-inch centers~~ *{Addendum No. 2}*
	Locations	All cells
	Maximum allowable wall screen headloss	Shall not exceed 3 inches in each cell at peak hydraulic condition
MBBR Plastic Biofilm Carrier Media	Type	High density polyethylene carrier media**,** ~~AnoxKaldnes Media – K5, or equal~~ **as per supplier** *{Addendum No. 2}*
	~~Effective surface area~~	~~800 m^2/m^3~~*{Addendum No. 2}*
	~~Nominal diameter~~	~~25 mm~~ *{Addendum No. 2}*
	~~Height~~	~~3.7 mm~~ *{Addendum No. 2}*
	~~Thickness~~	~~4.0 mm~~ *{Addendum No. 2}*
	~~Nominal density~~	~~7.5 lb/cf~~ *{Addendum No. 2}*
	~~Nominal specific gravity~~	~~0.98~~*{Addendum No. 2}*
	Media fill% by volume	~~60%~~ **Max 50%** (see **Table 2-11**, footnote 3)
Mechanical Mixers	Products	~~Stamo~~ Top-entry dual blade mixers, or equivalent **as per supplier** *{Addendum No. 2}*
	Quantity	
	1st anoxic cells	(2 mixers per cell) x (2 cells) = 4 units
	Swing cells	(2 mixers per cell) x (2 cells) = 4 units
	2nd anoxic cells	(2 mixers per cell) x (2 cells) = 4 units
	Material (wetted parts)	AISI 329
	Number of impellers per shaft	2
	Minimum design requirements	• Each mixer shall consist of a variable speed motor-driven gear reducer directly connected to a vertical shaft equipped with axial flow turbine impeller. • Mixer shall be suitable for continuous outdoor operation with temperature from −35°F to 110°F. • Use of shaft stabilizer is not acceptable. • Design-Builder shall select mixers to operate efficiently and avoid damage to the carrier media.
	Operation	Variable speed motor
	Power	3 phase, 60 Hz, 460 volts
	Motor	Horizontal totally enclosed, fan-cooled (TEFC), squirrel cage induction units, Class F insulation, copper windings; National Electrical Manufacturers Association (NEMA)

Design Element		Value
		Design B in accordance with NEMA MG 1, Motors and Generators (2016).
	Horsepower, each	1st anoxic zone: 10 hp (estimated); swing and 2nd anoxic zones: 2 hp (estimated)
	Motor speed	1,800 rpm
Aeration System	Type	Medium-bubble aeration diffusers of type 316/316L stainless steel piping with 4 mm holes

	Minimum design requirements	• The aeration equipment systems shall be of the fixed header, diffused air type. The systems shall be suitable for installation as shown on the BODR **except where superseded by the Value Engineering Alternative Concept Design drawings as applicable.**
		• System shall be designed to meet both the minimum and maximum air demands to satisfy both mixing and oxygen transfer requirements.
		• Promote rolling-water circulation pattern that uniformly distributes plastic biofilm carriers.
		• The installed aeration system including supports shall be designed to withstand the weight force of the media and attached biofilm when the basin is drained and taken out of service.
		• Each aeration system designed and orifices sized so that at minimum and maximum airflows, the airflow rate when balanced of any two diffusers in the system shall not differ by more than 10% (based on the diffuser with the lower flow rate).
		• The distribution and balancing of air shall be controlled by the use of orifices or control valves and proper header size selection only.
		• Aeration system shall include:
		  o 316/316L stainless steel drop pipes for the aeration grid
		  o A 316/316L stainless steel grid system for each basin
		  o Drop pipe and aeration grid support system

	Airflow requirements	To be determined by the Design-Builder (see Table 2-10, note 2)
MBBR Drain System	Number	~~8~~ **2** drains with screened opening (one per **train** ~~cell~~)
	Screen opening size	5/8 inch
	Drain pipe size	8 inches
MBBR Drain ~~Pumps~~	Number	~~2 pumps (manual operation, 1 operating, 1 standby)~~ **Tanks will be capable of fully draining by gravity through the plant drain to the Backwash Equalization Pump Station or the Plant Drain Pump Station (adjacent to the grit tanks) or another location as approved by HRSD.** *{ANRI VE Alt No. 4A}*
	Type	~~Vertical centrifugal~~ **N/A** *{ANRI VE Alt No. 4A}*
	Design capacity	~~650 gpm per pump~~ **N/A** *{ANRI VE Alt No. 4A}*
	Discharge head	~~20 feet (estimated)~~ **N/A** *{ANRI VE Alt No. 4A}*

Design Element		Value
	Motor horsepower	~~7.5 (estimated)~~ **N/A** *{ANRI VE Alt No. 4A}*
	Suction size	~~8 inches~~ **N/A** *{ANRI VE Alt No. 4A}*
	Discharge size	~~10 inches~~ **N/A** *{ANRI VE Alt No. 4A}*
Gates	Number	~~29~~ **See Drawings** *{ANRI VE Alt No. 4A}*
	Size	~~Width: 6 feet; height: 6 feet~~ **As required** *{ANRI VE Alt No. 4A}*
	Material	Type 316/316L stainless steel
	Actuator	Electric, open-close with position indication
MBBR Blowers	Type	Rotary screw or approved alternate
	Number	3 (2 duty, 1 standby)
	Design capacity (each blower)	1,500 cfm (to be determined by the Design-Builder)
	Discharge pressure	To be determined by the Design-Builder
	Motor horsepower	To be determined by the Design-Builder

2.4.4.3 MBBR Process Instrumentation

Four clusters of instruments will be installed in the MBBR system, as shown on the piping and instrumentation diagram (P&ID) drawings in the **BODR except where superseded by the Value Engineering Alternatives Concept Design Drawings as applicable**. HRSD will provide the MBBR-required instruments as noted Appendix I (JRTP ANRI Instrumentation and Control), and the remainder shall be provided by the Design-Builder, ideally as part of the MBBR system supplier's package. Instruments to measure the following parameters are required to be installed by the Design-Builder to help control and monitor MBBR performance: orthophosphate, nitrite, nitrate, ammonia, and dissolved oxygen.

2.4.4.4 MBBR Effluent Flow Control Valve System

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.4.1.1.1 MBBR Flow Path

~~Flow enters the first anoxic treatment cells (Cells 1A and 1B) by flowing through four downward opening isolation gates (two per cell). Flow passes from the first cells through flat-screen sieves mounted on inner divider walls, which take the flow to a combined channel and on to the second pair of cells (Cells 2A and 2B). Flow passes through the second cells through flat-screen sieves into divided channels to the third pair of cells (Cells 3A and 3B). Flow then passes through the third cells to the fourth pair of cells (Cells 4A and 4B) though flat screen-sieves and divided channels. Effluent from the fourth pair of cells (Zones 4A and 4B) flows through cylinder sieves into a common channel and then over a submerged wall that prevents the MBBR Reactors from draining in the event of a downstream valve failure. For reference, the JRTP hydraulic grade line (HGL) for the BODR was calculated assuming a maximum allowable headloss of 3 inches for each cell in the MBBR system.~~ **Secondary effluent is pumped to the MBBR and discharges**

to a common influent channel that distributes flow between two MBBR trains. The two trains each consist of four individual cells. For both tanks, influent flow into Cell 1 is controlled through weir gates. The effluent from Cell 1 discharges to Cell 2 and subsequently to Cells 3 and 4 within each tank treatment train. An effluent weir is provided after Cell 4 of each treatment train to maintain the treatment volume within each cell. Downstream of the effluent weir, flow from both trains is combined. From the common effluent channel, flow either discharges to the SWIFT rapid mix process, SWIFT Influent Equalization or to the process overflow line which discharges back to the Junction/Splitter Box prior to the flow split for disinfection before discharge to the Chlorine Contact Tanks using automated controls. *{ANRI VE Alt No. 4A}*

~~The Design-Builder shall incorporate media screens or other measures at the inlet gates for each cell to prevent media from migrating into the upstream channels.~~ The Design-Builder shall also provide ~~air lift pumps or another~~ **an** approved method for controlling foam in each cell. **Intermediate common channels between the Cells are not provided and therefore media retention screens are only needed in the cell divider walls.** *{ANRI VE Alt No. 4A}*

2.4.4.4.1 Flow Control Valve Functions and Flow Ranges

MBBR effluent flowmeter and valve functions ~~are listed in **Table 2-14**~~ **MBBR Effluent gate functional requirements will be designed to meet the operation strategy provided in the MBBR Flow Path Sections. MBBR effluent is metered.**

~~**Table 2-14: MBBR Effluent-Related Piping Flowmeter and Valve Summary**~~ ***{ANRI VE Alt No. 4A}***

~~Equipment(1)~~	~~Size (inches)~~	~~Tag Number~~	~~Quantity~~	~~Function~~
~~MBBR Effluent Flow Valve~~	~~18~~	~~No Tag (manual)~~	~~1~~	~~Isolation valve~~
~~MBBR Effluent Flowmeter~~	~~18~~	~~FE 33-0601~~	~~1~~	~~Flow monitoring~~
~~MBBR Effluent Flow Control Valve~~	~~18~~	~~FCV 33-0501~~	~~1~~	~~Up to 2.5 mgd continuous flow to CCTs/outfall~~
~~MBBR Effluent Flow Valves~~	~~42~~	~~V-33-1201~~ ~~FV 33-0402~~ ~~FV 33-0403~~	~~3~~	~~Isolation valve~~
~~MBBR Effluent Flowmeter~~	~~42~~	~~FE 33-0101~~	~~1~~	~~Flow monitoring~~
~~MBBR Effluent Flow Control Valve~~	~~42~~	~~FCV 33-0201~~	~~1~~	~~Approximately 16 to 20 mgd to SWIFT Influent Pump Station~~
~~MBBR Effluent Flow Valve~~	~~66~~	~~FV 33-0801~~	~~1~~	~~Isolation valve~~
~~MBBR Effluent Flowmeter~~	~~66~~	~~FE 33-0701~~	~~1~~	~~Flow monitoring~~
~~MBBR Effluent Flow Valve~~	~~66~~	~~FV-33-1301~~	~~1~~	~~Isolation valve~~
~~SWIFT Influent Equalization Flow Valve~~	~~42~~	~~FV 33-1601~~	~~1~~	~~Isolation valve~~

~~(1) See P&ID I1301 (BODR drawing I1301) – MBBR room for piping arrangement and location of flowmeters and valves~~

2.4.4.5 MBBR Basin Drainage Provisions

Each MBBR ~~cell~~ tank includes a sump with an 8-inch pipe and a drain valve. Each drain pipe is connected to ~~a manifold connected to two drain pumps (one duty, one standby) that pump drain flow to the IFAS Effluent Channel~~ **the plant drain which conveys flow to an HRSD approved location. Each Cell divider wall will include a screened port at floor for tank draining.** *{ANRI VE Alt No. 4A}*

The MBBR channels will be drained by portable pumps and do not require a sump or related pumps and piping.

2.4.4.6 Additional Design Considerations

Additional design considerations are as follows:

- Provide provisions for one 15-minute (operator adjustable) period per day during which MBBR effluent is diverted to the plant outfalls for flushing.
- Provide 800,000-gallon MBBR effluent equalization capacity in the SWIFT Influent Equalization Tank to minimize SWIFT influent flow variations.
- Provide provisions for diverting flow to CCTs when the SWIFT Influent Equalization Tank is full or not in service.
- ~~UW~~ **SNPW** *{ANRI VE Alt No. 4A}* hose bibbs shall be provided in the MBBR area for scum control and washdown and incorporate the following:
  - Capped tees near hose bibbs shall be provided to facilitate installation of a permanent spray system later.
  - Warning signs shall be provided near each ~~UW~~ **SNPW** *{ANRI VE Alt No. 4A}* outlet and color-coded ~~UW~~ **SNPW** *{ANRI VE Alt No. 4A}* lines.
  - Hose bibbs shall be spaced such that all areas on the MBBR deck can be reached with a 50-foot hose.
- A guardrail system meeting all applicable standards, including OSHA Standard 29 CFR Part 1910, shall be provided around the MBBR Basins.
- A layout that provides convenient and safe access for routine maintenance items and sample collection.

2.4.5 SWIFT Influent Equalization Tank and Pumping (CIP No. GN016360)

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.4.5.1 Process Summary

Table 2-15 provides a summary of the general process design elements for the SWIFT Influent Equalization Tank and Pump Station.

Table 2-15: Process Summary for the SWIFT Influent Equalization Tank and Pumps

Element	Objective / Design Element
Purpose	• The SWIFT Influent Equalization Tank provides flow equalization to promote a constant feed rate to JR SWIFT and minimize the frequency and magnitude of SWIFT flow changes.
Redundancy	• The SWIFT Influent Equalization Pumps include two duty and one standby pump.
Design Approach	• ~~Hydraulically connecting existing Secondary Clarifier 5 (new SWIFT Influent Equalization Tank) with the SWIFT Influent Pump Station via a combination of new and existing interconnecting piping.~~ *{ANRI VE Alt No. 4A}* • ~~New SWIFT Influent Equalization Pumps are required to use the full volume in existing Secondary Clarifier 5 (new SWIFT Influent Equalization Tank) for equalization.~~ *{ANRI VE Alt No. 4A}* • ~~The existing~~ Drain piping **to the Backwash Equalization Pump Station or the Plant Drain Pump Station (adjacent to the grit tanks) or another location as approved by HRSD** ~~from existing Secondary Clarifier 5 (new SWIFT Influent Equalization Tank) to the Plant Drain Pump Station shall be maintained.~~ *{ANRI VE Alt No. 4A}* • **MBBR Effluent can be diverted to the SWIFT Influent EQ Tank by gravity flow over a weir in the MBBR Effluent Channel. SWIFT Influent EQ flow is pumped to the MBBR Effluent Channel.** *{ANRI VE Alt No. 4A}*
Operations and Control Philosophy	• Control of the system will be automated. ~~The SWIFT Influent Equalization Tank level will control the SWIFT Influent Pump Station pumps' flow setpoint. The SWIFT Influent Pump Station level will control the operation of the SWIFT Influent Equalization Pumps.~~ **At periods where MBBR Effluent flow is less than the setpoint SWIFT influent flow, the SWIFT Influent EQ pumps will pump back to the MBBR Effluent Channel to maintain a nearly constant flow to the SWIFT rapid mix process. When the SWIFT Influent EQ Tank is full, excess flow will be diverted to the overflow line that discharges to the CCT splitter box from the MBBR Effluent Channel.** *{ANRI VE Alt No. 4A}*
Facility Layout Concepts	• ~~Facility layout concepts are discussed in the balance of Section 2.4.5.~~ *{ANRI VE Alt No. 4A}* • ~~A new SWIFT Influent Equalization Electrical Building will house the electrical equipment associated with the new SWIFT Influent Equalization Pumps and the Well Backflush Return Pumps.~~ *{ANRI VE Alt No. 4A}* • Communications connections for SWIFT Influent Equalization Tank level and SWIFT Influent Equalization Pumps controls are required. • No chemicals or other services are required. • **A new tank will be provided for the SWIFT Influent EQ. The existing SC No. 5 will remain as a Secondary Clarifier.** *{ANRI VE Alt No. 4A}*

2.4.5.2 Design Criteria

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 2-16: Design Criteria for the SWIFT Influent Equalization Tank and Pump Station [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Design Element	Value	Design Element

2.4.5.3 SWIFT Influent Equalization Volume Sizing

SWIFT influent flow (MBBR effluent) in excess of the operating rate of JR SWIFT (up to 16.0 mgd maximum design flow) and the continuous MBBR effluent flow to the CCTs (up to a maximum of 2.5 mgd) will be diverted to the SWIFT Influent Equalization Tank. If the SWIFT Influent Equalization Tank is full, the excess flow will be diverted to the CCTs.

JR SWIFT influent water stored in the equalization tank will be released back to the ~~SWIFT Influent Pump Station~~ **MBBR Effluent Channel** *{ANRI VE Alt No. 4A}* during lower JRTP flow periods. Based on an HRSD evaluation, a usable equalization volume of 800,000 gallons is required to meet anticipated JRTP and JR SWIFT operating conditions.

2.4.5.4 ~~SWIFT Influent Pump Station Configuration~~ *{ANRI VE Alt No. 4A}*

~~The proposed SWIFT Influent Pump Station is adjacent to the MBBR Building. MBBR effluent is directed to the SWIFT Influent Channel, which is hydraulically connected to the SWIFT Influent Equalization Tank. Flow from the SWIFT Influent Channel enters the SWIFT Influent Pump Station wet wells through isolation gates with excess overflowing to the Junction/Splitter Box.~~ *{ANRI VE Alt No. 4A}*

~~The SWIFT Influent Pump Station is discussed further in Section 3.7.1 (SWIFT Influent Pump Station)~~. *{ANRI VE Alt No. 4A}*

2.4.5.5 ~~SWIFT Influent Equalization and Pumping~~

~~The proposed SWIFT influent flow equalization approach consists of hydraulically connecting existing Secondary Clarifier 5 with the SWIFT Influent Pump Station via a combination of new and existing interconnecting piping. A new 42-inch interconnect pipe is proposed between the SWIFT Influent Pump Station and temporary manholes that is initially used to convey effluent flow from existing Secondary Clarifiers 1, 2, and 3 to the CCTs.~~ *{ANRI VE Alt No. 4A}*

~~After the new Junction/Splitter Box is constructed, these pipes will be dedicated to transferring SWIFT influent flow to the SWIFT Influent Equalization Tank. A new 42-inch pipe will be installed between these manholes and the northwest appendage on the new Junction/Splitter Box. The appendage will also be connected to the existing 42-inch Secondary Clarifiers 4 and 5 effluent piping, which will remain in service as a SWIFT influent equalization interconnect pipe. This approach requires the addition of a new isolation gate at the bottom of the inlet to existing Secondary Clarifier 4, which will be repurposed to serve as a Well Backflush Equalization Tank.~~ *{ANRI VE Alt No. 4A}*

~~Based on the anticipated HGL for the new JRTP ANRI facilities, existing Secondary Clarifier 5 will be capable of providing an equalization volume in excess of 800,000 gallons via gravity flow from the SWIFT Influent Pump Station Influent Channel (assuming the maximum water level in the SWIFT Influent Pump Station is approximately 13.60 feet). However, due to existing Secondary Clarifier 5 and SWIFT Influent Pump Station elevations, approximately half of the tank volume cannot flow back by gravity to the SWIFT Influent Pump Station. Therefore, the new SWIFT Influent Equalization Pumps that can pump the lower volume of existing Secondary Clarifier 5 are shown in order to provide the required 800,000 gallons for equalization.~~ *{ANRI VE Alt No. 4A}*

~~See Appendix I (JRTP ANRI Instrumentation and Control) for additional information on Functional Control Descriptions.~~

2.4.5.6 Additional Design Considerations

- A flowmeter vault will be required for the SWIFT Equalization Pumps discharge piping.
- A cover system is required over the SWIFT Influent Equalization Tank. The new cover system shall be flat aluminum type with an aluminum truss system installed above the flat cover. Similar covers are on the JRTP primary clarifiers.
- Provide hatches for accessing and removing process pumps and a platform to support personnel if necessary.
- ~~Any existing underdrain piping system used to prevent flotation of the tank when empty shall be retained. The Design-Builder will determine whether any repair or improvements are necessary during detailed design and provide recommendations to HRSD for any additional enhancements that may be required.~~ *{ANRI VE Alt No. 4A}*
- Mixers shall be provided to minimize settling of solids. The Design-Builder shall determine type, sizing, and number/arrangement as required.

2.4.6 Well Backflush Equalization Tank and Pumping (CIP No. GN016360)

Each SWIFT recharge well may be backflushed for up to 30 minutes per day at an anticipated flow rate of 3.0 mgd to maintain recharge capacity. The backflush water from all recharge wells will be returned to the Well Backflush Equalization Tank (~~existing Secondary Clarifier 4~~ **new tank** *{ANRI VE Alt No. 4A}*). From the tank, well backflush water will be ~~pumped~~ **conveyed** *{ANRI VE Alt No. 4A}* to the Junction/Splitter Box **via the process overflow line. The rate of flow will be controlled via a flow meter and flow control valve.** ~~or the SWIFT Influent Pump Station~~ **. The flow control valve and flow meter will be sized to convey the 24-hour equalized flow.** *{ANRI VE Alt No. 4A}*

2.4.6.1 Process Summary

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 2-17: Process Summary for the Well Backflush Equalization Tank ~~and Pumps~~

Element	Objective / Design Element
Purpose	• The Well Backflush Equalization Tank provides the flow equalization to control of relatively high instantaneous well backflush flows.
Redundancy	• The Well Backflush Equalization ~~Pumps~~ shall include **redundancy for backflush equalized flow conveyance, automatic flow control valve by manual bypass valve** ~~one duty and one standby pump~~. *{ANRI VE Alt No. 4A}*
Design Approach	• Equalized backflush water discharged to the **process overflow line** ~~Junction/Splitter Box~~ (anticipated normal mode of operation) ~~or to the influent channel of the SWIFT Influent Pump Station~~ *{ANRI VE Alt No. 4A}*. • ~~Existing~~ Drain piping **to the Backwash Equalization Pump Station or the Plant Drain Pump Station (adjacent to the grit tanks) or another location as approved by HRSD**

Element	Objective / Design Element
	~~from existing Secondary Clarifier 4 (new Well Backflush Equalization Tank) to Plant Drain Pump Station shall be maintained~~ *{ANRI VE Alt No. 4A}*.
Operations and Control Philosophy	• Control of the system will be automated. The Well Backflush Equalization ~~Pumps~~ **system will** *{ANRI VE Alt No. 4A}* operate based on Well Backflush Equalization Tank level ~~in a lead/lag arrangement~~ **with a flow control valve** *{ANRI VE Alt No. 4A}*.
Facility Layout Concepts	• Facility layout concepts are discussed in the balance of Section 2.4.6. • ~~The new SWIFT Influent Equalization Electrical Building will house the electrical equipment associated with the new Well Backflush Equalization Tank and Pumps.~~ *{ANRI VE Alt No. 4A}* • DCS connections for Well Backflush Equalization Tank level and ~~pump~~ *{ANRI VE Alt No. 4A}* controls are required. • No chemicals or other services are required.

2.4.6.2 Design Criteria

Table 2-18 provides the design criteria used for the Well Backflush Equalization Tank and Pumps.

Table 2-18: Design Criteria for Well Backflush Equalization Tank

Equipment	Element	Value
Well Backflush Equalization Tank (~~existing Secondary Clarifier 4~~ **new tank)** *{ANRI VE Alt No. 4A}*)	Capacity	572,000 gallons
~~Well Backflush Equalization Pumps~~ **Well Backflush Equalization Tank will convey by gravity to the Junction / Splitter Box via the Process Overflow Line** *{ANRI VE Alt No. 4A}*	~~Number of pumps~~	~~2 (1 duty, 1 standby)~~
	Capacity	450 gpm ~~per pump~~
	~~Estimated motor horsepower~~	~~10 hp~~
	~~Drive type~~	~~VFD~~

2.4.6.3 Well Backflush Equalization Tank Sizing

The estimated maximum well backflush volume anticipated to be generated per day is 625,00 gallons (10 wells each backflushed for 30 minutes at 3.0 mgd). **New tank** with an approximate volume of 572,000 gallons~~, existing Secondary Clarifier 4 provides enough capacity to serve as the Well Backflush Equalization Tank~~ *{ANRI VE Alt No. 4A}*.

2.4.6.4 Well Backwash Equalization Tank and Pumping Configuration

All well backflush water will be conveyed through a single, new pipe to the Well Backflush Equalization Tank. ~~Submersible pumps will be installed along the inside wall of the Well Backflush Equalization Tank. A new aluminum access platform with stairs down to grade shall be constructed over the pumps to allow the pumps to be removed on guide rails, and control panels shall be installed above the pumps.~~ The Well Backflush Equalization ~~Pumps~~ will discharge water to the Junction/Splitter Box ~~or the influent channel of the SWIFT Influent Pump Station~~ *{ANRI VE Alt No. 4A}*. A flowmeter vault will be required for the discharge piping.

~~The new SWIFT Influent Equalization Electrical Building will also house the electrical equipment associated with the new Well Backflush Equalization Tank and Pumps.~~ *{ANRI VE Alt No. 4A}*

2.4.6.5 Equalized Well Backflush Return Flow Control

The Well Backflush Equalization ~~Pumps~~ will operate based on **flow setpoint or equalization tank level** ~~Well Backflush Equalization Tank level in a lead/lag arrangement. Typically, one pump will turn on and off at preset operating levels, with the second pump serving as a backup if needed~~ *{ANRI VE Alt No. 4A}*. See Appendix I (JRTP ANRI Instrumentation and Control) for additional information on Functional Control Descriptions).

2.4.6.6 Additional Design Considerations

- The Well Backflush Equalization Tank does not need to be covered.
- ~~Any existing underdrain piping system used to prevent flotation of the tank when empty shall be retained. The Design-Builder shall determine whether any repair or improvements are necessary during detailed design and provide recommendations to HRSD for any additional enhancements that may be required.~~ *{ANRI VE Alt No. 4A}*
- Mixers shall be provided to minimize settling of solids. The Design-Builder shall determine type, sizing, and number/arrangement as required.

2.4.7 Junction/Splitter Box

The proposed Junction/Splitter Box ~~is~~ **will be** designed to **collect secondary clarifier effluent flow and process overflow**, minimize headloss at the entrance to the existing CCTs, ~~improve the flow split between the existing CCTs under high river level and/or high flow conditions, and assist construction sequencing to allow the new secondary clarifiers to be brought on line while the existing secondary clarifiers are still in service.~~ **balance the flow split between the existing CCTs at the target flow condition and serve as the single point for sodium hypochlorite addition and mixing prior to splitting flow to the CCTs.** *{ANRI VE Alt No. 4A}*

2.4.7.1 Process Summary

Table 2-19 provides a summary of general process design elements for the Junction/Splitter Box.

Table 2-19: Process Summary for the Junction/Splitter Box

Element	Objective / Design Element
Purpose	• Ensure proportional flow distribution between the existing CCTs **at the target flow condition.** *{ANRI VE Alt No. 4A}* • Suitable location for sodium hypochlorite injection point for effluent disinfection
Redundancy	• ~~Each splitter chamber can be isolated for maintenance.~~ *{ANRI VE Alt No. 4A}* Each CCT can be bypassed for maintenance.
Design Approach	• Maximum design flow – 57 mgd • Isolation slide gates provided for each CCT • ~~New 72-inch pipe will convey 2.5 to 57 mgd from MBBR bypass channel to Junction/Splitter Box.~~ **Three new pipes will convey 2.5 to 57 mgd of secondary effluent through the junction/splitter box to the chlorine contact tanks.** *{ANRI VE Alt No. 4A}*

Element	Objective / Design Element
	• ~~New 48-inch pipe will convey maximum flow of 21 mgd from SWIFT overflow to Junction/Splitter Box when the SWIFT Influent Equalization Tank is full or out of service.~~ **The process overflow line from the SWIFT Process Facilities and the MBBR will discharge to the splitter box.** *{ANRI VE Alt No. 4A}* • ~~Three weir trough systems will be used to distribute the flow to downstream CCTs.~~ **The design of the three lines and box will be used to balance flow between the CCTs at the target flow condition.** *{ANRI VE Alt No. 4A}* • ~~Weir lengths are proportional to the respective CCT volume.~~ *{ANRI VE Alt No. 4A}* • ~~CCT 2 and CCT 3 will have a direct hydraulic connection to the new Junction/Splitter Box.~~ *{ANRI VE Alt No. 4A}* • ~~The Junction/Splitter Box structure will be constructed in multiple phases to allow for minimum plant outage.~~ *{ANRI VE Alt No. 4A}* • Sodium hypochlorite diffusers will be installed in the Junction/Splitter Box with sodium hypochlorite injected proportionally to incoming flow **(based on calculated value from flow meters installed elsewhere)** and ~~mixed with a top-entry mechanical mixer~~ **uniformly mixed prior to flow splitting to the three CCTs**. *{ANRI VE Alt No. 4A}* • The Design-Builder shall perform ~~CFD~~ **scaled physical** modeling analysis to design and verify ~~suitable~~ **uniform** mixing. • **Scaled physical modeling will be performed to design flow control devices that can be modified to achieve a target flow split at a target flow condition. The model will be run at average and maximum daily flow conditions to determine predicted flow split to the three CCTs for use in verifying compliance with VDEQ Sewage Collection and Treatment (SCAT) regulations for contact period. The model will include additional flow rates to provide predicted flow split under lower flow conditions and with CCTs out of service.** *{ANRI VE Alt No. 4A}* • **The target flow condition is the maximum day flow of 36.4 mgd for proportional flow distribution with three CCTs in service. The scaled physical model will test average dry weather flow with the objective of achieving a design for reasonable flow split to the extent possible given the limited available head. This may require modifications to the flow control devices designed for the maximum day flow. The scaled physical model testing will define the flow control device configuration for all flow conditions. The Design-Builder will design, construct and commission the Junction/Splitter Box based on the scaled physical model design defined to meet the SCAT minimum contact periods. The scaled physical model results will be the basis for the Design-Builder to validate the design for CCT flow distribution and sodium hypochlorite mixing. Field testing of flow split and mixing are excluded from Design-Builder's scope of work.** *{ANRI VE Alt No. 4A}*
Operations and Control Philosophy	• Flows to each CCT can be controlled via slide gates to allow for maintenance activities. • ~~Weir trough systems will control the distribution of flow between the existing CCTs.~~ *{ANRI VE Alt No. 4A}*
Facility Layout Concepts	• Site constraints, HGL, and construction sequencing dictate the geometry and location of the Junction/Splitter Box.

2.4.7.2 Design Criteria

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 2-20: Design Criteria for the Junction/Splitter Box

Design Element	Value
~~Number of weir trough systems~~ *{ANRI VE Alt No. 4A}*	~~3~~
CCT 1 Influent Chamber	
Volume	0.160 mg
Weir trough system length	28 feet
Weir elevation	13.5 feet
Flow distribution	31%
CCT 2 Influent Chamber	
Volume	0.194 mg
Weir trough system length	42 feet
Weir elevation	13.5 feet
Flow distribution	38%
CCT 3 Influent Chamber	
Volume	0.162 mg
Weir trough system length	26.5 feet
Weir elevation	13.5 feet
Flow distribution	31%

2.4.7.3 ~~Equipment Summary Table~~ *{ANRI VE Alt No. 4A}*

~~**Table 2-21** summarizes the type of equipment in the Junction/Splitter Box.~~

~~**Table 2-21: Junction/Splitter Box Equipment Summary**~~

~~Equipment~~	~~Element~~	~~Value~~
~~Trough~~	~~Material of construction~~	~~FRP, aluminum, or concrete~~
	~~Style~~	~~Rectangular~~
~~Weir plate~~	~~Material of construction~~	~~FRP~~
	~~Style~~	~~Straight edge~~

2.4.7.4 Additional Design Considerations

~~The new structure will be built just north of the existing CCTs. It will intercept piping between the existing secondary clarifiers and CCTs in two places, which will facilitate construction sequencing connections to the new secondary clarifiers. It includes a common influent chamber that discharges to three isolatable downstream chambers with launders and flow-splitting weirs with proportional lengths to match the volume of the existing CCTs. Each chamber will connect to one of the existing CCTs through a separate pipe connection downstream of the weirs.~~ **The Junction/Splitter Box will be designed to avoid introduction of sodium hypochlorite into the MBBR influent pumps.** *{ANRI VE Alt No. 4A}*

2.4.8 Non-Potable Water Pump Systems

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.5 JRTP ANRI Chemical Feed Systems

~~The JRTP ANRI project includes a dedicated chemical storage and feed system housed in Chemical Building No. 2, a stand-alone building. Prior to the construction of Chemical Building No. 2, there is a high likelihood the existing JRTP Sodium Hypochlorite and Sodium Bisulfite Buildings will need to be demolished to facilitate construction of the ANRI secondary clarifiers and MBBR.~~

~~The temporary JRTP chemicals that will be required during construction include:~~

- ~~Sodium hypochlorite (hypochlorite)~~
- ~~Sodium bisulfite (bisulfite)~~

~~The JRTP ANRI-specific chemicals to be incorporated into Chemical Building No. 2 include:~~

- ~~Sodium hypochlorite (hypochlorite)~~
- ~~Sodium bisulfite (bisulfite)~~
- ~~Phosphoric acid~~

~~The following sections provide the Basis of Design for the temporary and permanent chemical storage and feed systems.~~

Existing sodium hypochlorite and sodium bisulfite buildings shall remain for reuse. The existing storage shall remain, a portion of the feed pumps and feed systems will be replaced and connected to the DCS. Full automation of the feed pumps with monitoring, control and instrumentation similar to the BODR is required. For sodium bisulfite, the following will be monitored/controlled by the DCS: remote pump start/stop, carrying water flow meters, automatic/manual pump speed, carrying water motorized flow control valves, chemical flow metering, tank level signals and atmospheric safety alarms. For sodium hypochlorite, the following will be monitored/controlled from the DCS: remote pump start/stop, automatic/manual pump speed, chemical flow metering, tank level signals, and atmospheric safety alarms. Existing signals and instruments shall be reused and connected to the DCS, if available. Should existing instruments and signals not be available for the monitoring/control points, new instruments and signals shall be provided. *{ANRI VE Alt No. 4A}*

2.5.1 ~~Temporary JRTP Hypochlorite and Bisulfite Storage and Feed System~~

~~Due to the proximity of the existing JRTP Sodium Hypochlorite (hypochlorite) and Sodium Bisulfite (bisulfite) Buildings to major ANRI construction, it is likely that a temporary hypochlorite and bisulfite storage and feed system will be required. In the event the Design-Builder's construction sequencing requires the demolition of existing JRTP chemical facilities, the Design-Builder shall provide temporary JRTP Hypochlorite and Bisulfite Storage and Feed facilities.~~

~~The Design-Builder shall propose for the Owner's approval an area and structure(s) for the temporary facilities that will be compatible with the Design-Builder's proposed construction activities.~~ *{ANRI VE Alt No. 4A}*

2.5.1.1 ~~Process Summary~~

~~**Table 2-22** provides a summary of general design elements associated with the Temporary JRTP Hypochlorite and Bisulfite Storage and Feed System.~~ *{ANRI VE Alt No. 4A}*

~~Table 2-22: General Design Elements for the Temporary JRTP Hypochlorite and Bisulfite Storage and Feed System~~

~~Element~~	~~Objective / Design Element~~
~~Purpose~~	• ~~Provide temporary storage and feed of hypochlorite and bisulfite to the existing JRTP feed points.~~ • ~~Feed points include CCTs, RAS piping, and odor control system.~~
~~Equipment Provided~~	• ~~Hypochlorite and bisulfite feed must be maintained at all times for the Temporary JRTP Hypochlorite and Bisulfite Storage and Feed System.~~ • ~~A minimum of 7 days of storage for each chemical for existing JRTP chemical storage must be maintained at all times during the transition to the Temporary JRTP Hypochlorite and Bisulfite Storage and Feed System.~~ • ~~Existing hypochlorite and bisulfite tanks can be utilized for temporary facilities (relocated by Design-Builder at own risk).~~ • ~~If new tanks are provided for temporary hypochlorite or bisulfite storage, they can be transferred to Chemical Building No. 2 if the capacities are equivalent.~~ • ~~Existing JRTP chemical feed pumps can be reused as long as feed capabilities are maintained during the relocation.~~ • ~~Peristaltic pumps must be provided.~~ • ~~Provide chlorine and sulfur dioxide gas/fume detection system.~~ • ~~All temporary feed and storage facilities shall be linked to the DCS for control and monitoring.~~ • ~~Provide a chemical unloading and fill system including piping, connections, and chemical containment at the hook up point.~~
~~Facility/System Requirements~~	• ~~Provide a temporary building(s) designed to withstand a Category 2 hurricane and comply will all City of Newport News building codes, including heating, ventilation, and air conditioning (HVAC) and fire suppression.~~ • ~~Construct a temporary road to allow bulk chemical deliveries to the chemical unloading area.~~ • ~~Chemical unloading area shall allow for delivery truck parking and unloading and be sloped toward the fill connects.~~ • ~~Any failures in the temporary chemical storage and feed facilities must be repaired by the Design-Builder at own cost.~~ • ~~HVAC system shall maintain interior temperatures between 65 and 85ºF.~~ • ~~Storage area shall have secondary containment as required in *HRSD Design and Construction Standards*.~~ • ~~Temporary chemical storage and feed facilities shall be tested, fully operational, and approved by the Owner before the existing chemical storage and feed facilities are removed from service and demolished.~~ • ~~Chemical Building No. 2 shall be Substantially Complete before the temporary JRTP chemical storage and feed facilities are removed from service and deconstructed.~~ *{ANRI VE Alt No. 4A}*

~~The Temporary JRTP Hypochlorite and Bisulfite Storage and Feed System shall provide the same feed capabilities as the existing JRTP feed system.~~ ~~**Table 2-23**~~ ~~provides the hypochlorite and bisulfite storage and the existing feed capabilities that are required for the Temporary JRTP Hypochlorite and Bisulfite Storage and Feed System.~~ *{ANRI VE Alt No. 4A}*

~~**Table 2-23: Temporary for JRTP Hypochlorite and Bisulfite Storage and Feed System**~~

~~**Item**~~	~~**Hypochlorite**~~	~~**Bisulfite**~~
~~Number of Tanks Required (minimum)~~	~~Two~~	~~Two~~
~~Capacities of Existing JRTP Tanks~~	• ~~Two 7,050-gallon design capacity (6,800-gallon working capacity)~~ • ~~Two 5,800-gallon design capacity (5,500-gallon working capacity)~~	~~4,500-gallon design capacity (3,800-gallon working capacity)~~
~~Total Storage Required~~	~~15,000 gallons (working capacity)~~	~~7,600 gallons (working capacity)~~
~~Number and Capacity of Existing JRTP Feed Pumps~~		
~~CCT Pumps~~	• ~~Four 132 gph~~ • ~~Two 55 gph~~	• ~~Four 20 gph~~ • ~~One 40 gph~~ • ~~One 5 hp transfer pump (centrifugal)~~
~~Odor A Pumps~~	• ~~One 14 gph~~ • ~~One 40 gph~~	
~~Odor **B** A Pumps *{Addendum No. 4}*~~	• ~~One 14 gph~~ • ~~One 20 gph~~	
~~Emergency Pump~~	~~One 100 gph~~	
~~RAS Pump~~	~~One 69 gph~~ *{ANRI VE Alt No. 4A}*	

2.5.2 JRTP ANRI Sodium Hypochlorite Storage and Feed System

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.5.2.1 Process Summary

~~The sodium hypochlorite (hypochlorite) storage and feed system for wastewater applications is located in Chemical Building No. 2. Hypochlorite will be delivered to Chemical Building No. 2 by bulk truckload or from transfer for Chemical Building No. 1 and stored in bulk storage tanks.~~

~~**Table 2-24** provides a summary of general process design elements associated with the ANRI Sodium Hypochlorite Storage and Feed System.~~ *{ANRI VE Alt No. 4A}*

Table 2-24: Process Summary for JRTP ANRI Hypochlorite Storage and Feed System

Element	Objective / Design Element
Purpose	• JRTP effluent disinfection • RAS treatment for bulking, foaming, and filamentous organism control • Odor Scrubber System feed to neutralize hydrogen sulfide gas, ammonia, and other odors
Redundancy	• ~~Hypochlorite transfer from Chemical Building No. 1 is available.~~ • ~~Each bulk storage tank includes individual fill lines and feed piping to common feed pump suction headers.~~ • The metering pump system includes an installed standby pump and accessories for each pump size and application point. • A spare hypochlorite feedline to each application point is required for piping in the yard. **A spare line is not required for the existing odor control application points.** *{ANRI VE Alt No. 4A}*
Design Approach	• ~~*HRSD Design and Construction Standards* require that the total bulk storage volume be sized for the largest of the following:~~ o ~~7 days, maximum flow, maximum dose~~ o ~~15 days, average flow, average dose~~ o ~~Truckload volume plus 15%~~ • ~~*Each tank must accept a bulk truckload.*~~ • Metering pumps are sized to handle maximum flow, maximum dose and have adequate turndown capability for the minimum flow, minimum dose needed for each application point. • ~~Secondary containment is sized to handle one bulk storage tank volume plus 20 minutes of sprinkler water.~~ • ~~All vents are terminated outside Chemical Building No. 2.~~ • ~~Chlorine gas/fume detection system shall be provided.~~ • **New** buried piping shall have secondary containment. Containment piping shall be sloped toward secondary containment in the Chemical Building ~~No. 2~~ or to chemical junction boxes in the yard equipped with level switches. *{ANRI VE Alt No. 4A}*
Operations and Control Philosophy	• **Existing** Tank level and volume shall be monitored continuously. • **New** hypochlorite metering pumps will be flow-paced with manual operation backup. • The duty metering pump discharge flow rate will be monitored locally with a flow element and flow indicator transmitter (FE/FIT), including a local read-out and connection to the plant DCS system. • **Existing** emergency eyewash/shower flow, **existing** containment area sump high level, and **existing** chlorine gas detection conditions to be monitored continuously.
Facility Layout Concepts	• ~~The hypochlorite fill station is located outside the exterior wall of the hypochlorite storage and feed room.~~ • ~~Spill containment for drips and small spills shall be provided at the fill station.~~ • ~~Bulk chemical unloading facilities shall include a sloped concrete pad adjacent to the truck unloading quick connections. The unloading pad shall be sloped away from the surrounding pavement and toward a containment trench along the chemical containment outer wall.~~ • ~~The containment trench volume shall be capable of containing a full truckload of chemical.~~ • ~~The JRTP ANRI Sodium Hypochlorite Chemical Storage and Feed System includes a dedicated secondary containment area in Chemical Building No. 2.~~

Element	Objective / Design Element

	• ~~Bulk storage tanks shall be located on equipment pads and have a ladder for access to the manway and accessories on top of the tank. The tops of the tanks shall be flat or shallow domes and with a guardrail.~~
	• ~~Bulk storage tanks shall also include a manway on the side of the tank near the bottom for personnel access.~~
	• Metering pumps are located on a shelf above containment with piping, valves, and accessories installed to allow for operator access.
	• ~~Secondary containment shall:~~
	  ○ ~~Surround bulk storage tanks, metering pumps, and piping~~
	  ○ ~~Be sloped to a sump interior to the containment area~~
	• Any **new** hypochlorite piping outside the secondary containment area shall be routed though containment piping.
	• **New** containment piping shall be sloped toward secondary containment in Chemical Building ~~No. 2~~ or to chemical junction boxes equipped with sumps and level switches in the yard.
	• All **new** equipment, valves, and piping material to be compatible with 15% sodium hypochlorite.
	• ~~Emergency showers/eyewashes shall be located at both the fill station and the pump/containment area.~~
	• Provisions for flushing **new** feed lines shall be provided. *{ANRI VE Alt No. 4A}*

2.5.2.2 Design Criteria

Table 2-25 ~~provides the design criteria used for the JRTP ANRI Sodium Hypochlorite Storage and Feed System.~~ **The following table provides the design conditions for the replacement pumps.** *{ANRI VE Alt No. 4A}*

Table 2-25: Design Criteria for JRTP ANRI Hypochlorite Storage and Feed System

Design Element	Single Value	Value		
		Max	Avg	Min
Design flow[1] JRTP historical data				
Maximum	30.1 mgd	–	–	–
Minimum	10.5 mgd	–	–	–
Average	14.3 mgd	–	–	–
Sodium hypochlorite application points				
CCT dose, mg/L[1],[2]	–	9.3	3.6	1.6
Odor Scrubber, mg/L[1],[2]	–	N/A	TBD	TBD
RAS, mg/L[1],[2]	–	N/A	1.0	N/A
Sodium hypochlorite properties				
Concentration delivered	12% trade	–	–	–
Specific gravity	1.20	–	–	–
Effective density, lb Cl/gal	1.04	–	–	–
~~Bulk storage~~ **Existing Storage to Remain** *{ANRI VE Alt No. 4A}*				

Design Element	Single Value	Value		
		Max	Avg	Min
~~7-day, maximum flow, maximum dose~~	~~14,119 gallons~~	–	–	–
~~15-day, average flow, average dose~~	~~6,847 gallons~~	–	–	–
~~Truckload volume plus 15%~~	~~4,496 gallons~~	–	–	–
~~Largest bulk storage volume required~~	~~15,000 gallons~~	–	–	–

(1) 2017–2019 JRTP data

(2) Concentration as hypochlorite

(3) ~~Bulk storage calculations assume adequate hypo storage capacity at Chemical Building No. 1 for the SWIFT processes. SWIFT Feed Pump Station as well as the SWIFT Equalization Tank are both assumed to be off line.~~ *{ANRI VE Alt No. 4A}*

2.5.2.3 Additional Design Considerations

~~Because the hypochlorite bulk storage tanks can be filled directly or from Chemical Building No. 1, special consideration must be made to alarm the truck operator and bulk transfer system as the tanks approach high level.~~ *{ANRI VE Alt No. 4A}*

2.5.2.4 Equipment Summary Tables

~~**Table 2-26** summarizes the type of equipment in the JRTP ANRI Sodium Hypochlorite Storage and Feed System.~~ **The following table summarizes the design conditions for the replacement sodium hypochlorite pumps**: *{ANRI VE Alt No. 4A}*

Table 2-26: JRTP ANRI Sodium Hypochlorite Improvements Equipment Summary

~~Equipment~~	~~Element~~	~~Value~~
~~Bulk Storage~~ *{ANRI VE Alt No. 4A}*	~~Type~~	~~• Vertical, cylindrical tank~~ ~~• Flat bottom~~ ~~• Flat or shallow dome top~~
	~~Material~~	~~FRP~~
	~~Number of tanks~~	~~2~~
	~~Nominal capacity~~	~~7,500 gallons each~~
	~~Maximum diameter~~	~~10 feet~~
	~~Maximum straight shell height~~	~~18 feet~~
	~~Connection openings~~	~~Truck fill, suction, transfer pump discharge fill, overflow, vent, top manway, side manway, level instrument, side bottom drain~~
Feed Pumps	Type	Peristaltic
	Effluent disinfection (CCT)	
	Number	6 (3 duty, 3 standby)
	Maximum capacity	225 gph

~~Equipment~~	~~Element~~	~~Value~~
	Minimum capacity	3.6 gph
	Power draw	120 volt, 1 phase, 60 Hz
	Odor Control Scrubber System - **Existing Odor to Remain** *{ANRI VE Alt No. 4A}*	
	~~Number~~	~~2 (1 duty, 1 standby)~~
	~~Maximum capacity~~	~~150 gph~~
	~~Minimum capacity~~	~~12 gph~~
	~~Power draw~~	~~120 volt, 1 phase, 60 Hz~~
	RAS	
	Number	2 (1 duty, 1 standby)
	Maximum capacity	300 gph
	Minimum capacity	30 gph
	Power draw	120 volt, 1 phase, 60 Hz
	Secondary foam	
	Number	2 (1 duty, 1 standby)
	Maximum capacity	300 gph
	Minimum capacity	30 gph
	Power draw	120 volt, 1 phase, 60 Hz

2.5.3 JRTP ANRI Sodium Bisulfite Storage and Feed System

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.5.3.1 Process Summary

~~The JRTP ANRI Sodium Bisulfite Chemical Storage and Feed System shall be located in Chemical Building No. 2. Bisulfite will be delivered by bulk truckload to the bisulfite fill station for Chemical Building No. 2 and stored inside in bulk storage tanks.~~

~~**Table 2-27** provides a summary of general process design elements associated with the JRTP ANRI Sodium Bisulfite Chemical Storage and Feed System.~~ *{ANRI VE Alt No. 4A}*

Table 2-27: Process Summary for JRTP ANRI Sodium Bisulfite Chemical Storage and Feed System

Element	Objective/Design Element
Purpose	Post-disinfection dechlorination of JRTP effluent
~~Redundancy~~	• ~~Each bulk storage tank includes individual fill lines and feed piping to common feed pump suction headers.~~ • The metering pump system includes an installed standby pump and accessories for each pump size and application point. • A spare bisulfite feedline to each application point is required for **new** piping in the yard.

Element	Objective/Design Element

~~Design Approach~~	• ~~Per *HRSD Design and Construction Standards*, minimum total bulk storage volume is sized for the largest of the following:~~
	  ○ ~~15 days, maximum flow, maximum dose~~
	  ○ ~~30 days, average flow, average dose~~
	  ○ ~~Truckload volume plus 15%~~
	• ~~Individual bisulfite tanks shall be able to accept a bulk truckload.~~
	• Metering pumps are sized to handle maximum flow, maximum dose and will have adequate turndown capability for the minimum flow, minimum dose needed at the application point.
	• ~~Secondary containment shall be sized to handle one bulk storage tank volume plus 20 minutes of sprinkler water.~~
	• **New** buried piping shall have secondary containment. Containment piping shall be sloped toward secondary containment in the Chemical Building ~~No. 2~~ or to chemical junction boxes in the yard equipped with level switches. *{ANRI VE Alt No. 4A}*

Operations and Control Philosophy	• Tank level and volume shall be monitored continuously. • **New** bisulfite metering pumps will be flow-paced with manual operation backup. • The duty metering pump discharge flow rate will be monitored locally with an FE/FIT, including a local read-out and connection to the plant DCS system. • **Existing** carrier water will be fed at the metering pump discharge to reduce the sodium bisulfite concentration to less than 25% to eliminate freezing concerns. ~~The Design-Builder will coordinate water supply source, including water-softening provisions as necessary.~~ • **Existing** emergency eyewash/shower flow and **existing** containment area sump high level and **existing** sulfur dioxide gas detection will be monitored.

Facility Layout Concepts	• ~~The bisulfite fill station will be located outside the exterior wall of the bisulfite storage and feed room.~~
	• ~~The bisulfite tanks and pumps will be inside Chemical Building No. 2.~~
	• ~~Bulk storage tanks will be located on equipment pads. Each tank shall have a ladder with a manway and accessories on top of the tank. The tops of the tanks shall be flat or shallow domes with a guardrail.~~
	• ~~Metering pumps are located on a concrete shelf above containment with piping, valves, and accessories installed to allow for operator access.~~
	• ~~Secondary containment shall be:~~
	  ○ ~~Provided for bulk storage tanks, metering pumps, and piping~~
	  ○ ~~Sloped to a sump for pumping out spills or washdown water~~
	• Any **new** piping outside the secondary containment will be routed through containment piping.
	• **New** Containment piping shall be sloped toward secondary containment in Chemical Building ~~No. 2~~ or to chemical junction boxes equipped with sumps and level switches in the yard.
	• All **new** materials shall be compatible with sodium bisulfite.
	• ~~Emergency showers/eyewashes shall be located at both the fill station and the containment / pump area.~~
	• ~~Sulfur dioxide gas/fume detection system shall be provided.~~
	• Provisions for flushing **new** feed lines shall be provided.

2.5.3.2 Design Criteria

Table 2-28 ~~provides the design criteria used for the JRTP ANRI Sodium Bisulfite Chemical Storage and Feed System.~~ **The following table summarizes the design criteria for the replacement sodium bisulfite pumps:** *{ANRI VE Alt No. 4A}*

Table 2-28: Design Criteria for JRTP ANRI Sodium Bisulfite Chemical Storage and Feed System

Design Element	Single Value	Value Max	Avg	Min
Design flow, JRTP				
Maximum	30.1 mgd	–	–	–
Minimum	10.5 mgd	–	–	–
Average	14.3 mgd	–	–	–
Sodium bisulfite JRTP dose[(1),(2)]	–	4.3 mg/L	2.6 mg/L	1.3 mg/L
Sodium bisulfite properties				
Concentration delivered	38%	–	–	–
Specific gravity	1.30	–	–	–
Effective density	4.12 lb/gal	–	–	–
~~Bulk storage~~[(3)] *{ANRI VE Alt No. 4A}*				
~~15-day, maximum flow, maximum dose~~	~~3,945 gallons~~	–	–	–
~~30-day, average flow, average dose~~	~~2,267 gallons~~	–	–	–
~~Truckload volume plus 15%~~	~~4,773 gallons~~	~~–~~	–	–
~~Largest bulk storage volume required~~	~~5,000 gal~~	~~–~~	–	–

(1) As sodium bisulfite
(2) 2017–2019 JRTP data
~~(3) Bulk storage calculations assume max week / month flows at JRTP with SWIFT flow included.~~ *{ANRI VE Alt No. 4A}*

2.5.3.3 Equipment Summary Tables

Table 2-29 summarizes the type of equipment included in the JRTP ANRI Sodium Bisulfite Chemical ~~Storage and~~ Feed System. **The following table provides the equipment summary:** *{ANRI VE Alt No. 4A}*

Table 2-29: JRTP ANRI Sodium Bisulfite Chemical ~~Storage and~~ Feed System Summary

~~Equipment~~	~~Element~~	~~Value~~
~~Bulk Storage~~ *{ANRI VE Alt No. 4A}*	~~Type~~	~~Vertical, cylindrical tank; flat bottom; dome top~~
	~~Material~~	~~FRP~~
	~~Number of tanks~~[(1)]	~~2~~
	~~Nominal capacity~~	~~5,000 gallons each~~
	~~Diameter~~	~~8 feet~~
	~~Straight shell height~~	~~14 feet~~

~~Equipment~~	~~Element~~	~~Value~~
	~~Connection openings~~	~~Fill, suction, overflow, vent, top manway, side manway, level instrument, side bottom drain~~
Feed Pumps	Type	Peristaltic
	Number	4 (3 duty, 1 standby)
	Maximum capacity	5.46 gph per pump
	Minimum capacity	0.58 gph per pump
	Power	120 volt, 1 phase, 60 Hz

~~(1) Provides HRSD-required redundancy~~ *{ANRI VE Alt No. 4A}*

2.5.4 JRTP ANRI Phosphoric Acid Storage and Feed System

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.5.4.1 Process Summary

Table 2-30 **and Table 3-44** provides a summary of general process design elements associated with the JRTP ANRI Phosphoric Acid Storage and Feed System. **The ANRI Phosphoric Acid Storage and Feed System will be integrated into an expanded single system inside SWIFT Process Building No. 1 that will serve both the SWIFT process and MBBR. Two ANRI phosphoric acid feed pumps will be provided in SWIFT Process Building No. 1 and pull from two SWIFT chemical totes as indicated in Table 3-68.** *{ANRI VE Alt No. 4A}*

Table 2-30: Process Summary for JRTP ANRI Phosphoric Acid Storage and Feed System

Element	Objective/Design Element
Purpose	Phosphoric acid is fed, as required, to MBBR influent to provide phosphorus for nitrification.
~~Redundancy~~	• ~~The active and standby totes are connected to dedicated metering pumps that connect to a common discharge pipe.~~ • ~~A spare phosphoric feedline shall be provided for piping in the yard.~~
~~Design Approach~~	• ~~Per *HRSD Design and Construction Standards*, minimum total bulk storage volume is sized for the largest of the following:~~ o ~~15 days, maximum flow, maximum dose~~ o ~~30 days, average flow, average dose~~ o ~~Two, 275-gallon totes (for redundancy)~~ • ~~Metering pumps are sized to handle maximum flow, maximum dose and will have adequate turndown capability for the minimum flow, minimum dose needed for each application point.~~ • ~~Secondary containment shall be sized to handle one tote volume plus 20 minutes of sprinkler water.~~

Element	Objective/Design Element
~~Operations and Control Philosophy~~	• ~~Weight and volume for each tote will be monitored by scale platforms under the duty and standby totes.~~ • ~~Phosphoric acid metering pumps will be flow-paced with manual operation backup.~~ • ~~The duty metering pump discharge flow rate will be monitored with a flowmeter and transmitter connected to the DCS.~~ • ~~Emergency eyewash/shower flow will be monitored.~~
~~Facility Layout Concepts~~	• ~~The phosphoric acid room will include two roll-up doors for tote delivery.~~ • ~~Phosphoric acid totes (duty and standby) shall be located on containment pallets. Spare and empty totes will be stored in the adjacent bay on storage racks or containment pallets.~~ • ~~Metering pumps will be located on top of the containment pallets along with piping, valves, and accessories and arranged for operator access.~~ • ~~Any piping outside the containment pallets shall have containment piping.~~ • ~~Containment piping shall be sloped toward secondary containment in Chemical Building No. 2 or to chemical junction boxes equipped with sumps and level switches in the yard.~~ • ~~All materials shall be compatible with phosphoric acid.~~ • ~~Emergency showers/eyewashes will be located in the tote / pump room.~~ • ~~Provisions for flushing feed lines shall be provided.~~

2.5.4.2 Design Criteria

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 2-31: Design Criteria for JRTP ANRI Phosphoric Acid Storage and Feed System

Design Element	Value		
Design flow, mgd			
MBBR maximum flow	21 mgd		
MBBR average flow	16 mgd		
MBBR minimum flow	8 mgd		
Phosphoric acid application points	Maximum	Average	Minimum
Nitrification, mg/L$^{(1)}$	0.2	0.1	0.1
Phosphoric acid properties			
Concentration delivered	85%		
Specific gravity	1.68		
Density, lb P/gal	14.01		
Bulk storage			
15-day, maximum flow, maximum dose	44.1 gal		
30-day, average flow, average dose	33.6 gal		
Two, 275-gallon totes	~~550 gal~~ **See Table 3-68** *{ANRI VE Alt No. 4A}*		
Largest bulk storage volume required	~~550 gal~~ **See Table 3-68** *{ANRI VE Alt No. 4A}*		

(1) As phosphorus

2.5.4.3 Additional Design Requirements

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.5.4.4 Equipment Summary Tables

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 2-32: JRTP ANRI Phosphoric Acid Storage and Feed System Equipment Summary

Equipment	Element	Value
Bulk storage	Type	Tote
	Number of totes	~~2~~ **See Table 3-68** *{ANRI VE Alt No. 4A}*
	Nominal capacity	~~275 gallons per tote~~ **See Table 3-68** *{ANRI VE Alt No. 4A}*
	Connection openings	Outlet, vent
Feed pumps	Type	Peristaltic
	Number	2 (1 duty, 1 standby)
	Maximum capacity	0.72 gph
	Minimum capacity	0.18 gph
	Power	120 volt, 1 phase, 60 Hz

2.6 JRTP ANRI Structural and Geotechnical

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.6.1 General Structural Descriptions

2.6.1.1 Administration/Maintenance Building

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.6.1.2 Secondary Clarifiers, MBBR Basins, ~~MBBR Building~~, and ~~SWIFT~~ MBBR Influent Pump Station

The secondary clarifiers and MBBR Basins are open-top, partially buried ~~rectangular~~ *{ANRI VE Alt No. 4A}* concrete tanks ~~separated by expansion joints~~ *{ANRI VE Alt No. 4A}*. The ~~structure is divided into individual basins and channels~~ **walkways are** surrounded by aluminum guardrail.

~~The MBBR Building is on the southern side of the MBBR Basins. The building has two levels. The lower level is below grade and includes the MBBR room and process (water conveyance) channels. The upper level is above grade and includes the mechanical, electrical, and blower~~

~~rooms. The lower level and the ground floor slab shall be constructed with cast-in-place concrete. The upper level shall consist of load-bearing masonry walls and precast-concrete, hollow-core roof members.~~ *{ANRI VE Alt No. 4A}*

~~At the southwestern corner of the secondary clarifiers, there is an enclosed staircase. Similar to the MBBR Building, the staircase has two levels. The upper level shall be constructed with reinforced load-bearing concrete masonry unit (CMU) walls and precast-concrete, hollow-core roof members. The below-grade lower level shall be cast-in-place concrete.~~ *{ANRI VE Alt No. 4A}*

~~The walkway between the staircase and the MBBR Building shall be covered with translucent panel canopy walkways with aluminum framing. A similar canopy shall also be provided along the walkway at the MBBR Basins north of the MBBR Building.~~ *{ANRI VE Alt No. 4A}*

~~The SWIFT Influent Pump Station is east of the MBBR Building. The below-grade lower level shall be concrete. The upper level shall be constructed with reinforced load-bearing CMU wall and precast-concrete, hollow-core roof members.~~ **The MBBR Influent Pump Station will be located outdoors without a superstructure enclosing the process systems.** *{ANRI VE Alt No. 4A}*

2.6.1.3 Chemical Building No. 2

~~Chemical Building No. 2 is located between the MBBR Building and the Administration/ Maintenance Building. This structure includes containment areas for the chemical tanks or totes used in the treatment process, including sodium bisulfite, sodium hypochlorite, and phosphoric acid. The containment areas shall be isolated from each other, and appropriate chemical-resistant materials shall be used in each containment area as well as in containment coatings.~~

~~The superstructure over the containment areas shall consist of a reinforced concrete frame. The roof shall consist of a cast-in-place concrete slab supported by concrete beams. Roof openings shall be located directly above each of the four bulk chemical storage tanks to facilitate removal and replacement of the chemical tanks in the future.~~ *{ANRI VE Alt No. 4A}*

2.6.1.4 Main Electrical Building

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.6.1.5 Electrical Building No. 2

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.6.1.6 IFAS Effluent Channel

~~The IFAS Effluent Channel shall be a cast-in-place concrete structure. The portion of the channel located at a road crossing shall be buried below grade and shall have a concrete roof. The rest of the channel is slightly above adjacent grade and shall have an open top covered~~

~~with aluminum grating.~~ **Channel to be open top with aluminum grating at walkways.** *{ANRI VE Alt No. 4A}*

2.6.1.7 Junction/Splitter Box

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.6.1.8 Well Backflush Equalization Tank

~~Existing Secondary Clarifier 4, which is a partially buried circular concrete tank, will be converted to the Well Backflush Equalization Tank. The process mechanism and access bridge inside the secondary clarifier will be demolished, but the existing concrete tank will remain.~~ **A new tank will be provided with** ~~New~~ elevated walkways and platforms ~~shall be~~ constructed on top of the tank in areas that require access to new process equipment. The walkway and platform shall be constructed with aluminum grating supported by aluminum or steel beams. ~~Aluminum railings shall be provided around the walkway and platform.~~ *{ANRI VE Alt No. 4A}*

2.6.1.9 SWIFT Influent Equalization Tank

~~Existing Secondary Clarifier 5, which is a partially buried circular concrete tank supported on piles, will be converted to the SWIFT Influent Equalization Tank. The existing process mechanism and access bridge inside the secondary clarifier shall be demolished while the existing concrete tank will remain.~~ **A new tank will be provided with a** pre-engineered, surface-mounted aluminum flat cover supported by pre-engineered aluminum trusses located above the cover shall be installed to cover the top of the tank. ~~The cover shall be fastened to the existing tank wall with concrete anchors per cover manufacturer's recommendations.~~ Provide platform with hatches for accessing and removing process pumps and equipment. *{ANRI VE Alt No. 4A}*

2.6.1.10 ~~SWIFT Influent Equalization~~ South Electrical Building, Effluent Sampler Building, MBBR Blower/Electrical Building and RAS Pump Station

The ~~SWIFT Influent Equalization Electrical Building~~ **South Electrical Building, Effluent Sampler Building, MBBR Blower/Electrical Building and superstructure of the RAS Pump Station** shall be a precast-concrete structure with load-bearing precast walls **or load-bearing masonry** and precast roof. The building shall be supported by a concrete mat foundation. The precast building will be connected to the mat foundation with anchor bolts per precast building manufacturer's recommendations.

2.6.1.11 Miscellaneous Equipment Pads

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.6.2 Geotechnical Considerations

~~Based on the preliminary analyses from borings (see Reference Documents to the RFP) secondary clarifiers/MBBR Basins/MBBR Building/SWIFT Influent Pump Station, Chemical Building No. 2, Administration/Maintenance Building, Main Electrical Building, and Fuel Storage Tanks are recommended to be supported on a deep foundation. All other JRTP ANRI-related structures are recommended to be supported on a shallow foundation.~~ **The Design-Builder is responsible for foundation systems and** Design-Builder shall confirm the foundation type selection based on the final design loads. *{ANRI VE Alt No. 4A}*

Excavation support systems are needed for construction of underground structures. Due to the location of existing adjacent structures and subsurface conditions, driven excavation support systems (such as driven sheet piles or driven soldier piles) present a risk of vibration-induced settlement. Potential driven excavation systems shall be assessed and monitored for vibration and vibration-induced settlement in compliance with local codes and *HRSD Design and Construction Standards.*

See the JRTP ANRI Geotechnical Technical Memorandum, included as a Reference Document to the RFP, for additional information and recommendations, **as applicable unless superseded by the Value Engineering Alternatives Concept Documents.**

2.7 JRTP ANRI Architectural

This section describes the basis of the architectural design criteria for the facilities associated with the JRTP ANRI project. The design criteria list building characteristics and other applicable standards that shall guide the design. The following new buildings and structures are described:

- Administration/Maintenance Building
- Main Electrical Building
- Electrical Building No. 2
- ~~SWIFT Influent Equalization Electrical Building~~ **South Electrical Building**
- Secondary Clarifiers/MBBR Basins/~~MBBR Building/SWIFT~~ **MBBR** *{ANRI VE Alt No. 4A}* **Influent Pump Station**
- ~~Chemical Building No. 2~~ *{ANRI VE Alt No. 4A}*
- **Effluent Sampler Building** *{ANRI VE Alt No. 4A}*
- **MBBR Blower/Electrical Building** *{ANRI VE Alt No. 4A}*
- **RAS Pump Station** *{ANRI VE Alt No. 4A}*

2.7.1 Codes

See Section 1.4 (Architectural) for codes adopted by the Commonwealth of Virginia and standards that are required for this project. Building Code Data sheets are in Appendix H (JRTP ANRI Architectural), **that will be revised during Stipulated Price Design for the accepted Value Engineering Alternatives as applicable**.

2.7.2 Typical Process Building Materials

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.7.3 Administration/Maintenance Building Materials

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.7.4 Administration/Maintenance Building

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.7.4.1 Administration Area

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.7.4.1.1 Design Criteria

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 2-33: Design Criteria for the Administration Area [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Design Element	Value

2.7.4.2 Maintenance Area

2.7.4.2.1 Design Criteria

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 2-33: Design Criteria for the Maintenance Area [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Design Element	Value

2.7.5 Main Electrical Building

2.7.5.1 Design Criteria

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 2-34: Design Criteria for the Main Electrical Building [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Design Element	Value

2.7.6 Electrical Building No. 2

2.7.6.1 Design Criteria

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 2-35: Design Criteria for Electrical Building No. 2 [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Design Element	Value

2.7.7 ~~SWIFT Influent Equalization Electrical Building~~ South Electrical Building, Effluent Sampler Building, MBBR Blower/Electrical Building and RAS Pump Station *{ANRI VE Alt No. 4A}*

2.7.7.1 Design Criteria

Table 2-36 provides the design criteria used for the ~~SWIFT Influent Equalization Electrical Building~~ **South Electrical Building, Effluent Sampler Building, MBBR Blower/Electrical Building and RAS Pump Station.**

Table 2-36: Design Criteria for the ~~SWIFT Influent Equalization Electrical Building~~ South Electrical Building, Effluent Sampler Building, MBBR Blower/Electrical Building and RAS Pump Station

Design Element	Value
Building	Precast-concrete ~~electrical building~~ **or masonry** on a cast-in-place foundation slab. **The Effluent Sampler Building may be a precast concrete or prefabricated structure.**
Clear ceiling height	**As appropriate for each facility**
Roof	Factory-finished precast-concrete roof with 2:12 slope
Walls	Factory-finished precast concrete **or load bearing masonry**
Interior walls and ceiling finish	Fiberglass-faced plywood
Wall insulation	R-value of 15 minimum
Ceiling insulation	R-value of 30 minimum
Electrical room	~~Space for SWIFT Influent and Well Backflush Equalization Pumps electrical equipment~~ **As Required**
Analyzer room	Space for water quality analyzers **in Effluent Sampler Building**

2.7.8 ~~Secondary Clarifiers/~~MBBR Basins~~/MBBR Building/ SWIFT Influent Pump Station~~ *{ANRI VE Alt No. 4A}*

2.7.8.1 Design Criteria

Table 2-37 provides the design criteria used for the ~~Secondary Clarifiers/~~MBBR Basins/~~MBBR Building/SWIFT Influent Pump Station.~~ *{ANRI VE Alt No. 4A}*

Table 2-37: Design Criteria for the ~~Secondary Clarifiers/~~ MBBR Basins/~~MBBR Building/SWIFT Influent Pump Station~~

Design Element	Value
Building	**Single-story above grade tank** ~~One story with lower level connected with two stairs, with one stair proving access to the roof~~
Floor-to-floor height	~~30 feet 2 inches~~ **Per Value Engineering Alternative Concept Design drawings** *{ANRI VE Alt No. 4A}*
~~Freight elevator~~	~~• Connecting 2 levels~~ ~~• 5,000 lb capacity~~ ~~• 4-foot 6-inch x 7-foot 0-inch interior door (upper and lower levels)~~ ~~• 4-foot 6-inch x 7-foot 0-inch exterior door (upper level)~~ ~~• 100 FPM~~ ~~• Hydraulic with machine room~~ ~~• 5-foot 8-inch x 8-foot 5 1/2-inch x 7-foot 4-inch car~~ *{ANRI VE Alt No. 4A}*

2.7.8.2 Secondary Clarifiers

2.7.8.2.1 Design Criteria

Table 2-38 provides the design criteria used for the secondary clarifiers.

Table 2-38: Design Criteria for the Secondary Clarifiers

Design Element	Value
Roof structural clear height	~~12 feet~~ **Per Drawings** *{ANRI VE Alt No. 4A}*
~~Sludge Pump Station~~ **RAS Pump Station**	~~Gallery space~~ **Building and below grade dry well for** ~~sludge~~ pumps and other equipment *{ANRI VE Alt No. 4A}*

2.7.8.3 ~~MBBR Building~~ *{ANRI VE Alt No. 4A}*

~~2.7.8.3.1 Design Criteria~~

~~**Table 2-39** provides the design criteria used for the MBBR Building.~~

~~Table 2-39: Design Criteria for the MBBR Building~~

~~Design Element~~	~~Value~~
~~Roof structural clear height~~	~~16 feet~~
~~Gallery space~~	~~For piping and equipment requiring access~~
~~Mechanical room~~	~~For building mechanical equipment~~
~~Blower room~~	~~For MBBR blower equipment~~
~~Electrical room~~	~~For building electrical and communication equipment~~

2.7.8.4 ~~SWIFT~~ MBBR *{ANRI VE Alt No. 4A}* Influent Pump Station

2.7.8.4.1 Design Criteria

~~Table 2-40~~ ~~provides the design criteria used for the SWIFT Influent Pump Station.~~ **Pump station equipment to be located outdoors without a structural enclosure.**

~~Table 2-40: Design Criteria for the SWIFT Influent Pump Station~~

~~Design Element~~	~~Value~~
~~Roof structural clear height~~	~~16 feet~~
~~SWIFT influent pump room~~	• ~~Space for pumps and associated piping~~ • ~~Roof hatches above pump for removal~~

2.7.9 ~~Chemical Building No. 2~~ *{ANRI VE Alt No. 4A}*

2.7.9.1 ~~Design Criteria~~

~~Table 2-41~~ ~~provides the design criteria used for Chemical Building No. 2.~~

~~Table 2-41: Design Criteria for Chemical Building No. 2~~

~~Design Element~~	~~Value~~
~~Fire protection~~	~~Fire-suppression system throughout building~~
~~Roof structural clear height~~	~~26 feet over chemical and phosphoric acid rooms and 12 feet over electrical, HVAC, and fire suppression rooms~~
~~Chemical room~~	• ~~For storage and feed of sodium bisulfite and sodium hypochlorite.~~ • ~~Separate containment will be provided for each chemical.~~ • ~~Concrete containment floors and walls will be coated with vinyl ester chemical-resistant coating for containment service.~~ • ~~Concrete ceilings, floors, and walls outside of containment will be coated with epoxy chemical-resistant coating.~~ • ~~Provide safety shower/eyewashes at all chemical feed, storage, and fill areas.~~

~~Design Element~~	~~Value~~
~~Phosphoric acid room~~	• ~~For storage and feed of phosphoric acid~~ • ~~Containment will be provided for all chemicals.~~ • ~~Concrete ceilings, floors, and walls will be coated with epoxy chemical-resistant coating.~~ • ~~Two 10-foot-wide x 12-foot-high overhead roll-up stainless steel doors.~~ • ~~Provide safety shower/eyewashes at all chemical feed, storage, and fill areas.~~
~~Electrical room~~	~~For building electrical and communication equipment~~
~~Mechanical room~~	~~For building mechanical equipment~~
~~Fire suppression room~~	• ~~For fire suppression system~~ • ~~Exterior door~~ *{ANRI VE Alt No. 4A}*

2.8 JRTP ANRI Building Services (Plumbing, HVAC, and Fire Protection)

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.8.1 Administration/Maintenance Building – Administration Area

2.8.1.1 HVAC

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.8.1.2 Plumbing

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.8.1.3 Fire Protection

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.8.2 Administration/Maintenance Building – Maintenance Area

2.8.2.1 HVAC

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.8.2.2 Plumbing

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.8.2.3 Fire Protection

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.8.3 ~~Chemical Building No. 2~~*{ANRI VE Alt No. 4A}*

2.8.3.1 ~~HVAC~~ *{ANRI VE Alt No. 4A}*

- ~~The chemical room (sodium bisulfite and sodium hypochlorite) shall be provided with heating and cooling by one AHU. The unit shall provide 100% outside air and comprise an intake damper, MERV 8 (30%) filters, DX refrigerant cooling coil, gas (natural) heat (indirect gas-fired), and supply fan.~~ *{ANRI VE Alt No. 4A}*
- ~~The phosphoric acid area, fire-suppression room, and mechanical room shall be heated and ventilated by a single AHU. The unit shall provide 100% outside air and comprise an intake damper, MERV 8 (30%) filters, gas (natural) heat (indirect gas-fired), and supply fan.~~ *{ANRI VE Alt No. 4A}*
- ~~The AHUs shall be located inside the mechanical room.~~ *{ANRI VE Alt No. 4A}*
- ~~The chemical room and phosphoric acid area shall each be served by dedicated exhaust fans that will discharge air to the outside through the wall.~~ *{ANRI VE Alt No. 4A}*
- ~~The fire-suppression and mechanical rooms shall each be provided with a separate roof-mounted exhaust fan. A small electric unit heater shall be provided for the fire suppression room.~~ *{ANRI VE Alt No. 4A}*
- ~~The electrical room shall be served by a separate split-type DX unit with a small amount of ventilation air provided by the AHU serving the chemical room. The condensing unit shall be located outside on a concrete pad at grade.~~ *{ANRI VE Alt No. 4A}*

2.8.3.2 ~~Plumbing~~*{ANRI VE Alt No. 4A}*

- ~~The process areas shall be drained by a combination of floor, hub, and trench drains. Sump pumps shall collect the drainage and pump to a suitable location to be determined by the Design-Builder.~~ *{ANRI VE Alt No. 4A}*
- ~~Potable waterline shall be no smaller than 6 inches in diameter to supply potable and UW requirements.~~ *{ANRI VE Alt No. 4A}*
  - ~~One reduced-pressure horizontal backflow preventer shall be required on the potable waterline at point of entrance into the building to prevent cross contamination.~~
  - ~~UW lines shall also be installed with a backflow preventer to separate from the potable waterline.~~
- ~~Roof drains and overflow drains shall be provided to accommodate the storm drain system. The building exit locations shall be coordinated with site civil plans. An overflow roof drain shall be piped to terminate 24 inches above finished grade on the main entrance side of the building.~~ *{ANRI VE Alt No. 4A}*

- ~~Emergency shower and eyewash fixtures shall be located throughout the facility near the chemical storage and feed systems, as required.~~ *{ANRI VE Alt No. 4A}*
- ~~Non-freeze shower and eyewash fixtures shall be located outside by the truck fill area.~~ *{ANRI VE Alt No. 4A}*

2.8.3.3 ~~Fire Protection~~ *{ANRI VE Alt No. 4A}*

- ~~Chemical Building No. 2 shall be designed for Ordinary Hazard, Group 2 hazard classification with wet pipe sprinkler system.~~
- ~~All building fire protection design requirements shall be coordinated with the local Authorities Having Jurisdiction.~~

2.8.4 Secondary Clarifiers/RAS Pump Station/~~MBBR Building/SWIFT Influent Pump Station~~ /MBBR Blower/Electrical Building *{ANRI VE Alt No. 4A}*

2.8.4.1 HVAC

- ~~The sludge pump station, MBBR room, and SWIFT Influent Pump Station room shall be provided with ventilation rate of 6 air changes per hour per NFPA 820 with a single AHU located in the upper level mechanical room.~~ **The Secondary Clarifier RAS Pump Station will be ventilated per NFPA 820.** *{ANRI VE Alt No. 4A}*
  - ~~The AHU shall provide 100% outside air and comprise an intake damper, MERV 8 (30%) filters, gas (natural) heat (indirect gas-fired), and supply fan.~~ *{ANRI VE Alt No. 4A}*
  - The lower level **of the RAS** Pump Station ~~and MBBR room~~ shall be exhausted through in-line exhaust fans. ~~The SWIFT Influent Pump Station room shall be exhausted through a roof-mounted upblast exhaust fan.~~ *{ANRI VE Alt No. 4A}*
- The blower room shall be provided with make-up air through a wall-mounted louver, and a dedicated wall-mounted fan shall be provided for exhaust.
- The electrical room shall be served by a dedicated split-type AHU. The AHU shall be located inside the electrical room and consist of a mixing box, MERV 8 (30%) filters, DX refrigerant cooling coil, and supply fan. The condensing unit shall be located outside on a concrete pad at grade.
- The electrical room, stairs, and blower room shall each be provided with a small electric unit heater for winter heating. Each heater shall have an integral thermostat to control the fan and heating element operation.

2.8.4.2 Plumbing

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.8.4.3 Fire Protection

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.8.5 Main Electrical Building

2.8.5.1 HVAC

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.8.5.2 Plumbing

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.8.5.3 Fire Protection

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.8.6 Electrical Building No. 2/~~SWIFT Influent Equalization Electrical Building~~ /South Electrical Building/Effluent Sampler Building

2.8.6.1 HVAC

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.8.6.2 Plumbing

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.8.6.3 Fire Protection

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.9 JRTP ANRI Electrical

All new spaces in the ANRI-related facilities will be **built per applicable codes** ~~unclassified except the Secondary Clarifier Pump Station~~ *{ANRI VE Alt No. 4A}* ~~and the MBBR room, which are Class 1, Division 2~~. *{ANRI VE Alt No. 4A}*

2.9.1 System Architecture

A pair of 4160-volt to 480-volt transformers will be installed outside the Main Electrical Building, as shown on the BODR **except where superseded by the Value Engineering Alternatives Concept Design drawings as applicable**. The transformers are supplied by the 4160-volt switchgear medium voltage switchgear (MVSWGR) in the Main Electrical Building, and they step the voltage down to 480 volts to serve the low voltage motor control centers (MCCs) in the Main Electrical Building. A pair of 4160-volt to 480-volt transformers will be installed outside Electrical Building No. 2, as shown on the BODR **except where superseded by the Value Engineering Alternatives Concept Design Drawings as applicable**. The transformers are supplied by the 4160-volt switchgear MVSWGR in the Main Electrical Building, and they step the voltage down to 480 volts to serve ~~the low voltage switchgears~~ **MCC 1A/1B** *{ANRI VE Alt No. 4A}* in Electrical Building No. 2.

A pair of 4160-volt to 480-volt transformers will be installed outside the MBBR ~~Building~~ **Blower / Electrical Building** *{ANRI VE Alt No. 4A}*, as shown on the BODR **except where superseded by Value Engineering Alternatives Concept Design Drawings as applicable**. The transformers are supplied by the 4160-volt switchgear MVSWGR in the Main Electrical Building, and they step the voltage down to 480 volts to serve the ~~low voltage switchgears~~ **motor control centers** *{ANRI VE Alt No. 4A}* in the ~~MBBR~~ *{ANRI VE Alt No. 4A}* electrical room in ~~the MBBR Building~~ **that building.** *{ANRI VE Alt No. 4A}*.

A pair of 4160-volt to 480-volt transformers will be installed outside ~~Chemical Building No. 2~~ **of the South Electrical Building** *{ANRI VE Alt No. 4A}* as shown on the BODR **except where superseded by Value Engineering Alternatives Concept Design Drawings as applicable**. The transformers are supplied by the 4160-volt switchgear MVSWGR in the Main Electrical Building, and they step the voltage down to 480 volts to serve the low voltage switchgears ~~in Chemical Building No. 2 electrical room~~ **of the building** *{ANRI VE Alt No. 4A}*. **A separate secondary power source permanent generator and automatic transfer switch (ATS) shall be provided for each of the hypo and sodium bisulfite facilities.** *{ANRI VE Alt No. 4A}* The Design-Builder shall determine generator size, fuel type, ATS, and connection details.

The ~~low voltage switchgear~~ **electrical distribution equipment** *{ANRI VE Alt No. 4A}* in each facility will be a two-bus, double-ended, main-tie-main arrangement, as shown in the BODR **except where superseded by the Value Engineering Alternative Concept Design Drawings as applicable**. The ~~switchgear~~ **equipment** *{ANRI VE Alt No. 4A}* tie circuit breaker will normally be open, while the main circuit breaker will normally be closed. This dual-bus configuration allows for redundant supply cable to be provided to each facility, as well as a redundant transformer. This bus configuration promotes the HRSD strategy of mitigating arc flash hazards by allowing load to be served from one bus while the other bus is out of service (de-energized) for testing, repair, or modifications.

As shown on the single line diagrams in the BODR **except where superseded by the Value Engineering Alternatives Concept Design Drawings as applicable**, the low voltage switchgear serves some larger loads directly but also serves MCCs, which supply power and motor starter units for smaller loads. With both the low voltage switchgear and MCCs, loads are split between the two busses so when a bus is de-energized, an entire process is not interrupted. **Motor control centers are used as the distribution equipment powered by 750 KVA transformers and smaller. This limits the main-tie-main circuit breakers to 1200A.** *{ANRI VE Alt No. 4A}*

In addition, ATSs are shown to provide power from either bus to power and lighting panelboards. If a bus is de-energized, the transfer switch will change positions to ensure that loads supplied from these panelboards (such as lighting, receptacles, and instrument) remain operational as well.

2.9.2 Equipment Locations

Electrical distribution equipment will be located as follows:

- Main Electrical Building switchgear room
  - MVSWGR-A, MVSWGR-B, and MVSWGR-C
  - MCC-9A/9B
  - DP-9A
  - **ATS 9A**, TX-LP-9A and LP-9A
- Electrical Building No. 2
  - ~~SWGR-1A/1B~~ *{ANRI VE Alt No. 4A}*
  - MCC-1A/1B
  - ~~Combination motor starter (CMS) Aeration Blower No. 1, 2, and 3 supplied by SWGR-1A/1B~~ *{ANRI VE Alt No. 4A}*
  - Automatic transfer switch (ATS)-1A
  - DP-1A
  - TX-LP-1A and LP-1A
- MBBR ~~Building electrical room~~ **Blower/Electrical Building** *{ANRI VE Alt No. 4A}*
  - ~~SWGR-4A/4B~~ *{ANRI VE Alt No. 4A}*
  - MCC-4A/4B
  - Individual VFDs ~~supplied by SWGR-4A/4B and MCC-4A/4B~~ *{ANRI VE Alt No. 4A}*
  - ATS-4A
  - DP-4A, DP-4B, ~~and DP-4C~~ *{ANRI VE Alt No. 4A}*
  - TX-LP-4A and LP-4A, **TX-LP-4B and LP-4B** *{ANRI VE Alt No. 4A}*
- ~~Chemical Building No. 2 electrical room~~ **South Electrical Building** *{ANRI VE Alt No. 4A}*
  - SWGR-7A/7B
  - MCC-7A/7B
  - Individual VFDs supplied by SWGR-7A/7B and MCC-7A/7B

  - ATS-7A
  - DP-7A, DP-7B, ~~and DP-7C~~ *{ANRI VE Alt No. 4A}*
  - TX-LP-7A, TX-LP-7B, ~~TX-LP-7C~~ *{ANRI VE Alt No. 4A}*~~,~~ LP-7A, LP-7B, ~~and LP-7C~~ *{ANRI VE Alt No. 4A}*
- Administration/Maintenance Building electrical room
  - ~~MCC-7C/7D~~ **MCC-7E/7F** *{ANRI VE Alt No. 4A}*
  - ~~ATS-7B~~ **ATS (TBD)** *{ANRI VE Alt No. 4A}*
  - ~~DP-7B,~~ **DP-(TBD)** *{ANRI VE Alt No. 4A}*
  - ~~TX-LP-7D, TX-LP-7E, TX-LP-7F, LP-7D, LP-7E, and LP-7F~~ **3 Sets TX/LP (Tags TBD)** *{ANRI VE Alt No. 4A}*
- **RAS PS Electrical Room**
  - **MCC-7C/7D**
  - **Individual VFDs**
  - **ATS-(TBD)**
  - **DP-(TBD)**
  - **2 Sets TX-LP-(TBD) and LP-(TBD)** *{ANRI VE Alt No. 4A}*

2.10 JRTP ANRI Instrumentation and Control Improvements

2.10.1 General Description

The following provides a brief summary of the instrumentation and control (I&C) system components specific to the JRTP ANRI project. See the BODR **except where superseded by the Value Engineering Alternative Concept drawings as applicable** for the DCS Network System Architecture. **The DCS will be provided in accordance with selected alternatives and will comply with the functional requirements of the Conceptual Documents.**

New Distributed Control Unit (DCU)-5/55 **location and service** shall be **provided in accordance with selected alternatives and will comply with the functional requirements of the Conceptual Documents.** ~~in the new MBBR Building electrical room. The DCU will serve:~~

- ~~Secondary clarifiers including sludge and scum pumping~~
- ~~MBBR Basins~~
- ~~All equipment located in the MBBR Building~~
- ~~SWIFT Influent Pump Station~~

New remote input / output (RIO)-51 **location and service** shall be **provided in accordance with selected alternatives and will comply with the functional requirements of the Conceptual Documents.** ~~in the new SWIFT Influent Equalization Electrical Building. This RIO will serve:~~

- ~~SWIFT Influent Equalization Tank and Equalization Pump Station~~
- ~~Well Backflush Equalization Tank and Pumping~~
- ~~Junction/Splitter Box~~
- ~~NPW pumps and associated equipment~~
- ~~CCTs 1, 2, and 3~~
- ~~All instrumentation related to CCTs and plant effluent sampling~~

New RIO-52 **location and service** shall be **provided in accordance with selected alternatives and will comply with the functional requirements of the Conceptual Documents.** ~~in the new Chemical Building No. 2 electrical room. This RIO will serve:~~

- ~~Chemical storage and feed systems serving the JRTP~~

2.10.2 Input / Output List

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.10.3 Instrument List

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

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2.10.4 Functional Control Descriptions

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

2.10.5 Variable Frequency Drives

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3. James River SWIFT Facility

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.1 SWIFT Projected Influent Water Quality

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.2 SWIFT Hydraulic Capacity

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.3 SWIFT Critical Control Points

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-1: CCPs Identified for JR SWIFT

Critical Control Point	Units	Alert Value	Alarm Value	Time Delay (seconds)	Action	Hazard
High SWIFT Influent Conductivity	μS/cm	1,400(1)	1,600(1)	600	Divert biofilter effluent to filter to waste	Bromate
High SWIFT Influent Total Inorganic Nitrogen	mg/L	4.0	5.0	600		Nitrate, nitrite
High SWIFT Influent Turbidity	NTU	3.5	5.0	600		Pathogens
Hydrogen Peroxide Pre-Ozone Feed Status	N/A	N/A	Failed(4)	0	Stop SWIFT pumps, overflow to Chlorine Contact Tank	Bromate, 1,4 Dioxane
Ozone Feed Status	N/A	N/A	Failed(4)	0	Close biofilter inlet valves, overflow to Chlorine Contact Tank	Organics, 1,4 Dioxane
High Ozone Dose	mg/L	8.0	9.0	3,600	Divert biofilter effluent to filter to waste	Bromate
High Biofilter Individual Filter Effluent Turbidity	NTU	0.1	0.15	5	Divert affected biofilter effluent to filter to waste	Pathogens
High Biofiltration Combined Filter Effluent Turbidity	NTU	0.1	0.15	1,800	Divert biofilter effluent to filter to waste	
High GAC Combined Effluent Nitrite-N	mg/L	0.25	0.5	600	Stop SWIFT pumps, overflow	Nitrite

Critical Control Point	Units	Alert Value	Alarm Value	Time Delay (seconds)	Action	Hazard
High GAC Combined Effluent Total Organic Carbon	mg/L	4.0	5.0	600	to Chlorine Contact Tank	Organics
Low UV Disinfection Dose(1)	mJ/cm(2)	~~223~~ **203** *{SWIFT VE Alt No. 12A}*	195	5		Pathogens
~~Low UV AOP Dose(2)~~	~~mJ/cm(2)~~	~~TBD~~	~~TBD(3)~~	~~600~~		~~1,4 Dioxane~~ *{SWIFT VE Alt No. 12A}*
~~Hydrogen Peroxide Pre-UV AOP Feed Status(2)~~	~~N/A~~	~~N/A~~	~~Failed(4)~~	~~0~~		~~1,4 Dioxane~~ *{SWIFT VE Alt No. 12A}*
High SWIFT Water Total Nitrogen	mg/L	4.5	5.0	3,600		Nitrate, nitrite

(1) Values subject to change based on site-specific relationship of conductivity and treatment performance

(2) Calculated as a 10-minute running average

~~(3) Activated only when the UV system is operating in UV AOP mode~~ *{SWIFT VE Alt No. 12A}*

(4) Equipment failures resulting in a loss of treatment capacity

Table 3-2: COPs Identified for JR SWIFT

Critical Operating Point	Units	Alert Value	Alarm Value	Time Delay (seconds)	Action
High JRTP Influent Conductivity	µS/cm	N/A	2,000	120	No action
High JRTP Effluent Nitrate-N	mg/L	N/A	5.0	120	
MBBR Dissolved Oxygen	–	N/A	TBD	–	
IFAS Blower Status	N/A	N/A	Failed(1)	0	Divert biofiltration effluent to filter to waste
MBBR Blower Status	N/A	N/A	Failed(1)	0	
High SWIFT Influent Nitrite-N	mg/L	0.5	1.0	600	No action
High SWIFT Influent NOx	mg/L	3.0	5.0	600	
High SWIFT Influent Ammonia-N	mg/L	1.0	2.0	600	
High SWIFT Influent TOC	mg/L	12	15	3,600	Divert biofiltration effluent to filter to waste
Coagulant Feed Status	N/A	N/A	Failed(1)	600	
High Settled Water Turbidity	NTU	2.0	5.0	600	Close biofilter inlet valves, overflow to Chlorine Contact Tank
~~Post-Ozone Bisulfite Feed Status~~ *{SWIFT VE Alt No. 10A}*	~~N/A~~	~~N/A~~	~~Failed(1)~~	~~600~~	~~No action~~

(1) Equipment failure or multiple equipment failures resulting in a loss of treatment capacity

3.4 SWIFT Process Interconnections and Flow Directions

Section 3.4 provides a summary of major process flows and interconnections between the JRTP and the JR SWIFT Facilities. **Figure 3-1** shows a simplified graphic depicting the primary interconnections and typical maximum instantaneous flow rates.

The following is a general summary of the flow terminology and flows, where stated, for the SWIFT process.

- The SWIFT influent flow – the ~~SWIFT~~ **MBBR** *{ANRI VE Alt No. 4A}* Influent Pump Station conveys **Secondary Clarifier** *{ANRI VE Alt No. 4A}* effluent to **MBBR and** {ANRI VE Alt No. 4A} SWIFT Process Building No. 1. The maximum SWIFT influent flow is 16 mgd.

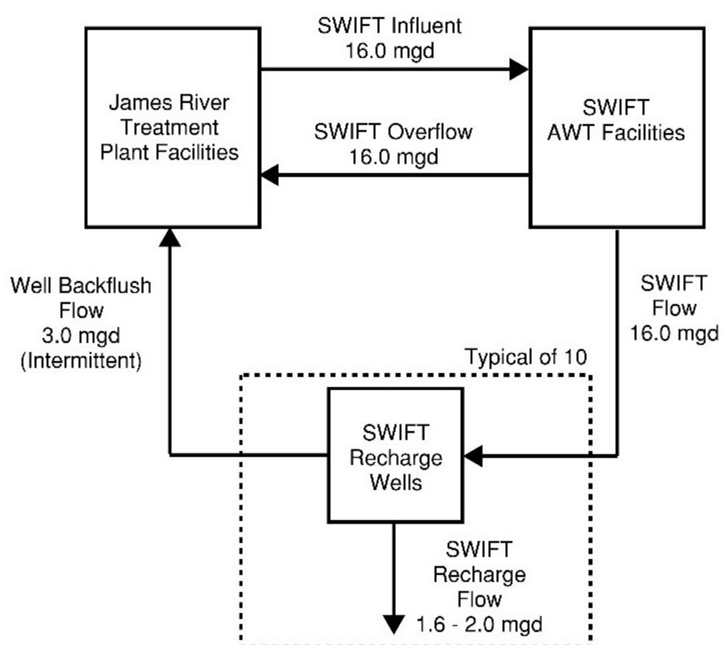


Figure 3-1: Simplified diagram of primary interconnections for the JR SWIFT facilities (excluding residuals)

- SWIFT flow and SWIFT recharge flow – the SWIFT Water Pump Station pumps SWIFT Water to each of the 10 SWIFT recharge wells. The maximum total SWIFT flow is 16 mgd. The maximum recharge flow per well is 2 mgd.
- SWIFT overflow – the SWIFT overflow piping conveys overflows from various JR SWIFT processes back to the JRTP via gravity. See Section 3.5 (SWIFT Hydraulic Profile) for further details.

  The SWIFT overflows can be directed back to the ~~SWIFT Influent Pump Station or directly to the Chlorine Contact Tank~~ **Junction/**Splitter box **prior to the Chlorine Contact Tank flow split** *{ANRI VE Alt No. 4A}*. See the Advanced Nutrient Reduction Improvements (ANRI) Flow Diagram in the BODR **except where superseded by the Value Engineering Alternatives Concept Design drawings as applicable** for further details. *{ANRI VE Alt No. 4A}*

- SWIFT recharge well backflush – SWIFT recharge wells will occasionally be backflushed to maintain injectivity. Only one recharge well shall be allowed to be backflushed at a time. The maximum recharge well backflush flow is 3 mgd per well. Well backflush flow is conveyed back to the Well Backflush Equalization Tank, located in the ~~JRTP~~ **SWIFT** *{ANRI VE Alt No. 4A}* area.

  The piping and valves at each recharge well can be configured such that SWIFT Water from the SWIFT Water Pump Station can be bypassed to the backflush piping system and returned to the Well Backflush Equalization Tank located in the ~~JRTP~~ **SWIFT** *{ANRI VE Alt No. 4A}* area. This flow path may be useful during start-up of the SWIFT Water Pump Station.

3.5 SWIFT Hydraulic Profile

The Design-Builder is responsible for all hydraulics and shall develop a final hydraulic profile, including overflows, based on its final design. **The Design-Builder will revise this Section 3.5 during Stipulated Price Design for the Value Engineering Alternatives. Revisions shall identify modifications to discharge locations, structure locations and elevations.**

Section 3.5 provides the background information for the SWIFT hydraulic profile developed for the conceptual design. BODR Drawing G5 details the hydraulic grade line (HGL) for each consecutive unit process flowing downstream to the SWIFT Water Pump Station. The assumptions used for developing the conceptual design hydraulic profile were as follows:

- Each of the four flocculation basins are in operation.
- Each of the four sedimentation basins are in operation. At a maximum flow rate, the plate settler headloss is approximately 10 inches based on manufacturer information for the weir, orifice, and trough headloss. One foot of freefall was added between the trough and effluent channel.
- One biofilter is out of service.
- Two GAC units are out of service.
- One UV reactor is out of service.
- The SWIFT Water Pump Station influent weir is set at 24.25 feet.
- Hazen and William's roughness coefficient of 110 for piping.
- Manning resistance coefficient of 0.015 for channels.

The Design-Builder shall evaluate JR SWIFT hydraulic conditions over the full range of flows to confirm that, based on the final design, JR SWIFT can operate at full capacity (16 mgd) with one flocculation and sedimentation basin train, one biofilter, two GAC units, and one UV reactor out of service.

The overflows for the biofiltration influent channel, the SWIFT Intermediate Pump Station, and the SWIFT Water Pump Station shall be combined into a common overflow pipe and routed to the JRTP, where flow can be diverted to the SWIFT Influent Pump Station or to a manhole that directs flow to the new JRTP Junction/Splitter Box upstream of the Chlorine Contact Tank.

Assumptions used for the conceptual design overflow hydraulic profile models were as follows:

- The biofiltration influent channel overflow weir is set at 39.50 feet.
- The Intermediate Pump Station overflow weir is set at 23.50 feet.
- The SWIFT Water Pump Station overflow weir is set at 25.00 feet.
- Overflow piping from JR SWIFT to the SWIFT Influent Pump Station / Chlorine Contact Tank box is 36 inches.
- Maximum WSEL of 14.76 feet at the SWIFT Influent Pump Station.
- Overflow to the SWIFT Influent Pump Station will be more hydraulically restrictive than for the Junction/Splitter Box due to downstream hydraulic conditions. Therefore, conceptual design overflow models assumed overflows to the SWIFT Influent Pump Station.

3.6 SWIFT Residuals

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.6.1 Settled Solids

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-3: Settled Solids Return Flows and Loads [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Flow Condition	Unit	0.3% TS(1)		1.5% TS(2)		0.1% TS(3)	
		Low(4)	High(5)	Low(4)	High(5)	Low(4)	High(5)

3.6.2 Biofilter and GAC Contactor Backwash

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-4: Backwash Equalization Pump Station Flows[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Scenario	Floc Basin/Plate Settler Drain	Biofilter Filter (48 hour)	GAC start-up	Discharge Flow (gpm)	Discharge Flow (mgd)

3.7 SWIFT Advanced Water Treatment Process Descriptions

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.7.1 ~~SWIFT~~ **MBBR** *{ANRI VE Alt No. 4A}* Influent Pump Station

The ~~SWIFT~~ **MBBR** *{ANRI VE Alt No. 4A}* Influent Pump Station is located adjacent to the ~~MBBR~~ **secondary clarifiers** *{ANRI VE Alt No. 4A}* and conveys water to the **MBBR and** {ANRI VE Alt No. 4A} SWIFT advanced water treatment process. The ~~SWIFT~~ **MBBR** *{ANRI VE Alt No. 4A}* ~~Influent Pump Station~~ *{ANRI VE Alt No. 4A}* is hydraulically connected to the SWIFT equalization basins to attenuate the diurnal flow variation and deliver a more consistent flow to the SWIFT advanced water treatment process.

3.7.1.1 Process Summary

Table 3-5 provides a summary of general process design elements associated with the SWIFT Influent Pump Station.

Table 3-5: Process Summary for ~~SWIFT~~ MBBR *{ANRI VE Alt No. 4A}* Influent Pump Station

Element	Objective / Design Element
Purpose	• ~~Convey SWIFT influent to the SWIFT advanced water treatment process~~ **Conveys unchlorinated secondary effluent to the MBBR which discharges to SWIFT.** *{ANRI VE Alt No. 4A}*
Redundancy	• Three 50% capacity pumps (2 duty, 1 standby) • Separate wet wells for each pump to facilitate dewatering and maintenance
Design Approach	• Maximum pump station flow – ~~16 mgd~~ **21 MGD** *{ANRI VE Alt No. 4A}* • Minimum pump station flow – 8 mgd • Isolation slide gates are provided for each pump bay
Operations and Control Philosophy	• ~~SWIFT~~ **MBBR** *{ANRI VE Alt No. 4A}* influent flow setpoint can be set by plant operator • ~~SWIFT~~ **MBBR** *{ANRI VE Alt No. 4A}* influent flow setpoint can be set by the Distributed Control System (DCS) based on the water level in the equalization basins. See the SWIFT Flow Equalization Functional Description in Appendix K (JR SWIFT Functional Control Descriptions), for further information.
Facility Layout Concepts	• ~~SWIFT Influent Pump Station structure is integral to JRTP secondary clarifier/MBBR to reduce footprint~~ *{ANRI VE Alt No. 4A}* • ~~SWIFT~~ **MBBR** *{ANRI VE Alt No. 4A}* influent pump electrical switchgear/variable frequency drives (VFDs) is located in the ~~MBBR electrical room~~ **South Electrical Building** *{ANRI VE Alt No. 4A}* • Each bay can be drained by dropping in a submersible pump and sending the flow to ~~the SWIFT overflow channel~~ **an adjacent channel or tank** *{ANRI VE Alt No. 4A}* • ~~Roof hatches over each pump to facilitate removal and replacement~~ **MBBR Influent Pump Station is located outside and does not have a superstructure.** *{ANRI VE Alt No. 4A}*

3.7.1.2 Design Criteria

Table 3-6 provides the design criteria used for the ~~SWIFT~~ **MBBR** *{ANRI VE Alt No. 4A}* Influent Pump Station.

Table 3-6: Design Criteria for <u>MBBR</u> *{ANRI VE Alt No. 4A}* Influent Pump Station

Design Element	Value
Number of pumps	3
Capacity per pump	~~8~~**<u>10.5</u>** mgd *{ANRI VE Alt No. 4A}*
Firm capacity	~~16 mgd~~ **<u>21 mgd</u>** *{ANRI VE Alt No. 4A}*

3.7.1.3 Equipment Summary Table

Table 3-7 summarizes the type of equipment included in the ~~SWIFT~~**<u>MBBR</u>** *{ANRI VE Alt No. 4A}* Influent Pump Station.

Table 3-7: Equipment Summary for ~~SWIFT~~ <u>MBBR</u> *{ANRI VE Alt No. 4A}* Influent Pump Station

Equipment	Element	Value
~~SWIFT~~ **<u>MBBR</u>** *{ANRI VE Alt No. 4A}* Influent Pump	Type	~~Lineshaft Mixed Flow~~ **<u>Vertical turbine solids handling pump</u>** *{ANRI VE Alt No. 4A}*
	Capacity per pump	~~8 mgd~~ **<u>10.5 mgd</u>** *{ANRI VE Alt No. 4A}*
	Total dynamic head	56 feet
	Estimated motor nameplate horsepower	~~125 hp~~ **<u>150 hp</u>** *{ANRI VE Alt No. 4A}*
	Drive type	VFD
	Pump shaft	416 stainless steel
	Pump column and discharge head	Epoxy coated carbon steel
	Pump manufacturers	Fairbanks Nijhuis, Flowserve, Goulds, Weir Floway, or approved equal

3.7.2 Rapid Mix

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.7.2.1 Process Summary

Table 3-8 provides a summary of general process design elements associated with the rapid mix process.

Table 3-8: Process Summary for Rapid Mix

Element	Objective / Design Element
Purpose	• Provides injection point for coagulant and sodium hypochlorite • Rapidly disperses coagulant within the SWIFT influent water before flocculation

Element	Objective / Design Element
Redundancy	• Two 100% capacity mixers (1 duty, 1 standby) • Each mixer can be isolated and removed from service without affecting SWIFT treatment capacity
Design Approach	• Mechanical in-line blenders selected for maintainability, flexibility, and low capital cost • Piping and valves configured to allow for ~~two-stage or~~ single-stage operation and the ability to isolate each mixer for removal or maintenance *{SWIFT VE Alt No. 10A}*
Operations and Control Philosophy	• Mixer speed for each rapid mixer set by operator to achieve a target velocity gradient (G-value) • DCS calculates and displays G-value based on the entered motor speed and measured water temperature
Facility Layout Concepts	• Rapid mixers and associated chemical feed injection points located in an enclosed space for freeze protection, ease of maintenance/access, and general protection from elements • Mixer motor switchgear and VFDs located in electrical room located adjacent to rapid mix equipment

3.7.2.2 Design Criteria

Table 3-9 provides the design criteria used for the rapid mix system.

Table 3-9: Design Criteria for the Rapid Mix System

Design Element	Value
Capacity per train	16 mgd
Number of rapid mix trains	~~1~~ **2** *{SWIFT VE Alt No. 10A}*
Number of stages per train	1 ~~or 2~~ *{SWIFT VE Alt No. 10A}*
Number of rapid mixers per train	~~2~~ **1** *{SWIFT VE Alt No. 10A}*

3.7.2.3 Additional Design Considerations

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.7.2.4 Equipment Summary Table

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-10: Equipment Summary for Rapid Mix System

Equipment	Element	Value
Rapid Mixers	Type	In-line
	Mixer body diameter	~~30~~ **36** inches *{SWIFT VE Alt No. 10A }*
	Velocity gradient	1,000 s^{-1}
	Estimated maximum motor nameplate horsepower	15 hp

Equipment	Element	Value
	Drive type	VFD
	Wetted parts – materials of construction	316 stainless steel
	Acceptable manufacturers and/or products	Lightnin, Walker Process, or approved equal

3.7.3 Flocculation

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.7.3.1 Process Summary

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-11: Process Summary for Flocculation [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report

Element	Objective / Design Element

3.7.3.2 Design Criteria

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-12: Design Criteria for the Flocculation Process [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report

Design Element	Value

3.7.3.3 Additional Design Considerations

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.7.3.4 Equipment Summary Table

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-13: Equipment Summary for the Flocculation System Mixers [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design] Report

Equipment	Element	Value

3.7.4 Sedimentation

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.7.4.1 Process Summary

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-14: Process Summary for Sedimentation

Element	Objective / Design Element
Purpose	• Provide quiescent conditions for floc to settle through the water column with the aid of the inclined plate settlers and allow clarified water to overflow from the top of the basin.
Redundancy	• Four 33% sedimentation trains. All trains will typically be in service. • Five 100% capacity settled solids pumps. Standby pump configured as a swing pump.
Design Approach	• Each train is designed to treat 4 mgd with all trains in service or 5.3 mgd with one train out of service. • Four rows of inclined plate settler packs with two settled water launders per basin. • Cable-driven hoseless sludge collector headers used for settled solids removal. • Each sedimentation train provided with a dedicated settled solids pump. A swing spare settled solids pump can be manifolded to any sedimentation train. • Valves for settled solids service shall be 100% port type plug valves. • Settled solids pump discharge is conveyed to the existing JRTP gravity thickener influent or to the influent of the JRTP primary clarifiers. • Up to 1.53 mgd of the settled solids pump discharge can be returned to the rapid mix effluent/flocculation influent when in settled solids recirculation mode.
Operations and Control Philosophy	• The sludge collectors and settled solids pumps will have constant and intermittent operating modes. Under intermittent mode, the collectors and pumps will operate automatically at an operator-adjustable interval. • Settled solids collection header limit sensors shall be located in the basin and directly measure the position of the collection header.
Facility Layout Concepts	• Settled solids basins are enclosed to facilitate maintenance and washdown of the plate settlers. Design-Builder shall furnish plan and associated access, etc. for removing and replacing plate packs. Plate packs may be disassembled for removal and replacement. • Cantilevered walkways provide access on either side of each sedimentation basin. • Sedimentation basins shall be ~~enclosed within a masonry and concrete superstructure consistent with building architecture~~ **covered with a metal canopy roof** to reduce the growth of algae. **The canopy will be designed to block direct sunlight from reaching the water surface between 9:00 a.m. and 6:00 p.m. on any day throughout the year. Screen walls will be employed to reduce sunlight where they do not impede egress or operator access to equipment** *{SWIFT VE Alt No. 10A}*. • Sedimentation basins drain to Backwash Equalization Pump Station. Drain piping and valves are not shown; final configuration is the responsibility of the Design-Builder. Drain valves and valve operator locations shall be coordinated by the Design-Builder considering plate settlers, settled solids collectors, and washdown post hydrant locations and associated piping. • It shall be possible to drain one sedimentation basin without affecting the other trains in operation.

Element	Objective / Design Element
	• At least four washdown hydrants connected to the SWIFT NPW supply as shown on the BODR **except where superseded by the Value Engineering Alternative Concept drawings as applicable.** • Settled solids pump motor switchgear and VFDs located in electrical room located adjacent ozone generator room. • Access into each plate settler basin shall be provided via one 36-inch submarine door from the settled solids pump area.

3.7.4.2 Design Criteria

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-15: Design Criteria for the Sedimentation System [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Design Element	Value

3.7.4.3 Additional Design Considerations

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.7.4.3.1 Return to Gravity Thickeners

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report].

Figure 3-2: Process flow diagram of settled solids handling

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report

3.7.4.3.2 Return to Primary Clarifiers

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Figure 3-3: Proposed equipment layout in sludge handling facility

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.7.4.4 Equipment Summary Table

Table 3-16 summarizes the equipment design for the sedimentation system.

Table 3-16: Equipment Summary for the Sedimentation System

Equipment	Element	Value
Inclined Plate Settlers and Settled Solids Collection System	Wetted parts – materials of construction	316 stainless steel
	Settled solids collection system	Telescoping cable driven hydraulic suction type
	Acceptable manufacturers and/or products	Meurer Research Inc., **Jim Myers & Sons, Inc.** *{SWIFT VE Alt No. 10A}* or approved equal
Settled Solids Pumps	Type	Progressive cavity
	Capacity per pump	265 gpm(1)
	Total dynamic head	17 feet
	Estimated motor nameplate horsepower	15 hp
	Drive type	VFD
	Acceptable manufacturers and/or products	Moyno Series 2000 as manufactured by Robbins and Myers, NEMO as manufactured by Netzsch, or approved equal
In-line Grinders	Solids concentration	0-6%
	Capacity per grinder	1,310 gpm(2)
	Maximum headloss through grinder	4.2 feet
	Estimated motor nameplate horsepower	5 hp
	Inlet and outlet diameter	10 inches
	Acceptable manufacturers and/or products	“Muffin Monster” as manufactured by JWC Environmental, “Annihilator” by Moyno, equivalent by Franklin Miller, or approved equal

(1) When operated in intermittent pumping mode

(2) The in-line grinders are sized to handle the combined maximum settled solids flow of 530 gpm (e.g., continuous settled solids pumping at 0.1%TS) and a maximum primary sludge flow of 780 gpm

3.7.5 Liquid Oxygen Storage and Feed

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.7.5.1 Process Summary

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-17: Process Summary for Liquid Oxygen Storage and Feed [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Element	Objective / Design Element

3.7.5.2 Design Criteria

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-18: Design Criteria for the Liquid Oxygen Storage and Feed System [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Design Element	Value

3.7.6 Ozonation

Ozonation provides direct oxidation of organic and inorganic contaminants in the settled water, increases the bioavailability of certain organics for subsequent assimilation/metabolization through the biofilters and is used in conjunction with hydrogen peroxide to produce hydroxyl radicals used for advanced oxidation of trace contaminants. Ozone will be generated on site from liquid oxygen and transferred to the water using fine bubble diffusion added at multiple points along the length of the ozone contactor. The ozonated water will pass through an over-under ozone contactor. ~~Any ozone or hydrogen peroxide residual in the ozone contactor effluent will be quenched using sodium bisulfite before biofiltration.~~ *{SWIFT VE Alt No. 10A}.* The ozone system is not expected to be operated for pathogen inactivation credit.

3.7.6.1 Process Summary

Table 3-19 provides a summary of general process design elements associated with the ozonation process.

Table 3-19: Process Summary for Ozonation

Element	Objective / Design Element
Purpose	• Oxidation of organic contaminants, biofiltration pretreatment, advanced oxidation of 1,4-Dioxane
Redundancy	• Two 100% capacity or three 50% capacity ozone generators (1 or 2 duty, 1 standby) *A* • Two 100% capacity open/closed cooling water systems and heat exchangers (1 duty, 1 standby) • Two 100% capacity ozone destruct systems that are piped to draw from both ozone contact basins (1 duty, 1 standby) • Two 100% capacity nitrogen boost systems (1 duty, 1 standby) • Two 100% capacity ozone contactors (1 duty, 1 standby)
Design Approach	• Selection of ozone generators, ancillary equipment, and mass transfer system based on delivering the specified maximum applied dose at a 10% ozone concentration. • Hydrogen peroxide will be injected into the settled water channel upstream of the ozone contactors. The Design-Builder shall provide a system that delivers sufficient dispersion of

Element	Objective / Design Element
	chemical into the settled water channel to provide a stable treatment process (e.g., channel mixer or sidestream injection diffuser system). • The ozone contactors are over-under basins with seven intra-basin baffles creating seven equal size contactor chambers with a final reduced-area riser chamber at the end of the contactor basin. Ozone will be added into the first and third **and fifth** contactor chambers. *{SWIFT VE Alt No. 10A}*. • Diffuser system design shall be optimized based on the following: ○ Typical ozone-in-oxygen concentration of 10% at the average expected ozone dose. ○ Ozone-in-oxygen concentration may be varied between 6% and 12% to achieve suitable gas flow rates for the diffuser system. ○ System will typically be operated with both diffuser banks in operation and maintain an equal split of ozone-in-oxygen gas flow between the two diffuser banks. • Detailed design features of the ozone contactor including features for optimizing inlet flow, chambered baffle walls, etc. shall be considered during detailed design. CFD analysis shall be used to verify the baffle factor of the final contactor design. • ~~Sodium bisulfite is injected in the ozone contactor effluent to quench any remaining ozone or peroxide. The Design-Builder shall provide a system that delivers sufficient dispersion of chemical into the ozonated settled water to fully quench any remaining ozone or peroxide before the water reaches the biofiltration influent channel.~~ *{SWIFT VE Alt No. 10A}*. • A common sample gallery is located between the ozone contactor basins. ○ Sample ports are located along the length of the contactor. First six sample ports are spaced such that they are 15 seconds apart (at a flow of 16 mgd, typical). After the first 90 seconds, the remaining sample ports shall be spaced at equal intervals. ○ In-basin sample piping shall be configured to sample water from the bulk flow, away from effects of walls or baffles. ○ Residual monitor flow chambers are co-located with the sample ports in the sample gallery to minimize the travel distance of the water sample before residual ozone measurement or sample collection. Travel time from the entrance of the sample port to the residual monitor flow chamber shall be 10 seconds or less for each residual monitoring sample port. ○ Two "floating" ozone residual monitors will be provided and will be positioned based on which contactor is operational and the treatment goals during operation. ○ After passing through the residual monitor flow chamber(s), ozonated sample shall remain in a closed environment and will be returned to the ozone contactor using a pump or pump station to prevent ozone from off-gassing into the gallery occupied space. If a pump station is used, the headspace shall be maintained under vacuum conditions. • The ozone destruct blowers shall be capable of maintaining a vacuum of -2 to -4 inches of water column within the ozone contactor headspace. • The vacuum/pressure release valves vacuum setpoint shall be -6 inches of water column. The vacuum/pressure release valve shall be sized to prevent any damage to the ozone contactor structure or ozone equipment during variations in operational water level, catastrophic drain down events, and typical contactor filling. • The ozone destruct systems shall be capable of removing ozone down to 0.10 ppmv at the maximum system ozone production and gas flow rate. • Open loop cooling water shall use settled water pumped through plate and frame heat exchangers. • Closed-loop cooling water chemistry shall be coordinated by Design-Builder to meet manufacturer requirements and all equipment required to test and maintain desired closed-loop cooling water chemistry shall be provided.
Operations and Control Philosophy	• All equipment provided by the ozone system supplier is controlled by the main ozone control panel (MOCP) Programable Logic Computer (PLC)-based control system (Allen-Bradley ControlLogix) with a hot backup. • DCS will have supervisory control over the MOCP.

Element	Objective / Design Element

	• The ozone generator PLCs (Allen-Bradley CompactLogix) and MOCP are connected to the plant DCS network to allow for direct communication of generator equipment status (not control) from the generator PLCs to the DCS.
	• Each cooling water skid, each ozone destruct skid, and the nitrogen boost skid will be controlled through hardwired input / output (I/O) and have local control capabilities.
	• The DCS will provide an ozone system start permissive signal and ozone production signal to the MOCP.
	• The MOCP will operate the ozone system to achieve the ozone production output setpoint.
	• Independent ozone-in-oxygen flowmeters and motor-operated control valves for application points one and two in each contactor.
	• Operator will be able to set the ozone-in-oxygen gas flow split to each contactor's two application points.
	• The ozone production setpoint will be calculated based on the operating mode:
	  ○ Applied ozone dose – DCS calculates the ozone production setpoint based on the SWIFT flow rate and the operator-input dose.
	  ○ Residual ozone control with feed-forward flow control – DCS controls the ozone production setpoint based on maintaining an ozone residual setpoint at a target residual monitoring location. The DCS adjusts the ozone dose automatically based on changes in ozonated water flow rate.
	• Ambient oxygen and ozone gas monitoring:
	  ○ Ambient ozone gas monitors shall include lengths of stainless steel tubing to take their sample within 1 foot of the finished floor elevation (FFE) in each monitoring location.
	  ○ The ozone generator room, ozone sample gallery area, and ozone destruct room shall each have a panel with a siren, strobe, and alarm silence button located outside of the room or area.
	  ○ Ozone generator room:
	    ▪ Ambient ozone monitoring – 0.1 ppmv triggers high alarm and supplemental ventilation, 0.3 ppmv triggers high-high alarm and shuts down generators
	    ▪ Ambient oxygen monitoring – 22.5% triggers a high alarm and supplemental ventilation, 23.5% triggers high-high alarm, shuts down generators, and closes master oxygen control valve
	  ○ Ozone sample gallery area:
	    ▪ Ambient ozone monitoring – 0.1 ppmv triggers high alarm and supplemental ventilation, 0.3 ppmv triggers a high-high alarm and shuts down ozone generators
	  ○ Ozone destruct room:
	    ▪ Ambient ozone monitoring – 0.1 ppmv triggers high alarm and supplemental ventilation, 0.3 ppmv triggers a high-high alarm and shuts down generators
	    ▪ Ambient oxygen monitoring – 22.5% triggers a high alarm and supplemental ventilation, 23.5% triggers high-high alarm, shuts down generators, and closes master oxygen control valve
	  ○ ~~Biofilter area (above slab at EL 44.00 as shown):~~
	    ▪ ~~Ambient ozone monitoring – 0.1 ppmv triggers high alarm and shuts down generators~~ *{SWIFT VE Alt No. 11A}*

Facility Layout Concepts	• Ozone generation equipment located in a dedicated room • Ozone destruct systems located in an enclosed area above ozone contactor • Electrical switchgear for ozone generators located in electrical room adjacent to ozone generator room

3.7.6.2 Design Criteria

Table 3-20 provides the design criteria used for the ozonation system.

Table 3-20: Design Criteria for Ozonation System

Design Element	Value
Applied ozone dose	
Minimum	1 mg/L
Average	6 mg/L
Maximum	10 mg/L
Ozone demand, lb/day	
Maximum flow (8 mgd), minimum dose	67 lb/day
Maximum flow (16 mgd), average dose	801 lb/day
Maximum flow (16 mgd), maximum dose	1,334 lb/day
Ozone mass transfer efficiency	≥ 90%
Ozone mass transfer system	Fine bubble diffusion
Nominal sidewater depth	~~22~~ **21** feet *{SWIFT VE Alt No. 10A}*
Number of ozone contactors	2
Ozone contactor T_{10}	5 minutes(1)
Ozone contactor configuration	Over-under
Minimum baffle factor	0.5

(1) at 16 mgd

3.7.6.3 Additional Design Considerations

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.7.6.4 Equipment Summary Table

Table 3-21 summarizes the type of equipment included in the ozonation system.

Table 3-21: Equipment Summary for Ozonation System [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Equipment	Element	Value

3.7.7 Biofiltration

3.7.7.1 Process Summary

Table 3-22 provides a summary of general process design elements associated with the biofiltration process.

Table 3-22: Process Summary for Biofiltration

Element	Objective / Design Element
Purpose	• Physical removal of suspended particulates. • Biological treatment of dissolved organics.
Redundancy	• 10-minute empty bed contact time with one filter out-of service.
Design Approach	• Seven biofilters (6 duty, 1 standby at design flow). • 10 feet of hydraulic driving head over the media. • The biofilters share a filter gallery with the GAC contactors and ~~both~~ **the gallery is** covered ~~to prevent algae growth and~~ to facilitate maintenance. **The biofilters will be covered by a canopy roof to reduce algae growth. The canopy will be designed to block direct sunlight from reaching the water surface between 9:00 a.m. and 6:00 p.m. on any day throughout the year. Screen walls will be employed to reduce sunlight where they do not impede egress or operator access to equipment.** *{SWIFT VE Alt No. 11A}* • Overflow from the biofilter influent channel and filter-to-waste is conveyed to the JRTP through the overflow gravity pipeline. • Backwash waste flows to the Backwash Equalization Pump Station.
Operations and Control Philosophy	• The effluent flow rate from each biofilter is measured by a magnetic flowmeter and subsequently adjusted by a modulating control valve to achieve a constant flow rate through each biofilter and maintain the filter water level setpoint. • The backwash steps include air scour, combined air scour / low water wash, high water wash, low water wash, biofilter refill, and filter-to-waste. • Upon an upstream CCP exceeding its alarm value, the influent valves to all biofilters shall close, which will cause the influent to overflow into the overflow gravity drain pipeline.

Facility Layout Concepts	• The biofilter length to width ratio is approximately 1.25.
	• The biofilters share a common filter gallery with the GAC contactors.
	• **Provisions will be made to allow future installation of propane feed into or directly upstream of the Biofilter Influent Flume. Provisions include reserved space for a vault or structure immediately upstream of the Biofilter Influent Flume, a 4' x 4' opening with cover in the Biofilter Influent Flume, and space in the electrical room for future breakers and VFD up to 100 hp.** *{ SWIFT VE Alt No. 11A}*.
	• Two submarine doors (one on each end) provide access to the backwash waste flume for maintenance.
	• Considerations for removing equipment and materials from the filter gallery include:
	  ○ One monorail on the west side of the filter gallery that services the lower level of the gallery and terminates on an enclosed landing. An overhead door is provided to allow for transferring the load directly from the monorail to a vehicle.
	  ○ One monorail on the east side of the filter gallery that services both the upper and lower level of the gallery and terminates in the Intermediate Pump Station room at an overhead door to allow for transferring the load directly from the monorail to a vehicle. Access to the lower level of the gallery is through an access hatch.

3.7.7.2 Design Criteria

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-23: Design Criteria for the Biofiltration System [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Design Element	Value

3.7.7.3 Additional Design Considerations

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.7.7.4 Equipment Summary Table

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report].

Table 3-24: Equipment Summary for the Biofiltration System [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Equipment	Element	Value

3.7.8 Intermediate Pump Station

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report].

3.7.8.1 Process Summary

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report].

Table 3-25: Process Summary for Intermediate Pump Station [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Element	Objective / Design Element

3.7.8.2 Design Criteria

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report].

Table 3-26: Design Criteria for the Intermediate Pump Station [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Design Element	Value

3.7.8.3 Additional Design Considerations

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.7.8.4 Equipment Summary Table

Table 3-27 summarizes the equipment design for the Intermediate Pump Station.

Table 3-27: Equipment Summary for the Intermediate Pump Station [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Equipment	Element	Value

3.7.9 GAC Adsorption

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report].

3.7.9.1 Process Summary

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-28: Process Summary for GAC Adsorption [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Element	Objective / Design Element

3.7.9.2 Design Criteria

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-29: Design Criteria for the GAC Adsorption Process [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Design Element	Value

3.7.9.3 Equipment Summary Table

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-30: Equipment Summary for GAC Adsorption Filters [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Equipment	Element	Value

3.7.10 UV Treatment

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report].

3.7.10.1 Process Summary

Table 3-31 provides a summary of general process design elements associated with the UV treatment system.

Table 3-31: Process Summary for UV Treatment

Element	Objective / Design Element
Purpose	• Inactivate *Giardia*, *Cryptosporidium*, and viruses in disinfection mode • Photolyze N-nitrosodimethylamine (NDMA) when operated in photolysis mode. **The UV treatment requirement for NDMA is to achieve a 1 log reduction with all UV reactors in service at 100% lamp capacity with a UVT of ~~93%~~ 95%** *SWIFT VE Alt No. 12A}* **and a combined aging and fouling factor of 0.9. ~~The UV system shall be designed to achieve the treatment requirements for 1,4-Dioxane, NDMA, and pathogen inactivation.~~** *{Addendum No. 5} {SWIFT VE Alt No. 12A}*. • ~~Oxidize 1,4-Dioxane when operated with hydrogen peroxide feed in UV AOP mode~~ *{SWIFT VE Alt No. 12A}*
Redundancy	• Deliver ~~0.3 log reduction of 1,4-Dioxane~~ **4.4 log inactivation of viruses** at full facility flow with largest reactor out of service *{SWIFT VE Alt No. 12A}*
Design Approach	• Low pressure high output (LPHO) lamps • ~~Hydrogen peroxide addition point at common point upstream of all reactors in use when system operated in UV AOP mode~~ *{SWIFT VE Alt No. 12A}* • ~~Sodium bisulfite for residual quenching,~~ sodium hydroxide for pH control, and ~~preformed monochloramine~~ **sodium hypochlorite** for maintaining disinfection residual added downstream of UV reactors *{SWIFT VE Alt No. 12A}* • Flowmeters and flow control valves to provide equal flow split between active reactors
Operations and Control Philosophy	• UV control system to consist of a main UV control panel connected to individual power panels. Power panels shall be provided by the UV system manufacturer. • Ethernet communication between DCS and main UV control panel. • Main UV control panel includes an Allen-Bradley ControlLogix PLC with a hot backup. • DCS has supervisory control of UV control setpoints, including delivered UV dose, offset, lamp power, and operating mode. • UV system can be operated in dose control mode or full power mode. • In disinfection dose control mode, the UV control system adjusts the lamp power based on the reactor flow, water UV transmittance (UVT), number of lamps online, and intensity sensor feedback to achieve the target disinfection dose plus an offset value. • In photolysis control mode, the UV control system adjusts the lamp power based on the reactor flow, water UVT, number of lamps online, and intensity sensor feedback to achieve the NDMA reduction value setpoint.

Element	Objective / Design Element
	• ~~In UV AOP control mode, the UV control system adjusts the lamp power and hydrogen peroxide feed rate based on the reactor flow, water UVT, number of lamps online, and intensity sensor feedback to achieve the target 1,4-Dioxane reduction setpoint.~~ *{SWIFT VE Alt No. 12A}* • In full power mode, the UV system operates at full lamp power and the UV dose is calculated in real-time by the Main UV control panel PLC. • The UV control system shall display the calculated log removal of NDMA through photolysis ~~and the log removal of 1,4-Dioxane through advanced oxidation~~ given the number of UV reactors online, reactor flow, lamp power, UVT, **and** intensity sensor feedback~~, and hydrogen peroxide feed (for 1,4-Dioxane removal)~~. *{SWIFT VE Alt No. 12A}*. • UV reactor effluent isolation/flow control valves are controlled by DCS to maintain flow split. The UV control system provides a permissive signal to control when UV reactor effluent isolation/flow control valve must open or close based on lamp status, flow rate, power mode, and duty/standby cycling. • Main UV control panel provided with a 5-minute uninterruptible power supply (UPS) and backed up with generator power (for control panel power only). o Alerts and alarms to include lamp / reactor failures, isolation valve failures, low intensity, low dose, low UVT, off-specification events, high reactor temperature, and others as recommended by the Owner or manufacturer.
Facility Layout Concepts	• ~~Mechanical in-line blender used for providing rapid dispersion of hydrogen peroxide before UV reactors.~~ *{SWIFT VE Alt No. 12A}* • Proposed layout includes space for ~~up to three~~ **two** parallel UV trains with one UV reactor per train. Changes to the piping and facility layout may be required if a different manufacturer is selected. *{SWIFT VE Alt No. 12A}* • Ballast cabinets located adjacent to reactors and within maximum conduit length requirements of the selected manufacturer. • Mechanical in-line blender for sodium hydroxide and ~~bisulfite~~ **sodium hypochlorite** chemical feed is located near the operating elevation to facilitate access to mechanical equipment and chemical feed injection points. *{SWIFT VE Alt No. 12A}* • ~~Hydraulic detention time in baffled SWIFT Water Pump Station influent channel provides time to complete quenching of hydrogen peroxide residual with bisulfite.~~ *{SWIFT VE Alt No. 12A}* • ~~Preformed monochloramine in carrier water is fed into SWIFT Water Pump Station influent channel using a diffuser pipe after the hydrogen peroxide quenching detention time.~~ *{SWIFT VE Alt No. 12A}* • ~~Vertical turbine mixer used to provide dispersion of preformed monochloramines in~~ SWIFT Water Pump Station influent channel **to be sampled and free chlorine** residual is measured in Analyzer Bank 4-1. *{SWIFT VE Alt No. 12A}* • Space around reactors to facilitate maintenance and to allow for cleaning, lamp replacement, and intensity sensor testing. • Spare and spent lamp storage on the UV operating level. • ~~Freight elevator to facilitate transporting lamps, ballasts, and cleaning equipment from grade to UV equipment operating level.~~ *{SWIFT VE Alt No. 12A}* • Separate monorails with electric hoists located above reactors, influent flowmeters, and influent valves to facilitate removal/replacement of equipment **and for movement of UV lamps from grade to operating level.** • Common trench drain passing under each reactor to facilitate draining of reactors for cleaning and maintenance. Drains from each reactor shall include an air gap to prevent cross-contamination. • Trench drain terminates at a sump pump well. Sump pumps convey drain water to the Backwash Equalization Pump Station.

3.7.10.2 Design Criteria

Table 3-32 provides the design criteria used for the UV treatment system.

Table 3-32: Design Criteria for UV Treatment System

Design Element	Value
Installed redundancy (for **4.4 log inactivation of viruses** at the conditions described in this table) *{SWIFT VE Alt No. 12A}*	n+1
UV treatment capacity	16 mgd
Validated UV dose	186 mJ/cm^2
Virus inactivation target in disinfection mode	4 Log Removal Value (LRV)
~~1,4-Dioxane removal target in AOP mode~~	~~0.3 Log Reduction~~ *{SWIFT VE Alt No. 12A}*
~~Maximum hydrogen peroxide dose required to achieve 1,4-Dioxane removal target~~	~~7 mg/L~~ *{SWIFT VE Alt No. 12A}*
Hydroxyl radical scavenging	100,000 s^{-1}
UV transmittance at 254 nm	89%
Combined aging and fouling factor	0.9
Validation approach	UVDGM(1) through a third party
Headloss through reactor at design flow used as Basis of Design	2.0 inches H_2O

(1) *UV Disinfection Guidance Manual* (USEPA, 2006)

3.7.10.3 Additional Design Considerations

~~The Design-Builder shall perform CFD modeling to confirm even flow split between all reactors.~~ *{SWIFT VE Alt No. 12A}*

The final design, including the upstream pipe, valve and flowmeter configuration, shall be in accordance with the *UV Disinfection Guidance Manual* (USEPA, 2006).

3.7.10.4 Equipment Summary Table

Table 3-33 summarizes the equipment design for the UV treatment system.

Table 3-33: Equipment Summary for UV Treatment System

Equipment	Element	Value
UV Reactor	Type of lamp	Low pressure high output
	Acceptable manufacturers and/or products	Wedeco, Trojan
Mechanical In-Line Blenders	Type	In-line
	Mixer body diameter	36 inches
	Estimated motor nameplate horsepower	15 hp
	Drive type	VFD

Equipment	Element	Value
	Wetted parts materials of construction	316 stainless steel
	Acceptable manufacturers and/or products	Lightnin, Walker Process, or approved equal
~~Chloramine Dispersion Mixer~~ *{SWIFT VE Alt No. 12A}*	~~Type~~	~~Vertical turbine~~
	~~Impeller type~~	~~Axial or radial~~
	~~Estimated motor nameplate horsepower~~	~~15 hp~~
	~~Drive type~~	~~VFD~~
	~~Gear reducer design~~	~~Horizontal right angle (helical and spiral bevel gearing)~~
	~~Wetted parts~~	~~316 stainless steel~~
	~~Acceptable manufacturers and/or products~~	~~Lightnin Series 70, Philadelphia Mixers Series 3800, or approved equal~~

3.7.11 SWIFT Water Pump Station

The SWIFT Water Pump Station pumps SWIFT Water from the SWIFT treatment facility to the recharge wells located remote from the SWIFT Water Pump Station. The SWIFT Water Pump Station also contains the SWIFT NPW pumps that provide water to various washdown, chemical dilution, and carrier water flows around the JR SWIFT Facility.

3.7.11.1 Process Summary

Table 3-34 provides a summary of general process design elements associated with the SWIFT Water Pump Station.

Table 3-34: Process Summary for SWIFT Water Pump Station

Element	Objective / Design Element
Purpose	• Pump SWIFT Water to the SWIFT recharge wells • Provide pressurized SWIFT NPW to various demands throughout the JR SWIFT
Redundancy	• Four 33% capacity SWIFT pumps (3 duty, 1 standby) • Two 100% capacity small SWIFT NPW pumps (1 duty, 1 standby) • One 100% capacity large SWIFT NPW pump
Design Approach	• After passing through the post-UV chemical addition in-line blender, the SWIFT Water enters the SWIFT Water Pump Station influent channel to provide time ~~for the quenching of peroxide residual with bisulfite.~~ **for a stable chemical concentration to facilitate process control**. *{SWIFT VE Alt No. 12A}* • ~~After the quenching retention time, monochloramine is added to the water, dispersed using a vertical turbine mixer, and~~ **Flow** subsequently passes over the SWIFT Water Pump Station influent weir. The SWIFT Water Pump Station influent weir maintains a minimum HGL in the UV reactors to ensure that the UV reactors and associated piping is always full of water. *{SWIFT VE Alt No. 12A}* • If the SWIFT pumps are turned off, the WSEL in the SWIFT Water Pump Station and SWIFT Water Pump Station influent channel will rise and the SWIFT Water will pass

Element	Objective / Design Element

	over the SWIFT Water Pump Station overflow weir and into the overflow piping that conveys overflows back to the SWIFT Influent Pump Station or the Chlorine Contact Tank Junction/Splitter Box.
	• The preliminary pump selection and pump station design includes the following assumptions:
	  ○ The recharge wells will be capable of conveying SWIFT Water through the well backflush pump column or directly through the well casing (or annulus). See Section 3.7.12 (Recharge Well Facilities) for additional discussion.
	  ○ The number of recharge wells in service at any time will be determined by the SWIFT Water flow to keep the flow per well between 1.6 and 2.0 mgd.
	  ○ The initial static water level of the aquifer at each of the recharge well locations is approximately 70 feet below grade (fbg).
	• The SWIFT Water Pump Station pumps shall be sized to provide sufficient flow and pressure to deliver the highest per well recharge flow at the condition where the aquifer HGL is approximately elevation 35 feet (i.e., approximately 10 feet above land surface elevation) when SWIFT Water is directed into the aquifer through the pump column (described further in Section 3.7.12 [Recharge Well Facilities]).
	• The Design-Builder will confirm the design assumptions for the SWIFT Water Pump Station during detailed design.
	• The SWIFT NPW pumps will be VFD driven to allow for a variation in flows. The pump sizes will be stepped so that two redundant small pumps can deliver typical operating loads and one single larger pump can provide large but infrequent additional demands such as GAC slurry makeup.

Operations and Control Philosophy	• The SWIFT pumps will operate to maintain a level setpoint in the SWIFT Water Pump Station wet well. • When the operating pump(s) reach 95% of maximum speed, another pump will come online. • When the operating pump reaches 50% of maximum speed, a pump will be turned off. • The SWIFT NPW pumps will be operated to maintain a SWIFT NPW system pressure of between 60 and 80 psi. The SWIFT NPW pumps will adjust their speed and turn on and off to maintain system pressure in the SWIFT NPW system via VFDs.
Facility Layout Concepts	• The SWIFT Water Pump Station is located adjacent to the SWIFT Process Building No. 2. • The SWIFT Water Pump Station finished floor elevation will be close to grade to facilitate access. • SWIFT pumps' electrical switchgear/VFDs are located in the electrical room adjacent to the pump station operating floor. • Hatches or skylights provide overhead access for picking up pumps using a crane.

3.7.11.2 Design Criteria

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-35: Design Criteria for SWIFT Water Pump Station [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Design Element	Value

3.7.11.3 Additional Design Considerations

The SWIFT NPW water demands are summarized in **Table 3-36**.

Table 3-36: SWIFT NPW Water Demands

Demand Type	Value
Continuous Demands	
Sodium hydroxide dilution makeup	1 gpm
~~Monochloramine dilution water~~	~~**7.5** 27 gpm~~ ~~*{Addendum No. 2}*~~ *{SWIFT VE Alt No. 10A}*
Flocculation polymer dilution water	14 gpm
Filter polymer dilution water	1 gpm
Polymer carrier water	5 gpm
~~Bisulfite carrier water~~	~~0.3 gpm~~*{SWIFT VE Alt No. 10A}*
Total Continuous (Minimum) Demands	**21** ~~**28.5**~~ ~~48~~ gpm *{Addendum No. 2}* *{SWIFT VE Alt No. 10A}*
Additional Demands	
Floc basin washdown hydrants, or Sed basin plate pack washdown hydrants, or biofilter washdown hydrants, or GAC washdown hydrants	50 gpm
GAC media slurry makeup	200 gpm
Washdown hose reels	Insignificant
UV cleaning solution makeup water	Insignificant
Total Additional Demands	**250 gpm**
Maximum Demand	**≈300 gpm**

3.7.11.4 Equipment Summary Table

Table 3-37 summarizes the equipment design for the SWIFT Water Pump Station.

Table 3-37: Equipment Summary for SWIFT Water Pump Station [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Equipment	Element	Value

3.7.12 Recharge Well Facilities

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.7.12.1 Process Summary

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-38: Process Summary for Recharge Well Facilities [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Element	Objective / Design Element

3.7.12.2 Design Criteria

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-39: Design Criteria for Recharge Well Facilities [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Design Element	Value

3.7.12.3 Additional Design Considerations

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.7.12.4 Equipment Summary Table

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-40: Equipment Summary for Backflush Pumps[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Equipment	Element	Value

3.7.13 Backwash Equalization Pump Station

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.7.13.1 Process Summary

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-41: Process Summary for Backwash Equalization Pump Station [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Element	Objective / Design Element

3.7.13.2 Design Criteria

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-42: Design Criteria for Backwash Equalization Pump Station [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Design Element	Value

3.7.13.3 Additional Design Considerations

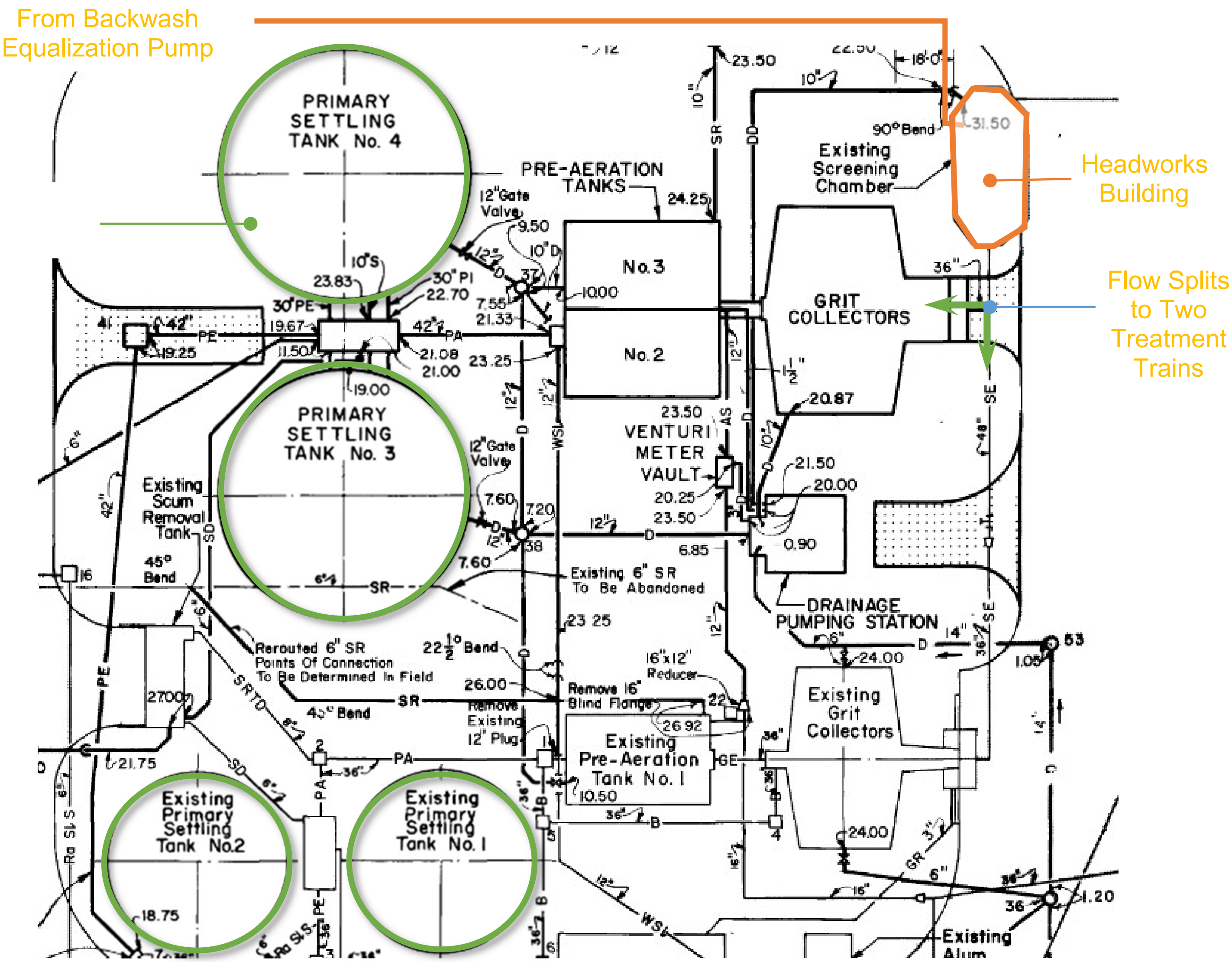


Figure 3-4: Backwash Equalization Pump Station return locations

The 12-inch backwash equalization piping will be installed below grade to the west side of the Headworks Building, where it will penetrate the building above grade. The building penetration will require that a wall be added where the pipe enters the building, and the existing translucent panel be replaced with a smaller panel.

Once inside the building, the backwash equalization piping will be routed overhead adjacent to existing odor piping, until it is adjacent to the screenings effluent chamber. The piping will then be routed into the screenings effluent chamber. See Error! Reference source not found. through Error! Reference source not found. for an illustration of the preliminary concept. The Design-Builder shall coordinate this work with the installation of MCC-5C / MCC-5D immediately outside the Headworks Building (see BODR drawing E1026, Note 5 **except where superseded by the Value Engineering Alternatives Concept Design drawings as applicable).**

There will be a 4-inch sanitary sewer pump station discharge line that runs in parallel with the 12-inch backwash equalization pipe. The Design-Builder may consider manifolding the 12-inch backwash equalization pipe and the 4-inch sanitary pump station discharge line together before the screenings building but shall confirm the hydraulic feasibility of this approach.

Figure 3-5: Entrance to Headworks Building, exterior

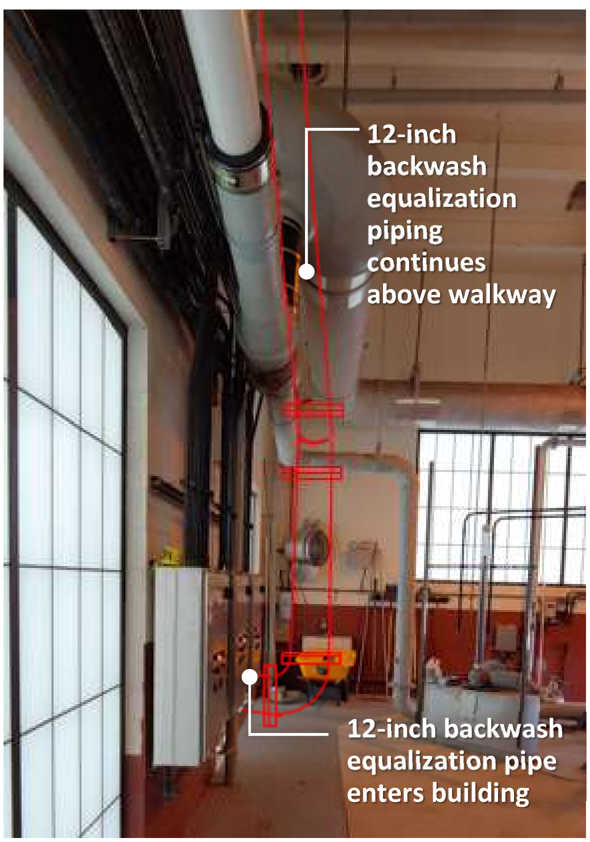


Figure 3-6: Entrance to Headworks Building, interior

Figure 3-7: Entrance to Headworks Building and pipe routing

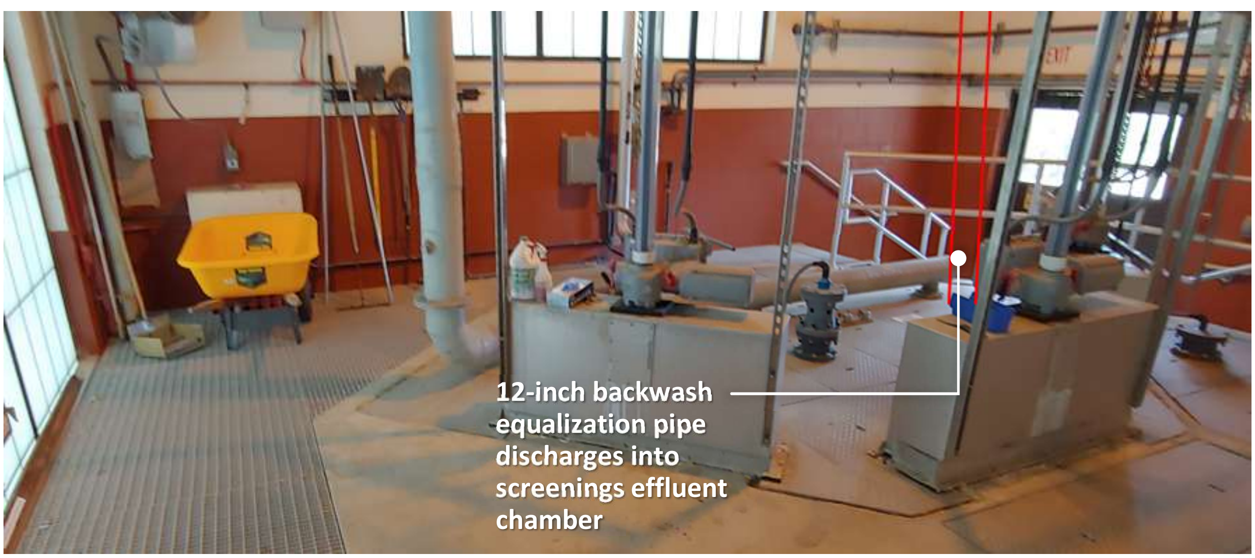


Figure 3-8: Pipe routing to the screenings effluent chamber

3.7.13.4 Equipment Summary Table

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-43: Equipment Summary for Backwash Equalization Pump Station [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Equipment	Element	Value

3.8 SWIFT Chemical Storage and Feed Systems

The SWIFT advanced water treatment process requires the storage and feed of a wide variety of chemicals. The storage and feed systems ~~for these chemicals will be in Chemical Building No. 1 and~~ shall include the following chemicals: aluminum chlorohydrate (ACH), sodium hypochlorite, flocculation aid polymer, ~~liquid ammonium sulfate (LAS), sodium bisulfite,~~ phosphoric acid, filter aid polymer, sodium hydroxide, and hydrogen peroxide. ~~Chemical Building No. 1 will also include a room housing the water softening and preformed monochloramine systems and a dedicated electrical room.~~ *{SWIFT VE Alt No. 10A}*

Chemicals will be delivered by bulk truckload (for storage in bulk tanks), totes, or drums, depending on the chemical and demands its use. For chemical systems with two bulk storage tanks, transfer pumps are provided for transfer of chemical between them. Metering pumps will be provided for chemical feed to each application point. Safety provisions shall be provided for each chemical system including temporary emergency shower/eyewash stations, a sprinkler system, gas detection (as needed), industrial chemical curtains (as needed), vented ball valves (as needed), and secondary containment for chemical spills, equipment failure, and sprinkler operation

Table 3-44 provides a summary of general process design elements associated with the SWIFT chemical feed systems. Subsequent sections detail specific design for each individual chemical system.

Table 3-44: General Process Summary for SWIFT Chemical Storage and Feed Systems

Element	Objective / Design Element
Purpose	• Each chemical system provides the necessary storage and means for application to all identified application points.

Element	Objective / Design Element
Redundancy	• Each bulk storage tank shall be equipped with an individual fill line and piping to the common pump suction header. • Each tote or drum shall be equipped with piping to the common pump suction header. • The common pump suction header shall have a sample line, drain, and a temporary tote connection (in the event of a storage failure). • Chemical transfer systems are equipped with an installed standby pump and accessories. • Metering pump systems shall have an installed standby pump and accessories. • Provide quick connects at various locations throughout the chemical feed system for SWIFT NPW flushing of feed lines. • A spare chemical feed line for each application point shall be provided in the containment piping within the yard.
Design Approach	• Total bulk storage volume is sized for the largest of the following: ○ 15 days (7 days for sodium hypochlorite), maximum flow, maximum dose ○ 30 days (15 days for sodium hypochlorite), average flow, average dose ○ Truckload volume plus 15%, 330-gallon tote volume, or 55-gallon drum volume ○ Current JRTP storage (for sodium hypochlorite) • For multiple bulk storage tanks, each tank shall be able to accept at least one bulk truckload. • Chemical transfer pumps are sized to provide efficient transfer of chemical while limiting the transfer pump capacity. • Metering pumps are sized to handle maximum flow, maximum dose and include adequate turndown capability for the minimum flow, minimum dose needed for each application point. • Secondary containment shall be sized to handle one bulk storage tank, tote, or drum volume plus 20 minutes of sprinkler water.
Operations and Control Philosophy	• Continuous level and volume monitoring for each bulk storage tank. • Continuous weight and volume monitoring for each tote and drum. • Chemical transfer between bulk storage tanks will be initiated manually with an automatic transfer pump shutoff included based on tank level and containment area spill detection. • Chemical metering pumps will be flow-paced with manual operation as an alternative, except where noted in chemical sections below. • Continuous flow rate for metering pump discharge will be monitored at the workstation for application points with feed rates high enough to be monitored by a flowmeter. • Applications points with lower feed rates will be monitored locally with a rotameter. • Emergency eyewash/shower flow and containment area sump high level conditions will be monitored.

Element	Objective / Design Element

Facility Layout Concepts	• Chemical feed systems with temperature control needs, ventilation limitations, and/or compatibility concerns will be located in individual rooms as shown in the BODR **except where superseded by the Value Engineering Alternatives Concept Design Drawings as applicable.** The remaining chemical feed systems will have shared ventilation space.
	• Bulk storage tanks:
	  ○ Chemical fill stations will be located outside the exterior wall of the chemical storage and feed room.
	  ○ Bulk storage tanks will be located on equipment pads and will each have a ladder for access to the manway and accessories on top of the tank.
	  ○ Skylights for future replacement of bulk storage tanks shall be provided.
	• Totes and drums:
	  ○ The exterior wall of tote or drum chemical systems will include a roll-up door for delivery by forklift.
	  ○ Totes and drums will be located on scales at grade with the floor sloped towards the chemical containment area.
	• Transfer pumps will be located on a small equipment pad near the bulk storage tanks with a flooded suction.
	• Metering pumps:
	  ○ Will be located on an FRP table with piping, valves, and accessories installed to allow for operator access.
	  ○ The FRP table will be at grade over grating or with the floor sloped towards the chemical containment area.
	• Secondary containment:
	  ○ Provide for each individual chemical system to eliminate mixing of chemicals in the event of a spill, except flocculation aid and filter aid polymer systems will share a containment area.
	  ○ Provide for bulk storage tanks, drums, totes, transfer pumps, metering pumps, and piping.
	  ○ Slope to a sump for:
	    ▪ Pumping out spills with a vacuum truck at a quick connect located outside.
	    ▪ Pumping out washdown water to drain with an installed sump pump.
	• Any piping outside of secondary containment will be routed through containment piping. Chemical feed piping **routed through the yard will leave the containment area through a** ~~will leave Chemical Building No. 1 through the~~ pipe pit. *{SWIFT VE Alt No. 10A}*
	• Containment piping shall be sloped towards secondary containment within Chemical ~~Building No. 1~~ **rooms** or to chemical junction boxes equipped with sumps and level switches within the yard.
	• All equipment will consider compatibility of materials with the specified chemical.
	• Emergency showers/eyewashes will be located at fill stations, containment areas, ~~and Chemical Building No. 1 corridor~~ **and as required by HRSD Design & Construction Standards.**

3.8.1 Water Softening System

Softening of the SWIFT NPW or potable water is required for the sodium hydroxide feed system ~~and the preformed monochloramine feed system~~. *{SWIFT VE Alt No. 10A}*

3.8.1.1 Process Summary

General process design elements associated with the SWIFT chemical storage and feed systems are provided in **Table 3-44**. **Table 3-45** provides a summary of general process design elements associated with the water softening system.

Table 3-45: Process Summary for Water Softening System

Element	Objective / Design Element
Purpose	• Remove hardness in the supply water that could cause crystallization and clogging when added to caustic ~~or hypochlorite~~. • Softened carrying water will dilute 50% caustic down to below 25% to minimize freezing issues. • ~~Softened carrying water will be used to dilute sodium hypochlorite and LAS for preformed monochloramines formation~~ *{SWIFT VE Alt No. 10A}*
Redundancy	• Two 100% capacity water softeners and brine tanks.
Design Approach	• Water softeners are sized to each handle total flow needs of ~~softened water pumps~~ **caustic feed pumps** for all application points. • ~~Softened water storage volume is sized to provide a balance between tank draining and filling from the pumps and water softener, respectively.~~ • ~~Softened water pumps for the preformed monochloramines application point are sized to provide a consistent pressure and flow rate that provides 50:1 dilution of the sodium hypochlorite feed rate; this minimizes the exothermic reaction and elevated pH concerns.~~ ~~Softened water pumps for the preformed monochloramines application point are sized to provide a consistent pressure and flow rate that provides 25:1 dilution of the sodium hypochlorite feed rate; this minimizes the exothermic reaction and elevated pH concerns.~~ *{Addendum No. 2}* • Softened water ~~pumps~~ **system** for the caustic system are sized to handle carrying water flow to dilute 50% caustic to 25% caustic at maximum flow, maximum dose needs. *{SWIFT VE Alt No. 10A}*
Operations and Control Philosophy	• An electronic controller on the water softening system will actuate the cycles of backwash, brine, slow rinse, fast rinse, and service. • Continuous hardness and flow rate for the softened water will be monitored. • ~~Continuous level and volume for the softened water storage tank will be monitored. A solenoid valve will open/close to allow softened water to flow into the tank based on the level.~~ • ~~Softened water pumps will provide a continuous flow rate when in use. Continuous flow rates for the duty pump discharge will be monitored at the workstation.~~ *{SWIFT VE Alt No. 10A}* • The caustic carrying water system will be controlled as described below in Section 3.8.10 (Sodium Hydroxide).
Facility Layout Concepts	• ~~The exterior wall of the water softening system room will include a translucent panel for future replacement of the storage tank.~~ *{SWIFT VE Alt No. 10A}*

3.8.1.2 Design Criteria

Table 3-46 provides the design criteria used for the water softening system.

Table 3-46: Design Criteria for Water Softening System

Design Element		Value
Softened water design flow	~~Preformed monochloramines – post-UV~~ {SWIFT VE Alt No. 10A}	**7.5** ~~27 gpm {Addendum No. 2}~~
	Sodium hydroxide system	1.0 gpm

3.8.1.3 Additional Design Considerations

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.8.1.4 Equipment Summary Table

Table 3-47 summarizes the equipment design for the water softening system.

Table 3-47: Equipment Summary for Water Softening System

Equipment	Element	Value	
Water Softening System	Type	Ion exchange	
	Number	2 (1 duty, 1 standby)	
	Design capacity	**20** ~~75gpm {Addendum No. 2}~~ **1 gpm** ~~-~~{SWIFT VE Alt No. 10A}	
	Source water	Hardness, mg/L as $CaCO_3$	Total chlorine, mg/L as Cl
	Newport News[(1)]	62 – 114	0.020 – 3.5
	SWIFT NPW[(2)] **[(3)]** {Addendum No. 3}	66 – 108	0.50 – 3.0
Brine Tank	Number	2 (1 duty, 1 standby)	
	Salt capacity per tank	~~620 lb~~ **TBD** {SWIFT VE Alt No. 10A}	
~~Softened Water Storage Tank~~ {SWIFT VE Alt No. 10A}	~~Type~~	~~Vertical, cylindrical tank, flat bottom, dome top~~	
	~~Material~~	~~High density polyethylene (HDPE)~~	
	~~Number of tanks~~	~~1~~	
	~~Nominal capacity~~	**~~600~~** ~~1,200 gallons~~ **~~Tank dimensions shall be as required.~~** ~~{Addendum No. 2}~~	
	~~Storage provided~~	~~~40 minutes~~	
	~~Maximum diameter~~	~~5 feet~~	
	~~Maximum straight shell height~~	~~10 feet~~	
	~~Connection openings~~	~~Fill, pump suction, overflow, vent to exterior, handhole, level instrument~~	
~~Softened Water Pumps – Sodium Hydroxide System~~	~~Type~~	~~Centrifugal~~	
	~~Number~~	~~2 (1 duty, 1 standby)~~	

Equipment	Element	Value
{SWIFT VE Alt No. 10A}	~~Design capacity~~	~~1 gpm~~
	~~Motor horsepower~~	~~<1 hp~~
~~Softened Water Pumps – Preformed Monochloramines System at Post-UV~~ *{SWIFT VE Alt No. 10A}*	~~Type~~	~~Centrifugal~~
	~~Number~~	~~2 (1 duty, 1 standby)~~
	~~Design capacity~~	~~13 gpm~~
	~~Motor horsepower~~	~~3 hp~~

(1) 2018 Newport News Water Quality Report (City of Newport News WaterWorks)

(2) 2015 James River TP Characterization Study and anticipated SWIFT doses (HRSD)

(3) SWIFT NPW is the primary makeup supply for softened water with Newport News as the secondary source. Location of the dual supply connection is noted on Drawing I2500 Instrumentation SWIFT Water Pump Station. *{Addendum No. 3}*

3.8.2 Preformed Monochloramines System *{SWIFT VE Alt No. 10A}*

~~The monochloramines will be formed by feeding sodium hypochlorite (hypochlorite) and LAS into the softened water pump discharge.~~

3.8.2.1 ~~Process Summary~~

~~General process design elements associated with the SWIFT chemical feed systems are provided in **Table 3-44**. **Table 3-48** provides a summary of general process design elements associated with preformed monochloramines system.~~

~~Table 3-48: Process Summary for Preformed Monochloramines System~~

~~Element~~	~~Objective / Design Element~~
~~Purpose~~	• ~~Preformed monochloramines will provide disinfection of SWIFT Water.~~
~~Redundancy~~	• ~~See **Table 3-44**.~~
~~Design Approach~~	• ~~A static mixer will be located after each hypochlorite and LAS application point into the softened waterline to promote sufficient mixing before the process application points.~~
~~Operations and Control Philosophy~~	• ~~High temperature switches will monitor the preformed monochloramines feed line downstream of the hypochlorite and LAS addition.~~
~~Facility Layout Concepts~~	• ~~The system will be in an individual room due to corrosivity and safety concerns.~~ • ~~An industrial chemical curtain will be positioned around the preformed monochloramines containment area.~~

3.8.2.2 ~~Design Criteria~~

~~**Table 3-49** provides the design criteria used for the preformed monochloramines system.~~

~~Table 3-49: Design Criteria for Preformed Monochloramines System~~

~~Design Element~~	~~Value~~
~~Softened water design flow for preformed monochloramines – post-UV~~	~~**7.5** 13 gpm *{Addendum No. 2}*~~

~~Design Element~~	~~Value~~
~~Sodium hypochlorite design flow for preformed monochloramines – post-UV~~ ~~Maximum~~ ~~Minimum~~	 ~~16 gph~~ ~~1.3 gph~~
~~LAS design flow for preformed monochloramines – post-UV~~ ~~Maximum~~ ~~Minimum~~	 ~~4.8 gph~~ ~~0.40 gph~~

~~3.8.2.3 Equipment Summary Table~~

~~**Table 3-50** summarizes the equipment design for the preformed monochloramines system.~~

~~**Table 3-50: Equipment Summary for Preformed Monochloramines System**~~

~~Equipment~~	~~Element~~	~~Value~~
~~Sodium Hypochlorite Static Mixers~~	~~Number~~	~~1~~
	~~Chemical Added~~	~~12.5% sodium hypochlorite~~
	~~Material~~	~~Chlorinated polyvinyl chloride (CPVC)~~
~~Liquid Ammonium Sulfate Static Mixers~~	~~Number~~	~~1~~
	~~Chemical Added~~	~~40% LAS~~
	~~Material~~	~~Polyvinylidene difluoride (PVDF)~~

3.8.3 Aluminum Chlorohydrate Storage and Feed System

ACH will be delivered to the plant by bulk truckload at the ACH fill station ~~in the west chemical unloading area of the Chemical Building No. 1.~~ **north of SWIFT Process Building No. 1**. *{SWIFT VE Alt No. 10A}* It will be stored in bulk storage tanks located within the ACH containment area. Transfer pumps will be provided for transfer of ACH between the bulk storage tanks. Metering pumps will feed ACH to Rapid Mixer 1 or 2.

3.8.3.1 Process Summary

General process design elements associated with the SWIFT chemical feed systems are provided in **Table 3-44**. **Table 3-51** provides a summary of general process design elements associated with the ACH system.

Table 3-51: Process Summary for ACH System

Element	Objective / Design Element
Purpose	• ACH is a coagulant that will promote the development of floc for settling.
Redundancy	• See **Table 3-44.**
Design Approach	• See **Table 3-44.**
Operations and Control Philosophy	• Continuous flow rate for the duty metering pump discharge will be monitored at the workstation.

Element	Objective / Design Element
Facility Layout Concepts	• The ACH **bulk storage tanks and transfer pumps will be located in an outdoor containment area north of SWIFT Process Building No. 1. The containment area will be under a metal canopy roof. The metering pumps will be located inside the adjacent SWIFT Process Building No. 1 and** will be open to the hallway, **rapid mix room,** ~~pipe pit, LAS storage and feed system,~~ polymer storage and feed systems, and phosphoric acid storage and feed system. Each system will be in separate secondary containment areas to eliminate mixing of chemicals in the event of a spill, but they will be in the same ventilated space. *{SWIFT VE Alt No. 10A}*

3.8.3.2 Design Criteria

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-52: Design Criteria for ACH System [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Design Element	Value

3.8.3.3 Additional Design Considerations

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.8.3.4 Equipment Summary Table

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-53: Equipment Summary for ACH System [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Equipment	Element	Value

3.8.4 Sodium Hypochlorite

Sodium hypochlorite (hypochlorite) will be delivered by bulk truckload at the hypochlorite fill station in the ~~east~~ chemical unloading area of Chemical Building No. 1. It will be stored in bulk storage tanks located within the hypochlorite containment area. Transfer pumps will be provided for transfer of hypochlorite between the bulk storage tanks ~~and to Chemical Building No. 2~~ *{ANRI VE Alt No. 4A}*. Metering pumps will be provided for feed of hypochlorite to Rapid Mixer 1 or 2, biofilter influent, filter backwash, and ~~Preformed Monochloramines – Post-UV~~ **post-UV chemical mixer**. *{SWIFT VE Alt No. 10A}*

3.8.4.1 Process Summary

General process design elements associated with the SWIFT chemical storage and feed systems are provided in **Table 3-44**. **Table 3-54** provides a summary of general process design elements associated with the hypochlorite system.

Table 3-54: Process Summary for Hypochlorite System

Element	Objective / Design Element
Purpose	• Hypochlorite will be fed for oxidation, limiting biological activity in biofilters, and ~~monochloramines formation for disinfection~~ **provision of a residual disinfectant**. *{SWIFT VE Alt No. 10A}* • ~~Hypochlorite can also be transferred to Chemical Building No. 2 for JRTP disinfection needs.~~ • Hypochlorite may also be fed at start-up at the Post-UV application point for nitrite oxidation during biofilter onset of nitrification.
Redundancy	• See **Table 3-44.**
Design Approach	• See **Table 3-44.**
Operations and Control Philosophy	• ~~Hypochlorite transfer to the JRTP day tanks in Chemical Building No. 2 will be carried out from the SWIFT hypochlorite room. A selector switch for the JRTP day tanks will open the dedicated valve on the fill line for the selected day tank. Hypochlorite transfer will be started manually. Automatic transfer pump shutoff will be provided based on tank level and containment area spill detection.~~ • Continuous flow rate for each duty metering pump discharge will be monitored at the workstation for Rapid Mixer and ~~Preformed Monochloramines~~ **post-UV** application points. Biofilter influent and filter backwash application points will be monitored locally with a rotameter. *{SWIFT VE Alt No. 10A}*
Facility Layout Concepts	• The hypochlorite system will be in an individual room with secondary containment due to temperature control needs and corrosivity concerns. A window from the hallway will provide visibility into the room.

3.8.4.2 Design Criteria

Table 3-55 provides the design criteria used for the hypochlorite system.

Table 3-55: Design Criteria for Hypochlorite System

Design Element	Value		
Design flow	Maximum	Average	Minimum
Plant flow	16 mgd	16 mgd	8.0 mgd
Filter backwash (instantaneous)	21 mgd	3.7 mgd	
James River Treatment Plant (maximum week)	26 mgd		
Hypochlorite application points	Maximum	Average	Minimum
Rapid mix dose(1)	7.3 mg/L	3.0 mg/L	3.0 mg/L
Biofilter Influent dose(1)	1.0 mg/L	0.5 mg/L	0.5 mg/L
Filter backwash dose(1)	1.0 mg/L	0.5 mg/L	0.5 mg/L

Design Element	Value		
Post-UV ~~preformed monochloramines~~ **disinfectant residual** dose(1) *{SWIFT VE Alt No. 10A}*	3.0 mg/L	~~0.5~~ **1.5** mg/L	~~0.5~~ **1.0** mg/L
Post-UV start-up oxidation dose(1)	8.0 mg/L	0.5 mg/L	0.5 mg/L
JRTP dose(1)(2)	9.3 mg/L	3.6 mg/L	1.6 mg/L
Hypochlorite properties			
Concentration delivered	12.5% trade		
Specific gravity	1.20		
Effective density	1.04 lb Cl/gallon		
Bulk storage(3)			
7-day, maximum flow, maximum dose	14,258 gallons		
15-day, average flow, average dose	10,875 gallons		
Truckload volume plus 15%	4,496 gallons		
Existing JRTP storage	25,660 gallons		
Largest bulk storage volume required	25,660 gallons		

(1) As chlorine

(2) 2017-2019 JRTP data

(3) Bulk storage calculations assume maximum/average flows for SWIFT and maximum week flow at JRTP with SWIFT flow removed. Biofilter influent hypochlorite feed will be intermittent and is not included in the storage calculations. For filter backwash, assumes total of 15 minutes at low backwash rate and 10 minutes at high backwash rate. Each filter backwashed every 36 hours.

3.8.4.3 Equipment Summary Table

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-56: Equipment Summary for Hypochlorite System [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Equipment	Element	Value

3.8.5 Flocculation Aid Polymer

Flocculation aid polymer (floc aid polymer) will be delivered to the plant in 330-gallon totes at the polymer roll-up door on the ~~west side of the Chemical Building No. 1~~ **east side of SWIFT Process Building No. 1**. *{SWIFT VE Alt No. 10A}* The totes will be stored at grade next to the polymer containment area. Polymer preparation systems and a tank will be provided for activation and aging of the polymer. Metering pumps will be provided for feed of floc aid polymer to the flocculation tank trains. Feed points shall be provided for each flocculation tank train at both Stages 1 and 2.

3.8.5.1 Process Summary

General process design elements associated with the SWIFT chemical storage and feed systems are provided in **Table 3-44**. **Table 3-57** provides a summary of general process design elements associated with the floc aid polymer system.

Table 3-57: Process Summary for Floc Aid Polymer System

Element	Objective / Design Element
Purpose	• Floc aid polymer will be fed for enhancement of flocculation.
Redundancy	• Two 100% capacity polymer preparation systems (1 duty, 1 standby).
Design Approach	• Polymer preparation systems and aging tank will be sized for typical polymer supplier recommendations. • Carrying water (SWIFT NPW, not softened water) will be fed at the preparation system and metering pump discharge for each application point.
Operations and Control Philosophy	• Desired percent polymer solution will be input at the local control panel for the duty polymer preparation system. • Level controls for the aging tank will be integrated with the polymer preparation systems. • Continuous flow rate for each duty metering pump discharge will be monitored.
Facility Layout Concepts	• The exterior wall of the floc aid polymer system will include a roll-up door for delivery of totes by forklift (shared with the filter aid polymer system). • The floc aid polymer system will share a secondary containment area with the filter aid polymer system. • The polymer storage and feed systems will be open to the hallway, **rapid mix area,** ~~pipe pit,~~ ACH ~~storage and~~ feed system, ~~LAS storage and feed system,~~ and phosphoric acid storage and feed system. The other systems will be in separate secondary containment areas to eliminate mixing of chemicals in the event of a spill, but they will be in the same ventilated space. *{SWIFT VE Alt No. 10A}* • Polymer activation units will be located near the totes to minimize suction concerns. • The polymer aging tank will be located on an equipment pad. • The exterior wall of the polymer storage and feed systems will include a translucent panel for future replacement of tanks. Tanks can also be removed through the roll-up door or the building corridor.

3.8.5.2 Design Criteria

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-58: Design Criteria for Floc Aid Polymer System [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Design Element	Value

3.8.5.3 Additional Design Considerations

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.8.5.4 Equipment Summary Table

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-59: Equipment Summary for Floc Aid Polymer System [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Equipment	Element	Value

3.8.6 Liquid Ammonium Sulfate *{SWIFT VE Alt No. 10A}*

~~LAS will be delivered to the plant by bulk truckload at the LAS fill station in the west chemical unloading area of Chemical Building No. 1. It will be stored in a bulk storage tank located within the LAS containment area. Metering pumps will be provided for feed of LAS to Preformed Monochloramines – Post-UV.~~

3.8.6.1 ~~Process Summary~~

~~General process design elements associated with the SWIFT chemical storage and feed systems are provided in **Table 3-44**. **Table 3-60** provides a summary of general process design elements associated with the LAS system.~~

~~Table 3-60: Process Summary for LAS System~~

~~Element~~	~~Objective / Design Element~~
~~Purpose~~	• ~~LAS will be fed for monochloramines formation for disinfection.~~
~~Redundancy~~	• ~~See **Table 3-44**.~~
~~Design Approach~~	• ~~For preformed monochloramines formation, LAS dose will be 4:1 chlorine to nitrogen.~~
~~Operations and Control Philosophy~~	• ~~Each duty metering pump discharge flow rate will be monitored locally with a rotameter.~~
~~Facility Layout Concepts~~	• ~~The LAS system will be open to the hallway, pipe pit, ACH storage and feed system, polymer storage and feed systems, and phosphoric acid storage and feed system. Each system will be in separate secondary containment areas to eliminate mixing of chemicals in the event of a spill, but they will be in the same ventilated space.~~

3.8.6.2 ~~Design Criteria~~

~~**Table 3-61** provides the design criteria used for the LAS system.~~

~~Table 3-61: Design Criteria for LAS System~~

~~Design Element~~	~~Value~~
~~Design flow~~	
~~Maximum~~	~~16 mgd~~
~~Average~~	~~16 mgd~~
~~Minimum~~	~~8.0 mgd~~
~~LAS application point – Post-UV dose~~[(1)(2)]	
~~Maximum~~	~~0.75 mg/L~~
~~Average~~	~~0.13 mg/L~~
~~Minimum~~	~~0.13 mg/L~~
~~LAS properties~~	
~~Concentration delivered~~	~~40%~~
~~Specific gravity~~	~~1.22~~
~~Effective density~~	~~0.86 lb N/gallon~~
~~Bulk storage~~	
~~15-day, maximum flow, maximum dose~~	~~1,739 gallons~~
~~30-day, average flow, average dose~~	~~580 gallons~~
~~Truckload volume plus 15%~~	~~5,086 gallons~~
~~Largest bulk storage volume required~~	~~5,086 gallons~~

~~(1) As nitrogen~~

~~(2) 4:1 chlorine to nitrogen based on chlorine doses~~

3.8.6.3 ~~Equipment Summary Table~~

~~**Table 3-62** summarizes the equipment design for the LAS system.~~

~~Table 3-62: Equipment Summary for LAS System~~

~~Equipment~~	~~Element~~	~~Value~~
~~Bulk Storage~~	~~Type~~	~~Vertical, cylindrical tank, flat bottom, dome top~~
	~~Material~~	~~FRP~~
	~~Number of tanks~~	~~1~~
	~~Nominal capacity~~	~~7,000 gallons~~
	~~Maximum diameter~~	~~10 feet~~
	~~Maximum straight shell height~~	~~11 feet~~
	~~Connection openings~~	~~Fill, metering pump suction, overflow, vent to exterior, top manway, side manway, level instrument~~
~~Feed Pumps~~	~~Type~~	~~Peristaltic~~
	~~Number~~	~~2 (1 duty, 1 standby)~~
	~~Maximum capacity~~	~~4.8 gph~~
	~~Minimum capacity~~	~~0.40 gph~~
	~~Power~~	~~120 volts, 1 phase, 60 Hz~~

3.8.7 Sodium Bisulfite *{SWIFT VE Alt No. 10A}*

~~Sodium bisulfite (bisulfite) will be delivered to the plant by bulk truckload at the bisulfite fill station in the east chemical unloading area of Chemical Building No. 1. It will be stored in bulk storage tanks located within the bisulfite containment area. Transfer pumps will be provided for transfer of bisulfite between the bulk storage tanks. Metering pumps will be provided for feed of bisulfite to Post-Ozone and Post-UV.~~

3.8.7.1 ~~Process Summary~~

~~General process design elements associated with the SWIFT chemical storage and feed systems are provided in **Table 3-44**. **Table 3-63** provides a summary of general process design elements associated with the bisulfite system.~~

~~Table 3-63: Process Summary for Bisulfite System~~

~~Element~~	~~Objective / Design Element~~
~~Purpose~~	• ~~Bisulfite will be fed for quenching hydrogen peroxide and ozone residual after ozonation and hydrogen peroxide residual after UV.~~
~~Redundancy~~	• ~~See **Table 3-44**.~~
~~Design Approach~~	• ~~Carrying water (SWIFT NPW, not softened water) will be fed at the metering pump discharge for each application point to reduce the bisulfite concentration to less than 25% to eliminate freezing concerns.~~
~~Operations and Control Philosophy~~	• ~~Bisulfite metering pumps will be flow paced based on hydrogen peroxide feed, with manual operation as an alternative.~~ • ~~Continuous flow rate for each duty metering pump will be monitored.~~
~~Facility Layout Concepts~~	• ~~The bisulfite system will be in an individual room with secondary containment due to temperature control conditioning needs. A window from the hallway will provide visibility into the room.~~

3.8.7.2 ~~Design Criteria~~

~~**Table 3-64** provides the design criteria used for the bisulfite system.~~

~~Table 3-64: Design Criteria for Bisulfite System~~

~~Design Element~~	~~Value~~		
~~Design flow~~			
~~Maximum~~	~~16 mgd~~		
~~Average~~	~~16 mgd~~		
~~Minimum~~	~~8.0 mgd~~		
~~Bisulfite application points~~	~~Maximum~~	~~Average~~	~~Minimum~~
~~Post-ozone dose~~ (1)(2)	~~22 mg/L~~	~~9.0 mg/L~~	~~2.2 mg/L~~
~~Post-UV dose~~ (1)(2)	~~36 mg/L~~	~~21 mg/L~~	~~3.6 mg/L~~
~~Bisulfite properties~~			
~~Concentration delivered~~	~~38%~~		
~~Specific gravity~~	~~1.30~~		
~~Effective density~~	~~4.12 lb/gallon~~		

~~Design Element~~	~~Value~~
~~Bulk storage~~	
~~15-day, maximum flow, maximum dose~~	~~28,178 gallons~~
~~30-day, average flow, average dose~~	~~29,150 gallons~~
~~Truckload volume plus 15%~~	~~4,773 gallons~~
~~Largest bulk storage volume required~~	~~29,150 gallons~~
~~Carrying water feed rate~~[(4)]	
~~Post-ozone~~	~~0.30 gpm~~
~~Post-UV~~	~~0.50 gpm~~

~~(1) As bisulfite~~

~~(2) Based on 2.2 mg/L bisulfite required per part of ozone and 3.0 mg/L bisulfite required per part of hydrogen peroxide. Assume maximum ozone residual of 10 mg/L and average peroxide residual of 3 mg/L at post-ozone.~~

~~(3) Based on 3.0 mg/L bisulfite required per part of hydrogen peroxide. Assume maximum peroxide residual of 12 mg/L and average peroxide residual of 7 mg/L at post-UV.~~

~~(4) Provides dilution to less than 25% concentration at maximum feed rate.~~

3.8.7.3 ~~Equipment Summary Table~~

~~**Table 3-65** summarizes the equipment design for the bisulfite system.~~

~~Table 3-65: Equipment Summary for Bisulfite System~~

~~Equipment~~	~~Element~~	~~Value~~
~~Bulk Storage~~	~~Type~~	~~Vertical, cylindrical tank, flat bottom, dome top~~
	~~Material~~	~~FRP~~
	~~Number of tanks~~	~~2~~
	~~Nominal capacity per tank~~	~~15,000 gallons~~
	~~Maximum diameter~~	~~12 feet~~
	~~Maximum straight shell height~~	~~18 feet, 2 inches~~
	~~Connection openings~~	~~Fill, metering pump suction, transfer pump suction, transfer pump discharge, overflow, vent to exterior, top manway, side manway, level instrument~~
~~Transfer Pumps~~	~~Type~~	~~Magnetic drive centrifugal~~
	~~Number~~	~~2 (1 duty, 1 standby)~~
	~~Design capacity~~	~~100 gpm~~
	~~Motor horsepower~~	~~3 hp~~
~~Feed Pumps~~	~~Type~~	~~Peristaltic~~
	~~Number~~	~~3 (2 duty, 1 standby)~~
	~~Maximum capacity~~	~~49 gph~~
	~~Minimum capacity~~	~~1.5 gph~~
	~~Power~~	~~120 volts, 1 phase, 60 Hz~~

3.8.8 Phosphoric Acid

Phosphoric acid will be delivered to the plant in 330-gallon totes at the phosphoric acid roll-up door on the ~~west~~ **east** side of the ~~Chemical~~ **SWIFT Process** Building No. 1. *{SWIFT VE Alt No. 10A}* The totes will be stored at grade next to the phosphoric acid containment area. Metering pumps will be provided for feed of phosphoric acid to biofilter influent. **The system will be located in SWIFT Process Building No. 1 and will feed SWIFT facilities as described in the section as well as two metering pumps serving the ANRI facilities as described in Section 2.5.4.** *{ANRI VE Alt No. 4A}*

3.8.8.1 Process Summary

General process design elements associated with the SWIFT chemical storage and feed systems are provided in **Table 3-44**. **Table 3-66** provides a summary of general process design elements associated with the phosphoric acid system.

Table 3-66: Process Summary for Phosphoric Acid System

Element	Objective / Design Element
Purpose	• Phosphoric acid will be fed for nutrient addition upstream of biofiltration.
Redundancy	• See **Table 3-44.**
Design Approach	• See **Table 3-44.**
Operations and Control Philosophy	• The duty metering pump discharge flow rate will be monitored locally with a rotameter.
Facility Layout Concepts	• The phosphoric acid system will be open to the hallway, **rapid mix area,** ~~pipe pit,~~ ACH ~~storage and~~ feed system, ~~LAS storage and feed system,~~ and polymer storage and feed systems. Each system will be in separate secondary containment areas to eliminate mixing of chemicals in the event of a spill, but they will be in the same ventilated space. *{SWIFT VE Alt No. 10A}* • **Provisions for flushing feed lines shall be provided.** *{SWIFT VE Alt No. 10A}*

3.8.8.2 Design Criteria

Table 3-67 provides the design criteria used for the phosphoric acid system.

Table 3-67: Design Criteria for Phosphoric Acid System

Design Element	Value		
Design Flow			
Maximum	16.0 mgd		
Average	16.0 mgd		
Minimum	8.0 mgd		
Phosphoric Acid Application Point -	Maximum	Average	Minimum
Biofilter influent dose(1)	0.20 mg/L	0.20 mg/L	0.20 mg/L
Phosphoric Acid Properties			
Concentration delivered	75%		
Specific gravity	1.58		

Design Element	Value
Effective density	3.12 lb P/gallon
Bulk Storage	
15-day, maximum flow, maximum dose	128 gallons **SWIFT + 44.1 gallons ANRI** *{ANRI VE Alt No. 4A}*
30-day, average flow, average dose	257 gallons **SWIFT + 33.6 gallons ANRI** *{ANRI VE Alt No. 4A}*
Two, 330-gallon totes	660 gallons
Largest bulk storage volume required	660 gallons

(1) As phosphorus

3.8.8.3 Equipment Summary Table

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-68: Equipment Summary for Phosphoric Acid System [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Equipment	Element	Value

3.8.9 Filter Aid Polymer

Filter aid polymer will be delivered to the plant in 55-gallon drums at the polymer roll-up door on the ~~west~~ **east** side of the ~~Chemical~~ **SWIFT Process** Building No. 1. The drums will be stored at grade next to the polymer containment area. Polymer preparation systems and a tank will be provided for activation and aging of the polymer. Metering pumps will be provided for feed of filter aid polymer to the biofilter influent. *{SWIFT VE Alt No. 10A}*

3.8.9.1 Process Summary

General process design elements associated with the SWIFT chemical storage and feed systems are provided in **Table 3-44**. **Table 3-69** provides a summary of general process design elements associated with the filter aid polymer system.

Table 3-69: Process Summary for Filter Aid Polymer System

Element	Objective / Design Element
Purpose	• Filter aid polymer will be fed for enhancement of filtration.
Redundancy	• Two 100% capacity polymer preparation systems (1 duty, 1 standby).
Design Approach	• Polymer preparation systems and aging tank will be sized for typical liquid polymer supplier recommendations. • Carrying water (SWIFT NPW, not softened water) will be fed at the metering pump discharge for each application point.

Element	Objective / Design Element
Operations and Control Philosophy	• Desired percent polymer solution will be input at the local control panel for the duty polymer preparation system. • Level controls for the aging tank will be integrated with the polymer preparation systems. • Continuous flow rate for each duty metering pump discharge will be monitored.
Facility Layout Concepts	• The exterior wall of the filter aid polymer system will include a roll-up door for delivery of drums (shared with the floc aid polymer system). • The filter aid polymer system will share a secondary containment area with the floc aid polymer system. • The polymer storage and feed systems will be open to the hallway, **rapid mix area**, ~~pipe pit,~~ ACH ~~storage and~~ feed system, ~~LAS storage and feed system,~~ and phosphoric acid storage and feed system. The other systems will be in separate secondary containment areas to eliminate mixing of chemicals in the event of a spill, but they will be in the same ventilated space. *{SWIFT VE Alt No. 10A}* • Polymer activation units will be located near the drums to minimize suction concerns. • The polymer aging tank will be located on an equipment pad. • The exterior wall of the polymer storage and feed systems will include a translucent panel for future replacement of tanks. Tanks could also be removed though the roll-up door or the building corridor.

3.8.9.2 Design Criteria

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-70: Design Criteria for Filter Aid Polymer System
[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Design Element	Value
Design flow	

3.8.9.3 Additional Design Considerations

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report].

3.8.9.4 Equipment Summary Table

Table 3-71 summarizes the equipment design for the filter aid polymer system.

Table 3-71: Equipment Summary for Filter Aid Polymer System [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Equipment	Element	Value

3.8.10 Sodium Hydroxide

Sodium hydroxide (caustic) will be delivered to the plant by bulk truckload at the caustic fill station in the ~~east~~ chemical unloading area ~~of Chemical Building No. 1~~. *{SWIFT VE Alt No. 10A}* It will be stored in a bulk storage tank located within the caustic containment area. Metering pumps will be provided for feed of caustic to downstream of the UV reactors Post-UV.

3.8.10.1 Process Summary

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report].

Table 3-72: Process Summary for Caustic System [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Element	Objective / Design Element

3.8.10.2 Design Criteria

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-73: Design Criteria for Caustic System [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Design Element	Value

3.8.10.3 Additional Design Considerations

Caustic is delivered as a 50% solution and must be diluted to 25% caustic or lower with softened carrying water prior to leaving the caustic storage and feed system room due to freezing concerns. The 50% caustic will be diluted with carrying water downstream of the caustic metering pumps.

Due to the exothermic reaction associated with diluting 50% caustic, carbon steel piping is used for the caustic system throughout ~~the Chemical Building No. 1~~ **the SWIFT Process Building** until transitioning to HDPE for yard piping. *{SWIFT VE Alt No. 10A}* The travel time from the caustic dilution to the pipe pit will be sufficient for the heat to dissipate.

3.8.10.4 Equipment Summary Table

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Table 3-74: Equipment Summary for Caustic System [Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Equipment	Element	Value

3.8.11 Hydrogen Peroxide

Hydrogen peroxide (peroxide) will be delivered to the plant by bulk truckload at the peroxide fill station in the ~~east~~ **north** chemical unloading area of ~~Chemical~~ **SWIFT Process** Building No. 1. *{SWIFT VE Alt No. 10A}* It will be stored in bulk storage tanks located within the peroxide containment area. Transfer pumps will be provided for transfer of peroxide between the bulk storage tanks. Metering pumps will be provided for feed of peroxide to Ozone ~~and UV~~. *{SWIFT VE Alt No. 10A}*

3.8.11.1 Process Summary

General process design elements associated with the SWIFT chemical storage and feed systems are provided in **Table 3-44**. **Table 3-75** provides a summary of general process design elements associated with the peroxide system.

Table 3-75: Process Summary for Peroxide System

Element	Objective / Design Element
Purpose	• Peroxide will be fed for ozone ~~and UV~~ advanced oxidation process. *{SWIFT VE Alt No. 10A}*
Redundancy	• See **Table 3-44.**
Design Approach	• See **Table 3-44.**
Operations and Control Philosophy	• Peroxide metering pumps will be flow paced, with manual operation as an alternative. • Continuous flow rate for each duty metering pump will be monitored.
Facility Layout Concepts	• Due to off-gas potential, all ball valves for the system shall be vented. • The peroxide **storage** system will be in an ~~individual room with~~ **outdoor** secondary containment **area covered by a metal canopy roof** ~~due to corrosivity and hazard classification concerns. A window from the hallway will provide visibility into the room.~~ **The metering pumps will be located in the adjacent SWIFT Process Building No. 1.** *{SWIFT VE Alt No. 10A}* ~~• Building code requires a maximum 25-foot common path of travel for peroxide. The room has three doors as installed equipment will restrict the path of travel.~~ *{SWIFT VE Alt No. 10A}*

3.8.11.2 Design Criteria

Table 3-76 provides the design criteria used for the peroxide system.

Table 3-76: Design Criteria for Peroxide System

Design Element	Value		
Design flow			
Maximum	16 mgd		
Average	16 mgd		
Minimum	8.0 mgd		
Peroxide application point	Maximum	Average	Minimum
Ozone dose(1)(2)	11 mg/L	6.3 mg/L	6.3 mg/L

Design Element	Value		
~~UV dose[(1)(3)]~~ *{SWIFT VE Alt No. 12A}*	~~12 mg/L~~	~~7.0 mg/L~~	~~7.0 mg/L~~
Peroxide properties			
Concentration delivered	50%		
Specific gravity	1.20		
Effective density	5.01 lb/gallon		
Bulk storage			
15-day, maximum flow, maximum dose	~~9,000~~ **4,300** gallons *{SWIFT VE Alt No. 12A}*		
30-day, average flow, average dose	~~10,640~~ **5,000** gallons *{SWIFT VE Alt No. 12A}*		
Truckload volume plus 15%	5,171 gallons		
Largest bulk storage volume required	~~10,640~~ **5,171** gallons *{SWIFT VE Alt No. 12A}*		

(1) As peroxide

(2) Based on 1.5:1 ratio of peroxide to ozone; assume maximum and average dose of ozone 10 mg/L and 6 mg/L, respectively.

(3) Based on recommendation from UV equipment manufacturer

3.8.11.3 Additional Design Considerations

Peroxide at a concentration of 35% or greater is considered a Chemical of Interest by the Department of Homeland Security (DHS). Due to the volume of peroxide that will be stored, while not a requirement for the Design-Builder, HRSD will have to file with the DHS. However, a Security Plan will not be required as the JR SWIFT is expected to be exempt from this requirement as a "Treatment Works."

~~Each bulk tank can hold approximately two bulk truckloads, allowing multiple bulk truckloads per day.~~ *{SWIFT VE Alt No. 12A}*

3.8.11.4 Equipment Summary Table

Table 3-77 summarizes the equipment design for the peroxide system.

Table 3-77: Equipment Summary for Peroxide System

Equipment	Element	Value
Bulk Storage	Type	Vertical, cylindrical tank, flat bottom, dome top
	Material	316L stainless steel, HDPE
	Number of tanks	2
	Nominal capacity per tank	~~9,000~~ **6,000** gallons
	Maximum diameter	10 feet
	Maximum straight shell height	16 feet
	Connection openings	Fill, metering pump suction, transfer pump suction, transfer pump discharge, overflow, vent to exterior, top manway, side manway, level instrument

Equipment	Element	Value
Transfer Pumps	Type	Magnetic drive centrifugal
	Number	2 (1 duty, 1 standby)
	Design capacity	100 gpm
	Motor horsepower	3 hp
Feed Pumps	Type	Peristaltic
	Number	3 (2 duty, 1 standby)
	Maximum capacity	13 gph
	Minimum capacity	1.9 gph
	Power	120 volts, 1 phase, 60 Hz

3.9 SWIFT Structural and Geotechnical

The following section details general structural and geotechnical design information as it relates to SWIFT buildings and facilities. Subsequent sections detail specific information related to portions of each building, as needed. See Section 1.3 (Structural and Geotechnical) for additional information.

3.9.1 SWIFT Process Building No. 1

The SWIFT Process Building No. 1 contains the rapid mix units, the flocculation tanks, sedimentation basins, ozone contactor, ozone generation area, areas for associated piping and pumping, and electrical rooms, **chemical storage** and storage areas.

The Design-Builder is responsible for the foundation system. ~~The entire structure will be supported on a reinforced concrete mat foundation, supported by a deep foundation system. Based on the preliminary geotechnical investigation, the deep foundation system will likely consist of driven precast prestressed concrete piles (PPCP). The piles will have dimensions of either 12 inches or 14 inches square. The piles will be driven to a tip elevation of approximately 65 fbg to develop an allowable compressive load of 60 tons for 12-inch-square piles, or 75 tons for 14-inch-square piles. These capacities and the embedment depths must be verified via a comprehensive geotechnical investigation by the Design-Builder. The approximate pile grid can be assumed as 8 feet, 0 inches between pile centerlines in each direction.~~ All piping and appurtenances below the structure or attached to the structure will also require support via the chosen ~~deep~~ foundation system.

The sedimentation basins will be reinforced concrete tank structures covered with areas of elevated reinforced concrete slabs and grating and access hatches. The elevated concrete will cover the pipe galleries and equipment rooms east of the sedimentation basins. The basins will be open top surrounded by aluminum guards.

The occupied areas on the east and west sides of the sedimentation basins including the ozone generation areas, electrical rooms, and storage areas will consist of a superstructure comprising a rigid, reinforced concrete frame supporting precast concrete hollow core roof members. Expansion joints will be provided on each side of the sedimentation basins to isolate the framed structures from the basin walls. The wall system around the entire structure will consist of an interior wythe of reinforced concrete masonry, with an air gap and insulation separating the interior wythe from the exterior wythe of architectural concrete masonry.-The exterior walls of the sedimentation basins will also have an exterior architectural concrete masonry veneer to conceal the concrete walls.

3.9.2 SWIFT Process Building No. 2

The SWIFT Process Building No. 2 will be located north of the SWIFT Process Building No. 1. This facility will consist of the biofilters, GAC contactors, Intermediate Pump Station; the UV treatment room; **Chemical Building no. 1** and the SWIFT Water Pump Station.

3.9.2.1 Biofilters, GAC Contactors, and Intermediate Pump Station

The biofilter and GAC contactor area consists of 14 filter basins, 7 basins each on the north and south sides of the facility separated by a pipe gallery; the Intermediate Pump Station on the east side of the filters; and areas for electrical and mechanical equipment

~~The entire structure will be supported on a reinforced concrete mat foundation, which will be further supported by a deep foundation system.~~ **The Design-Builder is responsible for the foundation system.**

~~Based on the preliminary geotechnical investigation, the deep foundation system will likely consist of driven PPCP. The piles will have dimensions of either 12 inches or 14 inches square. The piles will be driven to a tip elevation of approximately 65 fbg to develop an allowable compressive load of 60 tons for 12-inch-square piles, or 75 tons for 14-inch-square piles. These capacities and the embedment depths must be verified via a comprehensive geotechnical investigation by the Design-Builder. The approximate pile grid can be assumed as 8 feet, 0 inches between pile centerlines in each direction.~~ All piping and appurtenances below the structure or attached to the structure will also require support via the chosen ~~deep~~ foundation system.

~~The deep areas of the structure, mainly the wet well of the Intermediate Pump Station, may not require a deep foundation system; this area could possibly be supported on a 24-inch-thick stone subbase. However, if this approach is considered, the Design-Builder will have to consider connections between the areas supported by shallow foundations and the areas bearing on deep foundation members.~~

The filter basins will be reinforced concrete tank structures covered with areas of elevated reinforced concrete slabs and grating and access hatches. The elevated concrete will cover the pipe gallery between the filter basins. The filter basins will be covered with an aluminum grating system supported by structural steel framing.

The biofilters, GAC contactors, and Intermediate Pump Station will be covered by a superstructure comprising a rigid, reinforced concrete frame supporting precast concrete hollow core roof members. The wall system around the entire building will consist of an interior wythe of reinforced concrete masonry, with an air gap and insulation separating the interior wythe from the exterior wythe of architectural concrete masonry. The exterior walls of the filter basins will also have an exterior architectural concrete masonry veneer to conceal the concrete walls.

3.9.2.2 Ultraviolet Treatment Room

The UV treatment room will be located north of the biofilter and GAC contactor, and Intermediate Pump Station area. The UV treatment room will contain the UV reactors and associated piping, pumping, and maintenance areas. A wet well will also be located on the east end of the area.

The Design-Builder is responsible for the foundation system. ~~The entire structure will be supported on a reinforced concrete mat foundation, which is further supported by a deep foundation system. Based on the preliminary geotechnical investigation, the deep foundation system will likely consist of driven PPCP. The piles will have dimensions of either 12 inches or 14 inches square. The piles will be driven to a tip elevation of approximately 65 feet bgs to develop an allowable compressive load of 60 tons for 12-inch-square piles, or 75 tons for 14-inch-square piles. These capacities and the embedment depths must be verified via a comprehensive geotechnical investigation by the Design-Builder. The approximate pile grid can be assumed as 8 feet, 0 inches between pile centerlines in each direction. All piping and appurtenances below the structure or attached to the structure will also require support via the chosen deep foundation system.~~

The wet well will be a reinforced concrete tank covered with areas of elevated reinforced concrete slabs and grating and access hatches. The remainder of the building will consist of a two-story reinforced concrete frame. The roof will consist of precast concrete hollow core roof members. The wall system around the entire building will consist of an interior wythe of reinforced concrete masonry, with an air gap and insulation separating the interior wythe from the exterior wythe of architectural concrete masonry.

3.9.2.3 SWIFT Water Pump Station

The SWIFT Water Pump Station will be located north of the biofilters and GAC contactor area and west of the UV treatment area. This structure will consist of a below-grade wet well with the associated pumping and piping located above the wet well at grade.

The Design-Builder is responsible for the foundation system. ~~The entire structure will be supported on a reinforced concrete mat foundation, supported by a deep foundation system. Based on the preliminary geotechnical investigation, the deep foundation system will likely consist of driven PPCP. The piles will have dimensions of either 12 inches or 14 inches square. The piles will be driven to a tip elevation of approximately 65 feet bgs to develop an allowable compressive load of 60 tons for 12-inch-square piles, or 75 tons for 14-inch-square piles. These capacities and the embedment depths must be verified via a comprehensive geotechnical investigation by the Design-Builder. The approximate pile grid can be assumed as 8 feet, 0 inches between pile centerlines in each direction. All piping and appurtenances below the structure or attached to the structure will also require support via the chosen deep foundation system.~~

~~The wet well of the pump station may not require a deep foundation system; this area could possibly be supported on a 24-inch-thick stone subbase. However, if this approach is considered, the Design-Builder will have to consider connections between the areas supported~~

~~by shallow foundations and the areas bearing on deep foundation members. This consideration is especially prevalent for elevated areas at grade that are immediately adjacent to lower areas.~~

The wet well will be a reinforced concrete tank structure covered with areas of elevated reinforced concrete slabs and grating and access hatches. The remainder of the structure will consist of a reinforced concrete frame. The roof will consist of precast concrete hollow core roof members. The wall system around the entire structure will consist of an interior wythe of reinforced concrete masonry, with an air gap and insulation separating the interior wythe from the exterior wythe of architectural concrete masonry. Skylights will be provided over the vertical turbine pumps in the roof to allow removal of the pumps, including the vertical pump columns within the wet well.

3.9.3 Backwash Equalization Pump Station

The Backwash Equalization Pump Station is located ~~east of the UV treatment area and the Intermediate Pump Station~~ **west of the SWIFT Process Building No. 2**. *{SWIFT VE Alt No. 10A}* The facility consists of two reinforced concrete equalization basins with a pump station on the south end of the facility.

The Design-Builder is responsible for the foundation system. ~~The entire facility will be supported on a reinforced concrete mat foundation supported by a deep foundation system, with the possible exception of the wet well of the pump station. Based on the preliminary geotechnical investigation, the wet well of the pump station can possibly be supported by a mat foundation bearing on 24 inches of stone subbase. However, the tank and valve vault attached to the wet well will require deep foundation support. The deep foundation system will likely consist of driven PPCP. The piles will have dimensions of either 12 inches or 14 inches square. The piles will be driven to a tip elevation of approximately 65 feet bgs to develop an allowable compressive load of 60 tons for 12-inch-square piles, or 75 tons for 14-inch-square piles. These capacities and the embedment depths must be verified via a comprehensive geotechnical investigation by the Design-Builder. The approximate pile grid can be assumed as 8 feet, 0 inches between pile centerlines in each direction.~~

All piping and appurtenances below the structure or attached to the structure will also require support via the chosen deep foundation system. The Design-Builder will have to consider connections between the areas supported by shallow foundations and the areas bearing on deep foundation members.

An elevated reinforced concrete slab with access hatches and grating will be constructed over the pump station portion of the structure. The two basins will be open at the top, surrounded by aluminum guard.

3.9.4 Chemical Building No. 1

The Chemical Building No. 1 will be located ~~east~~ **west** of the SWIFT Process Building No. ~~1~~ **2** and south of the Backwash Equalization Pump Station. This structure will consist of containment areas for the tanks containing **sodium hypochlorite and sodium hydroxide** used in the treatment process. ~~Mechanical and electrical rooms are also included.~~ *{SWIFT VE Alt No. 10A}*

The entire structure will be supported on a reinforced concrete mat foundation **and will abut to SWIFT Process Building 2**.~~, which is further supported by a deep foundation system. Based on the preliminary geotechnical investigation, the deep foundation system will likely consist of driven PPCP. The piles will have dimensions of either 12 inches or 14 inches square. The piles will be driven to a tip elevation of approximately 65 feet bgs to develop an allowable compressive load of 60 tons for 12-inch-square piles, or 75 tons for 14-inch-square piles. These capacities and the embedment depths must be verified via a comprehensive geotechnical investigation by the Design-Builder. The approximate pile grid can be assumed as 10 feet, 0 inches between pile centerlines in each direction~~

~~All piping and appurtenances below the structure or attached to the structure will also require support via the chosen deep foundation system.~~ *{SWIFT VE Alt No. 10A}*

The individual containment areas will be isolated from each other and appropriate chemical resistant materials will be used in each containment area, including containment coatings as discussed in Section 3.10 (SWIFT Architectural).

The entire superstructure over the containment areas will consist of a reinforced concrete frame. The roof will consist of precast concrete hollow core roof members. The wall system around the entire Chemical Building No. 1 will consist of an interior wythe of reinforced concrete masonry, with an air gap and insulation separating the interior wythe from the exterior wythe of architectural concrete masonry.

3.10 SWIFT Architectural

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report].

3.10.1 SWIFT Process Building No. 1

The SWIFT Process Building No. 1 is a two-story building of a height required to accommodate the equipment and related functional requirements for rapid mix, flocculation, sedimentation, and ozone. Removal of equipment shall be designed by the Design-Builder and as outlined in a maintenance, removal, and replacement plan provided by the Design-Builder and approved by HRSD. Access paths from equipment to doors shall be maintained throughout the building.

The roof shall be a low sloped built-up roof system providing positive drainage to drains. Each **superstructure** roof shall be accessed by stairways. *{SWIFT VE Alt No. 10A}* Heating, ventilation, and air conditioning (HVAC) equipment will be located on the roof. Parapet walls shall be of sufficient height to provide fall protection. Where the portions of the building extend above the general elevation of the adjacent spaces a gable or hipped roof maybe provided to break up the mass of the building.

SWIFT Process Building No. 1 exterior treatments shall provide a durable and clean aesthetic appearance utilizing architectural concrete masonry as the primary wall element. Banding and similar treatments may be used to provide interest and break up the mass of the walls. The building will not be open to the public and tours are not anticipated within the building.

Materials of construction will be in accordance with Section 1.4 (Architectural).

The following paragraphs provide additional design elements and outline of building code.

3.10.1.1 Building Code Summary

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.10.1.2 Accessibility

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.10.1.3 Fire Protection

A hydraulically designed wet pipe sprinkler system, per NFPA 13, shall be provided in SWIFT Process Building No. 1 within the ozone rooms **and applicable chemical areas**. *{SWIFT VE Alt No. 10A}* The system shall meet the requirements of an Ordinary Hazard Group 2 occupancy as required by the VCC. The system shall be designed and sealed by a licensed Fire Protection Engineer. Fire extinguishers shall be provided in accordance with Section 1.4 (Architectural).

3.10.1.4 Restroom Facilities

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.10.2 SWIFT Process Building No. 2

The SWIFT Process Building No. 2 will house equipment related to the filters and UV systems. The building will be a two-story building of sufficient height to accommodate the equipment and related functional requirements. Removal of equipment shall be designed by the Design-Builder and as outlined in a maintenance, removal, and replacement plan provided by the Design-Builder and approved by HRSD. ~~A freight elevator is included in the design to assist in removal of equipment from the UV treatment room. The elevator shall be designed with size and capacity that will allow removal of UV equipment and accessories.~~ *{SWIFT VE Alt No. 12A}* Access paths from equipment to doors shall be maintained.

The roof shall be a low sloped roof system providing positive drainage to drains. The roof shall accommodate HVAC equipment and be provided with a stairway to the roof. Where the building extends above the general elevation of the adjacent roof a gable or hipped roof may be provided to break up the mass of the building.

Exterior treatments shall provide a durable and clean aesthetic appearance utilizing architectural concrete masonry as the main wall elements. Banding and similar treatments may be used to provide interest and break up the mass of the building. The building will not be open to the public and tours are not anticipated within the building.

Materials of construction will be in accordance with Section 1.4 (Architectural).

The following paragraphs provide additional detail of design elements and outline of Building Code requirements.

3.10.2.1 Building Code Summary

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.10.2.2 Accessibility

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.10.2.3 Restroom Facilities

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.10.3 Chemical Building No. 1

Chemical Building No. 1 will house **sodium hypochlorite and sodium hydroxide chemical storage and feed equipment** ~~all of the chemicals~~ required for JR SWIFT operations and will have to meet a variety of architectural requirements. *{SWIFT VE Alt No. 10A}*

This building will house bulk chemical tanks and related equipment. The building will be a single-story building of sufficient height to accommodate the largest tank and accessories. Removal of tanks and equipment shall be designed by the Design-Builder but shall incorporate skylights for tank removal. ~~The general building arrangement in the Basis of Design includes a central accessway with chemical storage and support rooms located adjacent to central accessway.~~ *{SWIFT VE Alt No. 10A}*.

The roof shall be a low sloped roof system providing positive drainage to drains. The roof shall accommodate HVAC equipment and be provided with a stairway to the roof. Exterior treatment shall provide a durable and clean aesthetic appearance utilizing architectural concrete masonry as the main wall elements. Banding and similar treatments may be used to provide interest and breakup the mass of the building.

The chemicals stored include in Chemical Building No. 1 include sodium hydroxide **and** sodium hypochlorite~~, LAS, sodium bisulfite, ACH, hydrogen peroxide, floc aid polymer, filter aid polymer, and phosphoric acid~~. Volumes and concentrations are discussed in Section 3.8 (SWIFT Chemical Storage and Feed Systems). *{SWIFT VE Alt No. 10A}*

The building will not be open to the public and tours are not anticipated within the building.

Materials of construction will be in accordance with Section 1.4 (Architectural). Interior walls will be painted with chemical resistant coatings in lieu of the ground face block mentioned in Section 1.4 to provide surfaces that are easier to clean.

The following paragraphs provide additional detail of design elements and construction requirements for the Chemical Building No. 1.

3.10.3.1 Building Code Summary

The Design-Builder shall confirm all Hazard Classifications for Chemical Building No. 1 during detailed design. Based on a preliminary code evaluation, Chemical Building No. 1 is designated by VCC as: High Hazard Group 4 (H-4) Primary occupancy ~~and High Hazard Group 3 (H-3) Secondary occupancy, as follows:~~

- ~~Hydrogen peroxide is considered an oxidizer and would be classified as an H-3 occupancy.~~
- ~~The remainder of the Chemical Building No. 1 to be designed as a H-4 occupancy.~~ *{SWIFT VE Alt No. 10A}*

Final classification of chemicals shall be made during final design by the Design-Builder. Separation of occupancy shall be in accordance with VCC.

Additional safety provisions are required and include secondary containment, ventilation, identification of chemicals, separation of incompatible materials, and other requirements outlined in VCC and Virginia Statewide Fire Prevention Code. Structural systems shall be protected, non-combustible constructed in conformance with the requirements of Type IA construction in accordance with VCC. ~~Occupancy separation walls will be required to separate H-4 and H-3 occupancy.~~ *{SWIFT VE Alt No. 10A}* Doors, openings, and penetrations through fire-rated walls shall include the appropriate fire and UL assembly rating. Additionally, penetrations shall be provided with the appropriate UL listed penetration assemblies. Egress from hazardous occupancies require the use of panic hardware. Travel distances and number of exits shall comply with the VCC.

3.10.3.2 Accessibility

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.10.3.3 Floor and Containment Areas

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.10.3.4 Removable Skylights

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.10.3.5 Fire Protection

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.10.3.6 Restroom Facilities

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.10.4 Backwash Equalization Pump Station

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.10.4.1 Building Code Summary

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.10.4.2 Accessibility

The Backwash Equalization Pump Station is entered to perform maintenance, repair, and monitoring of equipment and is thus exempt from accessibility requirements.

3.10.4.3 Finishes

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.10.4.4 Restroom Facilities

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.10.5 Recharge Well Buildings

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Figure 3-9: Possible aesthetic and layout for Recharge Well Building

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.10.5.1 Building Code Summary

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.10.5.2 Accessibility

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.10.5.3 Fire Protection

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.10.5.4 Restroom Facilities

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

Figure 3-10: Possible aesthetic and layout for restroom facilities

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11 SWIFT Building Services (Plumbing, HVAC)

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.1 SWIFT Process Building No. 1

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.1.1 Plumbing

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.1.2 HVAC

HVAC will be provided for the ozone generator room, ozone destruct room, ozone sample gallery, ~~stair 1~~, electrical room 1, pipe gallery room, electrical room 2, and the lavatory. *{SWIFT VE Alt No. 10A}*

3.11.1.2.1 Ozone Generator Room, Ozone Destruct Room, and Ozone Sample Gallery

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.1.2.2 Stair 1 *{SWIFT VE Alt No. 10A}*

~~The following are included in the Basis of Design:~~

- ~~Wall-mounted self-contained metal housing electric unit heater with integral thermostat sized to maintain above 50ºF. Heater controls shall be 5 feet above finished floor.~~

3.11.1.2.3 Electrical Room 1

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.1.2.4 Settled Solids Pipe Gallery Room

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.1.2.5 Electrical Room 2

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.1.2.6 Lavatory

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.2 SWIFT Process Building No. 2

Section 3.11.2 describes plumbing and HVAC requirements for the SWIFT Process Building No. 2.

3.11.2.1 Plumbing

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.2.1.1 Filter Gallery and Intermediate Pump Station

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.2.1.2 UV Treatment Room

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.2.2 HVAC

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.2.2.1 Electrical Room 3

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.2.2.2 Blower Room

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.2.2.3 Pump Room / Pipe Gallery / UV Treatment Room

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.2.2.4 Stairs

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.3 SWIFT Water Pump Station

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.3.1 Plumbing

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.3.2 HVAC

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.3.2.1 Pump Room

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.3.2.2 Electrical Room 4

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.4 Chemical Building No. 1 and Other Chemical Storage and Feed Facilities

Section 3.11.4 describes plumbing and HVAC requirements for the Chemical Building No. 1 **and other chemical storage and feed facilities**. *{SWIFT VE Alt No. 10A}*

3.11.4.1 Plumbing

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.4.2 HVAC

HVAC will be provided for the ~~mechanical room/preformed monochloramines,~~ sodium hydroxide room, **and** sodium hypochlorite room~~, pipe pit (and other) room, sodium bisulfite room, hydrogen peroxide room, and electrical room~~. *{SWIFT VE Alt No. 10A}*

3.11.4.2.1 Mechanical Room / Preformed Monochloramines Room *{ SWIFT VE Alt No. 10A}*

~~The following are included in the Basis of Design:~~

- ~~Roof-mounted upblast exhaust fan(s) to ventilate the mechanical room/preformed monochloramines~~
  - ~~Sized at a minimum of 1 cfm/ft^2 and to maintain 10ºF above ambient air space temperature or 6 air changes per hour (whichever is greatest)~~
  - ~~Fan housing and propellers shall be constructed of fiberglass reinforced plastic (FRP)~~
  - ~~Mounted on a 10-inch roof curb and come with a local NEMA 3R disconnect~~
  - ~~The fan(s) shall be controlled by a space thermostat~~
- ~~Roof-mounted make-up air unit with indirect gas-fired heater~~
  - ~~Sized to maintain a space condition of 50ºF minimum~~
  - ~~Consist of a double-walled insulated metal cabinet with a "Hi-Pro polyester" coating, outdoor air intake weatherhood with aluminum mesh filter, motorized intake damper, min 80% efficient indirect gas heat exchanger, curb assembly and service receptacle~~
  - ~~Supply air blower shall consist of a TEFC electric motor, belt driven, double width, and double inlet forward curve blower~~
  - ~~Isolation damper on supply duct to close when system is off~~
  - ~~Single point electrical control center; solid state controls permitting stand-alone operation or control by building controllers~~

3.11.4.2.2 Sodium Hydroxide Room

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.4.2.3 Sodium Hypochlorite Room

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.4.2.4 Sodium Bisulfite Room *{SWIFT VE Alt No. 10A}*

~~The following are included in the Basis of Design:~~

- ~~Roof-mounted upblast exhaust fan(s) to ventilate the sodium bisulfite room~~
  - ~~Sized at a minimum of 1 cfm/ft² and to maintain 10ºF above ambient air space temperature or 6 air changes per hour (whichever is greater); on a signal from a sulfur dioxide detector, the fan(s) exhaust volume shall increase (double) to purge the area and an alarm signal shall be provided to the plant DCU system~~
  - ~~Fan housing and propellers shall be constructed of FRP~~
  - ~~The fan shall be mounted on a 10-inch roof curb and come with a local NEMA 3R disconnect~~
  - ~~The fan(s) shall be controlled by a space thermostat~~
- ~~Roof-mounted make-up air unit with indirect gas-fired heater~~
  - ~~Sized to maintain a space condition of 65ºF minimum~~
  - ~~Consist of a double-walled insulated metal cabinet with a "Hi-Pro polyester" coating, outdoor air intake weatherhood with aluminum mesh filter, motorized intake damper, min 80% efficient indirect gas heat exchanger, curb assembly and service receptacle, supply air blower shall consist of a TEFC electric motor, belt driven, double width, and double inlet forward curve blower~~
  - ~~Isolation damper on supply duct to close when system is off~~
  - ~~Single point electrical control center; solid state controls permitting stand-alone operation or control by building controllers~~

3.11.4.2.5 Hydrogen Peroxide ~~Room~~

The hydrogen peroxide storage system will be located outdoors and will not require HVAC. The metering pumps will be located in the Settled Solids Pump Room and the HVAC design for that system is described in Section 3.11.1.2.4. ~~The following are included in the Basis of Design:~~

- ~~Roof-mounted upblast exhaust fan(s) to ventilate the Hydrogen Peroxide room~~
  - ~~Sized at a minimum of 1 cfm/ft² and to maintain 10ºF above ambient air space temperature or 6 air changes per hour (whichever is greater)~~
  - ~~Fan housing and propellers shall be constructed of FRP~~
  - ~~Mounted on a 10-inch roof curb and come with a local NEMA 3R disconnect~~
  - ~~The fan(s) shall be controlled by a space thermostat~~
- ~~Roof-mounted make-up air unit with indirect gas-fired heater~~
  - ~~Sized to maintain a space condition of 50ºF minimum~~
  - ~~Consist of a double-walled insulated metal cabinet with a "Hi-Pro polyester" coating, outdoor air intake weatherhood with aluminum mesh filter, motorized intake damper,~~

~~min 80% efficient indirect gas heat exchanger, curb assembly and service receptacle, supply air blower shall consist of a TEFC electric motor, belt driven, double width, and double inlet forward curve blower~~

- ~~Isolation damper on supply duct to close when system is off~~
- ~~Single point electrical control center; solid state controls permitting stand-alone operation or control by building controllers~~ *{SWIFT VE Alt No. 10A}*

3.11.4.2.6 Electrical Room *{SWIFT VE Alt No. 10A}*

~~The following are included in the Basis of Design:~~

- ~~DX split cooling system(s) to maintain room conditions between 50ºF db and 85ºF db~~
  - ~~With an airside economizer~~
  - ~~Supply and return ductwork, supply grilles/diffusers and return grilles~~
  - ~~Controlled by a local thermostat and be capable of providing system failure alarms to the plant DCU system~~
  - ~~Balanced to maintain a positive pressure with adjacent spaces~~

3.11.4.2.7 Miscellaneous Chemical Areas ~~Remaining Areas of Chemical Building No 1~~

The ~~pipe pit, LAS,~~ ACH **metering pumps**, floc polymer, filter polymer, phosphoric acid, and corridor areas **will be located in SWIFT Process Building 1 near the rapid mix area. The HVAC** are included in the Basis of Design **except where superseded by the Value Engineering Concept Documents as applicable:** *{SWIFT VE Alt No. 10A}*

- Roof-mounted upblast exhaust fan(s) to ventilate the spaces
  - Sized at a minimum of 1 cfm/ft^2 and to maintain 10ºF above ambient air space temperature or 6 air changes per hour (whichever is greater)
  - Fan housing and propellers shall be constructed of FRP
  - Mounted on a 10-inch roof curb and come with a local NEMA 3R disconnect
  - The fan(s) shall be controlled by a space thermostat
- Roof-mounted make-up air unit with indirect gas-fired heater
  - Sized to maintain a space condition of 50ºF minimum
  - Consist of a double-walled insulated metal cabinet with a “Hi-Pro polyester” coating, outdoor air intake weatherhood with aluminum mesh filter, motorized intake damper, min 80% efficient indirect gas heat exchanger, curb assembly and service receptacle, supply air blower shall consist of a TEFC electric motor, belt driven, double width, and double inlet forward curve blower
  - Isolation damper on supply duct to close when system is off
  - Single point electrical control center; solid state controls permitting stand-alone operation or control by building controllers

3.11.5 Backwash Equalization Pump Station

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.5.1 Piping Vault

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.6 Recharge Well Buildings

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.6.1 Plumbing

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.6.2 HVAC

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.6.2.1 Pump Room

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.11.6.2.2 Electrical Room

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.12 SWIFT Electrical

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.12.1 System Architecture

A pair of 4,160-volt to 480-volt transformers shall be installed outside of the SWIFT Process Building No. 1 as shown on the site plans. The transformers are supplied by the 4,160-volt switchgear MVSWGR in the Main Electrical Building, and they step the voltage down to 480-volt to serve the low voltage switchgear located in Electrical Room 1 in the SWIFT Process Building No. 1.

Similarly, a pair of 4,160-volt to 480-volt transformers will be installed outside of the UV treatment area in SWIFT Process Building No. 2, as shown on the site plans, to supply the low voltage switchgear located within Electrical Room 3. Building layouts and locations for each electrical room can be found on the BODR **except where superseded by the Value Engineering Alternative Concept Design drawings (as applicable)**.

The low voltage switchgear **or MCCs** in each facility will be a two-bus, double-ended, main-tie-main arrangement as shown in the BODR **except where superseded by the Value Engineering Alternative Concept Design drawings (as applicable)**. The ~~switchgear~~ tie circuit breakers will be normally open, while the main circuit breakers will be normally closed. This dual bus configuration allows for redundant supply cables to be provided to each facility, as well as redundant transformers. This bus configuration promotes the HRSD strategy of mitigating arc flash hazards by allowing loads to be served from one bus while the other bus is out of service (de-energized) for testing, repairs, or modifications.

As shown in the single line diagrams in the BODR **except where superseded by the Value Engineering Alternative concept design drawings (as applicable)**, the low voltage switchgear **or MCCs** serves some larger loads directly, but also serves motor control centers that supply power and motor starter units for smaller loads. With both the low voltage switchgear **or MCCs** and the motor control centers, loads are split between the two busses so that when a bus is de-energized, an entire process is not interrupted. For example, odd numbered pumps are connected to the “A” bus, and even numbered pumps that perform the same function are connected to the “B” bus.

In addition, automatic transfer switches are shown to provide power from either bus to power and lighting panelboards. If a bus is de-energized, the transfer switch will change positions to ensure that loads supplied from these panelboards (such as lighting, receptacles, and instruments) remain operational as well.

~~The motor control center located in the Chemical Building No. 1 electrical room shall be main-tie-main configuration and supplied from the SWIFT Process Building No. 1 low voltage switchgear.~~ *{SWIFT VE Alt No. 10A}*

3.12.2 Uninterruptible Power Supplies

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.12.3 Equipment Locations

Electrical distribution equipment will be located shown in Table 3-78. Reference the BODR **except where superseded by the Value Engineering Alternative Concept Design Drawings (as applicable)** for location of each electrical room, and single line diagrams for equipment names.

Table 3-78: Location of Electrical Distribution Equipment

Location	Element
Electrical Room 1	• SWGR 5A/B • MCC-5A/B • Individual VFDs supplied by MCC-5A/B • ATS-5A

Location	Element
	• DP-5A, UPS, and DP-5B • TX-LP-5A and LP-5A
Electrical Room 2	• MCC-5C/D • Individual VFDs supplied by MCC-5C/D • ATS-5B • DP-5C, UPS, and DP-5D • TX-LP-5B and LP-5B
Electrical Room 3	• SWGR-6A/B • MCC-6A/B • ATS-6A • Individual VFDs supplied by MCC-6A/B • DP-6A, UPS, and DP-6B • TX-LP-6A and LP-6A
Electrical Room 4	• MCC-6C/D • SWIFT Pump VFDs • Individual VFDs supplied by MCC-6C/D • ATS-6B • DP-6C, UPS, and DP-6D • TX-LP-6B and LP-6B
~~Electrical Room 5~~	• ~~MCC-5E/F~~ • ~~Individual VFDs supplied by MCC 5E/F~~ • ~~ATS-5C~~ • ~~DP-5E, UPS, and DP-5F~~ • ~~TX-LP-5C and LP-5C~~ *{SWIFT VE Alt No. 10A}*

3.13 SWIFT Instrumentation and Control

Section 3.13 provides a summary of SWIFT instrumentation and control requirements. See Section 1.8 (Instrumentation and Control) for additional information.

3.13.1 Input Output List

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.13.2 Instrument List

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.13.3 Functional Control Descriptions

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.13.4 Variable Frequency Drives

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.13.5 Analyzers

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.13.6 Monitoring Wells

[Refer to the James River Treat Plant Advanced Nutrient Reduction Improvements and SWIFT Facility Basis of Design Report]

3.13.7 Business Network Architecture

See the BODR **except where superseded by the Value Engineering Alternative Concept Design Drawings (as applicable) for** process and instrumentation diagram ~~drawings~~.

3.13.8 SWIFT Facilities Generator Test Run

Upon the operator-initiated test run from the generator PLC human-machine interface (HMI), the DCS shall allow normal operation of SWIFT equipment.

3.13.9 SWIFT Facilities DCS Power Fail Restart Requirements

The equipment to be automatically restarted by the DCS after backup power is online includes:

- Rapid mixers
- Flocculation mixers
- Flocculation polymer systems
- Sludge collector drive systems
- Settled solids pumps
- SWIFT sanitary grinder pumps
- ACH feed pumps
- Sodium hypochlorite feed pumps
- ~~Sodium bisulfite feed pumps~~ *{SWIFT VE Alt No. 10A}*
- Biofilter influent valves (shall close)

The effluent and filter-to-waste valves for the biofilters and GAC contactors shall have UPS backup power. Upon loss of utility power, the DCS shall immediately perform the actions listed below:

- Close biofilter effluent and biofilter to waste valves (if not already closed)

- Close GAC effluent and GAC filter to waste valves (if not already closed)

Additional information is included in Appendix K (JR SWIFT Functional Control Descriptions).

Attachment C

Value Engineering Alternative Concept Design Drawings

James River Swift Facility (**GN016360)** and James River Treatment Plant Advanced Nutrient Reduction Improvements **(JR013400)**

The Intent of the JRTP ANRI (CIP No. JR013400) and JR SWIFT Facility (CIP No. GN016360) Value Engineering Alternatives Concept Design Drawings is to establish the design and other technical concepts sufficient to convey the design intent and to support the Design-Builder's development of its Price Proposal for the alternatives. The design requirements within these drawings are not intended to be inclusive of all of the design information and details needed to complete the work for the alternative design and construction concepts. It's the Design-Builder's responsibility to provide complete drawings for the Value Engineering Alternative Concepts including but not limited to process and instrumentation diagrams.

JAMES RIVER SWIFT FACILITY (GN016360) and JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400)

NEWPORT NEWS, VA

VALUE ENGINEERING ALTERNATIVES DRAWINGS

JANUARY 2021

VICINITY MAP

NOT TO SCALE

Revision Legend

X — Addenda Changes as applicable to VE alternatives

X — Value Engineering Alternatives

LOCATION MAP

NOT TO SCALE

ANRI VE ALTS Incorporated:
(4A) Circular Secondary Clarifiers

SWIFT VE Alts Incorporated:
(10A) SPB No. 1 and Chem Bldg No. 1 Changes
(11A) SPB No. 2 Changes
(12A) UV Equipment Changes w/ Reduced Footprint

DATUM: THE MERIDIAN SOURCE OF THIS TOPOGRAPHIC SURVEY IS BASED ON THE VIRGINIA STATE PLANE COORDINATE SYSTEM, SOUTH ZONE, NORTH AMERICAN DATUM 1983/2011 (US SURVEY FEET). ELEVATIONS REFER TO NAVD88 AND WERE ESTABLISHED FROM CITY OF NEWPORT NEWS CONTROL STATION 434 ELEVATION = 28.975.

DESIGN-BUILDER SHALL COMPLY WITH THE JANUARY 2020 EDITION OF HRSD'S DESIGN AND CONSTRUCTION STANDARDS

PRELIMINARY DESIGN - DO NOT USE FOR CONSTRUCTION

INSERT M1250.02.01 - MBBR INFLUENT PUMP STATION AND CCT SPLITTER BOX PLAN AND SECTION 1

INDEX OF DRAWINGS

DRAWING NUMBER DESCRIPTION

GENERAL

INSERT G0002.02.01 - FLOW SCHEMATIC 1

--	COVER
G1	INDEX OF DRAWINGS
G2	ANRI FLOW DIAGRAM
G3	SWIFT FLOW DIAGRAM

[redacted]

G5	ANRI HYDRAULIC PROFILE
G6	SWIFT HYDRAULIC PROFILE

1 INSERT G0005.02.01 - UPDATED HYDRAULIC PROFILE

[redacted]

CIVIL

CIVIL DEMOLITION

[redacted]

C101	PARTIAL DEMO PLAN - AREA 1
C102	PARTIAL DEMO PLAN - AREA 2
C103	PARTIAL DEMO PLAN - AREA 3
C104	PARTIAL DEMO PLAN - AREA 4
C105	PARTIAL DEMO PLAN - AREA 5
C106	PARTIAL DEMO PLAN - AREA 6

INSERT M1300.02.01 MBBR HYDRAULIC PROFILE INSERT M1300.02.02 MBBR PLAN AND SECTION 1

SWIFT

C107	PARTIAL DEMO PLAN - AREA 7

[redacted]

ADVANCED NUTRIENT REDUCTION IMPROVEMENTS

[redacted]

C201	PARTIAL SITE PLAN - AREA 1
C202	PARTIAL SITE PLAN - AREA 2
C203	PARTIAL SITE PLAN - AREA 3
C204	PARTIAL SITE PLAN - AREA 4
C205	PARTIAL SITE PLAN - AREA 5
C206	PARTIAL SITE PLAN - AREA 6

SWIFT

C207	PARTIAL SITE PLAN - AREA 7
C208	PARTIAL SITE PLAN - AREA 8
C209	PARTIAL SITE PLAN - AREA 9
C210	PARTIAL SITE PLAN - AREA 10

OVERALL SITE

[redacted]

YARD PIPING AND SITE ELECTRICAL

[redacted]

C401	PARTIAL SITE PIPING AND ELECTRICAL PLAN - AREA 1
C402	PARTIAL SITE PIPING AND ELECTRICAL PLAN - AREA 2
C403	PARTIAL SITE PIPING AND ELECTRICAL PLAN - AREA 3
C404	PARTIAL SITE PIPING AND ELECTRICAL PLAN - AREA 4
C405	PARTIAL SITE PIPING AND ELECTRICAL PLAN - AREA 5
C406	PARTIAL SITE PIPING AND ELECTRICAL PLAN - AREA 6

INSERT C1000.02.01 - ANRI VE ALT NO. 4A, 10A, 11A & 12A OVERALL SITE PLAN 1

MECHANICAL

IFAS EFFLUENT CHANNEL

M1101	PLAN AND SECTIONS
M1102	SECTION AND ISOMETRIC

SECONDARY CLARIFIERS - SLUDGE PUMP STATION

DELETED 1

~~M1201~~	~~PARTIAL PLAN - LOWER NORTH~~
~~M1202~~	~~PARTIAL PLAN - LOWER SOUTH~~
~~M1203~~	~~PARTIAL PLAN - UPPER NORTH~~
~~M1204~~	~~PARTIAL PLAN - UPPER SOUTH~~
~~M1205~~	~~PARTIAL PLANS~~
~~M1206~~	~~PARTIAL PLANS~~
~~M1207~~	~~SECTION~~
~~M1208~~	~~SECTION~~
~~M1209~~	~~ISOMETRICS~~

INSERT M1200.02.01 - CIRCULAR SECONDARY CLARIFIER PLAN AND SECTION
INSERT M1225.02.01 - CIRCULAR SECONDARY CLARIFIER RAS PUMP STATION PLAN AND SECTION 1

DRAWING NUMBER DESCRIPTION

MECHANICAL (CONTINUED)

MBBR BASINS & BUILDING

DELETED 1

~~M1301~~	~~PARTIAL PLAN - LOWER NORTH~~
~~M1302~~	~~PARTIAL PLAN - LOWER SOUTH~~
~~M1303~~	~~PARTIAL PLANS AND SECTION - UPPER NORTH~~
~~M1304~~	~~PARTIAL PLANS AND SECTION - UPPER SOUTH~~
~~M1305~~	~~MBBR ROOM ENLARGED PLAN~~
~~M1306~~	~~SECTION~~
~~M1307~~	~~SECTION~~
~~M1308~~	~~SECTIONS~~
~~M1309~~	~~ISOMETRIC~~

~~**EXISTING SECONDARY CLARIFIERS 4 AND 5 PARTIAL DEMOLITION**~~

~~M1401~~	~~PARTIAL DEMOLITION PLAN AND SECTIONS~~
~~M1402~~	~~PARTIAL PLAN AND SECTIONS~~
~~M1403~~	~~DEMOLITION NOTES~~

~~**WELL BACK FLUSH EQUALIZATION TANK**~~

~~M1411~~	~~PLAN~~
~~M1412~~	~~SECTIONS~~

~~**SWIFT INFLUENT EQUALIZATION TANK**~~

~~M1421~~	~~PLAN~~
~~M1422~~	~~SECTIONS~~

~~**JUNCTION/SPLITTER BOX**~~

~~M1501~~	~~PLAN~~
~~M1502~~	~~TOP PLAN AND SECTIONS~~

CHEMICAL BUILDING NO. 2

~~M1601~~	~~PLAN~~	DELETED 1
~~M1602~~	~~SECTIONS~~	DELETED 1
~~M1603~~	~~ISOMETRIC~~	DELETED 1

SWIFT INFLUENT PUMP STATION

~~M2100~~	~~ISOMETRIC, PLANS AND SECTION~~	DELETED 1

SWIFT PROCESS BUILDING No. 1

M2200	ISOMETRIC VIEW	
M2201	BOTTOM PLAN	REVISED TO M2201B 2
M2202	TOP PLAN	
M2203	SECTIONS	
M2204	SECTIONS	

SWIFT PROCESS BUILDING No. 2

BAF, GAC, AND INTERMEDIATE PUMP STATION

M2300	ISOMETRIC VIEWS

[redacted]

M2303	TOP PLAN
M2304	SECTIONS
M2305	SECTIONS

INSERT M2306 FOR SWIFT VE ALT NO. 11A 3

INSERT M2307 FOR SWIFT VE ALT NO. 10A 2

SWIFT PROCESS BUILDING No. 2

ULTRAVIOLET TREATMENT FACILITY

M2400	ISOMETRIC VIEWS
M2401	BOTTOM PLAN
M2402	TOP PLAN

[redacted]

M2404	SECTIONS

SWIFT PROCESS BUILDING No. 2

SWIFT PUMP STATION

M2500	ISOMETRIC VIEWS
M2501	PLANS

[redacted]

M2503	SECTIONS

DRAWING NUMBER DESCRIPTION

MECHANICAL (CONTINUED)

ON SITE RECHARGE WELL

[redacted]

OFF SITE RECHARGE WELL

[redacted]

BACKWASH EQUALIZATION PUMP STATION

M2600	ISOMETRIC VIEWS
M2601	PLANS

[redacted]

CHEMICAL BUILDING No. 1

~~M2700~~	~~ISOMETRIC VIEW~~	DELETED 2
~~M2701~~	~~OVERALL PLAN~~	DELETED 2
~~M2702~~	~~SECTIONS~~	DELETED 2

ARCHITECTURAL

SECONDARY CLARIFIERS

~~A1200~~	~~ISOMETRIC~~	DELETED 1
~~A1201~~	~~LOWER PLAN~~	DELETED 1
~~A1202~~	~~UPPER PLAN~~	DELETED 1

~~**MBBR BASINS & BUILDING**~~

~~A1300~~	~~LOWER PLAN~~	DELETED 1
~~A1301~~	~~UPPER PLAN~~	DELETED 1

SWIFT INFLUENT EQ ELECTRICAL BUILDING

A1440	PLAN AND SECTION

CHEMICAL BUILDING NO. 2

~~A1600~~	~~ISOMETRIC~~	DELETED 1
~~A1601~~	~~PLAN~~	DELETED 1

ADMINISTRATION/MAINTENANCE BUILDING

A1700	ISOMETRIC
A1701	PARTIAL FLOOR PLAN
A1702	PARTIAL FLOOR PLAN
A1703	GROUND FLOOR PLAN

[redacted]

INSERT A1750.01.01 - LAB / CONTROL ROOM REVISIONS 1

MAIN ELECTRICAL BUILDING

[redacted]

ELECTRICAL BUILDING NO. 2

[redacted]

ELECTRICAL

GENERAL

[redacted]

SITE

[redacted]

DRAWING NUMBER DESCRIPTION

ELECTRICAL (CONTINUED)

JRTP ELECTRICAL

E1021	ONE LINE DIAGRAM
E1022	ONE LINE DIAGRAM
E1023	ONE LINE DIAGRAM
E1024	ONE LINE DIAGRAM
E1025	ONE LINE DIAGRAM
E1026	ONE LINE DIAGRAM
E1027	ONE LINE DIAGRAM
E1028	ONE LINE DIAGRAM
E1029	ONE LINE DIAGRAM

DELETED 1

MBBR BASINS & BUILDING

~~E1301~~	~~PLAN~~

DELETED 1

SWIFT INFLUENT EQ ELECTRICAL BUILDING

~~E1441~~	~~PLAN~~

DELETED 1

CHEMICAL BUILDING No. 2

~~E1601~~	~~PLAN~~

ADMINISTRATION/MAINTENANCE BUILDING

E1701	PLAN

MAIN ELECTRICAL BUILDING

E1801	PLAN

ELECTRICAL BUILDING NO. 2

E1821	PLAN

SWIFT PROCESS BUILDING No. 1

E2201	SWITCH GEAR SINGLE LINE DIAGRAM
E2202	MCC SINGLE LINE DIAGRAM
E2203	MCC SINGLE LINE DIAGRAM
E2204	BOTTOM PLAN

SWIFT PROCESS BUILDING No. 2

ULTRAVIOLET TREATMENT FACILITY

E2401	SWITCH GEAR SINGLE LINE DIAGRAM
E2402	MCC SINGLE LINE DIAGRAM
E2403	BOTTOM PLAN

SWIFT PROCESS BUILDING No. 2

SWIFT PUMP STATION

E2501	MCC SINGLE LINE DIAGRAM
E2502	TOP PLAN

CHEMICAL BUILDING No. 1

~~E2701~~	~~MCC SINGLE LINE DIAGRAM~~	DELETED 2
~~E2702~~	~~BOTTOM PLAN~~	DELETED 2

INSTRUMENTATION

GENERAL

[redacted]

I2	SYSTEM ARCHITECTURE
I3	SWIFT SYSTEM ARCHITECTURE

[redacted]

I6	DCS NETWORK UPS

[redacted]

DRAWING NUMBER DESCRIPTION

INSTRUMENTATION (CONTINUED)

PROCESS AND INSTRUMENTATION DIAGRAM

I1200	IFAS EFFLUENT CHANNEL AND SECONDARY CLARIFIER DRAIN PUMPS	
I1201	SECONDARY CLARIFIERS NO. R1 AND R2	
I1202	SECONDARY CLARIFIERS NO. R3 AND R4	
I1203	SECONDARY CLARIFIERS NO. R5 AND R6	
I1204	SECONDARY CLARIFIERS NO. R7 AND R8	
I1205	SECONDARY CLARIFIERS SCUM SYSTEM	
I1300	MBBR MIXERS AND VALVES IN BASINS AND ANALYZERS	
~~I1301~~	~~MBBR ROOM~~	DELETED 1

[redacted]

I1303	MBBR AIR	
~~I1400~~	~~SWIFT INFLUENT EQUALIZATION AND WELL BACK FLUSH EQUALIZATION TANKS~~	DELETED 1
I1500	JUNCTION / SPLITTER BOX CCTS AND PLANT EFFLUENT PIPING	

[redacted]

I1600	WWTP PHOSPHORIC ACID SYSTEM
I1601	WWTP SODIUM BISULFITE TANKS AND FEED PUMPS
I1602	WWTP SODIUM HYPOCHLORITE TANKS
I1603	WWTP SODIUM HYPOCHLORITE FEED PUMPS TO ODOR, RAS, AND IFAS
I1604	WWTP SODIUM HYPOCHLORITE FEED PUMPS AND DISINFECTION
I2100	SWIFT INFLUENT PUMP STATION
I2200	RAPID MIX SYSTEM

1 MBBR

[redacted]

I2206	OZONE CONTACTOR

[redacted]

I2400	UV
I2500	SWIFT WATER PUMP STATION

[redacted]

~~I2707~~	~~PREFORMED MONOCHLORAMINE SYSTEM~~	DELETED SWIFT VE ALT NO. 10A 2

[redacted]

I2709	SODIUM HYPOCHLORITE SYSTEM	

[redacted]

~~I2312~~	~~LIQUID AMMONIUM SULFATE SYSTEM~~	DELETED SWIFT VE ALT NO. 10A 2
~~I2713~~	~~SODIUM BISULFITE SYSTEM~~	DELETED FOR SWIFT VE ALT NO. 10A 2
I2714	PHOSPHORIC ACID SYSTEM	

[redacted]

LEGEND

[redacted] DRAWING UNCHANGED FROM THE BODR

text sheet remaining DRAWING MODIFICATION INCLUDED IN ALTERNATE DRAWING SET

DRAWING DELETED

REV	ISSUED FOR	DATE	BY
3	ANRI VE ALT NO. 11A	12/2020	US-A
2	ANRI VE ALT NO. 10A	12/2020	US-A
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

INDEX OF DRAWINGS

DATE: 2020

PROJECT NO.: 32480

CONTRACT NO.: -

DRAWING NUMBER: G1

BIM 360://32480-001_HRSD James River Treatment Plant - SWIFT - WW32480-001-GENERAL-SHEETS.rvt
4/20/2020 12:01:26 PM

Recharge Well No. 1
Recharge Well No. 2
Recharge Well No. 3
Recharge Well No. 4
Recharge Well No. 5
Recharge Well No. 6
Recharge Well No. 7
Recharge Well No. 8
Recharge Well No. 9
Recharge Well No. 10
WB
WB
Well Backflush EQ
SWIFT Influent EQ
SWIFT
SNPW
SWIFT Non Potable Water Pumps
SWIFT Water Pumps
OF
SPB No. 2 BAF / GAC
BI
SPB No. 1 Rapid Mix / Floc Sed & Ozone
INF
SIEI
SIER
MBBR
Final Effluent Flow = A - B + C + D
Calculation assumes the following flows are negligible and not included:
1. Dewatered Cake.
2. SWIFT Settled Solids
3. SWIFT Building Drains
B
M
M
C
SWIFT Building Drains
BWW
SES
RWI
RWI
RWI
MBBRI
Backwash EQ
M
D
BEQD
M
A
Influent Screening
Grit Removal
Pre-Aeration
PCI
Primary Clarifiers
PCE
AI
IFAS Tanks
SCI
Secondary Clarifiers
SCE
MBBR Influent PS
Junction / Splitter Box
Chlorine Contact Tanks
Outfall
Landfill
Landfill
SCUM
SCUM
SCUM Concentrator
Landfill
PCS
SES
CCT + GBFL
SCUM
RAS
WAS
NPW
M
E
Notes:
1. All flow meters are not shown. Only the flow meters that contribute to the final effluent flow calculation are shown.
2. Plant drain system is not shown.
GSP
GSP
GSP
Gravity Thickeners
GBFL
Gravity Belt Thickener
CCT
CCT
GTS
CCT
Dewatering
DGE
Holding Tank
DGE
Anaerobic Digesters
DGI
GBTS
Offsite Composting
CIRCULAR SECONDARY CLARIFIERS FLOW SCHEMATIC
ANRI VE ALT NO. 4A
DRAWING G0002.02.01
REVISIONS
0 ANRI VE ALT NO. 4A 12/2020 US-A

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

ANRI
FLOW DIAGRAM

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: G2

REV	ISSUED FOR	DATE	BY
3	SWIFT VE ALT NO. 12A	12/2020	US-A
2	SWIFT VE ALT NO. 11A	12/2020	US-A
1	SWIFT VE ALT NO. 10A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

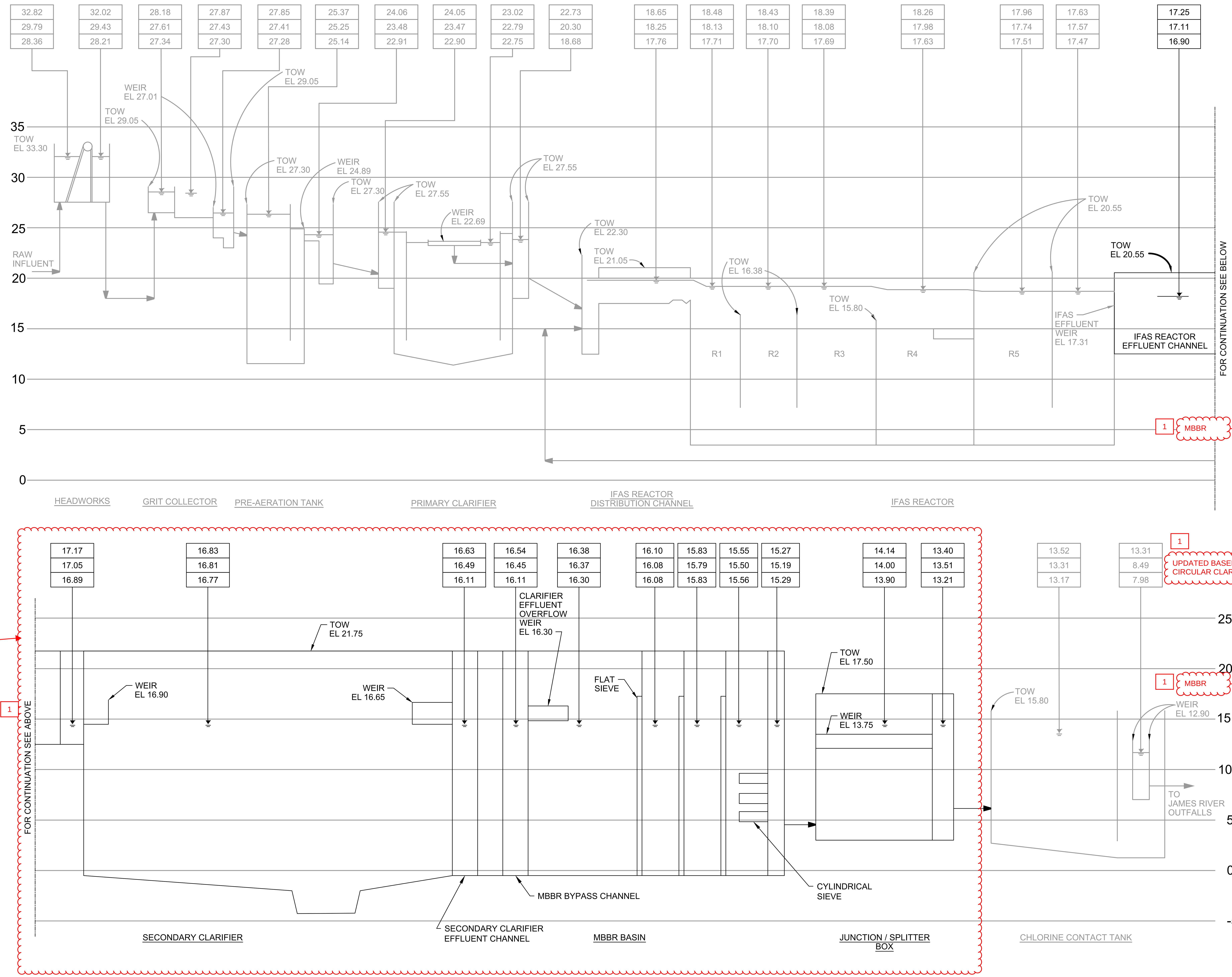
[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

SWIFT FLOW DIAGRAM

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: G3



REFER TO ATTACHED UPDATED HYDRAULIC PROFILE ON SHEET ANRI VE ALT NO. 4A G0005.02.01.

1

LEGEND:

18.04	WATER SURFACE ELEVATION AT 57 MGD PLANT INFLUENT FLOW.
17.91	WATER SURFACE ELEVATION AT 36.4 MGD PLANT INFLUENT FLOW.
17.83	WATER SURFACE ELEVATION AT 16.4 MGD PLANT INFLUENT FLOW.

NOTES:

1. HYDRAULIC GRADE LINE (HGL) DEVELOPED BASED ON THE FOLLOWING CONDITIONS:
   - SWIFT INFLUENT EQUALIZATION TANK NOT IN OPERATION.
   - ~~SWIFT~~ INFLUENT PUMP STATION NOT IN OPERATION.
   - RIVER LEVEL ELEVATION: 4 FT. (MAX, TYPICAL HIGH TIDE)
   - PLANT EFFLUENT FLOWS DISCHARGED THROUGH THE EXISTING 60-INCH OUTFALL. THE EXISTING 36-INCH OUTFALL ASSUMED TO BE OUT-OF-SERVICE.
   - THE TABLE BELOW SHOWS THE NUMBER AND/OR STATUS OF TREATMENT UNITS ASSUMED IN OPERATION FOR ALL FLOW CONDITIONS PRESENTED IN THE JRTP HYDRAULIC PROFILE

PROCESS	UNITS/TRAINS IN OPERATION	TOTAL UNITS
HEADWORKS	3	3
GRIT COLLECTORS	4	4
PRE-AERATION TANKS*	2	3
PRIMARY CLARIFIERS	4	4
IFAS	9	9
SECONDARY CLARIFIERS	~~8~~ 3	~~8~~ 3
MBBR	2	2
~~SWIFT~~ INFLUENT PUMP STATION	0	1
SWIFT INFLUENT EQ TANK	0	1
CHLORINE CONTACT TANKS	3	3
OUTFALL	1	2

*FLOW IS BEING DIVERTED AROUND PRE-AERATION BASIN 1 FOR ANITA-MOX

1

2. PRELIMINARY DRAWING AND HYDRAULIC DATA - FOR REVIEW PURPOSES ONLY, NOT RELEASED FOR CONSTRUCTION.
3. ELEVATION DATUM: UNLESS OTHERWISE NOTED, ALL ELEVATIONS SHOWN ARE IN DATUM NAVD 88. ELEVATIONS OF THE EXISTING FACILITIES AND STRUCTURES ARE TAKEN FROM AS-BUILT RECORD DRAWINGS AND ROUGHLY CONVERTED TO NAVD 88 COORDINATES. DESIGN-BUILDER SHALL CONFIRM AND SURVEY AS NECESSARY TO RESOLVE CONFLICTS.
4. DRAWING NOT TO SCALE.
5. DESIGN-BUILDER SHALL CONFIRM THE HYDRAULIC PROFILE AND EVALUATE RIVER LEVELS UP TO 10 FEET. COORDINATE WITH HRSD FOR ALL OUTFALL OPERATION SCENARIOS.

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

ANRI
HYDRAULIC PROFILE

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: G5

Circular Secondary Clarifiers
(2) New 130 FT Diameter & Reuse of Existing SC No. 5 and Junction / Splitter Box

CIRCULAR SECONDARY CLARIFIERS
HYDRAULIC PROFILE

ANRI VE ALT NO. 4A

DRAWING G0005.02.01

REVISIONS

0	ANRI VE ALT NO. 4A	12/2020	US-A

NOTES:

1. ASSUME ALL 4 FLOCCULATION AND SEDIMENTATION BASINS ARE IN OPERATION.
2. ASSUME 1 BAF UNIT IS OUT OF SERVICE FOR A TOTAL OF 6 FILTERS IN SERVICE AT A PLANT FLOW OF 16.0 MGD.
3. ASSUME 2 GAC UNITS ARE OUT OF SERVICE FOR A TOTAL OF 5 FILTERS IN SERVICE AT A PLANT FLOW OF 16.0 MGD.
4. ASSUME 1 UV REACTOR IS OUT OF SERVICE FOR A TOTAL OF 2 REACTORS IN SERVICE AT A PLANT FLOW OF 16.0 MGD.

UPDATED FOR THE MBBR AS SHOWN IN ANRI VE ALT NO. 4A. 1

CONDITION	PLANT FLOW	FLOCCULATION BASIN 1	SEDIMENTATION BASIN	SEDIMENTATION BASIN EFFLUENT CHANNEL	OZONE INFLUENT		OZONE EFFLUENT		BAF		INTERMEDIATE PUMP STATION INFLUENT CHANNEL		GAC CONTACTOR		UV		SWIFT PUMP STATION INFLUENT CHANNEL	SWIFT PUMP STATION	
SWIFT CAPACITY	16 MGD	44.36	44.27	42.45	42.34		40.81		39.50		24.02		43.50		25.44		24.71	23.00	

HYDRAULIC PROFILE

NTS

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"
4/10/2020

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

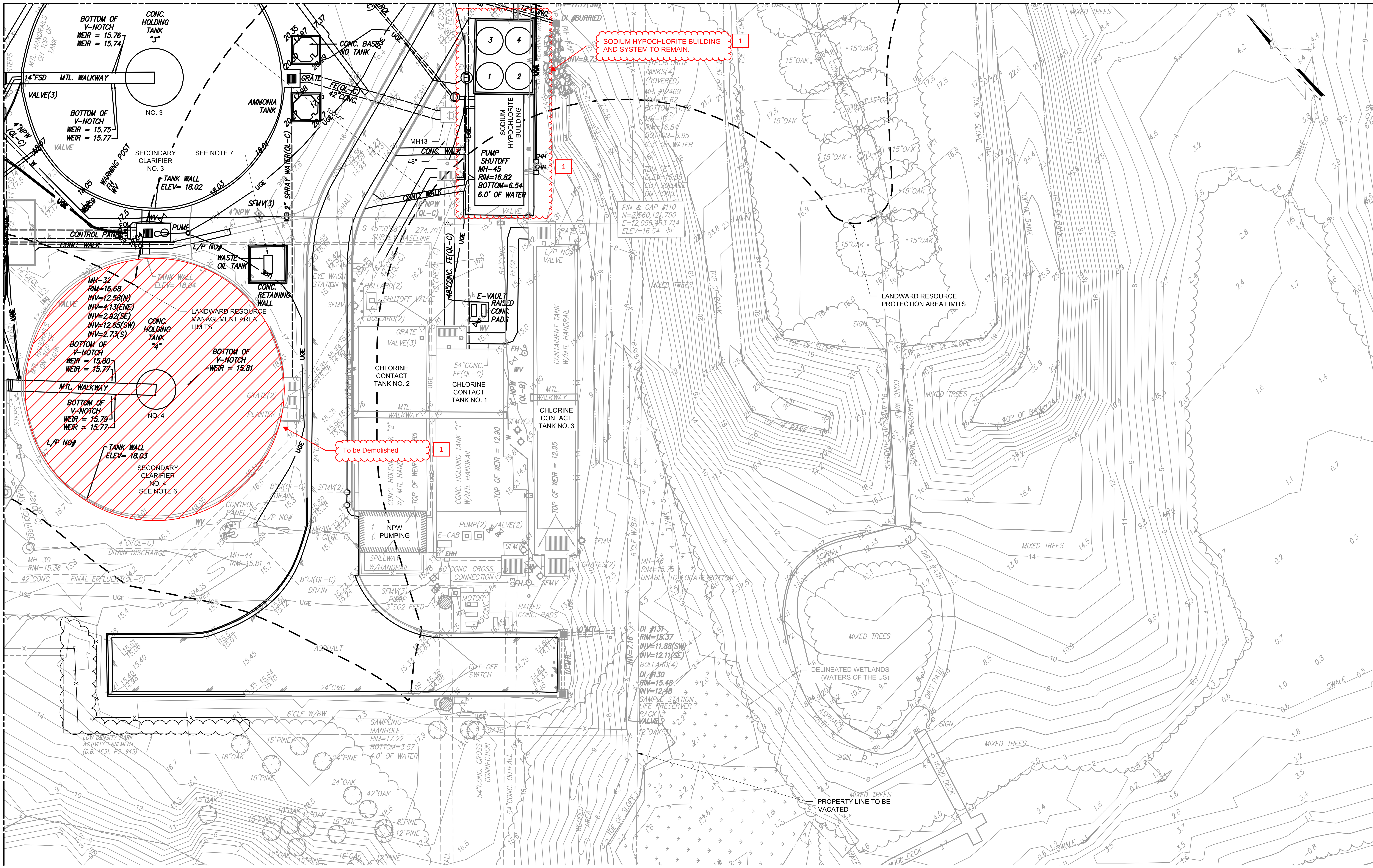
SWIFT
HYDRAULIC PROFILE

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: G6

MATCHLINE - SEE DWG C104

MATCHLINE - SEE DWG C103

MATCHLINE - SEE DWG C102



NOTES:

1. ~~FULL TONE LINES ARE USED TO DEPICT STRUCTURES OR FEATURES TO BE DEMOLISHED ON THIS DEMOLITION DRAWING.~~
2. HALF TONE STRUCTURES CONTAINING FULL TONE COMPONENTS ARE BEING MODIFIED TO SERVE A NEW FUNCTION.
3. EXISTING BURIED UTILITY INFORMATION SHOWN ON THIS DRAWING WAS COMPILED FROM RECORD DRAWINGS BUT SOME MINOR UTILITIES MAY BE MISSING. DESIGN-BUILDER SHALL VERIFY ALL EXISTING UTILITIES IN WORK AREAS AS PART OF THEIR DESIGN.
4. MAINTAIN STRUCTURES UNTIL NEW REPLACEMENT FACILITIES ARE ACCEPTED BY HRSD. COORDINATE REMOVAL OF FACILITIES TO MAINTAIN PLANT OPERATIONS AND MOPO CONSTRAINTS.
5. REROUTE EXISTING UTILITIES AS REQUIRED TO CONSTRUCT NEW FACILITIES AND MAINTAIN PLANT OPERATIONS.
6. SEE DRAWING M1401 FOR PARTIAL DEMOLITION OF SECONDARY CLARIFIER NO. 4.
7. PROVIDE NEW WASTE OIL TANK FOR OWNER'S USAGE ADJACENT TO THE OWNER STORAGE AREA, SEE DWG C208 FOR LOCATION.
8. THE EXACT LIMITS OF UTILITIES AND STRUCTURE TO BE DEMOLISHED SHALL BE COORDINATED AND COMPLETED BY THE DESIGN-BUILDER AS REQUIRED TO IMPLEMENT UPGRADES, REFER TO THE OVERALL SITE PLAN FOR NEW WORK TO BE COORDINATED WITH DEMOLITION WORK.

SCALE: 1" = 20'

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

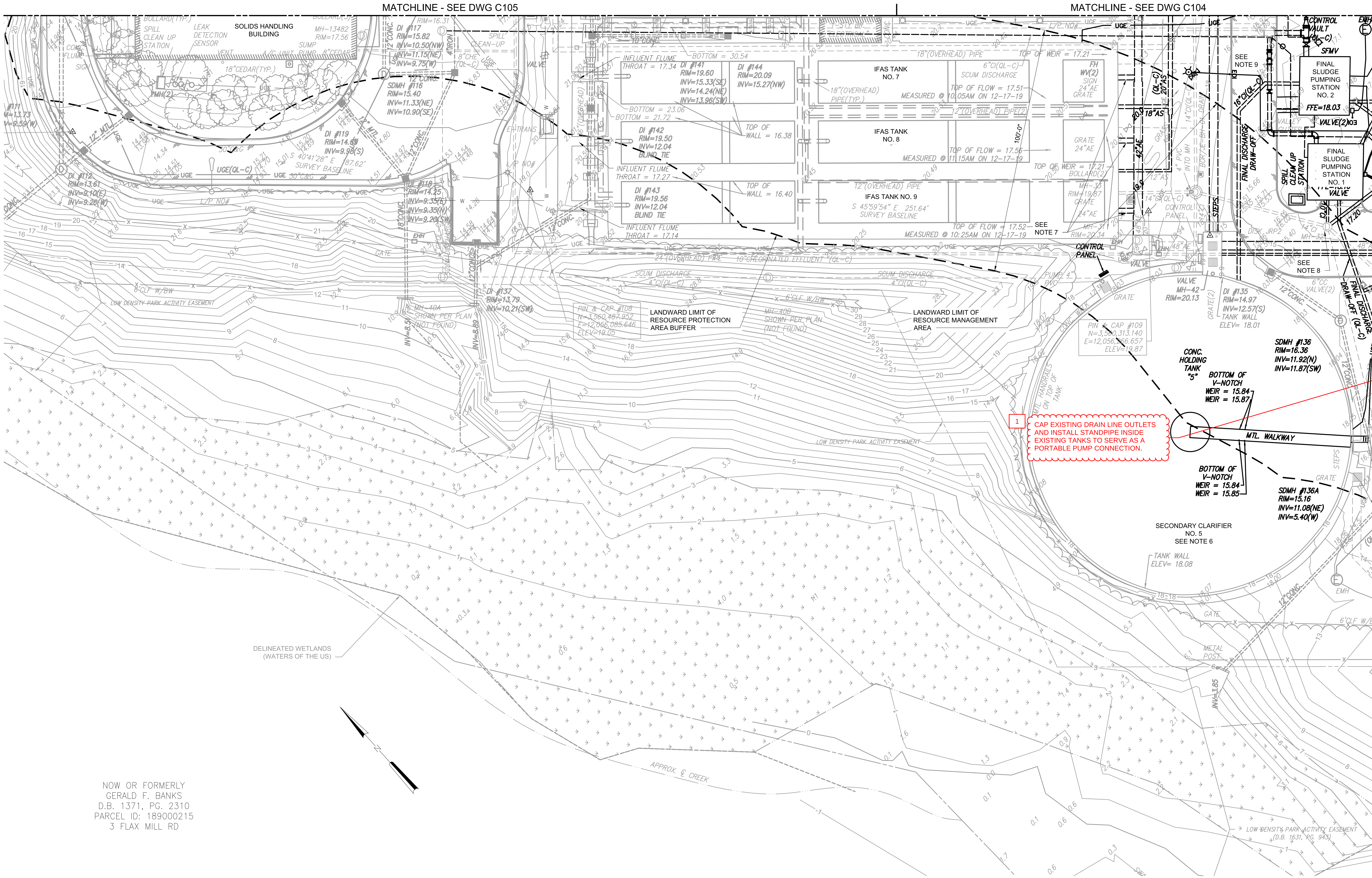
JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

JAMES RIVER TREATMENT PLANT
PARTIAL DEMO PLAN - AREA 1

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	C101

MATCHLINE - SEE DWG C105

MATCHLINE - SEE DWG C104



MATCHLINE - SEE DWG C101

NOTES:

1. FULL TONE LINES ARE USED TO DEPICT STRUCTURES OR FEATURES TO BE DEMOLISHED ON THIS DEMOLITION DRAWING.

1

~~2. HALF TONE STRUCTURES CONTAINING FULL TONE COMPONENTS ARE BEING MODIFIED TO SERVE A NEW FUNCTION.~~

3. EXISTING BURIED UTILITY INFORMATION SHOWN ON THIS DRAWING WAS COMPILED FROM RECORD DRAWINGS BUT SOME MINOR UTILITIES MAY BE MISSING. DESIGN-BUILDER SHALL VERIFY ALL EXISTING UTILITIES IN WORK AREAS AS PART OF THEIR DESIGN.

4. MAINTAIN STRUCTURES UNTIL NEW REPLACEMENT FACILITIES ARE ACCEPTED BY HRSD. COORDINATE REMOVAL OF FACILITIES TO MAINTAIN PLANT OPERATIONS AND MOPO CONSTRAINTS.

5. REROUTE EXISTING UTILITIES AS REQUIRED TO CONSTRUCT NEW FACILITIES AND MAINTAIN PLANT OPERATIONS.

6. SEE DRAWING M1402 FOR PARTIAL DEMOLITION OF SECONDARY CLARIFIER NO. 4.

7. AS PART OF CONSTRUCTING NEW IFAS EFFLUENT CHANNEL, REMOVE EACH EXISTING IFAS EFFLUENT PIPE AND ENLARGE WALL OPENING AS REQUIRED TO ACCOMMODATE NEW HYDRAULIC GRADE LINE AT PEAK WASTEWATER FLOW OF 57 MGD PLUS 16 MGD OF RAS. ~~ALSO REPLACE EXISTING IFAS TANK DRAIN PLUG VALVE DURING THE SHUTDOWN.~~

1

8. SEAL OPENINGS IN EXISTING MANHOLES TO REMAIN AFTER PIPES REMOVED.

9. REPLACE EXISTING TEE WITH CROSS TO PERMIT SIMULTANEOUS OPERATION OF EXISTING FINAL SLUDGE PUMP STATIONS 1 AND 2 AND NEW SLUDGE PUMP STATION UNTIL ALL EXISTING CLARIFIERS 1-5 ARE REMOVED FROM SERVICE. FINAL SLUDGE PUMP STATIONS 1 AND 2 CAN THEN BE DEMOLISHED.

1

10 THE EXACT LIMITS OF UTILITIES AND STRUCTURE TO BE DEMOLISHED SHALL BE COORDINATED AND COMPLETED BY THE DESIGN-BUILDER AS REQUIRED TO IMPLEMENT UPGRADES. REFER TO THE OVERALL SITE PLAN FOR NEW WORK TO BE COORDINATED WITH DEMOLITION WORK.

SCALE: 1" = 20'

20 10 0 20'

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

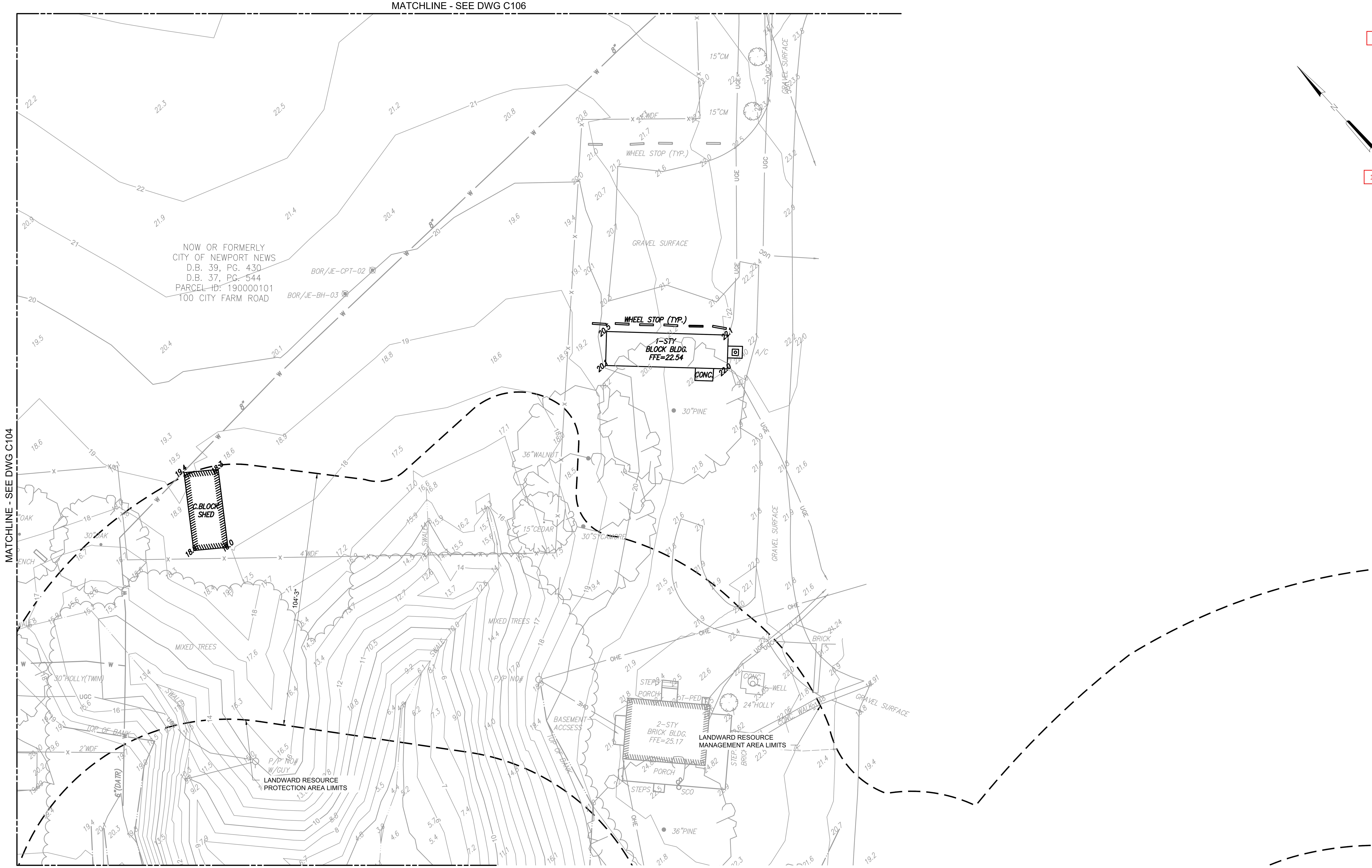
HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

JAMES RIVER TREATMENT PLANT
PARTIAL DEMO PLAN - AREA 2

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	C102

MATCHLINE - SEE DWG C106



MATCHLINE - SEE DWG C201

NOTES:

1. ~~FULL TONE LINES ARE USED TO DEPICT STRUCTURES OR FEATURES TO BE DEMOLISHED ON THIS DEMOLITION DRAWING.~~ 1
2. EXISTING BURIED UTILITY INFORMATION SHOWN ON THIS DRAWING WAS COMPILED FROM RECORD DRAWINGS BUT SOME MINOR UTILITIES MAY BE MISSING. DESIGN-BUILDER SHALL VERIFY ALL EXISTING UTILITIES IN WORK AREAS AS PART OF THEIR DESIGN.
3. REROUTE EXISTING UTILITIES AS REQUIRED TO CONSTRUCT NEW FACILITIES AND MAINTAIN PLANT OPERATIONS.
4. THE EXACT LIMITS OF UTILITIES AND STRUCTURE TO BE DEMOLISHED SHALL BE COORDINATED AND COMPLETED BY THE DESIGN-BUILDER AS REQUIRED TO IMPLEMENT UPGRADES. REFER TO THE OVERALL SITE PLAN FOR NEW WORK TO BE COORDINATED WITH DEMOLITION WORK. 1

SCALE: 1" = 20'

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

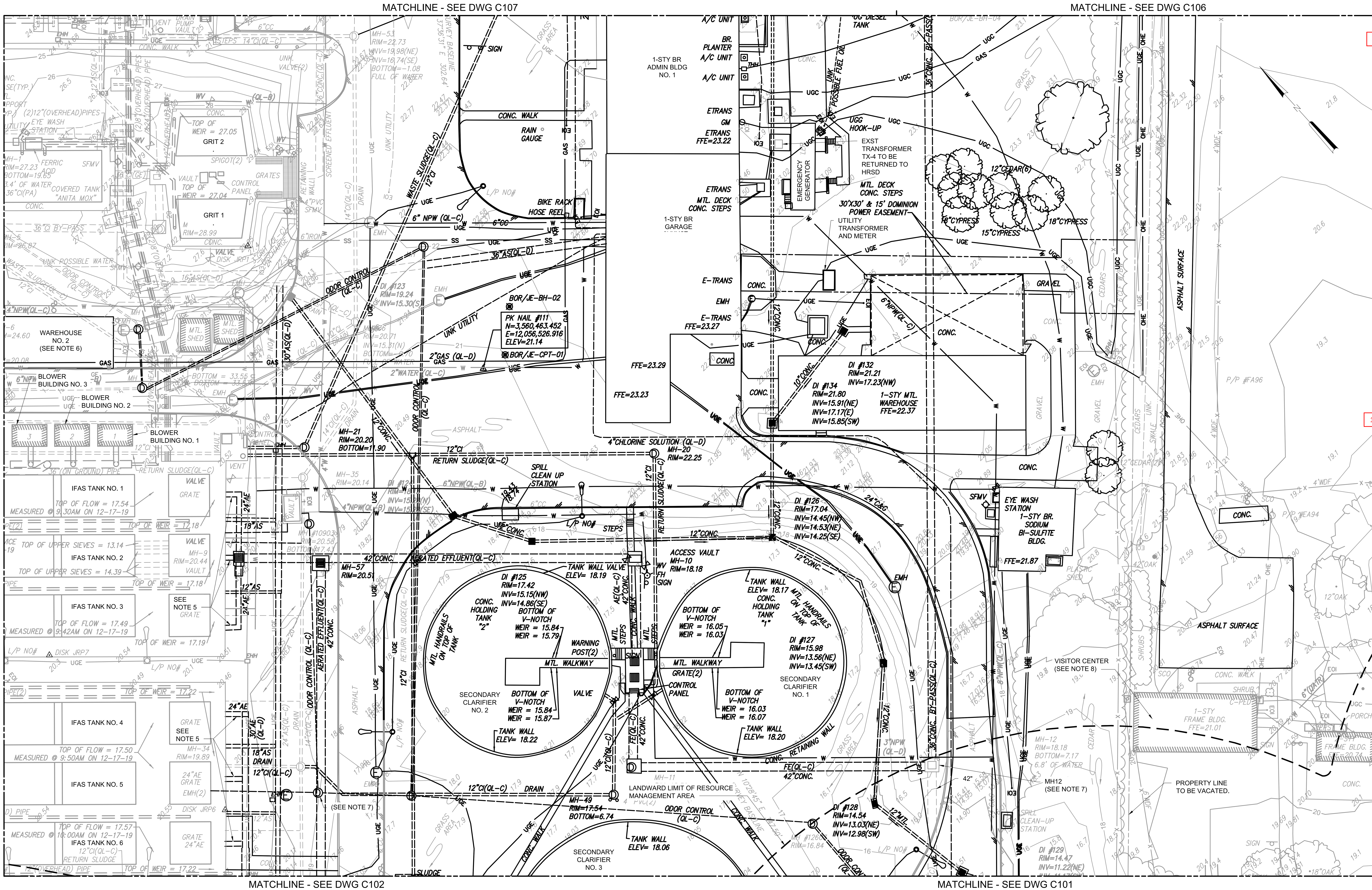
PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

JAMES RIVER TREATMENT PLANT
PARTIAL DEMO PLAN - AREA 3

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	C103



NOTES:

1. ~~FULL TONE LINES ARE USED TO DEPICT STRUCTURES OR FEATURES TO BE DEMOLISHED ON THIS DEMOLITION DRAWING.~~
2. EXISTING BURIED UTILITY INFORMATION SHOWN ON THIS DRAWING WAS COMPILED FROM RECORD DRAWINGS BUT SOME MINOR UTILITIES MAY BE MISSING. DESIGN-BUILDER SHALL VERIFY ALL EXISTING UTILITIES IN WORK AREAS AS PART OF THEIR DESIGN.
3. MAINTAIN STRUCTURES UNTIL NEW REPLACEMENT FACILITIES ARE ACCEPTED BY HRSD. COORDINATE REMOVAL OF FACILITIES TO MAINTAIN PLANT OPERATIONS AND MOPO CONSTRAINTS.
4. REROUTE EXISTING UTILITIES AS REQUIRED TO CONSTRUCT NEW FACILITIES AND MAINTAIN PLANT OPERATIONS.
5. AS PART OF CONSTRUCTING NEW IFAS EFFLUENT CHANNEL, REMOVE EACH EXISTING IFAS EFFLUENT PIPE AND ENLARGE WALL OPENING AS REQUIRED TO ACCOMMODATE NEW HYDRAULIC GRADE LINE AT PEAK WASTEWATER FLOW OF 57 MGD PLUS 16 MGD OF RAS. ALSO REPLACE EXISTING IFAS TANK DRAIN PLUG VALVE DURING THE SHUTDOWN.
6. DEMOLISH EXISTING WAREHOUSE 2'S SUPERSTRUCTURE WHILE MAINTAINING THE EXISTING BASE SLAB AND RETAINING WALL TO SUPPORT NEW ELECTRICAL BUILDING NO.2 AND TRANSFORMER PAD.
7. SEAL OPENINGS IN EXISTING MANHOLES TO REMAIN AFTER PIPES REMOVED.
8. CITY OF NEWPORT NEWS VISITORS CENTER TO REMAIN ACCESSIBLE.
9. THE EXACT LIMITS OF UTILITIES AND STRUCTURE TO BE DEMOLISHED SHALL BE COORDINATED AND COMPLETED BY THE DESIGN-BUILDER AS REQUIRED TO IMPLEMENT UPGRADES. REFER TO THE OVERALL SITE PLAN FOR NEW WORK TO BE COORDINATED WITH DEMOLITION WORK.

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

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PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

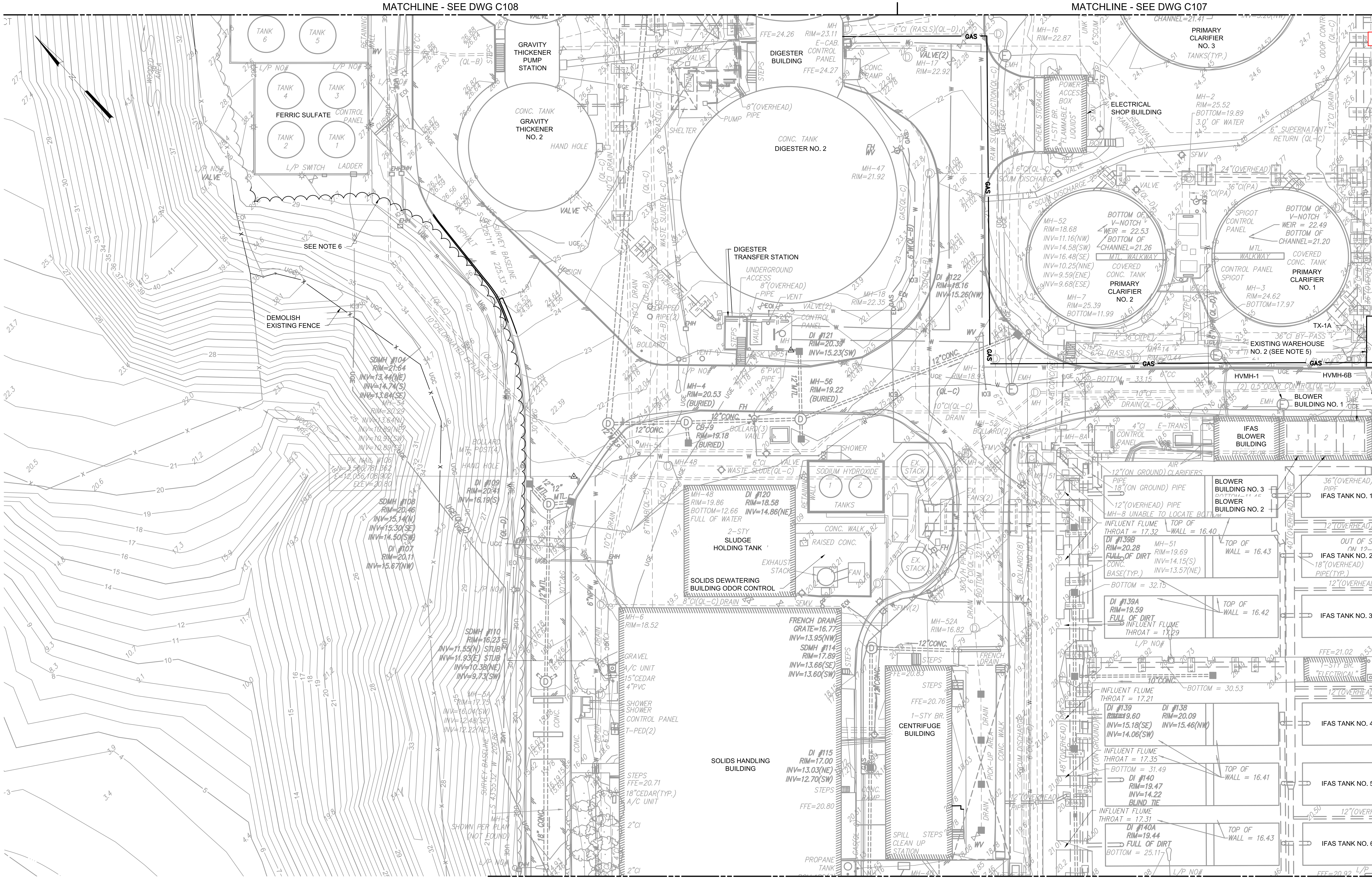
JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

JAMES RIVER TREATMENT PLANT
PARTIAL DEMO PLAN - AREA 4

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	C104

MATCHLINE - SEE DWG C108

MATCHLINE - SEE DWG C107



MATCHLINE - SEE DWG C104

MATCHLINE - SEE DWG C102

NOTES:

1. ~~FULL TONE LINES ARE USED TO DEPICT STRUCTURES OR FEATURES TO BE DEMOLISHED ON THIS DEMOLITION DRAWING.~~ 1
2. EXISTING BURIED UTILITY INFORMATION SHOWN ON THIS DRAWING WAS COMPILED FROM RECORD DRAWINGS BUT SOME MINOR UTILITIES MAY BE MISSING. DESIGN-BUILDER SHALL VERIFY ALL EXISTING UTILITIES IN WORK AREAS AS PART OF THEIR DESIGN.
3. MAINTAIN STRUCTURES UNTIL NEW REPLACEMENT FACILITIES ARE ACCEPTED BY HRSD. COORDINATE REMOVAL OF FACILITIES TO MAINTAIN PLANT OPERATIONS AND MOPO CONSTRAINTS.
4. REROUTE EXISTING UTILITIES AS REQUIRED TO CONSTRUCT NEW FACILITIES AND MAINTAIN PLANT OPERATIONS.
5. DEMOLISH EXISTING WAREHOUSE 2'S SUPERSTRUCTURE WHILE MAINTAINING THE EXISTING BASE SLAB AND RETAINING WALL TO SUPPORT NEW ELECTRICAL BUILDING NO.2 AND TRANSFORMER PAD.
6. TREELINE SHALL BE CLEARED AS NECESSARY FOR PROPOSED IMPROVEMENTS, TYPICAL AS NOTED ON DRAWINGS.
7. THE EXACT LIMITS OF UTILITIES AND STRUCTURE TO BE DEMOLISHED SHALL BE COORDINATED AND COMPLETED BY THE DESIGN-BUILDER AS REQUIRED TO IMPLEMENT UPGRADES. REFER TO THE OVERALL SITE PLAN FOR NEW WORK TO BE COORDINATED WITH DEMOLITION WORK.

1

SCALE: 1" = 20'

20 10 0 20'

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

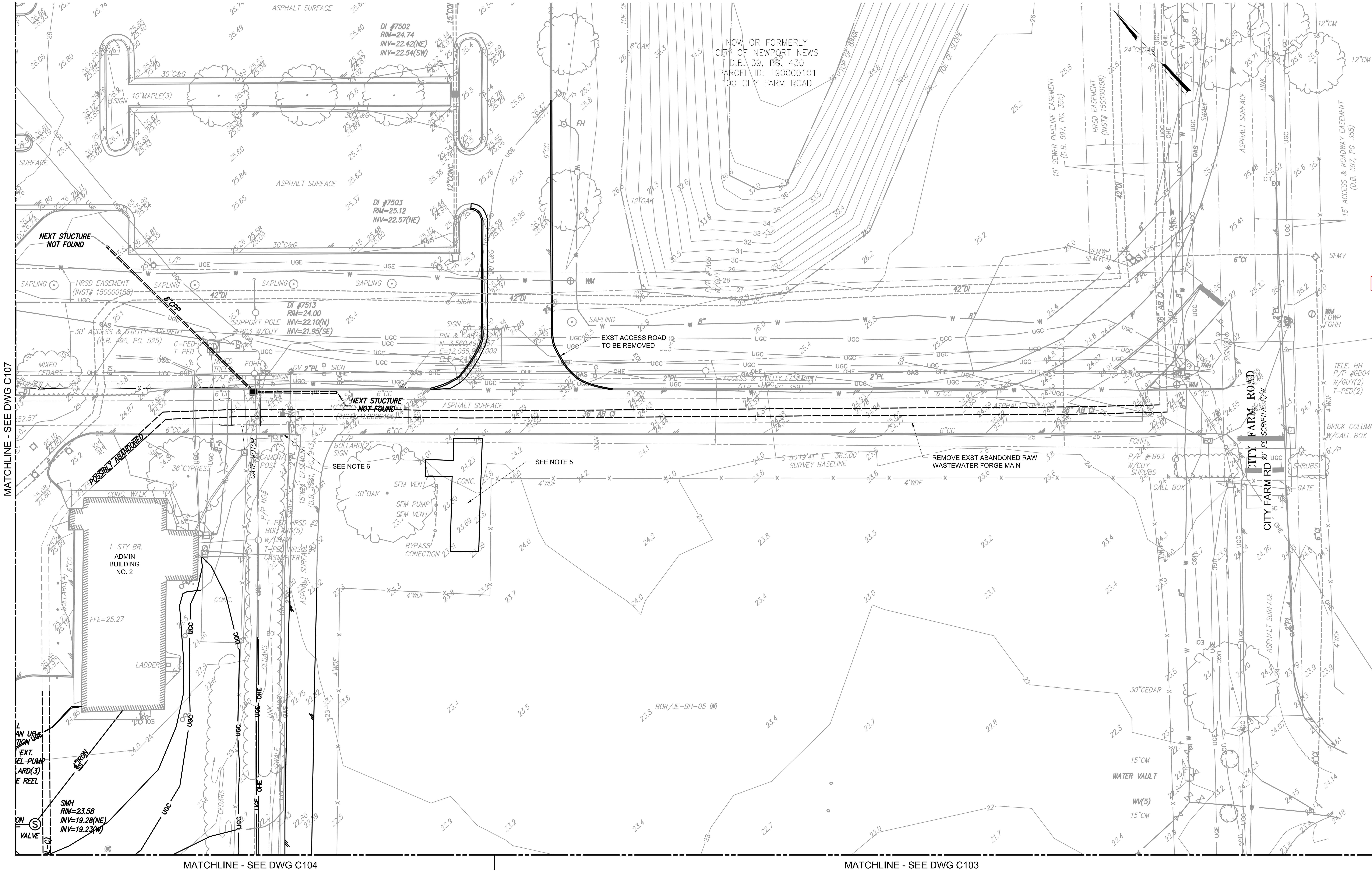
HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

JAMES RIVER TREATMENT PLANT
PARTIAL DEMO PLAN - AREA 5

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: C105

File: C:\BMS\HAZEN-PW\D0158606\C105 Saved by: I::at: ill Save date: 4/9/2020 10:07 PM PLOT DATE: 4/9/2020 11:54 AM BY: JBARNAK



NOTES:

1. ~~FULL TONE LINES ARE USED TO DEPICT STRUCTURES OR FEATURES TO BE DEMOLISHED ON THIS DEMOLITION DRAWING.~~
2. EXISTING BURIED UTILITY INFORMATION SHOWN ON THIS DRAWING WAS COMPILED FROM RECORD DRAWINGS BUT SOME MINOR UTILITIES MAY BE MISSING. DESIGN-BUILDER SHALL VERIFY ALL EXISTING UTILITIES IN WORK AREAS AS PART OF THEIR DESIGN.
3. MAINTAIN STRUCTURES UNTIL NEW REPLACEMENT FACILITIES ARE ACCEPTED BY HRSD. COORDINATE REMOVAL OF FACILITIES TO MAINTAIN PLANT OPERATIONS AND MOPO CONSTRAINTS.
4. REROUTE EXISTING UTILITIES AS REQUIRED TO CONSTRUCT NEW FACILITIES AND MAINTAIN PLANT OPERATIONS.
5. DEMOLISH EXISTING 10,000 GALLON UNDERGROUND WATER STORAGE TANK AND ASSOCIATED PIPING AND CONCRETE PADS AT GRADE.
6. REMOVE AND RELOCATE EXISTING CARD READER.
7. THE EXACT LIMITS OF UTILITIES AND STRUCTURE TO BE DEMOLISHED SHALL BE COORDINATED AND COMPLETED BY THE DESIGN-BUILDER AS REQUIRED TO IMPLEMENT UPGRADES. REFER TO THE OVERALL SITE PLAN FOR NEW WORK TO BE COORDINATED WITH DEMOLITION WORK.

SCALE: 1" = 20'

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

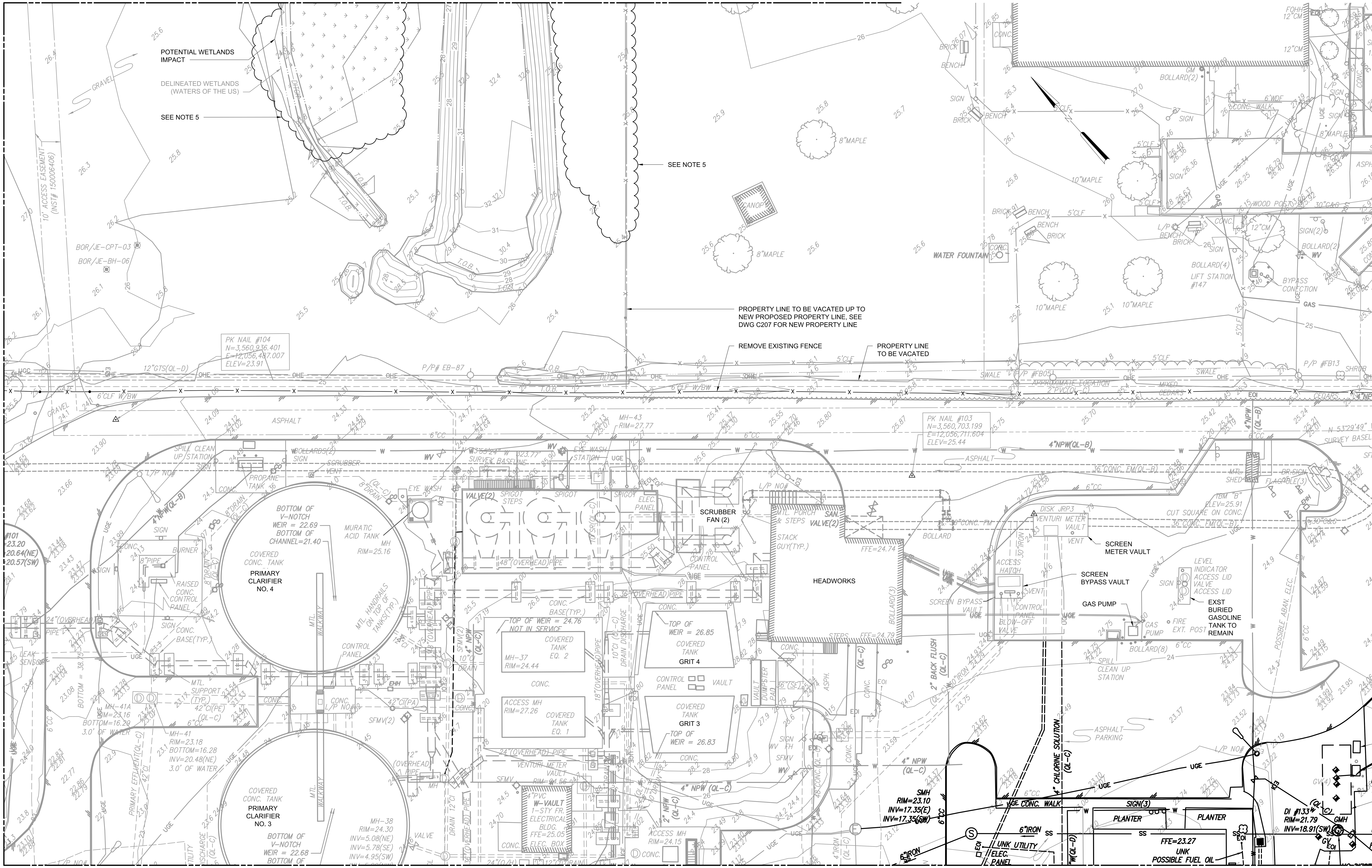
HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

JAMES RIVER TREATMENT PLANT
PARTIAL DEMO PLAN - AREA 6

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: C106

MATCHLINE - SEE DWG C109



MATCHLINE - SEE DWG C108

MATCHLINE - SEE DWG C106

MATCHLINE - SEE DWG C104

MATCHLINE - SEE DWG C105

NOTES:

1. ~~FULL TONE LINES ARE USED TO DEPICT STRUCTURES OR FEATURES TO BE DEMOLISHED ON THIS DEMOLITION DRAWING.~~ 1
2. EXISTING BURIED UTILITY INFORMATION SHOWN ON THIS DRAWING WAS COMPILED FROM RECORD DRAWINGS BUT SOME MINOR UTILITIES MAY BE MISSING. DESIGN-BUILDER SHALL VERIFY ALL EXISTING UTILITIES IN WORK AREAS AS PART OF THEIR DESIGN.
3. MAINTAIN STRUCTURES UNTIL NEW REPLACEMENT FACILITIES ARE ACCEPTED BY HRSD. COORDINATE REMOVAL OF FACILITIES TO MAINTAIN PLANT OPERATIONS AND MOPO CONSTRAINTS.
4. REROUTE EXISTING UTILITIES AS REQUIRED TO CONSTRUCT NEW FACILITIES AND MAINTAIN PLANT OPERATIONS.
5. TREELINE SHALL BE CLEARED AS NECESSARY FOR PROPOSED IMPROVEMENTS, TYPICAL AS NOTED ON DRAWINGS.
6. THE EXACT LIMITS OF UTILITIES AND STRUCTURE TO BE DEMOLISHED SHALL BE COORDINATED AND COMPLETED BY THE DESIGN-BUILDER AS REQUIRED TO IMPLEMENT UPGRADES. REFER TO THE OVERALL SITE PLAN FOR NEW WORK TO BE COORDINATED WITH DEMOLITION WORK. 1

SCALE: 1" = 20'

20 10 0 20'

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

SWIFT
PARTIAL DEMO PLAN - AREA 7

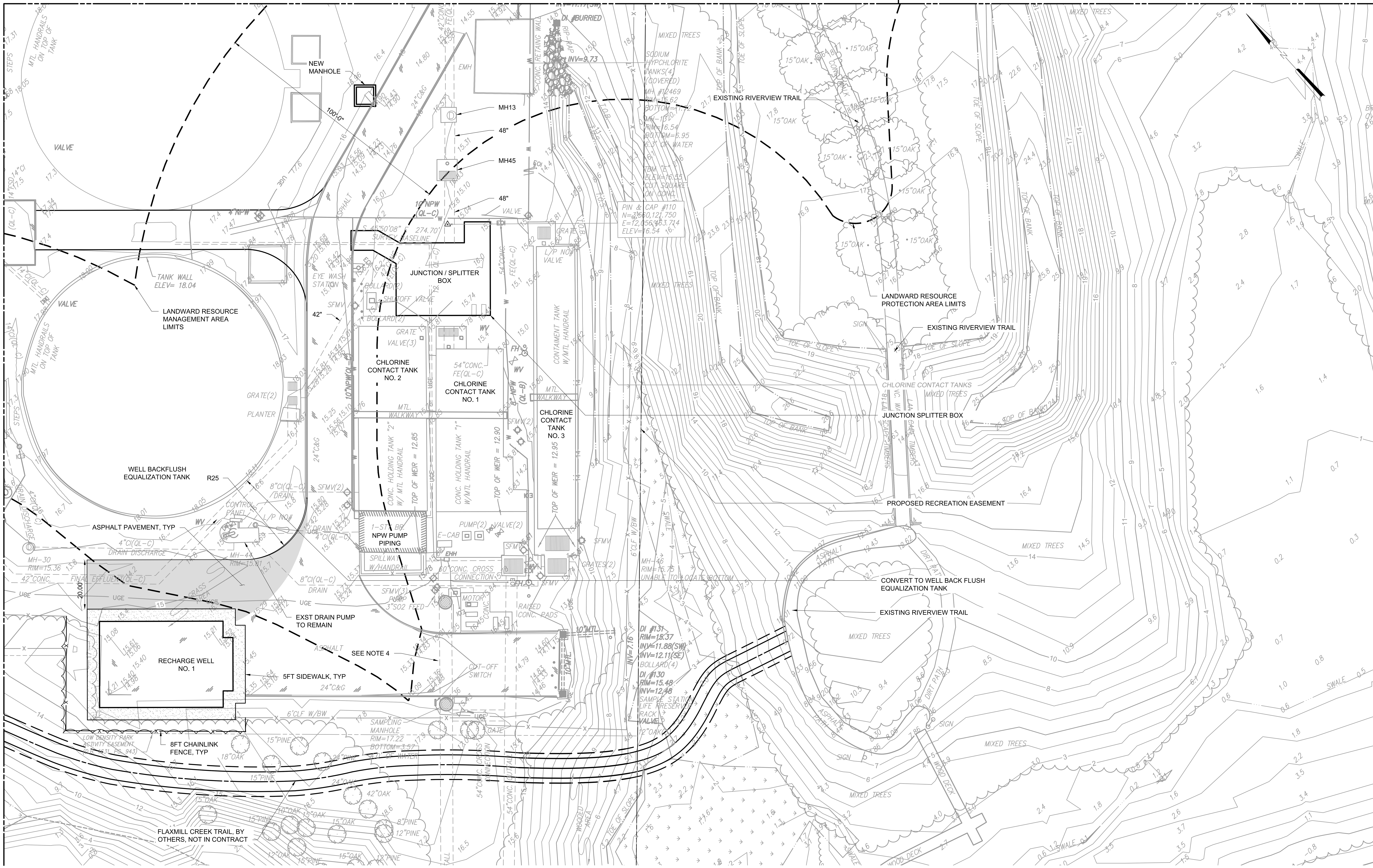
DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	C107

File: C:\BMS\HAZEN-PW\D0158696\C107 Saved by: ... Save date: 4/9/2020 10:16 PM
PLOT DATE: 4/9/2020 11:58 AM BY: JBARNAK

MATCHLINE - SEE DWG C204

MATCHLINE - SEE DWG C203

MATCHLINE - SEE DWG C202



NOTES:

1. MAINTAIN STRUCTURES UNTIL NEW REPLACEMENT FACILITIES ARE ACCEPTED BY HRSD. COORDINATE REMOVAL OF FACILITIES TO MAINTAIN PLANT OPERATIONS AND MOPO CONSTRAINTS.
2. STRUCTURES AND UTILITIES SHOWN FULL TONE REPRESENT NEW FACILITIES.
3. STRUCTURES AND UTILITIES SHOWN HALF TONE REPRESENT EXISTING FACILITIES TO REMAIN.
4. OUTFALL PIPING SHALL BE IMPROVED BY THE DESIGN BUILDER. REFER TO THE DIVISION 1 SUMMARY OF WORK.
5. SEE DRAWINGS C401-C406 FOR NEW YARD PIPING INFORMATION IN SECTORS 201-206.

1

6. Refer to the overall site plan for the revised arrangement of facilities.

SCALE: 1" = 20'

20 10 0 20'

REV	ISSUED FOR	DATE	BY
1	ANRI VE Alt N□. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

JAMES RIVER TREATMENT PLANT
PARTIAL SITE PLAN - AREA 1

DATE: 2020

PROJECT NO.: 32480

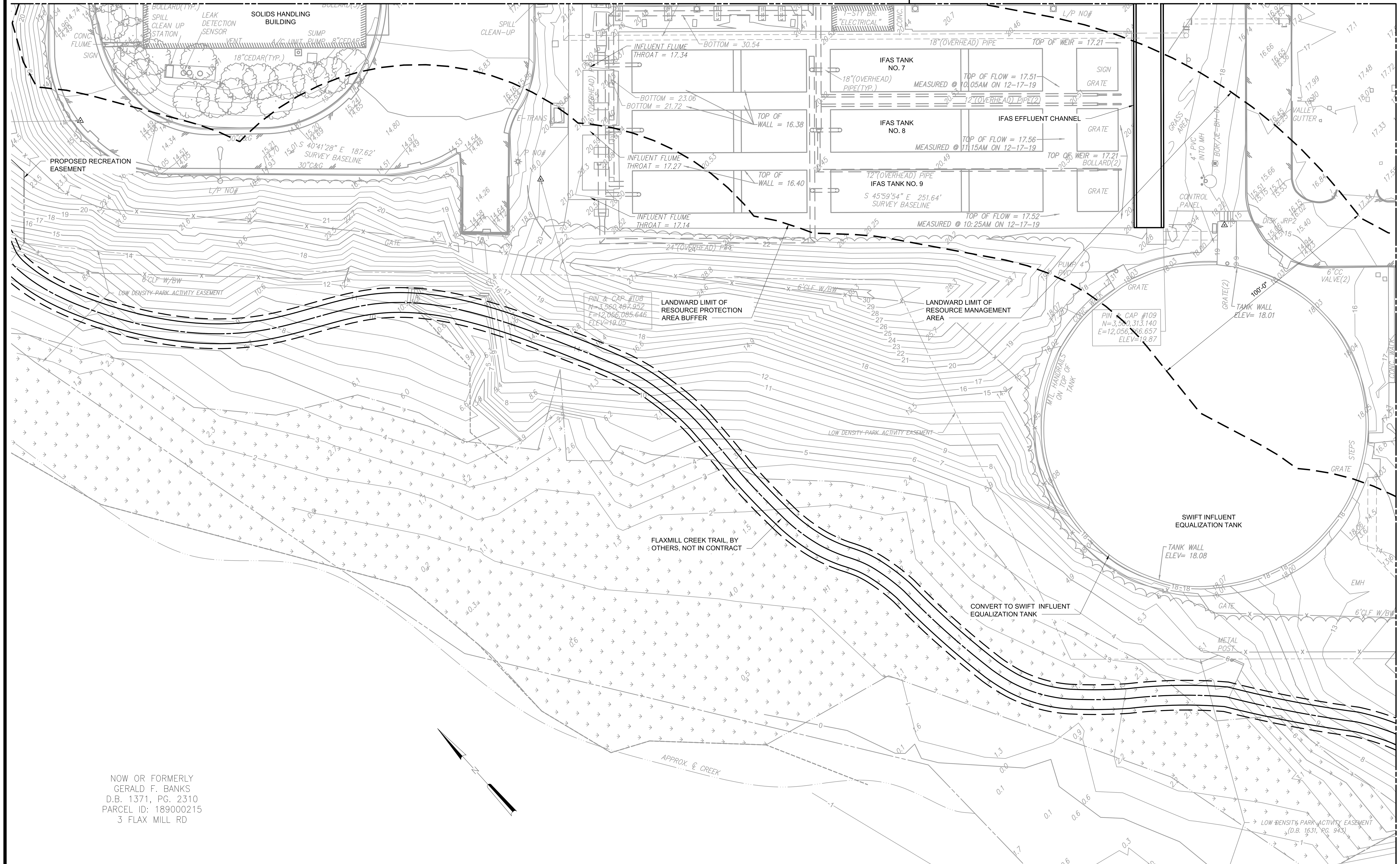
CONTRACT NO.: -

DRAWING NUMBER: C201

File: C:\BMS\HAZEN-PWD0158696\C201 Saved by lmacgill Save date: 4/8/2020 10:31 PM
PLOT DATE: 4/9/2020 12:13 PM BY: JBARNAK

MATCHLINE - SEE DWG C205

MATCHLINE - SEE DWG C204



MATCHLINE - SEE DWG C201

NOTES:

1. MAINTAIN STRUCTURES UNTIL NEW REPLACEMENT FACILITIES ARE ACCEPTED BY HRSD. COORDINATE REMOVAL OF FACILITIES TO MAINTAIN PLANT OPERATIONS AND MOPO CONSTRAINTS.
2. STRUCTURES AND UTILITIES SHOWN FULL TONE REPRESENT NEW FACILITIES.
3. STRUCTURES AND UTILITIES SHOWN HALF TONE REPRESENT EXISTING FACILITIES TO REMAIN.
4. SEE DRAWINGS C401-C406 FOR NEW YARD PIPING INFORMATION IN SECTORS 201-206.

1 5. Refer to the overall site plan for the revised arrangement of facilities.

SCALE: 1" = 20'

20 10 0 20'

REV	ISSUED FOR	DATE	BY
1	ANRI VE Alt N□ 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

JAMES RIVER TREATMENT PLANT PARTIAL SITE PLAN - AREA 2

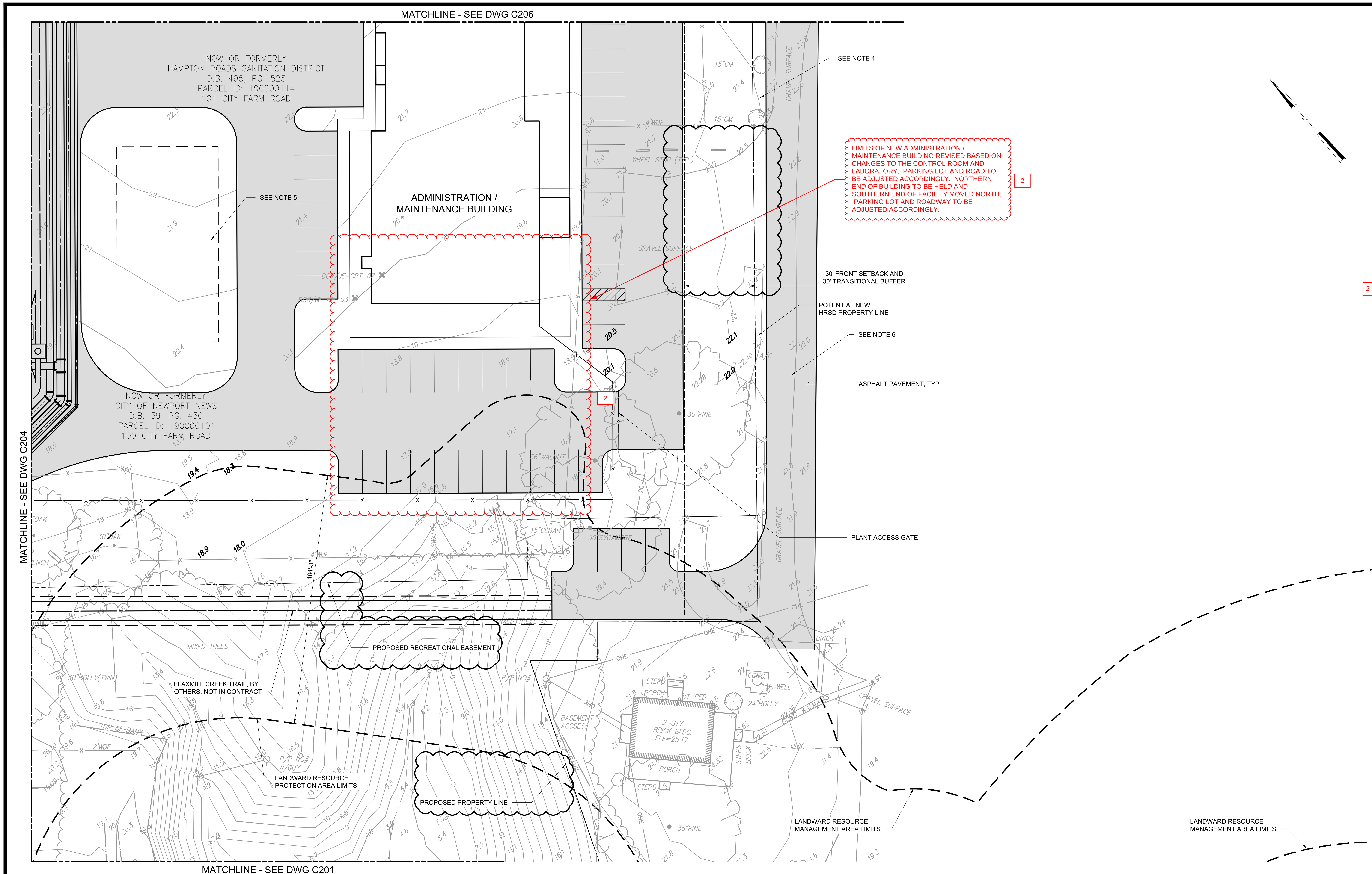
DATE: 2020

PROJECT NO.: 32480

CONTRACT NO.: -

DRAWING NUMBER: C202

File: C:\BMS\HAZEN-PW\D0158696\C202 Saved by Imagoff Save date: 4/8/2020 10:35 PM
PLOT DATE: 4/9/2020 12:16 PM BY: JBARNAK



NOTES:

1. BASE INFORMATION PER GIS AND AERIAL DATA. SURVEY PERFORMED IN THIS AREA NOT USED.
2. STRUCTURES AND UTILITIES SHOWN FULL TONE REPRESENT NEW FACILITIES.
3. STRUCTURES AND UTILITIES SHOWN HALF TONE REPRESENT EXISTING FACILITIES TO REMAIN.
4. REFER TO BODR FOR ALL LANDSCAPING REQUIREMENTS.
5. SPACE RESERVED FOR HRSD MAINTENANCE BUILDING NOT-IN-CONTRACT. THIS AREA IS AVAILABLE FOR DESIGN-BUILDER LAYDOWN.
6. THE DESIGN-BUILDER SHALL PROVIDE A TEMPORARY ROAD ON HRSD PROPERTY AS NECESSARY FOR PUBLIC ACCESS TO THE CITY'S VISITOR CENTER. THE DESIGN-BUILDER WITH AUTHORIZATION FROM HRSD SHALL IMPROVE CITY FARM ROAD THEN REMOVE THE TEMPORARY ACCESS ROAD ON HRSD PROPERTY. A CONSTRUCTION ENTRANCE FROM THE SECTION OF CITY FARM ROAD IS PROHIBITED.

2 7. Refer to the overall site plan for the revised arrangement of facilities.

1

SCALE: 1" = 20'

20 10 0 20'

REV	ISSUED FOR	DATE	BY
2	ANRI VE ALT NO. 4A	12/2020	US-A
1	ADDENDUM 3	6/19/2020	--
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

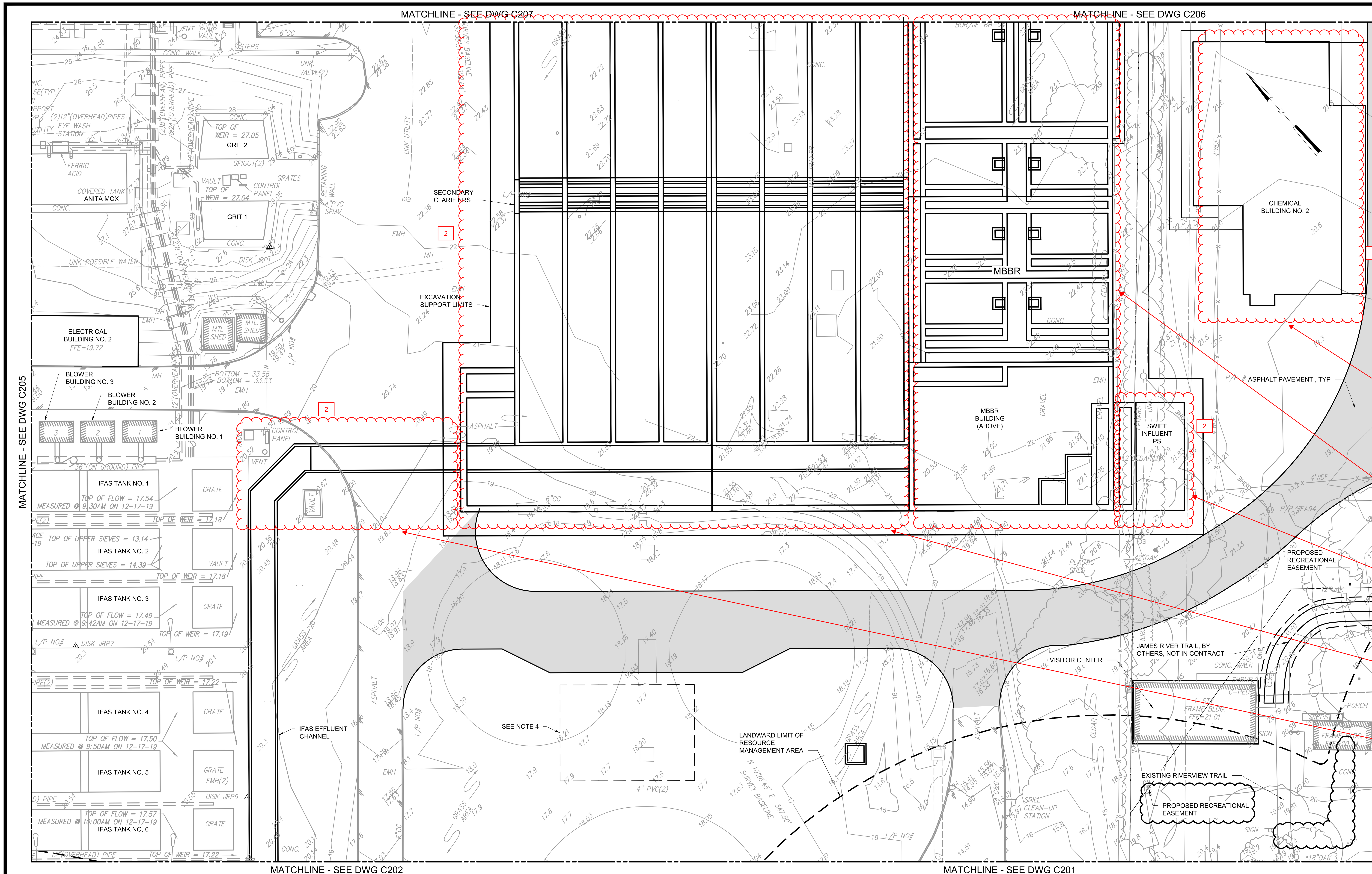
[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

JAMES RIVER TREATMENT PLANT
PARTIAL SITE PLAN - AREA 3

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: C203



NOTES:

1. MAINTAIN STRUCTURES UNTIL NEW REPLACEMENT FACILITIES ARE ACCEPTED BY HRSD. COORDINATE REMOVAL OF FACILITIES TO MAINTAIN PLANT OPERATIONS AND MOPO CONSTRAINTS.
2. STRUCTURES AND UTILITIES SHOWN FULL TONE REPRESENT NEW FACILITIES.
3. STRUCTURES AND UTILITIES SHOWN HALF TONE REPRESENT EXISTING FACILITIES TO REMAIN.
4. SPACE RESERVED FOR HRSD METHANOL BUILDING NOT-IN-CONTRACT. THIS AREA IS AVAILABLE FOR DESIGN-BUILDER LAYDOWN.
5. Refer to the overall site plan for the revised arrangement of facilities.

CHEMICAL BUILDING NO. 2 TO BE REMOVED FROM PROJECT. EXISTING SODIUM HYPOCHLORITE BUILDING AND SODIUM BISULFITE BUILDING ARE TO REMAIN. PHOSPHORIC ACID FOR THE MBBR TO BE MOVED TO SWIFT PROCESS BUILDING NO. 1 AND BE COMBINED WITH THE SYSTEM SERVING THE AWT SYSTEM.

MBBR TO BE RELOCATED TO SWIFT AREA ON PLANT SITE. SEE ATTACHED OVERALL SITE PLAN FOR ANRI VE ALT NO. 4A.

SWIFT INFLUENT PUMP STATION TO BE CHANGED TO THE MBBR INFLUENT PUMP STATION AND RELOCATED PER THE ATTACHED OVERALL SITE PLAN FOR ANRI VE ALT NO. 4A.

RECTANGULAR SECONDARY CLARIFIERS REPLACED WITH TWO CIRCULAR CLARIFIERS PER THE ATTACHED OVERALL SITE PLAN FOR ANRI VE ALT NO. 4A. ANRI VE ALT NO. 4A CONSISTS OF DEMOLISHING EXISTING SC NOS. 1 -4, REUSING EXISTING SC NO. 5 AND PROVIDING TWO NEW CIRCULAR CLARIFIERS.

LIMITS OF THE IFAS EFFLUENT CHANNEL ARE MODIFIED AS NEEDED TO ACCOMODATE THE CIRCULAR CLARIFIERS AS SHOWN ON THE ATTACHED OVERALL SITE PLAN FOR ANRI VE ALT NO. 4A.

SCALE: 1" = 20'

REV	ISSUED FOR	DATE	BY
2	ANRI VE ALT NO. 4A	12/2020	US-A
1	ADDENDUM 3	6/19/2020	--
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

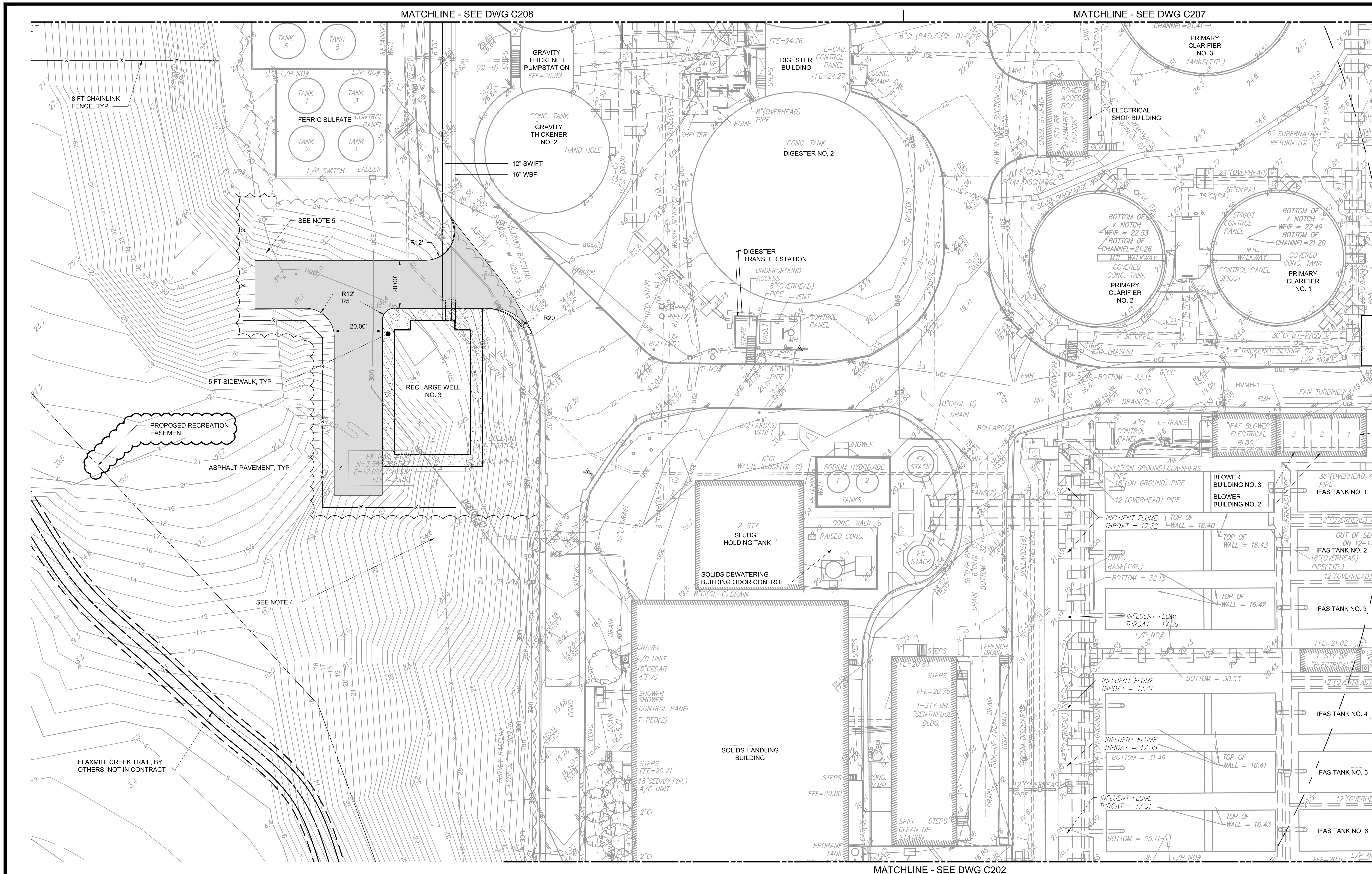
[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

JAMES RIVER TREATMENT PLANT
PARTIAL SITE PLAN - AREA 4

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: C204



NOTES:

1. MAINTAIN STRUCTURES UNTIL NEW REPLACEMENT FACILITIES ARE ACCEPTED BY HRSD. COORDINATE REMOVAL OF FACILITIES TO MAINTAIN PLANT OPERATIONS AND MOPO CONSTRAINTS.
2. STRUCTURES AND UTILITIES SHOWN FULL TONE REPRESENT NEW FACILITIES.
3. STRUCTURES AND UTILITIES SHOWN HALF TONE REPRESENT EXISTING FACILITIES TO REMAIN.
4. HISTORICAL ACCOUNTS INDICATE CONSTRUCTION-TYPE DEBRIS SUCH AS METAL, CONCRETE, 55-GALLON DRUMS AND SOIL WERE USED TO CONSTRUCT THE BERM. THE DESIGN-BUILDER SHALL INCLUDE THE COST OF REMOVAL IN THE PRICE PROPOSAL. REMOVE SECTION OF BERM TO AREA SOUTH OF RECHARGE WELL NO. 3 TO CONSTRUCT IMPROVEMENTS.
5. CONCRETE VAULT LOCATED IN THIS GENERAL VICINITY. HISTORICAL ACCOUNTS INDICATE THIS VAULT MAY HAVE BEEN PART OF FORMER POWER INFRASTRUCTURE THAT HAS SINCE BEEN ABANDONED.
6. Refer to the overall site plan for the revised arrangement of facilities.

2

1

SCALE: 1" = 20'

REV	ISSUED FOR	DATE	BY
2	ANRI VE Alt No. 4A	12/2020	USA
1	ADDENDUM 3	6/19/2020	--
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

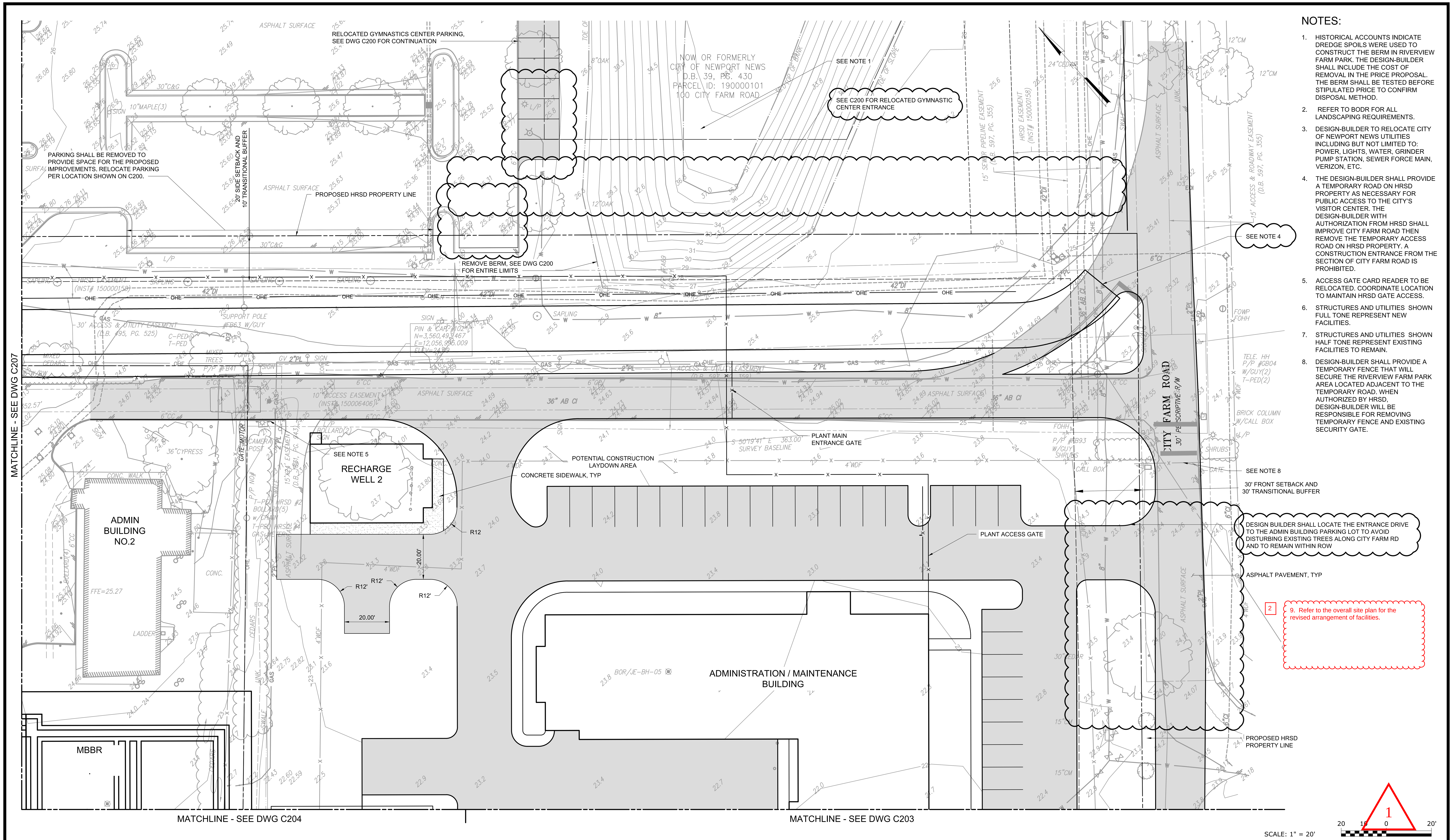
[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

JAMES RIVER TREATMENT PLANT
PARTIAL SITE PLAN - AREA 5

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	C205



NOTES:

1. HISTORICAL ACCOUNTS INDICATE DREDGE SPOILS WERE USED TO CONSTRUCT THE BERM IN RIVERVIEW FARM PARK. THE DESIGN-BUILDER SHALL INCLUDE THE COST OF REMOVAL IN THE PRICE PROPOSAL. THE BERM SHALL BE TESTED BEFORE STIPULATED PRICE TO CONFIRM DISPOSAL METHOD.
2. REFER TO BODR FOR ALL LANDSCAPING REQUIREMENTS.
3. DESIGN-BUILDER TO RELOCATE CITY OF NEWPORT NEWS UTILITIES INCLUDING BUT NOT LIMITED TO: POWER, LIGHTS, WATER, GRINDER PUMP STATION, SEWER FORCE MAIN, VERIZON, ETC.
4. THE DESIGN-BUILDER SHALL PROVIDE A TEMPORARY ROAD ON HRSD PROPERTY AS NECESSARY FOR PUBLIC ACCESS TO THE CITY'S VISITOR CENTER. THE DESIGN-BUILDER WITH AUTHORIZATION FROM HRSD SHALL IMPROVE CITY FARM ROAD THEN REMOVE THE TEMPORARY ACCESS ROAD ON HRSD PROPERTY. A CONSTRUCTION ENTRANCE FROM THE SECTION OF CITY FARM ROAD IS PROHIBITED.
5. ACCESS GATE CARD READER TO BE RELOCATED. COORDINATE LOCATION TO MAINTAIN HRSD GATE ACCESS.
6. STRUCTURES AND UTILITIES SHOWN FULL TONE REPRESENT NEW FACILITIES.
7. STRUCTURES AND UTILITIES SHOWN HALF TONE REPRESENT EXISTING FACILITIES TO REMAIN.
8. DESIGN-BUILDER SHALL PROVIDE A TEMPORARY FENCE THAT WILL SECURE THE RIVERVIEW FARM PARK AREA LOCATED ADJACENT TO THE TEMPORARY ROAD. WHEN AUTHORIZED BY HRSD, DESIGN-BUILDER WILL BE RESPONSIBLE FOR REMOVING TEMPORARY FENCE AND EXISTING SECURITY GATE.

REV	ISSUED FOR	DATE	BY
2	ANRI VE Alt N. 4A	12/2020	US-A
1	ADDENDUM 3	6/19/2020	--
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

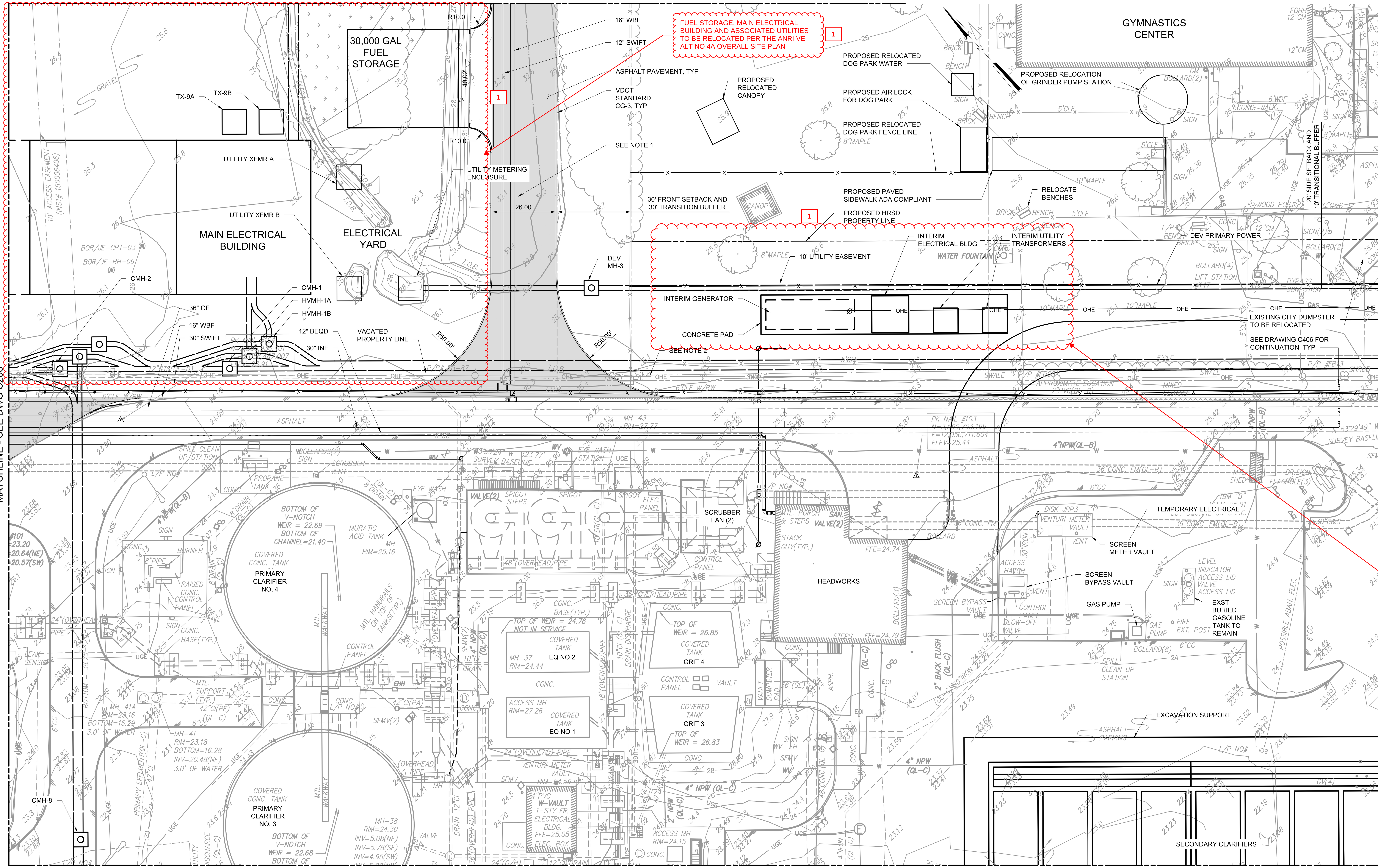
HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

JAMES RIVER TREATMENT PLANT
PARTIAL SITE PLAN - AREA 6

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: C206

MATCHLINE - SEE DWG C209



MATCHLINE - SEE DWG C208

MATCHLINE - SEE DWG C206

MATCHLINE - SEE DWG C204

MATCHLINE - SEE DWG C205

NOTES:

1. HISTORICAL ACCOUNTS INDICATE CONSTRUCTION-TYPE DEBRIS SUCH AS ASPHALT, CONCRETE, AND SOIL WERE USED TO CONSTRUCT THE BERM. THE DESIGN-BUILDER SHALL INCLUDE THE COST OF REMOVAL IN THE PRICE PROPOSAL.
2. EXISTING DRAINAGE FROM THE GYMNASTICS CENTER CONVEYED TO HRSD'S PROPERTY NEAR THIS LOCATION. DESIGN BUILDER SHALL ACCOUNT FOR THIS OFFSITE DRAINAGE.
3. DESIGN BUILDER SHALL COORDINATE LOCATION OF THE JRTP INTERIM DEV POWER.
4. REFER TO BODR FOR ALL LANDSCAPING REQUIREMENTS.
5. DESIGN-BULDER TO RELOCATE EXISTING DOG PARK/GYMNASTICS CENTER FEATURES INCLUDING WATER FOUNTAIN, CANOPY, BENCHES, DUMPSTER PAD, AND FENCING. FINAL LOCATIONS WILL BE COORDINATED WITH THE OWNER AND THE CITY OF NEWPORT NEWS.
6. DESIGN-BUILDER TO RELOCATE CITY OF NEWPORT NEWS UTILITIES INCLUDING BUT NOT LIMITED TO POWER, LIGHTS, WATER, GRINDER PUMP STATION, SEWER FORCE MAIN, VERIZON AND ETC.
7. MAINTAIN STRUCTURES UNTIL NEW REPLACEMENT FACILITIES ARE ACCEPTED BY HRSD. COORDINATE REMOVAL OF FACILITIES TO MAINTAIN PLANT OPERATIONS AND MOPO CONSTRAINTS.
8. STRUCTURES AND UTILITIES SHOWN FULL TONE REPRESENT NEW FACILITIES.
9. STRUCTURES AND UTILITIES SHOWN HALF TONE REPRESENT EXISTING FACILITIES TO REMAIN.
10. UTILITY ROUTING TO BE ADJUSTED TO ACCOMODATE THE FACILITY SITE LAYOUT CHANGES PER THE ATTACHED OVERALL SITE PLAN FOR VE ALT NO. 4A.

SCALE: 1" = 20'

20 10 0 20'

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

SWIFT
PARTIAL SITE PLAN - AREA 7

DATE: 2020

PROJECT NO.: 32480

CONTRACT NO.: -

DRAWING NUMBER: C207

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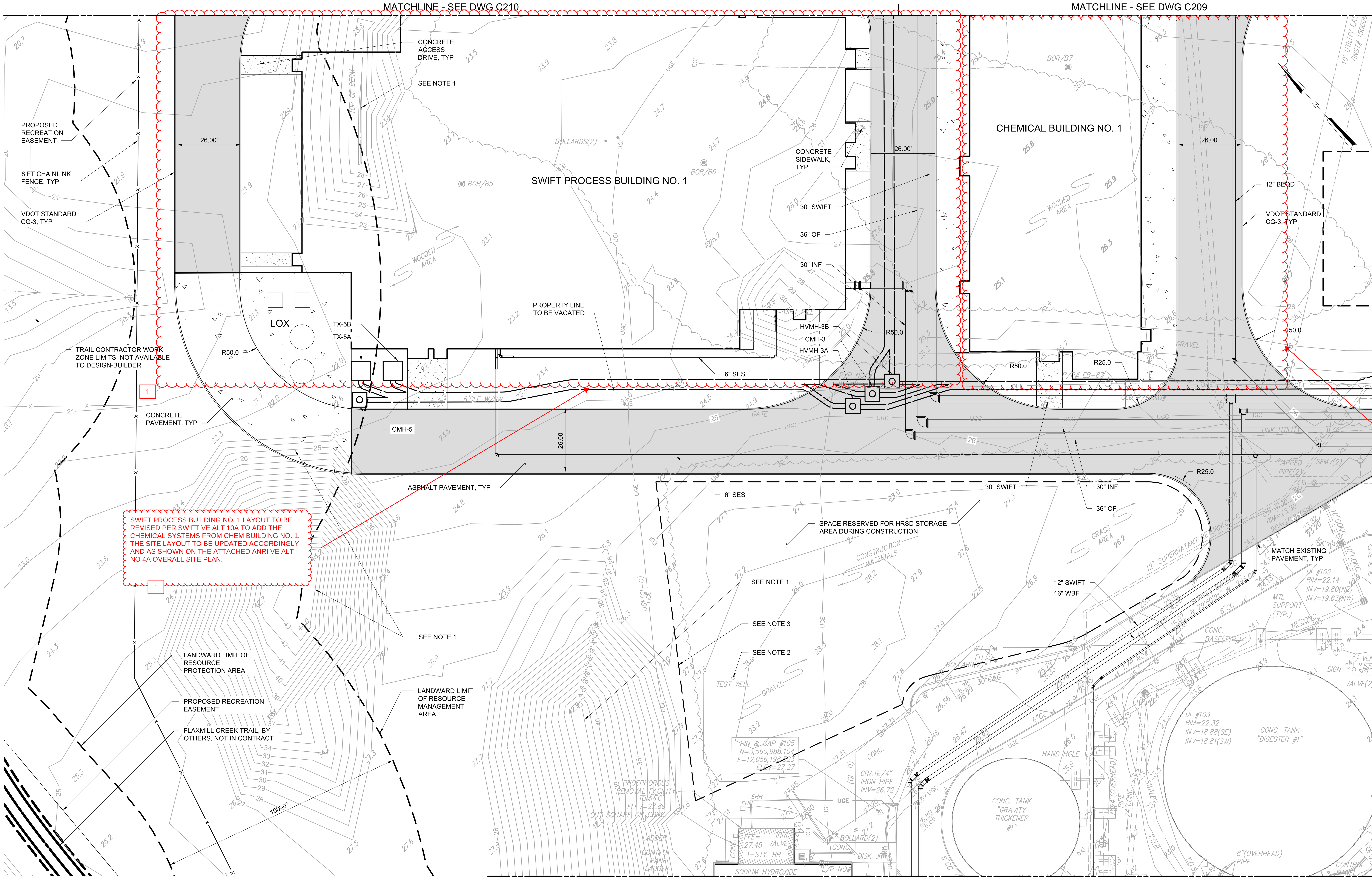
PLOT DATE: 4/9/2020 12:34 PM BY: JBARNAK



NOTES:

1. HISTORICAL ACCOUNTS INDICATE CONSTRUCTION-TYPE DEBRIS SUCH AS ASPHALT, CONCRETE, AND SOIL WERE USED TO CONSTRUCT THE BERM. THE DESIGN-BUILDER SHALL INCLUDE THE COST OF REMOVAL IN THE PRICE PROPOSAL.
2. EXISTING SWIFT TEST WELL, PROTECT DURING CONSTRUCTION.
3. SPACE RESERVED FOR HRSD ~~MAINTENANCE BUILDING, NOT IN CONTRACT.~~ SPACE RESERVED FOR HRSD DURING CONSTRUCTION. DESIGN-BUILDER SHALL MAINTAIN HRSD ACCESS DURING CONSTRUCTION. PROVIDE NEW WASTE OIL TANK FOR OWNER'S USAGE ADJACENT TO THE STORAGE AREA. FORMER TANK SHOWN ON DWG C101.
4. REFER TO BODR FOR ALL LANDSCAPING REQUIREMENTS.
5. UTILITY ROUTING TO BE ADJUSTED TO ACCOMODATE THE FACILITY SITE LAYOUT CHANGES PER THE ATTACHED OVERALL SITE PLAN FOR VE ALT NO. 4A.
6. Refer to the overall site plan for the revised arrangement of facilities.

SCALE: 1" = 20'

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A & SWIFT VE ALT NO. 10A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

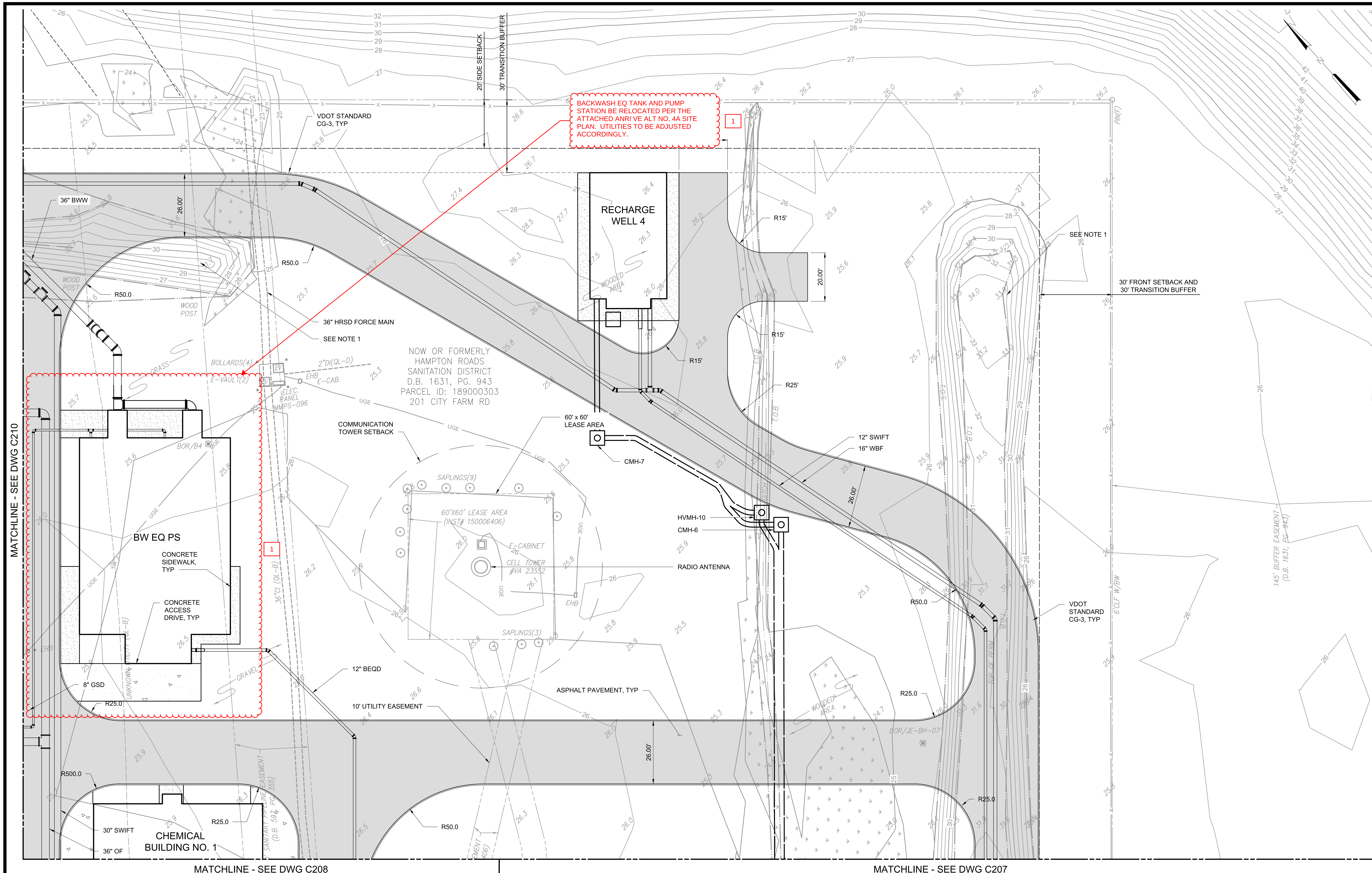
PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

SWIFT
PARTIAL SITE PLAN - AREA 8

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: C208



NOTES:

1. HISTORICAL ACCOUNTS INDICATE CONSTRUCTION-TYPE DEBRIS SUCH AS ASPHALT, CONCRETE, AND SOIL WERE USED TO CONSTRUCT THE BERM. THE DESIGN-BUILDER SHALL INCLUDE THE COST OF REMOVAL IN THE PRICE PROPOSAL.
2. REFER TO BODR FOR ALL LANDSCAPING REQUIREMENTS.
3. UTILITY ROUTING TO BE ADJUSTED TO ACCOMODATE THE FACILITY SITE LAYOUT CHANGES PER THE ATTACHED OVERALL SITE PLAN FOR VE ALT NO. 4A.

1

1 4. Refer to the overall site plan for the revised arrangement of facilities.

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A & SWIFT VE ALT NO. 10A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

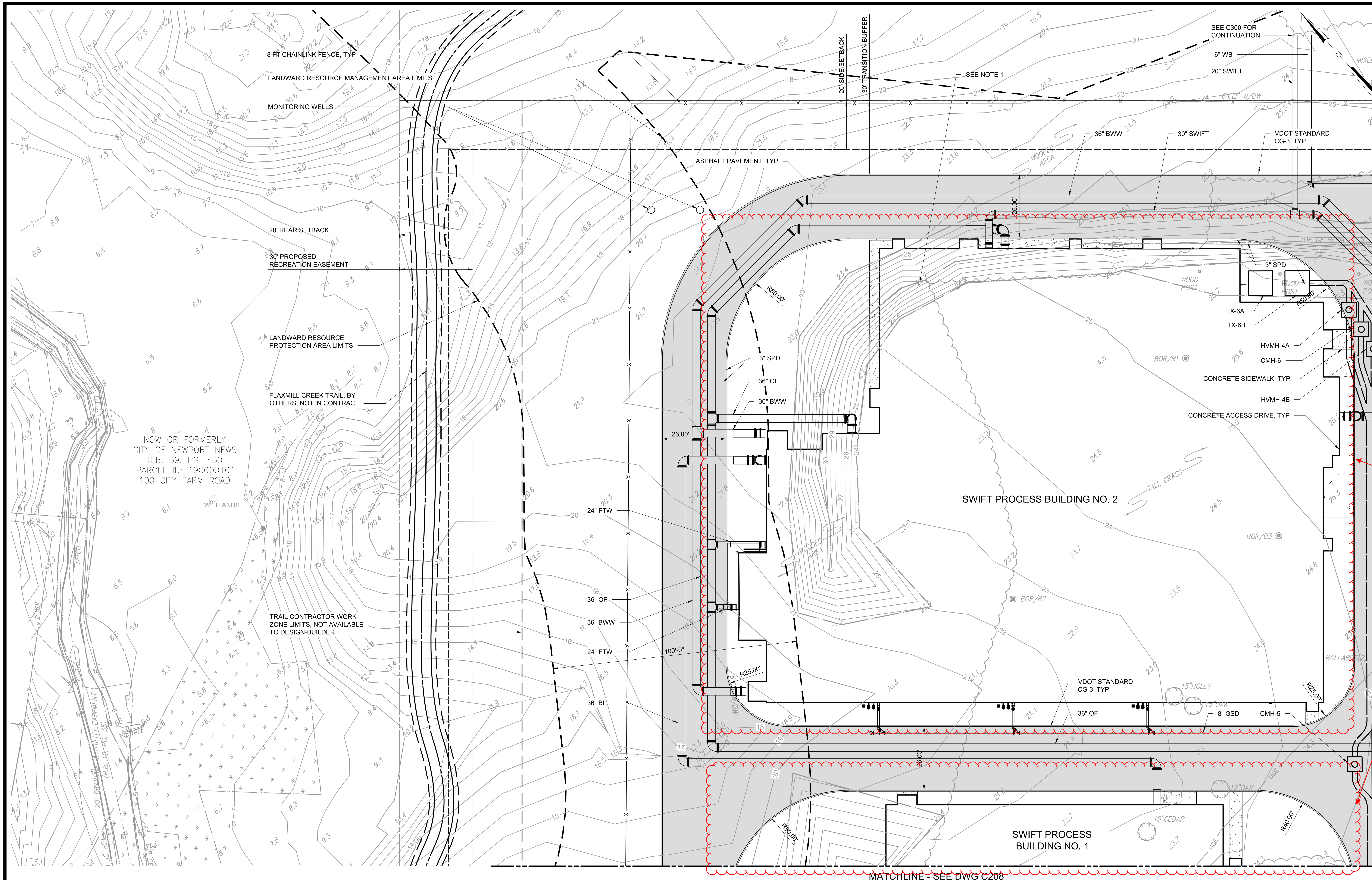
PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

SWIFT
PARTIAL SITE PLAN - AREA 9

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	C209



NOTES:

1. HISTORICAL ACCOUNTS INDICATE CONSTRUCTION-TYPE DEBRIS SUCH AS ASPHALT, CONCRETE, AND SOIL WERE USED TO CONSTRUCT THE BERM. THE DESIGN-BUILDER SHALL INCLUDE THE COST OF REMOVAL IN THE PRICE PROPOSAL.
2. REFER TO BODR FOR ALL LANDSCAPING REQUIREMENTS.
3. UTILITY ROUTING TO BE ADJUSTED TO ACCOMODATE THE FACILITY SITE LAYOUT CHANGES PER THE ATTACHED OVERALL SITE PLAN FOR VE ALT NO. 4A.
4. Refer to the overall site plan for the revised arrangement of facilities.

SCALE: 1" = 20'

REV	ISSUED FOR	DATE	BY
2	SWIFT VE ALT NO. 11A	12/2020	US-A
1	ANRI VE ALT NO. 4A & SWIFT VE ALT NO. 10A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

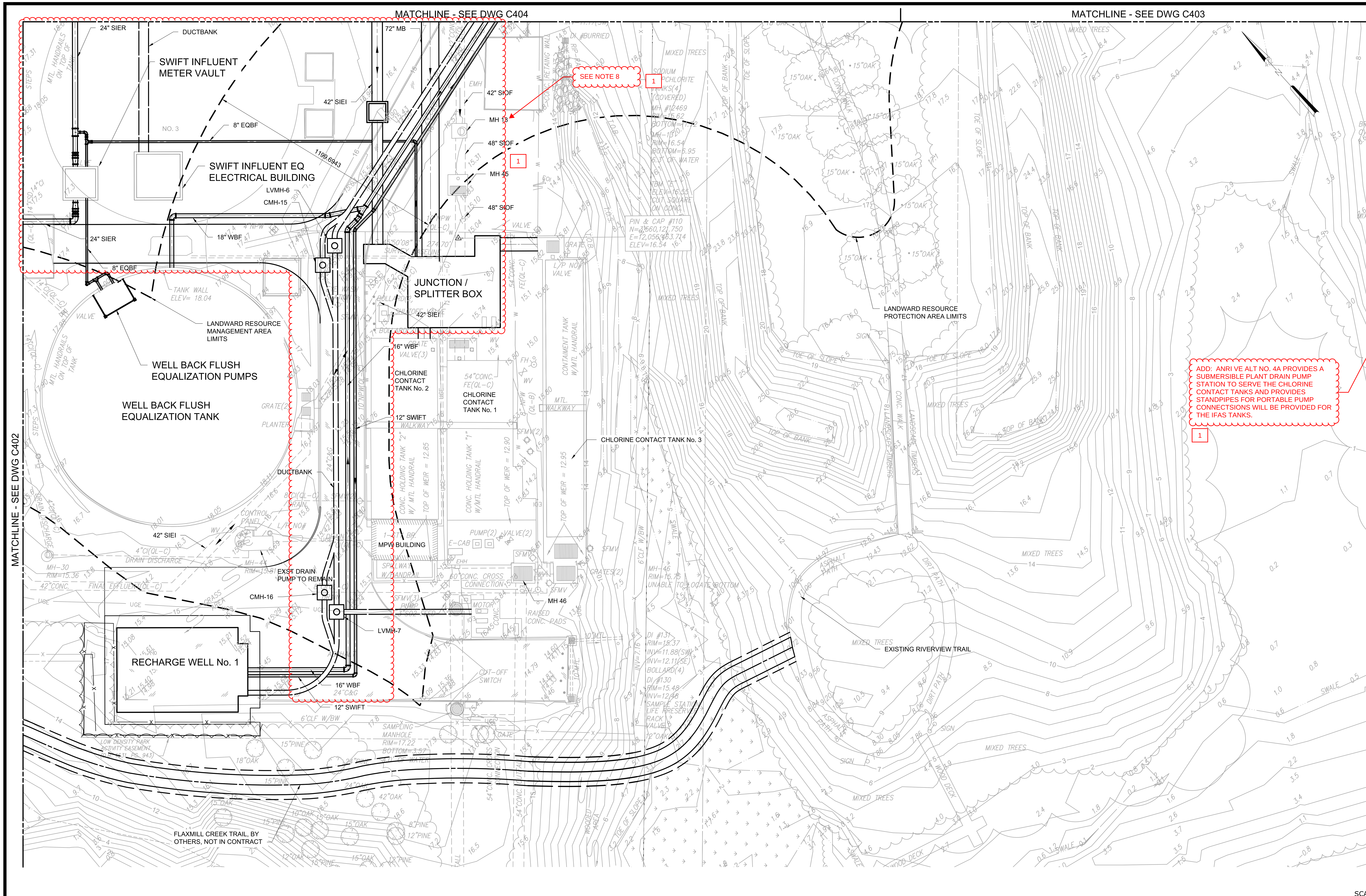
HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

SWIFT
PARTIAL SITE PLAN - AREA 10

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	C210

File: C:\BMS\HAZEN-PW\D0158696\C210 Saved by JBarnak Save date: 4/9/2020 1:56 PM
PLOT DATE: 4/9/2020 2:00 PM BY: JBARNAK



NOTES:

1. EXISTING BURIED UTILITY INFORMATION SHOWN ON THIS DRAWING WAS COMPILED FROM RECORD DRAWINGS BUT SOME MINOR UTILITIES MAY BE MISSING. DESIGN-BUILDER SHALL VERIFY ALL EXISTING UTILITIES IN WORK AREAS AS PART OF THEIR DESIGN.
2. MAINTAIN STRUCTURES UNTIL NEW REPLACEMENT FACILITIES ARE ACCEPTED BY HRSD. COORDINATE REMOVAL OF FACILITIES TO MAINTAIN PLANT OPERATIONS AND MOPO CONSTRAINTS.
3. REROUTE EXISTING UTILITIES AS REQUIRED TO CONSTRUCT NEW FACILITIES AND MAINTAIN PLANT OPERATIONS.
4. STRUCTURES AND UTILITIES SHOWN FULL TONE REPRESENT NEW FACILITIES.
5. STRUCTURES AND UTILITIES SHOWN HALF TONE REPRESENT EXISTING FACILITIES TO REMAIN.
6. PRELIMINARY DUCT BANK ROUTING MUST BE COORDINATED WITH EXISTING BURIED UTILITIES. DESIGN-BUILDER MAY RE-ROUTE DUCT BANK AS NECESSARY TO MINIMIZE CONFLICTS AND RELOCATIONS.
7. EVALUATE EXISTING PLANT DRAIN CAPACITY TO ACCOMMODATE ADDITION OF UTILITY TIE-INS AND IMPROVE AS NEEDED.
8. UNDERGROUND UTILITIES TO BE AS REQUIRED TO ACCOMODATE ANRI VE ALT NO. 4A. SEE ATTACHED ANRI VE ALT NO. 4A OVERALL SITE PLAN FOR FACILITY LOCATIONS AND ROUTING OF LARGE DIAMETER PIPING. FINAL ROUTING OF LARGE AND SMALL DIAMETER PIPING TO BE DEVELOPED BY DESIGN-BUILDER TO ACCOMODATE ADJACENT UTILITY AND FINAL STRUCTURE LOCATIONS.

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

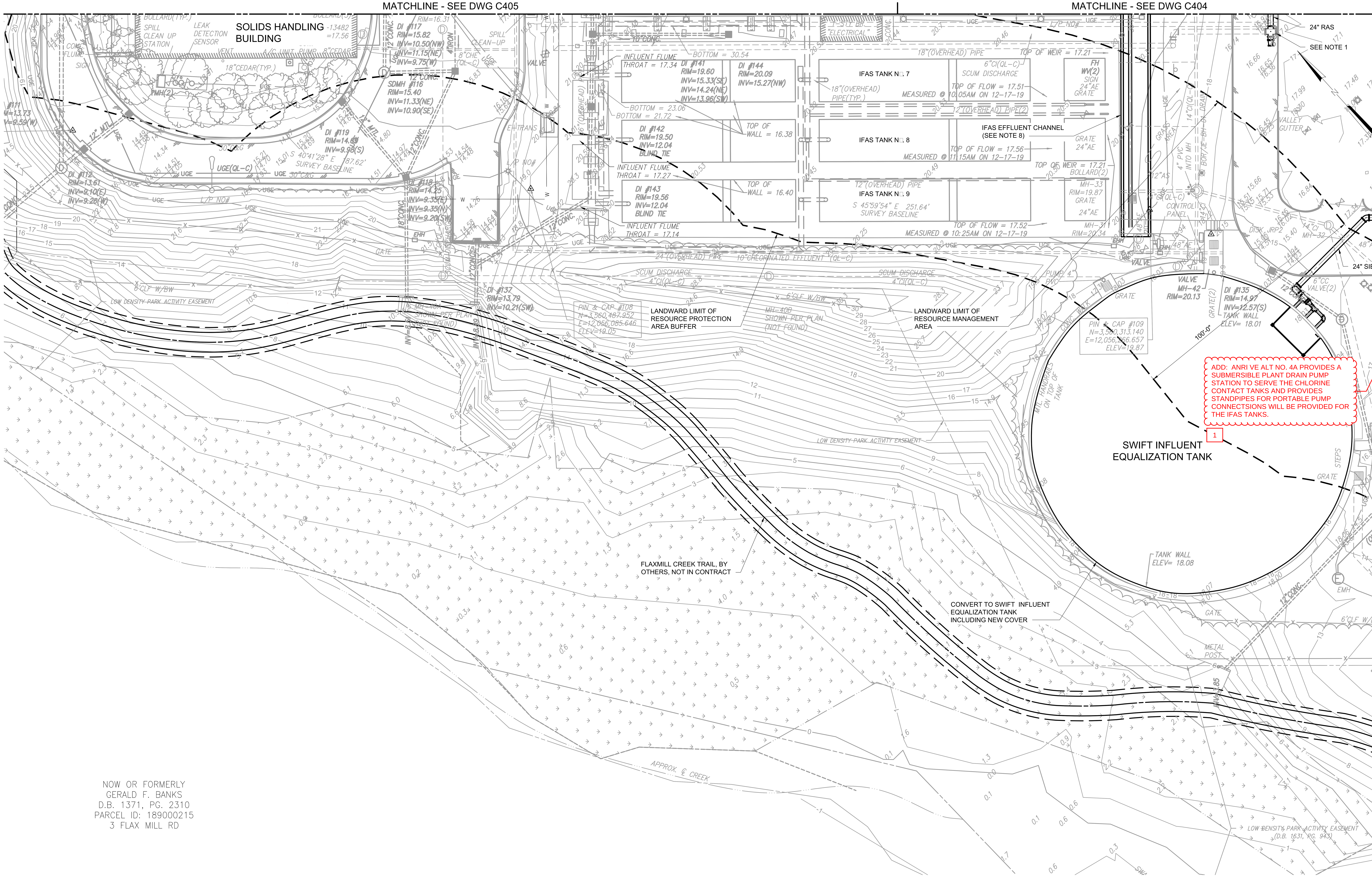
JAMES RIVER TREATMENT PLANT PARTIAL SITE PIPING AND ELECTRICAL PLAN - AREA 1

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	C401

File: C:\BMS\HAZEN-PW\D0158698\C401 Saved by Imaoglu Save date: 4/20/2020 11:00 AM
PLOT DATE: 4/20/2020 11:27 AM BY: EPAGSANJAN

MATCHLINE - SEE DWG C405

MATCHLINE - SEE DWG C404



MATCHLINE - SEE DWG C401

NOTES:

1. REPLACE CROSS WITH NEW 90-DEG ELBOW AFTER EXISTING SECONDARY CLARIFIERS AND ASSOCIATED SLUDGE PUMP STATIONS ARE REMOVED FROM SERVICE. COORDINATE WITH HRSD ON ACCEPTABLE RAS PUMP OUTAGE PERIOD.
2. EXISTING BURIED UTILITY INFORMATION SHOWN ON THIS DRAWING WAS COMPILED FROM RECORD DRAWINGS BUT SOME MINOR UTILITIES MAY BE MISSING. DESIGN-BUILDER SHALL VERIFY ALL EXISTING UTILITIES IN WORK AREAS AS PART OF THEIR DESIGN.
3. MAINTAIN STRUCTURES UNTIL NEW REPLACEMENT FACILITIES ARE ACCEPTED BY HRSD. COORDINATE REMOVAL OF FACILITIES TO MAINTAIN PLANT OPERATIONS AND MOPO CONSTRAINTS.
4. REROUTE EXISTING UTILITIES AS REQUIRED TO CONSTRUCT NEW FACILITIES AND MAINTAIN PLANT OPERATIONS.
5. STRUCTURES AND UTILITIES SHOWN FULL TONE REPRESENT NEW FACILITIES.
6. STRUCTURES AND UTILITIES SHOWN HALF TONE REPRESENT EXISTING FACILITIES TO REMAIN.
7. EVALUATE EXISTING PLANT DRAIN CAPACITY TO ACCOMMODATE ADDITION OF UTILITY TIE-INS AND IMPROVE AS NEEDED.
8. AS PART OF CONSTRUCTING NEW IFAS EFFLUENT CHANNEL, REMOVE EACH EXISTING IFAS EFFLUENT PIPE AND ENLARGE WALL OPENING AS REQUIRED TO ACCOMMODATE NEW HYDRAULIC GRADE LINE AT PEAK WASTEWATER FLOW OF 57 MGD PLUS 16 MGD OF RAS. ALSO REPLACE EXISTING IFAS TANK DRAIN PLUG VALVE DURING THE SHUTDOWN.
9. UNDERGROUND UTILITIES TO BE AS REQUIRED TO ACCOMODATE ANRI VE ALT NO. 4A. SEE ATTACHED ANRI VE ALT NO. 4A OVERALL SITE PLAN FOR FACILITY LOCATIONS AND ROUTING OF LARGE DIAMETER PIPING. FINAL ROUTING OF LARGE AND SMALL DIAMETER PIPING TO BE DEVELOPED BY DESIGN-BUILDER TO ACCOMODATE ADJACENT UTILITY AND FINAL STRUCTURE LOCATIONS.

1

SCALE: 1" = 20'

20 10 0 20'

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

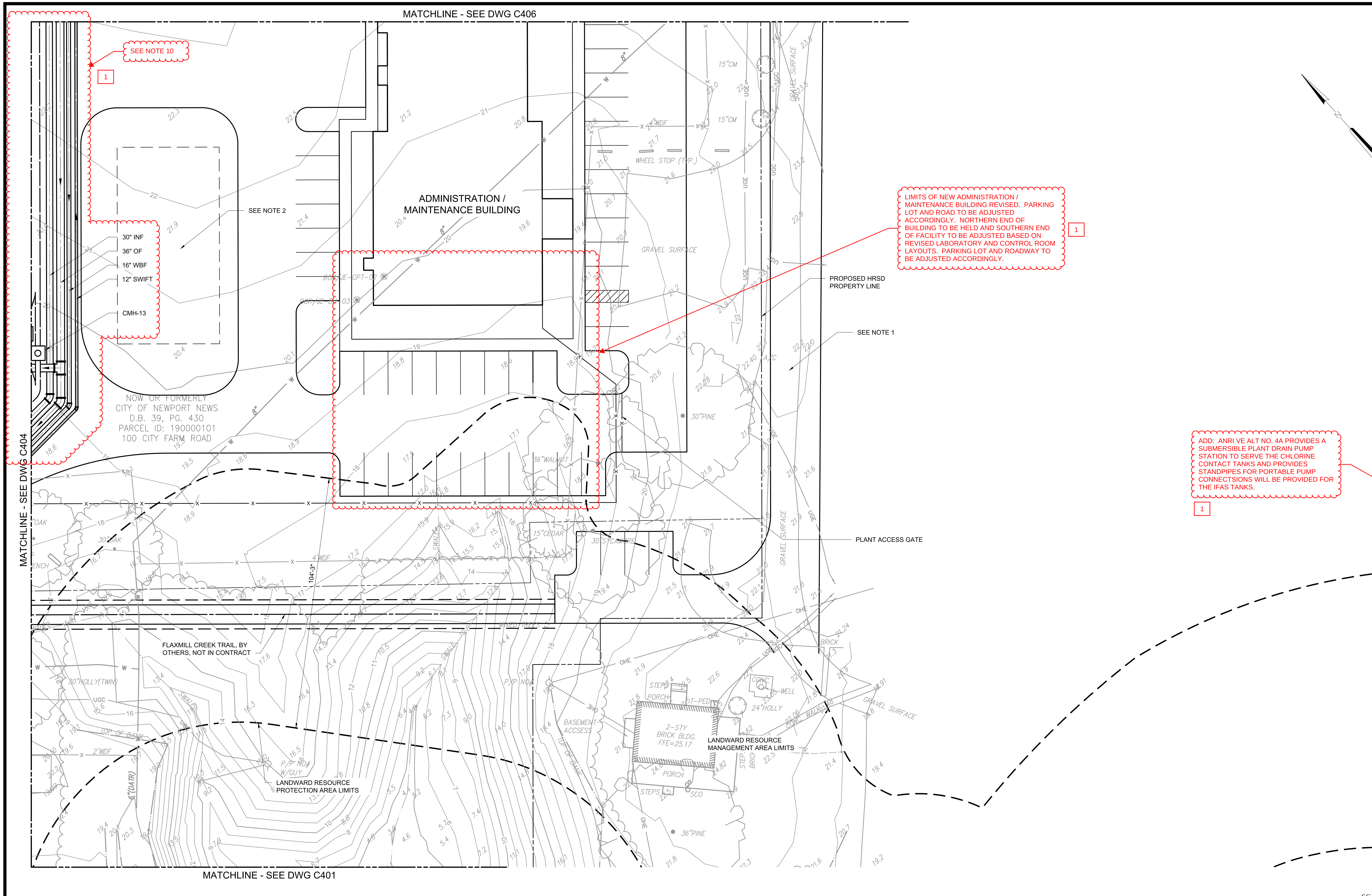
HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

JAMES RIVER TREATMENT PLANT
PARTIAL SITE PIPING AND ELECTRICAL PLAN - AREA 2

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	C402

File: C:\BMS\HAZEN-PW\D0158698\C402 Saved by Insegall Save date: 4/8/2020 10:23 PM
PLOT DATE: 4/9/2020 1:00 PM BY: JBARNAK



NOTES:

1. THE DESIGN-BUILDER SHALL PROVIDE A TEMPORARY ROAD ON HRSD PROPERTY AS NECESSARY FOR PUBLIC ACCESS TO THE CITY'S VISITOR CENTER. THE DESIGN-BUILDER WITH AUTHORIZATION FROM HRSD SHALL IMPROVE CITY FARM ROAD THEN REMOVE THE TEMPORARY ACCESS ROAD ON HRSD PROPERTY. A CONSTRUCTION ENTRANCE FROM THE SECTION OF CITY FARM ROAD IS PROHIBITED.
2. SPACE RESERVED FOR HRSD MAINTENANCE BUILDING NOT-IN-CONTRACT. THIS AREA IS AVAILABLE FOR DESIGN-BUILDER LAYDOWN.
3. EXISTING BURIED UTILITY INFORMATION SHOWN ON THIS DRAWING WAS COMPILED FROM RECORD DRAWINGS BUT SOME MINOR UTILITIES MAY BE MISSING. DESIGN-BUILDER SHALL VERIFY ALL EXISTING UTILITIES IN WORK AREAS AS PART OF THEIR DESIGN.
4. MAINTAIN STRUCTURES UNTIL NEW REPLACEMENT FACILITIES ARE ACCEPTED BY HRSD. COORDINATE REMOVAL OF FACILITIES TO MAINTAIN PLANT OPERATIONS AND MOPO CONSTRAINTS.
5. REROUTE EXISTING UTILITIES AS REQUIRED TO CONSTRUCT NEW FACILITIES AND MAINTAIN PLANT OPERATIONS.
6. STRUCTURES AND UTILITIES SHOWN FULL TONE REPRESENT NEW FACILITIES.
7. STRUCTURES AND UTILITIES SHOWN HALF TONE REPRESENT EXISTING FACILITIES TO REMAIN.
8. PRELIMINARY DUCT BANK ROUTING MUST BE COORDINATED WITH EXISTING BURIED UTILITIES. DESIGN-BUILDER MAY RE-ROUTE DUCT BANK AS NECESSARY TO MINIMIZE CONFLICTS AND RELOCATIONS.
9. EVALUATE EXISTING PLANT DRAIN CAPACITY TO ACCOMMODATE ADDITION OF UTILITY TIE-INS AND IMPROVE AS NEEDED.
10. UNDERGROUND UTILITIES TO BE AS REQUIRED TO ACCOMODATE ANRI VE ALT NO. 4A. SEE ATTACHED ANRI VE ALT NO. 4A OVERALL SITE PLAN FOR FACILITY LOCATIONS AND ROUTING OF LARGE DIAMETER PIPING. FINAL ROUTING OF LARGE AND SMALL DIAMETER PIPING TO BE DEVELOPED BY DESIGN-BUILDER TO ACCOMODATE ADJACENT UTILITY AND FINAL STRUCTURE LOCATIONS.

1

SCALE: 1" = 20'

20 10 0 20'

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

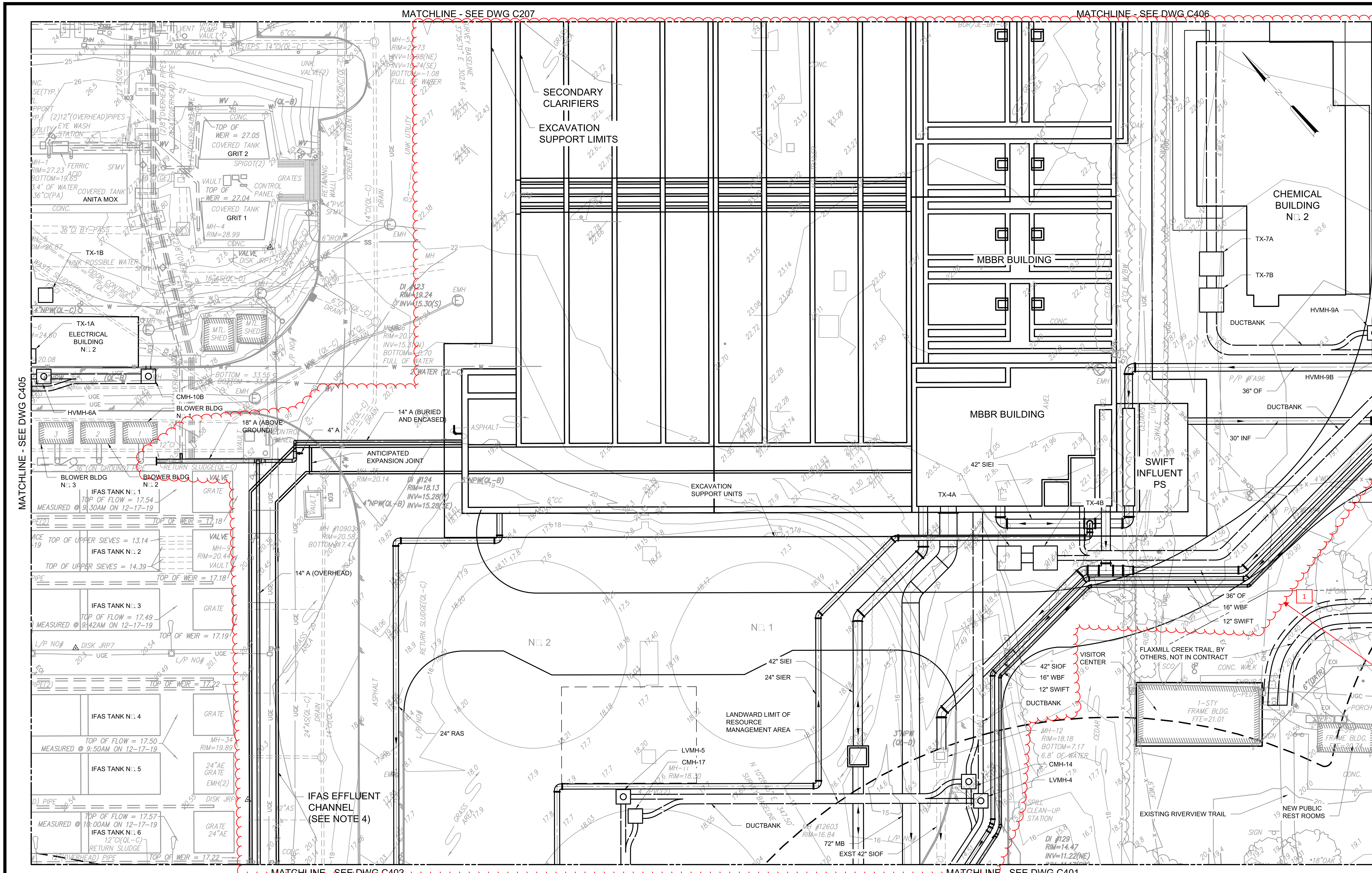
HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

JAMES RIVER TREATMENT PLANT PARTIAL SITE PIPING AND ELECTRICAL PLAN - AREA 3

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	C403

File: C:\BMS\HAZEN-PW\D0158690\C403 Saved by I: at: ill Save date: 4/9/2020 5:19 PM
PLOT DATE: 4/9/2020 1:04 PM BY: JBARNAK



NOTES:

1. EXISTING BURIED UTILITY INFORMATION SHOWN ON THIS DRAWING WAS COMPILED FROM RECORD DRAWINGS BUT SOME MINOR UTILITIES MAY BE MISSING. DESIGN-BUILDER SHALL VERIFY ALL EXISTING UTILITIES IN WORK AREAS AS PART OF THEIR DESIGN.
2. MAINTAIN STRUCTURES UNTIL NEW REPLACEMENT FACILITIES ARE ACCEPTED BY HRSD. COORDINATE REMOVAL OF FACILITIES TO MAINTAIN PLANT OPERATIONS AND MOPO CONSTRAINTS.
3. REROUTE EXISTING UTILITIES AS REQUIRED TO CONSTRUCT NEW FACILITIES AND MAINTAIN PLANT OPERATIONS.
4. AS PART OF CONSTRUCTING NEW IFAS EFFLUENT CHANNEL, REMOVE EACH EXISTING IFAS EFFLUENT PIPE AND ENLARGE WALL OPENING AS REQUIRED TO ACCOMMODATE NEW HYDRAULIC GRADE LINE AT PEAK WASTEWATER FLOW OF 57 MGD PLUS 16 MGD OF RAS. ALSO REPLACE EXISTING IFAS TANK DRAIN PLUG VALVE DURING THE SHUTDOWN.
5. PRELIMINARY DUCT BANK ROUTING MUST BE COORDINATED WITH EXISTING BURIED UTILITIES. DESIGN-BUILDER MAY RE-ROUTE DUCT BANK AS NECESSARY TO MINIMIZE CONFLICTS AND RELOCATIONS.
6. STRUCTURES AND UTILITIES SHOWN FULL TONE REPRESENT NEW FACILITIES.
7. STRUCTURES AND UTILITIES SHOWN HALF TONE REPRESENT EXISTING FACILITIES TO REMAIN.
8. EVALUATE EXISTING PLANT DRAIN CAPACITY TO ACCOMMODATE ADDITION OF UTILITY TIE-INS AND IMPROVE AS NEEDED.
9. UNDERGROUND UTILITIES TO BE AS REQUIRED TO ACCOMODATE ANRI VE ALT NO. 4A. SEE ATTACHED ANRI VE ALT NO. 4A OVERALL SITE PLAN FOR FACILITY LOCATIONS AND ROUTING OF LARGE DIAMETER PIPING. FINAL ROUTING OF LARGE AND SMALL DIAMETER PIPING TO BE DEVELOPED BY DESIGN-BUILDER TO ACCOMODATE ADJACENT UTILITY AND FINAL STRUCTURE LOCATIONS.

ADD: ANRI VE ALT NO. 4A PROVIDES A SUBMERSIBLE PLANT DRAIN PUMP STATION TO SERVE THE CHLORINE CONTACT TANKS AND PROVIDES STANDPIPES FOR PORTABLE PUMP CONNECTSIONS WILL BE PROVIDED FOR THE IFAS TANKS.

SCALE: 1" = 20'

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

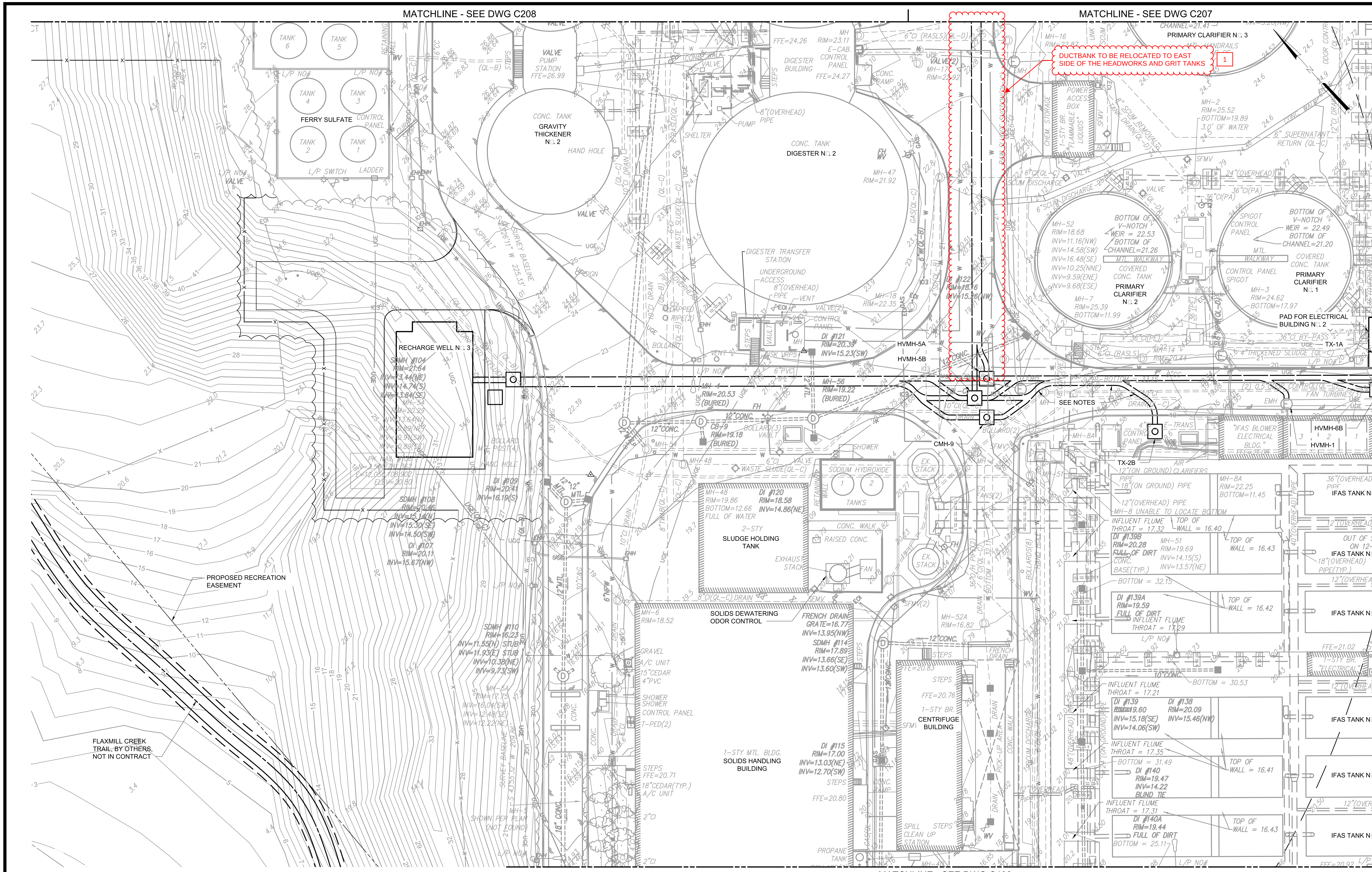
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

JAMES RIVER TREATMENT PLANT PARTIAL SITE PIPING AND ELECTRICAL PLAN - AREA 4

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	C404



NOTES:

1. EXISTING BURIED UTILITY INFORMATION SHOWN ON THIS DRAWING WAS COMPILED FROM RECORD DRAWINGS BUT SOME MINOR UTILITIES MAY BE MISSING. DESIGN-BUILDER SHALL VERIFY ALL EXISTING UTILITIES IN WORK AREAS AS PART OF THEIR DESIGN.
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3. REROUTE EXISTING UTILITIES AS REQUIRED TO CONSTRUCT NEW FACILITIES AND MAINTAIN PLANT OPERATIONS.
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8. UNDERGROUND UTILITIES TO BE AS REQUIRED TO ACCOMODATE ANRI VE ALT NO. 4A. SEE ATTACHED ANRI VE ALT NO. 4A OVERALL SITE PLAN FOR FACILITY LOCATIONS AND ROUTING OF LARGE DIAMETER PIPING. FINAL ROUTING OF LARGE AND SMALL DIAMETER PIPING TO BE DEVELOPED BY DESIGN-BUILDER TO ACCOMODATE ADJACENT UTILITY AND FINAL STRUCTURE LOCATIONS.

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

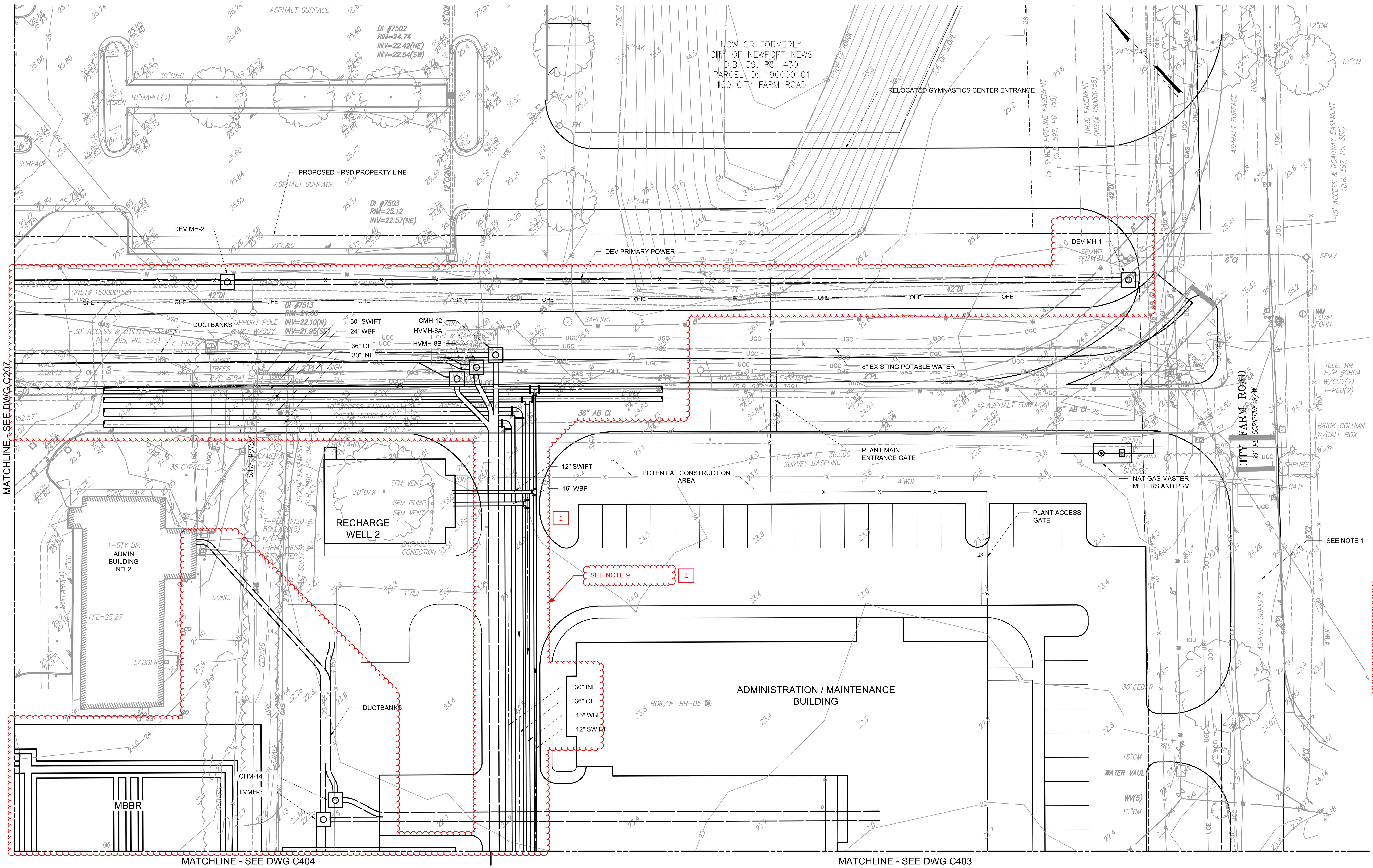
PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

JAMES RIVER TREATMENT PLANT PARTIAL SITE PIPING AND ELECTRICAL PLAN - AREA 5

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	C405



NOTES:

1. THE DESIGN-BUILDER SHALL PROVIDE A TEMPORARY ROAD ON HRSD PROPERTY AS NECESSARY FOR PUBLIC ACCESS TO THE CITY'S VISITOR CENTER. THE DESIGN-BUILDER WITH AUTHORIZATION FROM HRSD SHALL IMPROVE CITY FARM ROAD THEN REMOVE THE TEMPORARY ACCESS ROAD ON HRSD PROPERTY. A CONSTRUCTION ENTRANCE FROM THE SECTION OF CITY FARM ROAD IS PROHIBITED.
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8. EVALUATE EXISTING PLANT DRAIN CAPACITY TO ACCOMMODATE ADDITION OF UTILITY TIE-INS AND IMPROVE AS NEEDED.

1

ADD: ANRI VE ALT NO. 4A PROVIDES A SUBMERSIBLE PLANT DRAIN PUMP STATION TO SERVE THE CHLORINE CONTACT TANKS AND PROVIDES STANDPIPES FOR PORTABLE PUMP CONNECTIONS WILL BE PROVIDED FOR THE IFAS TANKS.

9. UNDERGROUND UTILITIES TO BE AS REQUIRED TO ACCOMODATE ANRI VE ALT NO. 4A. SEE ATTACHED ANRI VE ALT NO. 4A OVERALL SITE PLAN FOR FACILITY LOCATIONS AND ROUTING OF LARGE DIAMETER PIPING. FINAL ROUTING OF LARGE AND SMALL DIAMETER PIPING TO BE DEVELOPED BY DESIGN-BUILDER TO ACCOMODATE ADJACENT UTILITY AND FINAL STRUCTURE LOCATIONS.

1

SCALE: 1" = 20'

20 10 0 20'

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

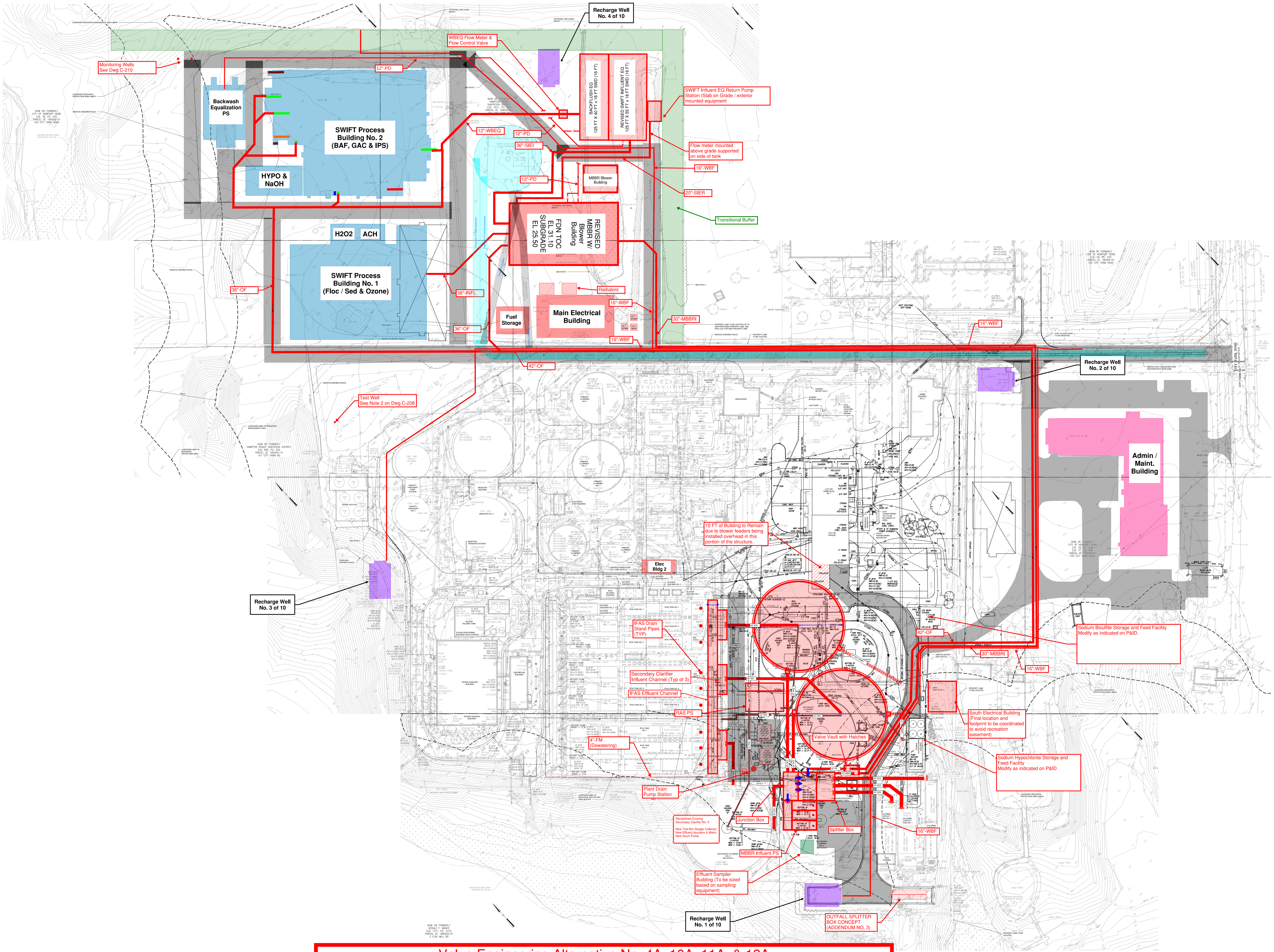
PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

JAMES RIVER TREATMENT PLANT
PARTIAL SITE PIPING AND ELECTRICAL PLAN - AREA 6

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	C406



Value Engineering Alternative No. 4A, 10A, 11A, & 12A
(2) New 130 FT Circular Secondary Clarifiers & Reuse of Existing SC No. 5
DRAWING C1000.02.01

LAYERED Background
SCALE 1" = 20 FT (Aprx)

Last Update: 3/7/2021

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

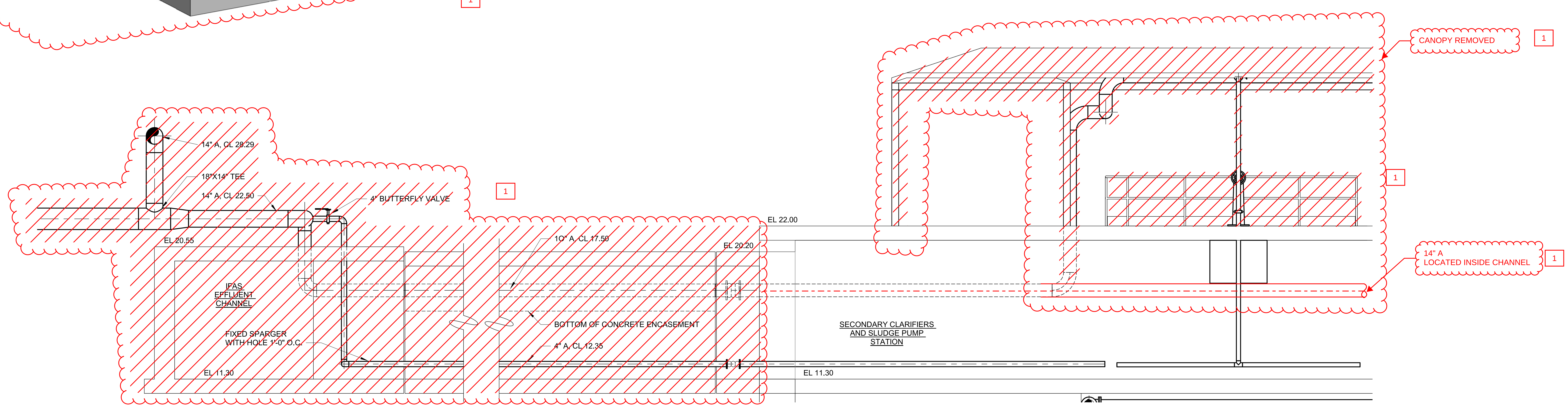
HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

IFAS EFFLUENT CHANNEL
MECHANICAL
PLAN AND SECTIONS

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: M1101

BIM 360://32480-001_HRSD James River Treatment Plant - SWIFT - WW/32480-002-1100-IEC-M.rvt
4/8/2020 7:06:47 PM



SECTION C
1/4" = 1'-0" M1101

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

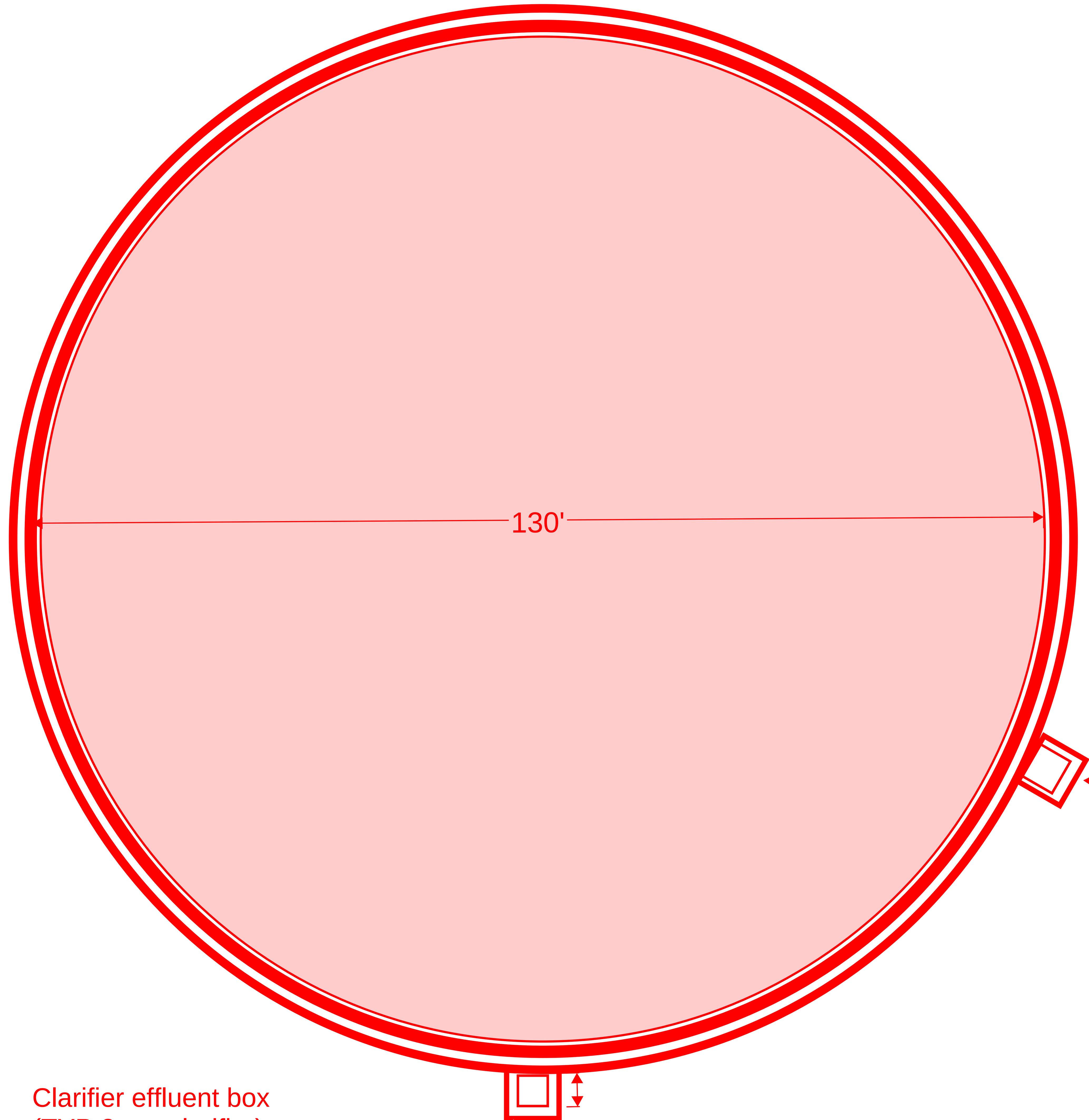
HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

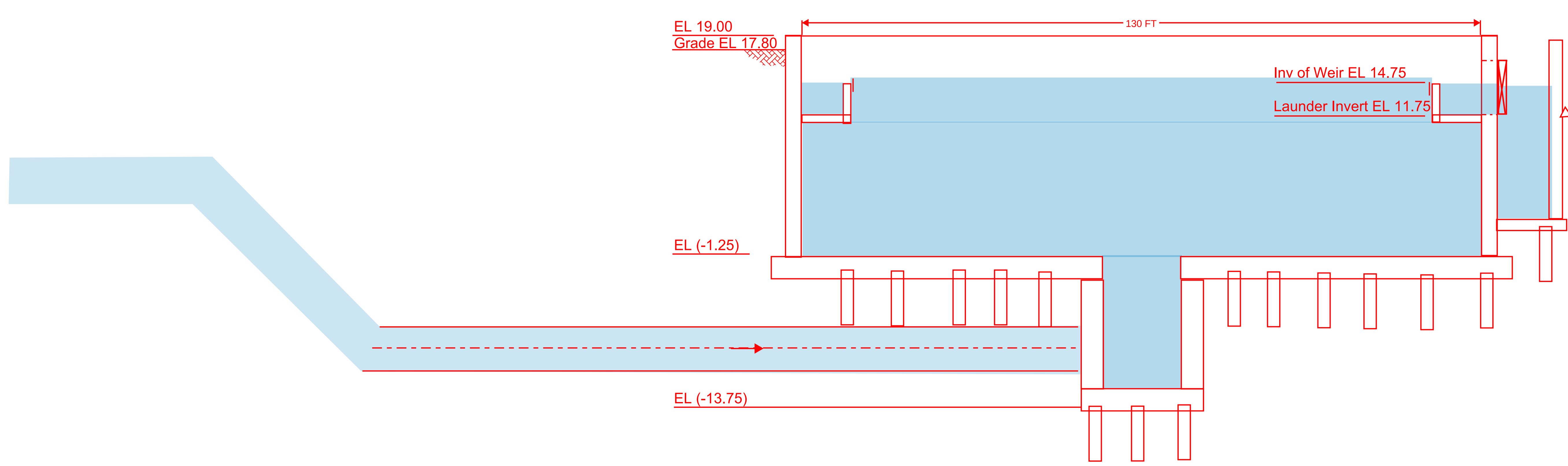
IFAS EFFLUENT CHANNEL MECHANICAL SECTION AND ISOMETRIC

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: M1102

BIM 360://32480-001_HRSD James River Treatment Plant - SWIFT - WW/32480-002-1100-IEC-M.rvt
4/8/2020 7:07:24 PM



130' Secondary Clarifier



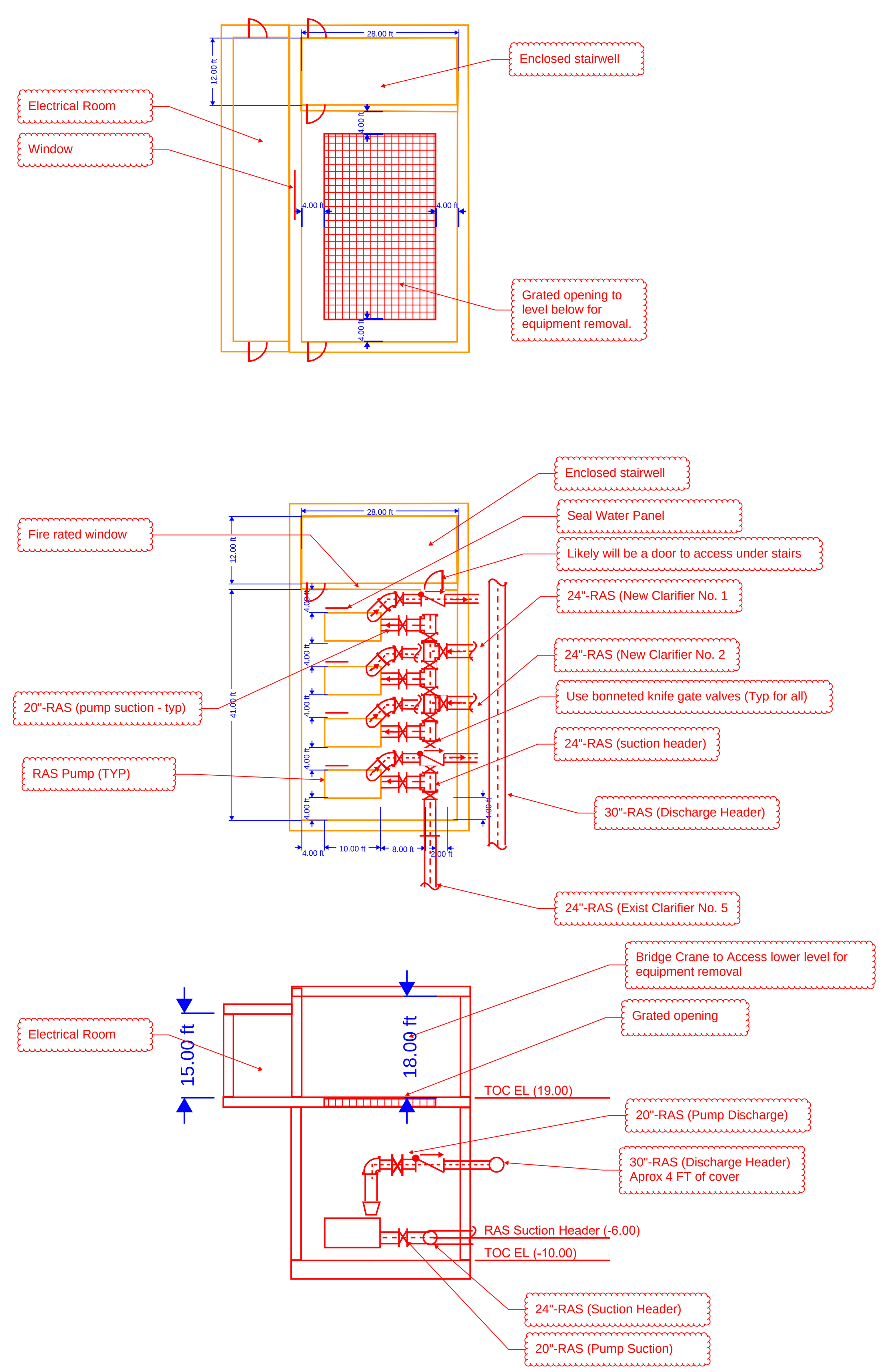
CIRCULAR SECONDARY CLARIFIERS
PLAN AND SECTION
(2) 130 FT DIAMETER CLARIFIERS
ANRI VE ALT NO. 4A

DRAWING M1200.02.01

REVISIONS

0	ANRI VE ALT NO. 4A	12/2020	US-A

0



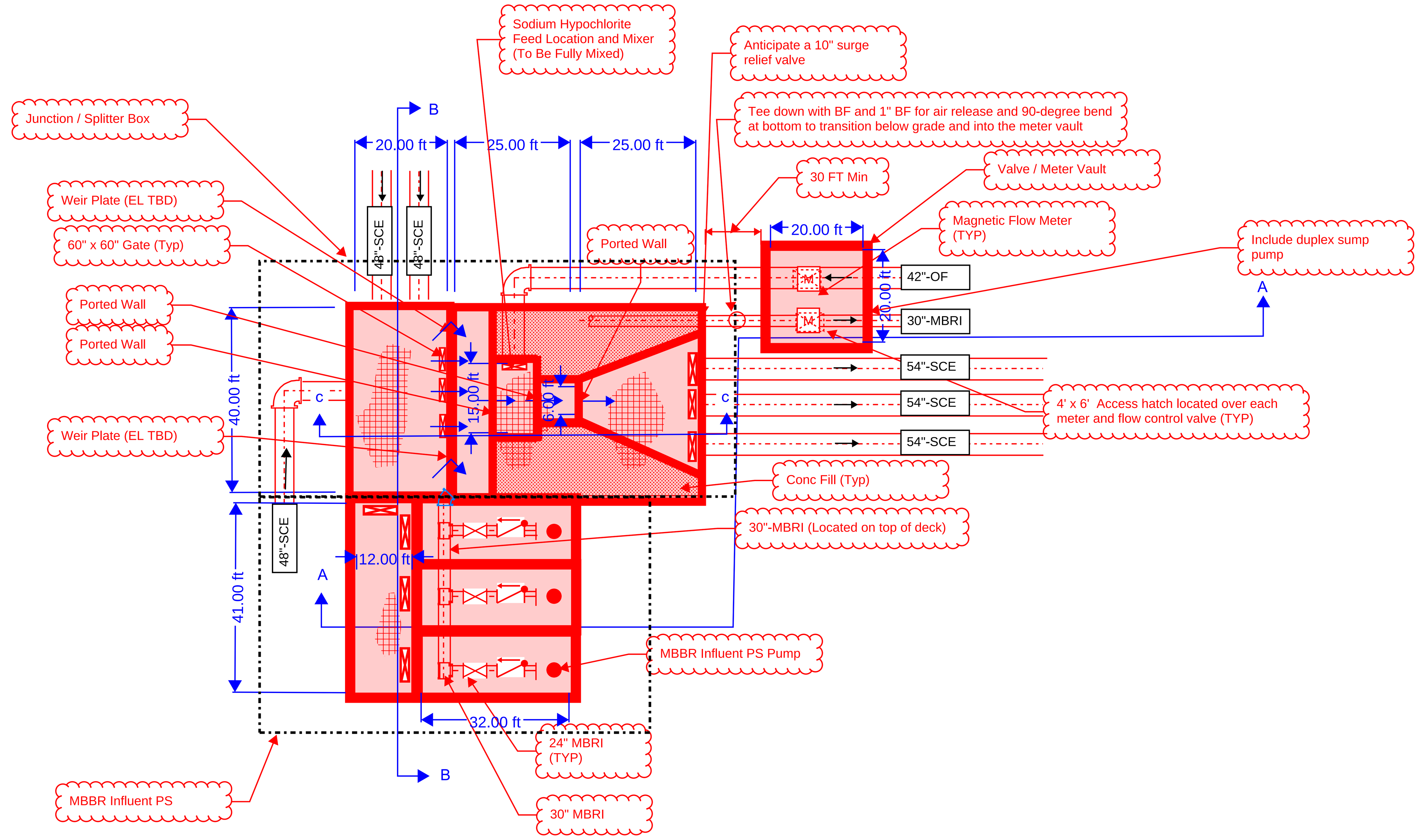
CIRCULAR SECONDARY CLARIFIERS
RAS PUMP STATION
(2) 130 FT DIAMETER CLARIFIERS
ANRI VE ALT NO. 4A

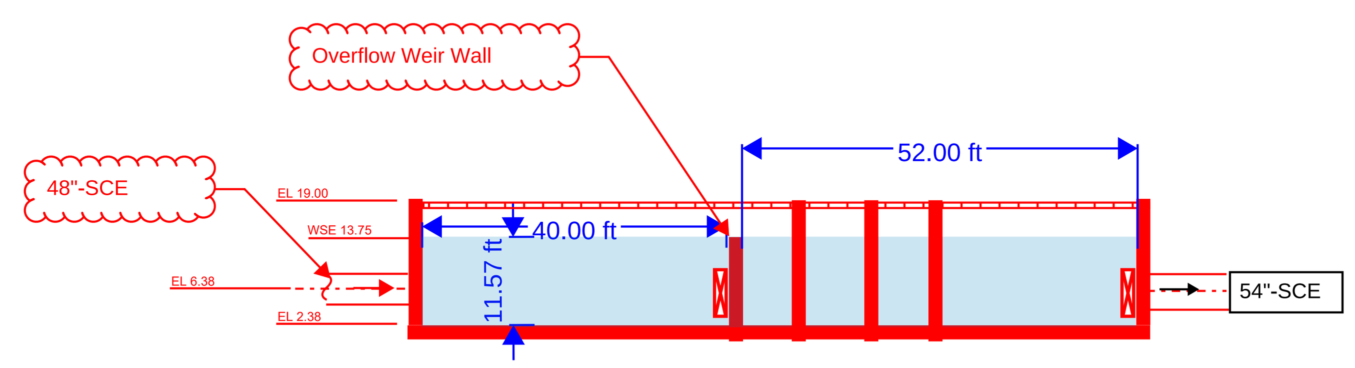
DRAWING M1225.02.01

REVISIONS

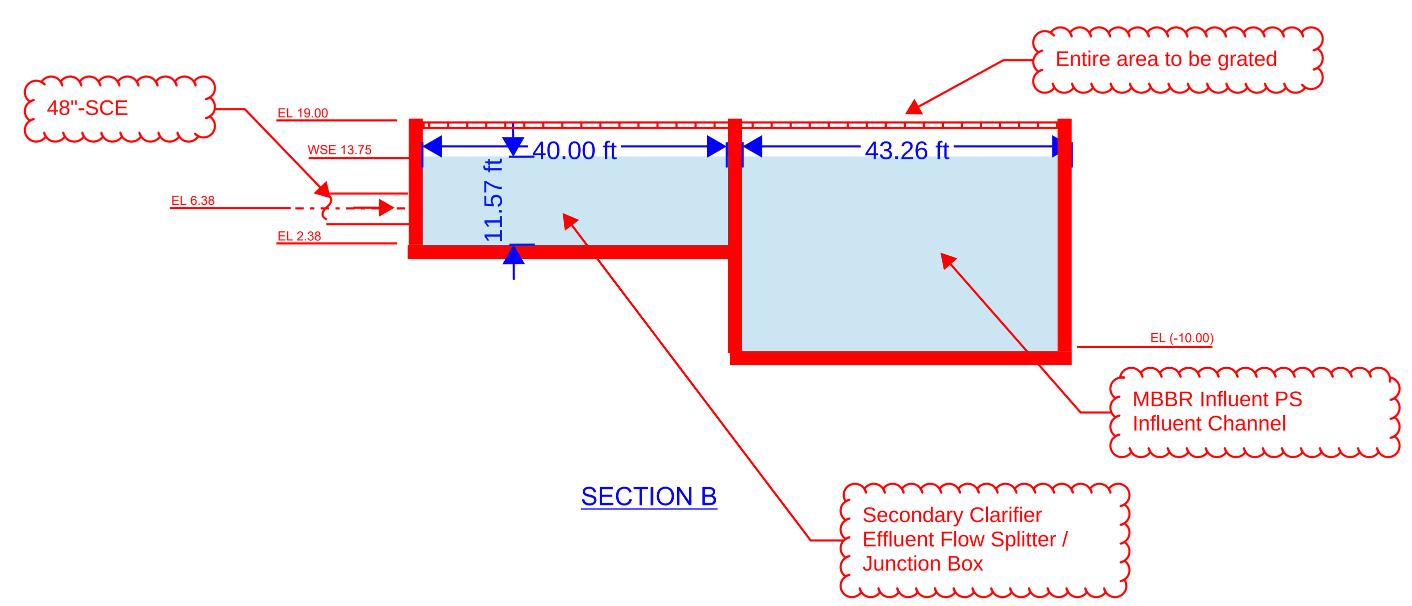
0 ANRI VE ALT NO. 4A 12/2020 US-A

0

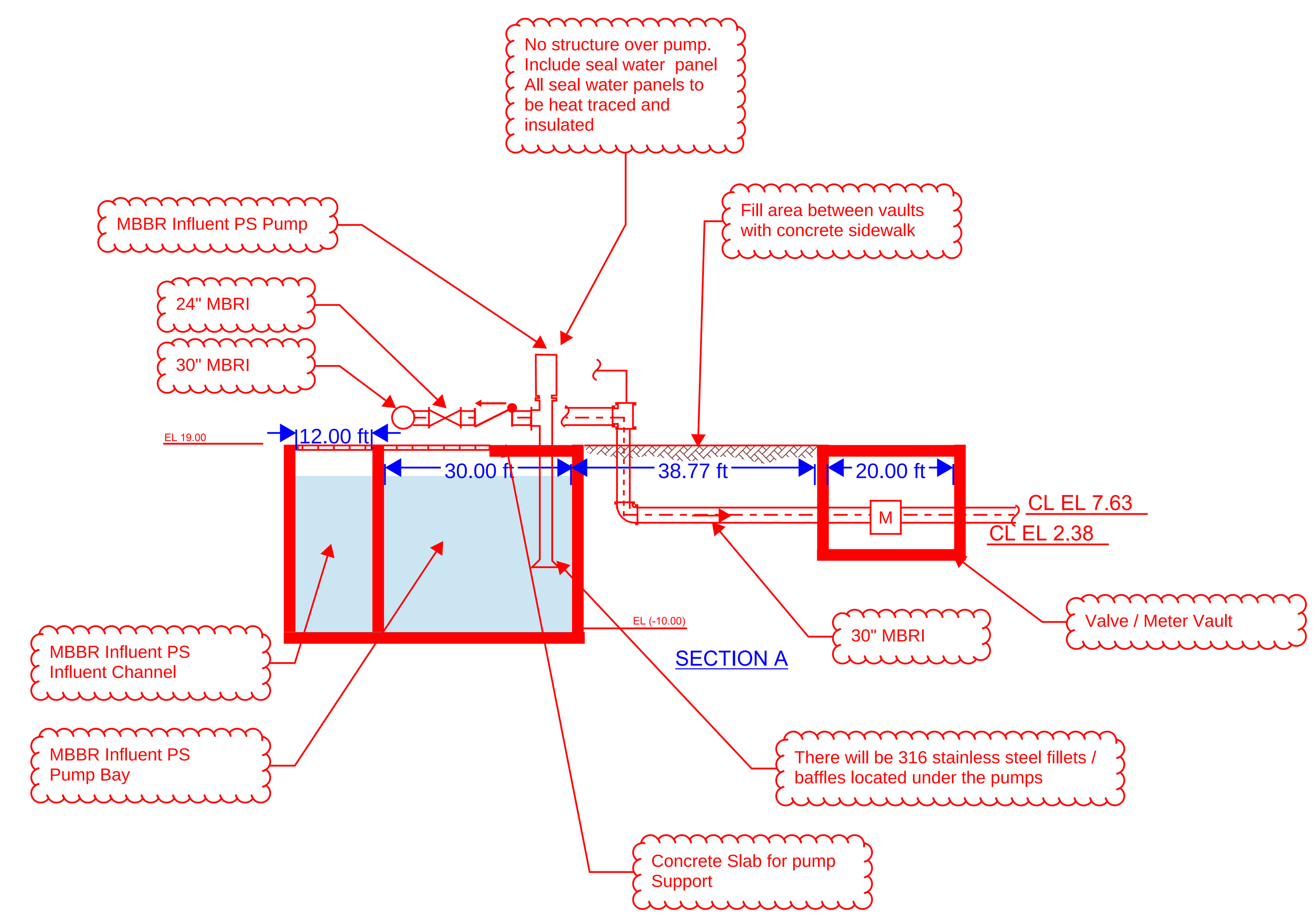




SECTION C



SECTION B



SECTION A

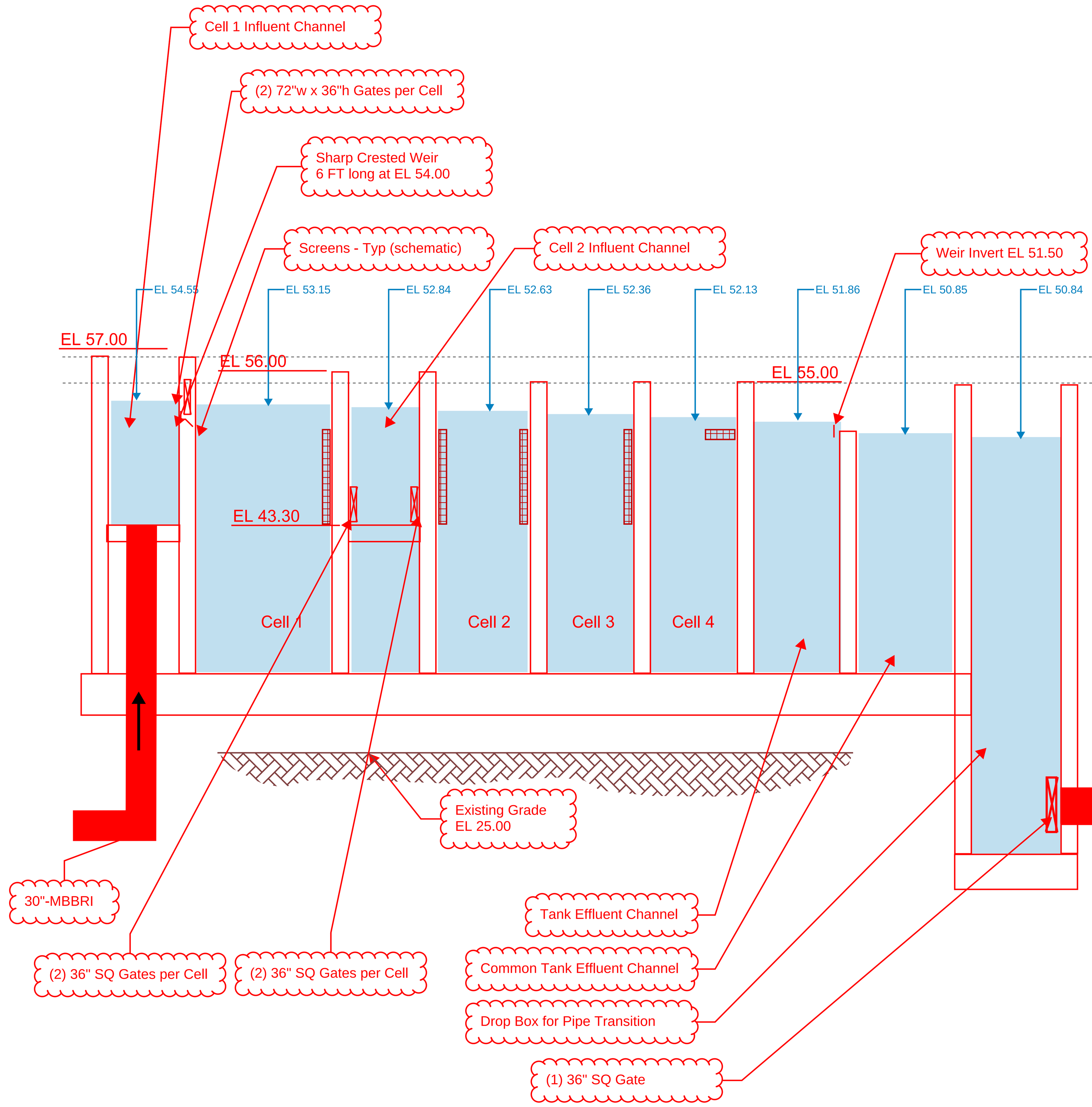
CIRCULAR SECONDARY CLARIFIERS
MBBR INFLUENT PS & JUNCTION / SPLITTER BOX
(2) 130 FT DIAMETER CLARIFIERS
ANRI VE ALT NO. 4A

DRAWING M1250.02.01

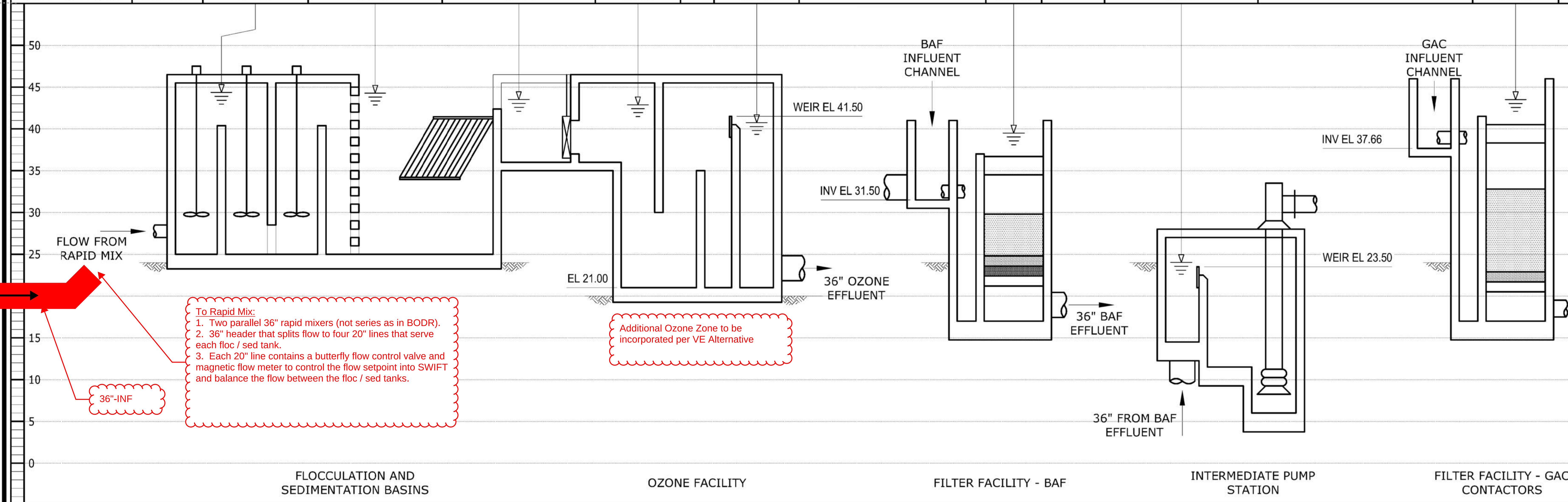
REVISIONS

0 ANRI VE ALT NO. 4A 12/2020 US-A

0

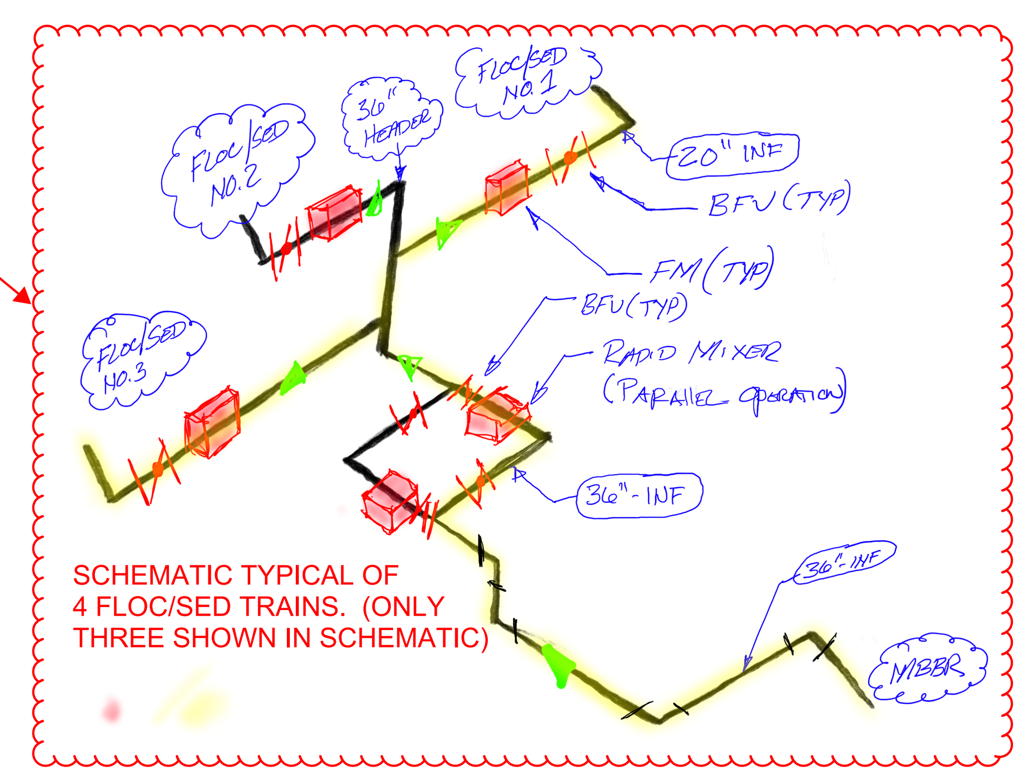


CONDITION	PLANT FLOW	FLOCCULATION BASIN 1	SEDIMENTATION BASIN	SEDIMENTATION BASIN EFFLUENT CHANNEL	OZONE INFLUENT		OZONE EFFLUENT		BAF		INTERMEDIATE PUMP STATION INFLUENT CHANNEL		GAC CONTACTOR
SWIFT CAPACITY	16 MGD	44.36	44.27	42.45	42.34		40.81		39.50		24.02		43.50



HYDRAULIC PROFILE
NTS

Schematic of Floc / Sed



MBBR
HYDRAULIC PROFILE
ANRI VE ALT NO. 4A

DRAWING M1300.02.01

REVISIONS

0 ANRI VE ALT NO. 4A 12/22/20 US-A

REV	ISSUED FOR	DATE	BY
0	REQUEST FOR PROPOSAL	4/10/2020	--

PROJECT ENGINEER: A. NEWBOLD
DESIGNED BY: D. TURNER
DRAWN BY: J. JORDAN
CHECKED BY: S. GIBSON

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1" 4/10/2020

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

Hazen
AECOM
HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

MBBR
HYDRAULIC PROFILE
ANRI VE ALT NO. 4A

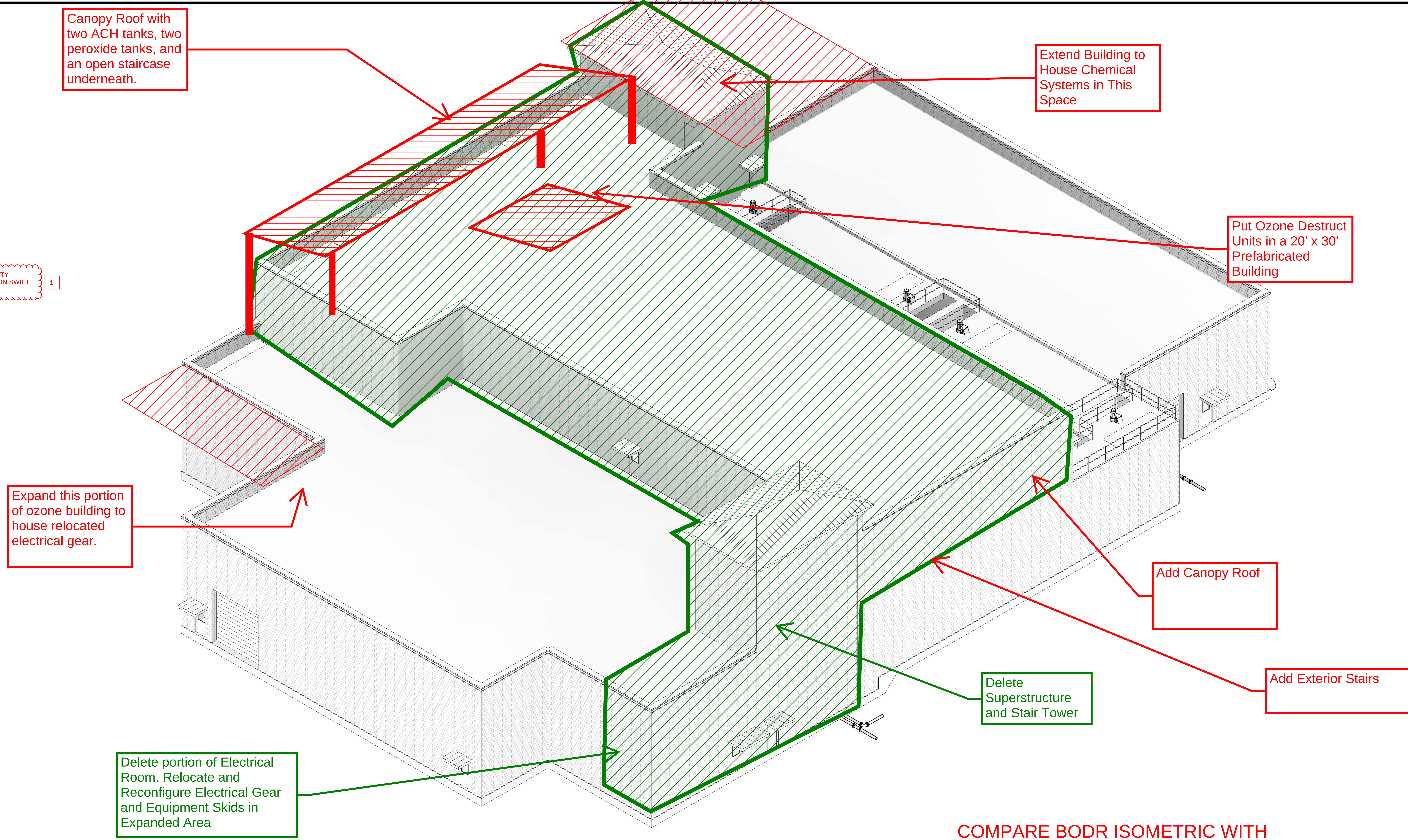
DRAWING M1300.02.01

REVISIONS

0	ANRI VE ALT NO. 4A	12/22/20	US-A

DRAWING / FACILITY REVISED BASED ON SWIFT VE ALT NO. 10A. 1

1



ISOMETRIC VIEW

COMPARE BODR ISOMETRIC WITH PROPOSED VE

REV	ISSUED FOR	DATE	BY
1	SWIFT VE ALT NO. 10A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

SWIFT PROCESS BUILDING No.1
MECHANICAL
ISOMETRIC VIEW

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	M2200

BIM 360://32480-001_HRSD James River Treatment Plant - SWIFT - WW/32480-001-2200-OZ-M.rvt
4/8/2020 11:06:51 AM

BOTTOM PLAN

3/32" = 1'-0"

BIM 360://10216644_HRSD_James River SWIFT DB_2020/2200-OZ-M_01.rvt
7/20/2020 10:18:50 AM

BLACK & VEATCH | US-A
Ulliman Schutte – Alberici Joint Venture

ISSUE	DATE	DESCRIPTION	
0	12/2020	SWIFT VE ALT NO. 10A	US-A

DESIGN MANAGER	W. M'COY
PROJECT ENGINEER	
DESIGNED BY	Designer
CHECKED BY	Checker
DRAWN BY	Author
PROJECT NUMBER	32480-002

PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING

HRSD

JAMES RIVER SWIFT FACILITY (GN016360)AND JAMES RIVER TREATMENT PLANT ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400)

PROCESS BUILDING NO. 1
BOTTOM PLAN

FILENAME 2200-OZ-M.rvt
SCALE 3/32" = 1'-0"

SHEET M2201B

COMPARE BODR ROOF LIMITS WITH PROPOSED VE ROOF AND CANOPIES

TOP PLAN
3/32" = 1'-0"

REV	ISSUED FOR	DATE	BY
1	SWIFT VE ALT NO. 10A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

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PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

SWIFT PROCESS BUILDING No.1
MECHANICAL
TOP PLAN

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: M2202

REV	ISSUED FOR	DATE	BY
1	SWIFT VE ALT NO. 10A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

SWIFT PROCESS BUILDING No.1
MECHANICAL
SECTIONS

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: M2203

BIM 360://32480-001_HRSD James River Treatment Plant - SWIFT - VWI/32480-001-2200-OZ-M.rvt
4/8/2020 11:07:01 AM

REV	ISSUED FOR	DATE	BY
1	SWIFT VE ALT NO. 10A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

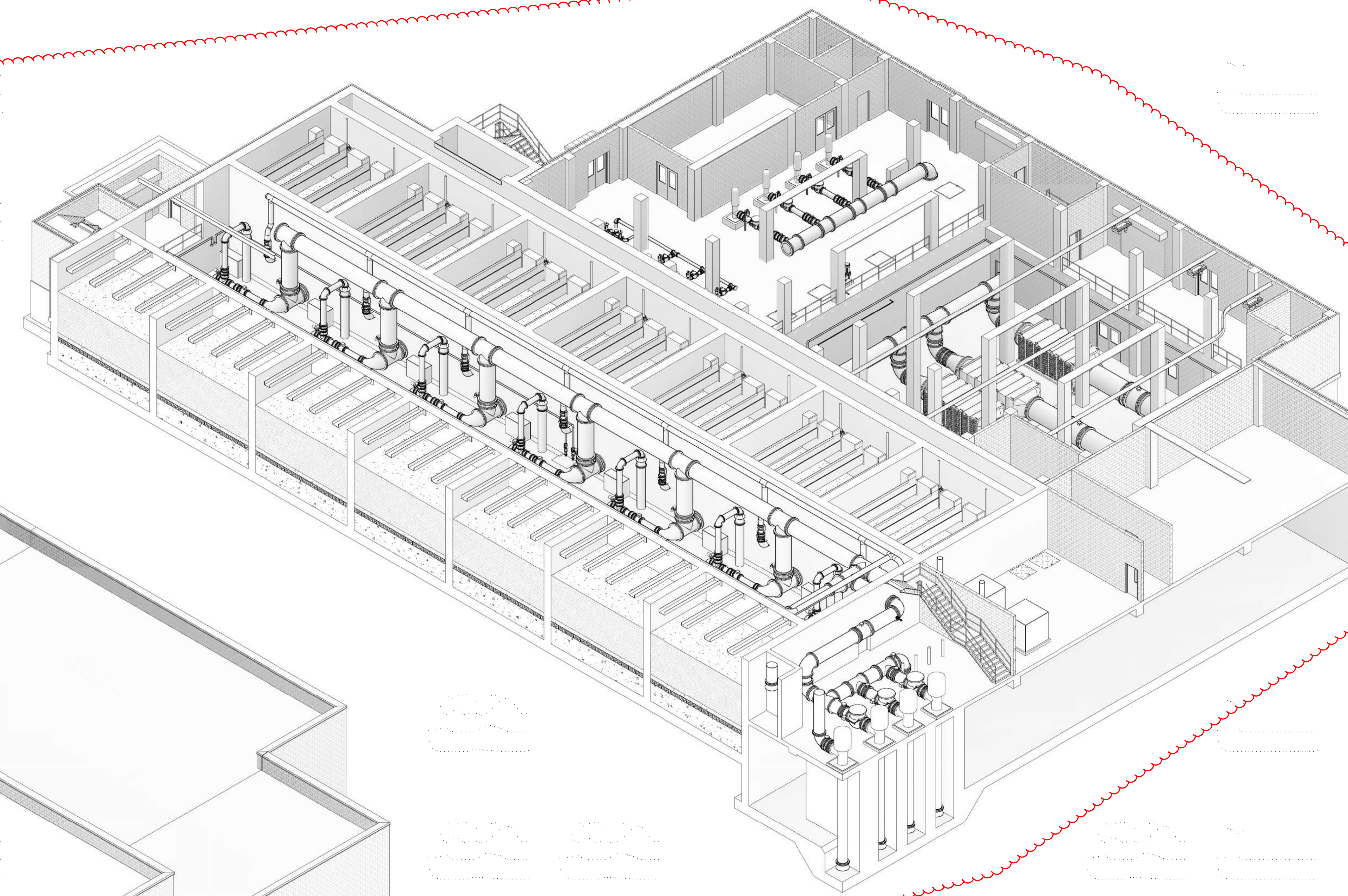
HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

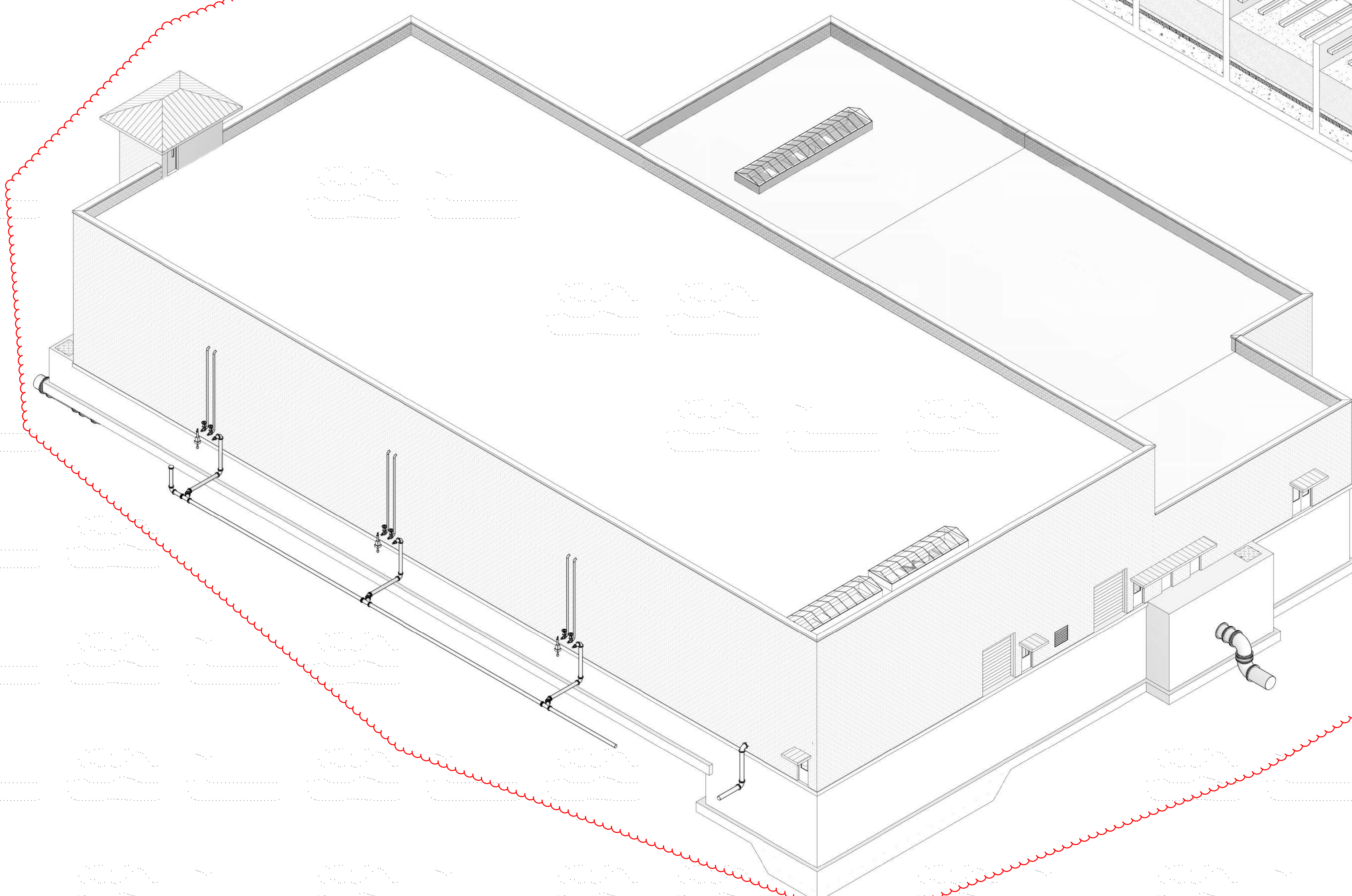
SWIFT PROCESS BUILDING No.1
MECHANICAL
SECTIONS

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: M2204

BIM 360://32480-001_HRSD James River Treatment Plant - SWIFT - WW/32480-001-2200-OZ-M.rvt
4/8/2020 11:07:02 AM



ISOMETRIC SECTION



TO BE UPDATED FOR VALUE ENGINEERING ALTERNATIVES 1

ISOMETRIC VIEW

REV	ISSUED FOR	DATE	BY
1	SWIFT VE ALT NO. 11A AND 12A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

SWIFT PROCESS BUILDING No. 2 -
BAF, GAC, AND INTERMEDIATE PUMP STATION
MECHANICAL
ISOMETRIC VIEWS

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	M2300

BIM 360://32480-001_HRSD James River Treatment Plant - SWIFT - WW/32480-001-2300-FLT-M.rvt
4/8/2020 4:00:06 PM

1. Delete masonry superstructure over BAF. Install metal canopy roof.

TOP PLAN

3/32" = 1'-0"

REV	ISSUED FOR	DATE	BY
2	SWIFT VE ALT NO. 10A	1/2021	US-A
1	SWIFT VE ALT NO. 11A	1/2021	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

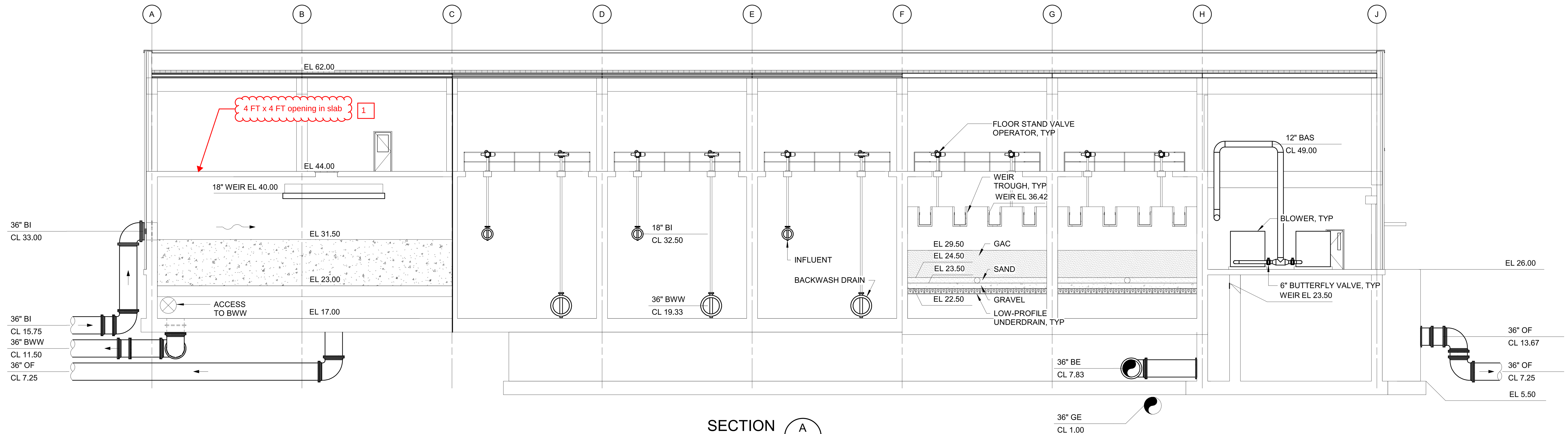
SWIFT PROCESS BUILDING No. 2 - BAF, GAC, AND INTERMEDIATE PUMP STATION MECHANICAL TOP PLAN

DATE: 2020

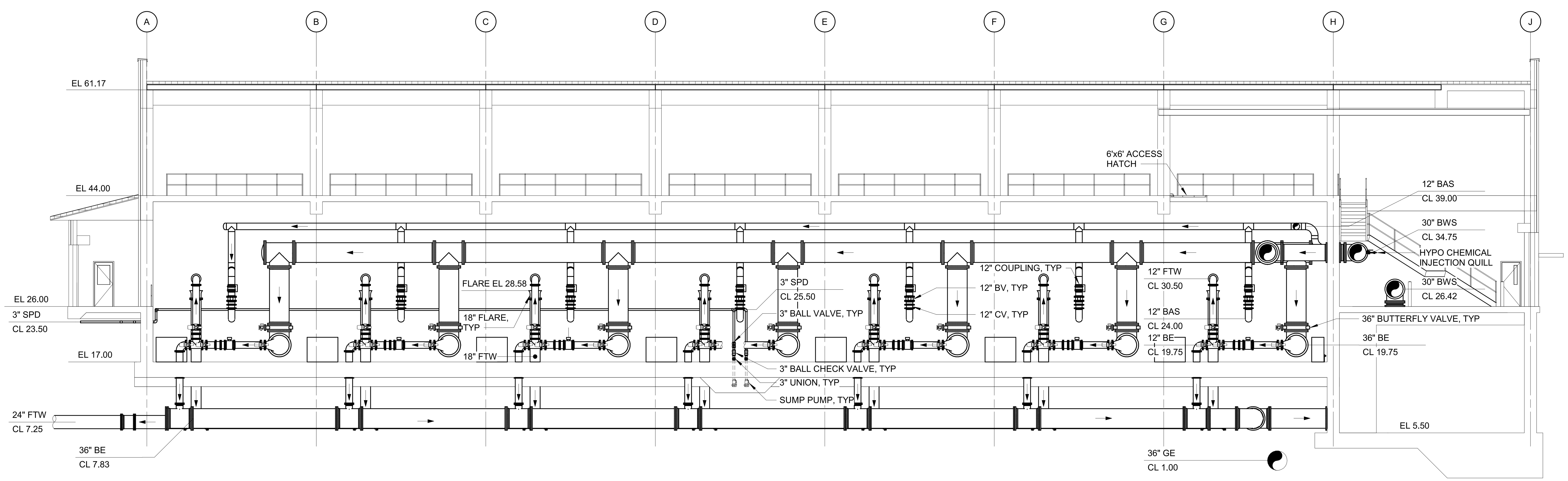
PROJECT NO.: 32480

CONTRACT NO.: -

DRAWING NUMBER: M2303



SECTION A
M2301
3/32" = 1'-0"



SECTION B
M2301
3/32" = 1'-0"

REV	ISSUED FOR	DATE	BY
1	SWIFT VE ALT N. 11A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

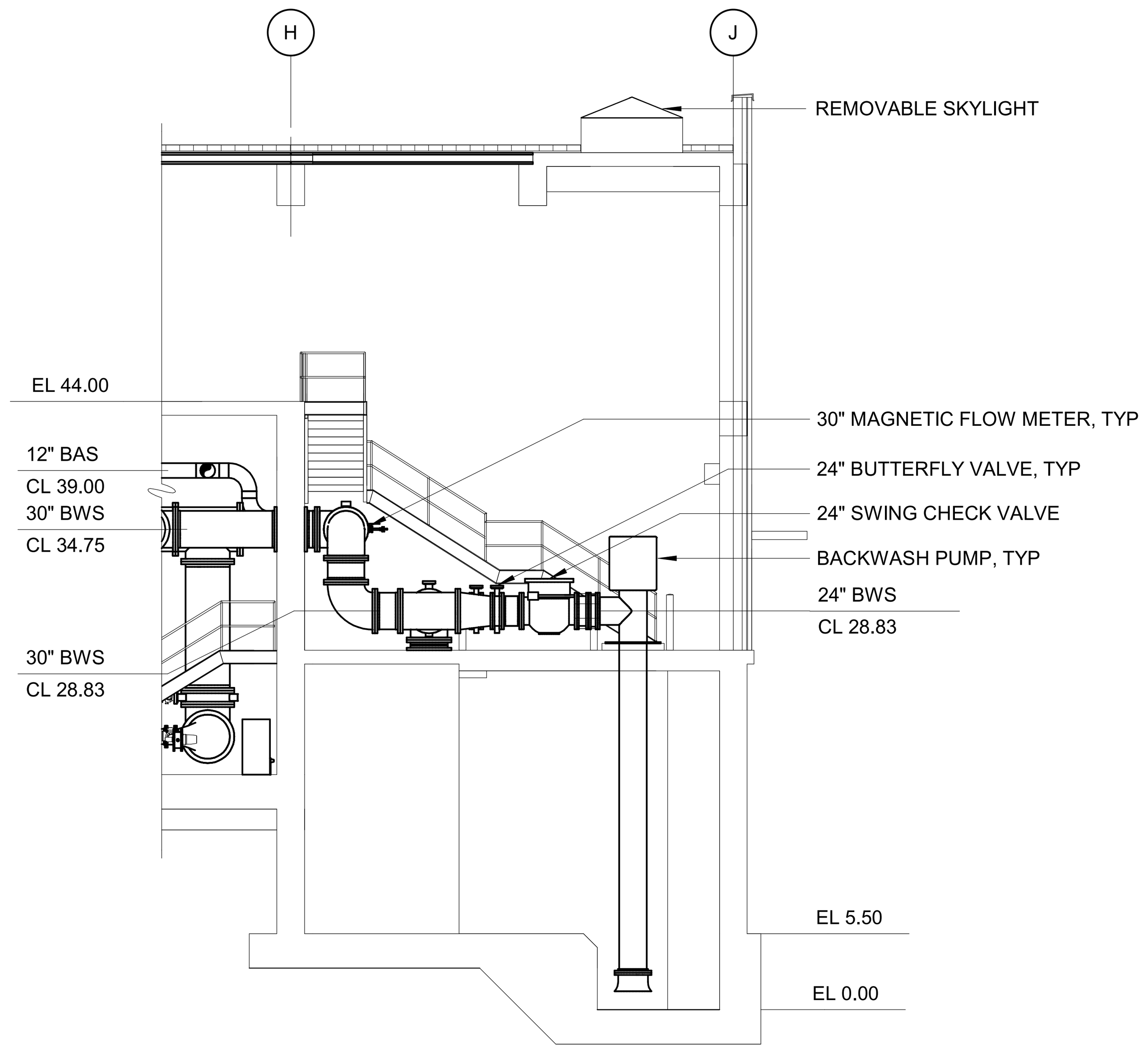
HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

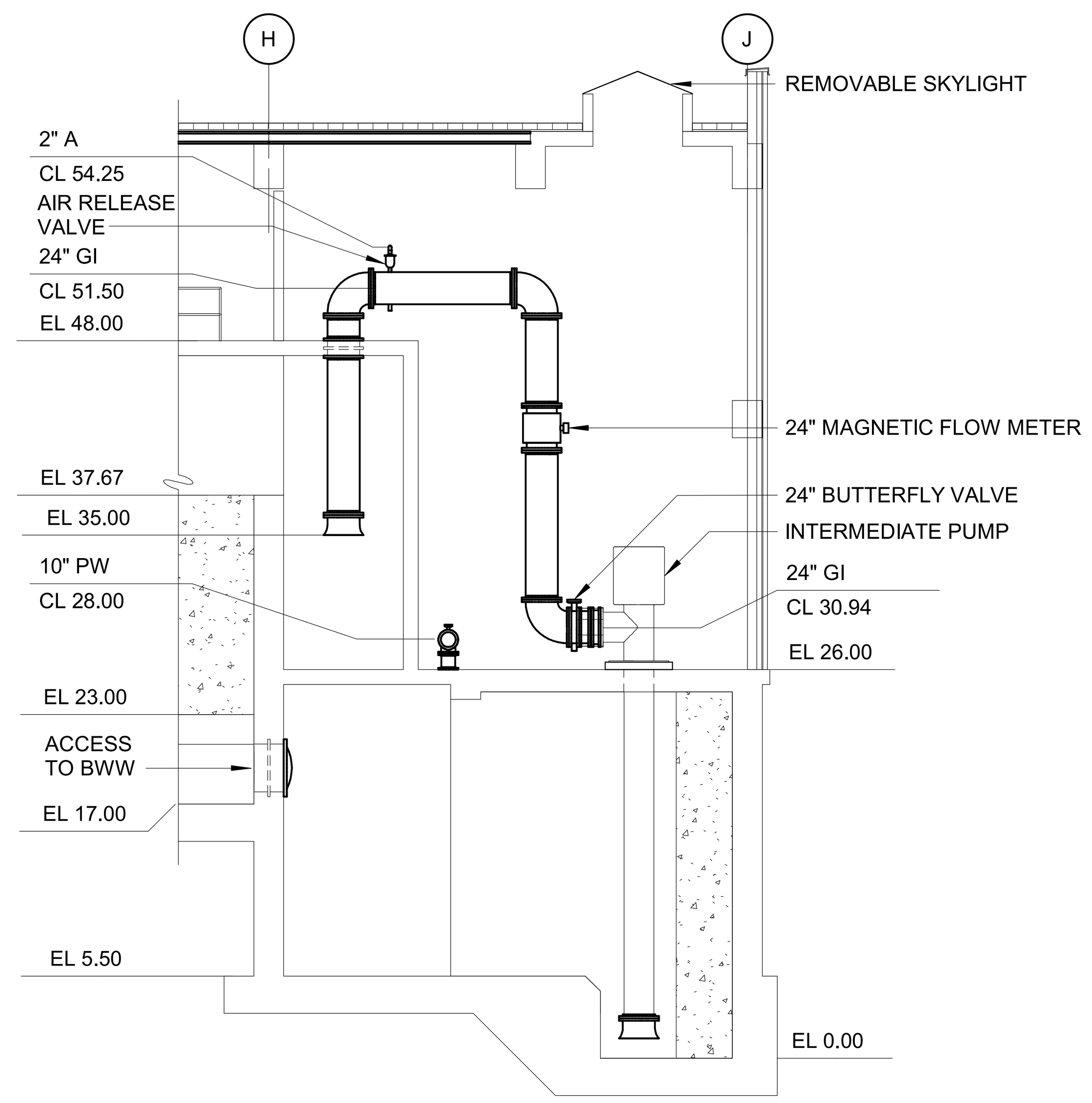
SWIFT PROCESS BUILDING No. 2 -
BAF, GAC, AND INTERMEDIATE PUMP STATION
MECHANICAL
SECTIONS

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: M2304

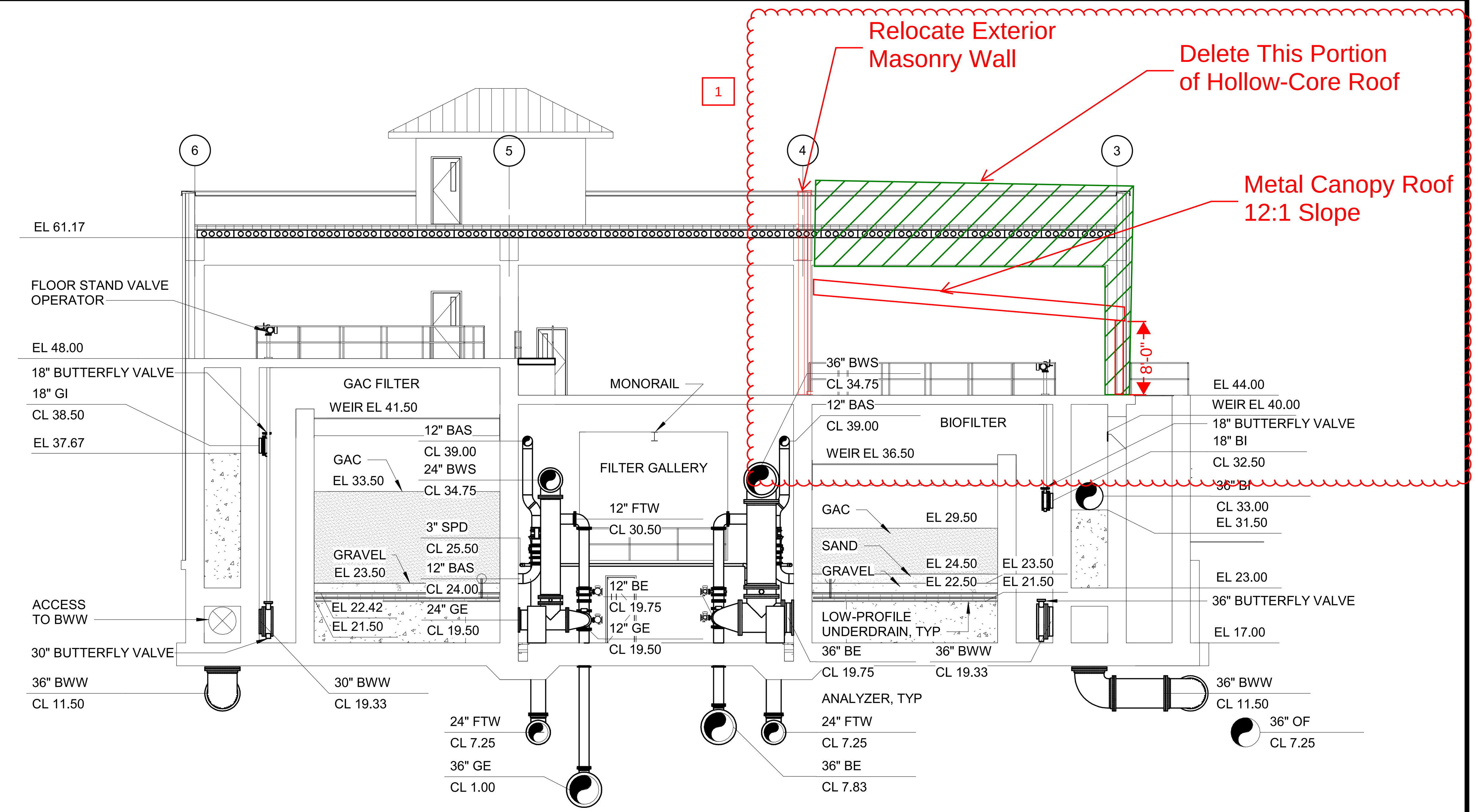
BIM 360://32480-001_HRSD James River Treatment Plant - SWIFT - WW/32480-001-2300-FLT-M.rvt
4/8/2020 4:00:19 PM



SECTION C
3/32" = 1'-0" M2301



SECTION D
3/32" = 1'-0" M2301



SECTION E
3/32" = 1'-0" M2301

REV	ISSUED FOR	DATE	BY
1	SWIFT VE ALT NO. 11A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

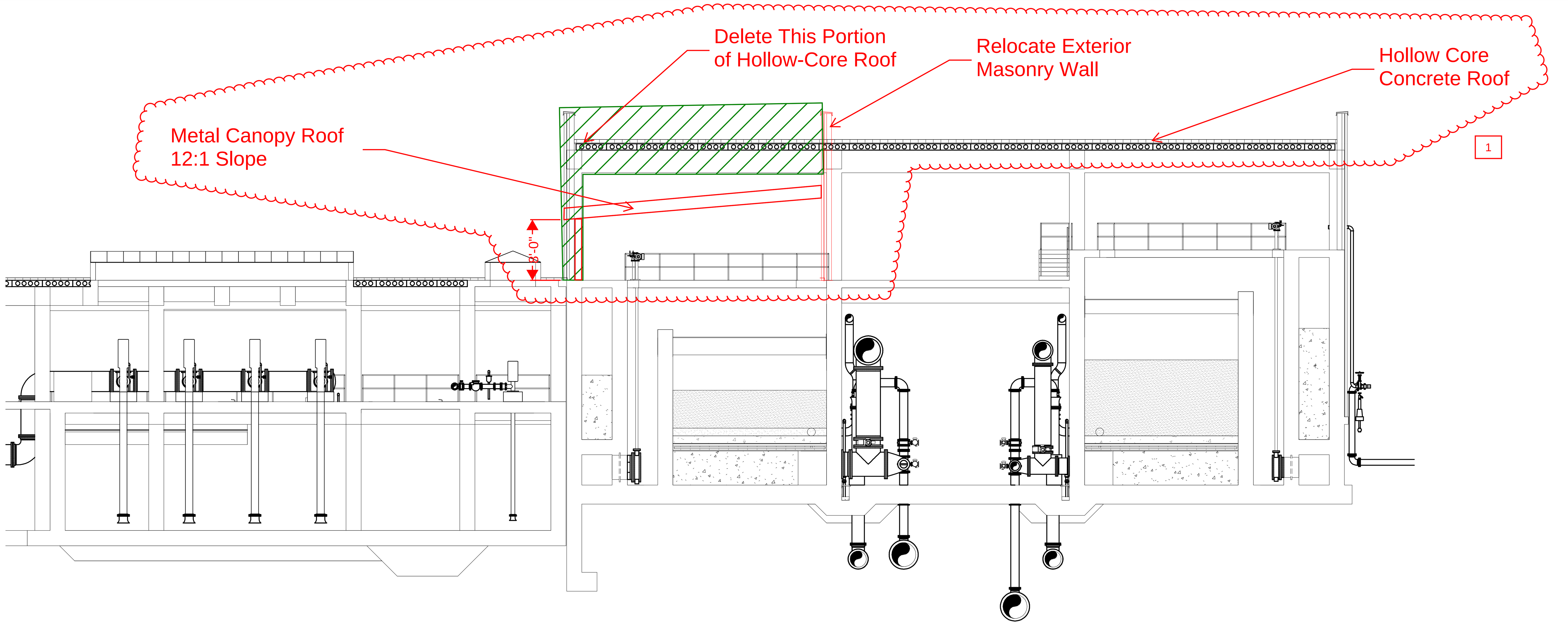
HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

SWIFT PROCESS BUILDING No. 2 -
BAF, GAC, AND INTERMEDIATE PUMP STATION
MECHANICAL
SECTIONS

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: M2305

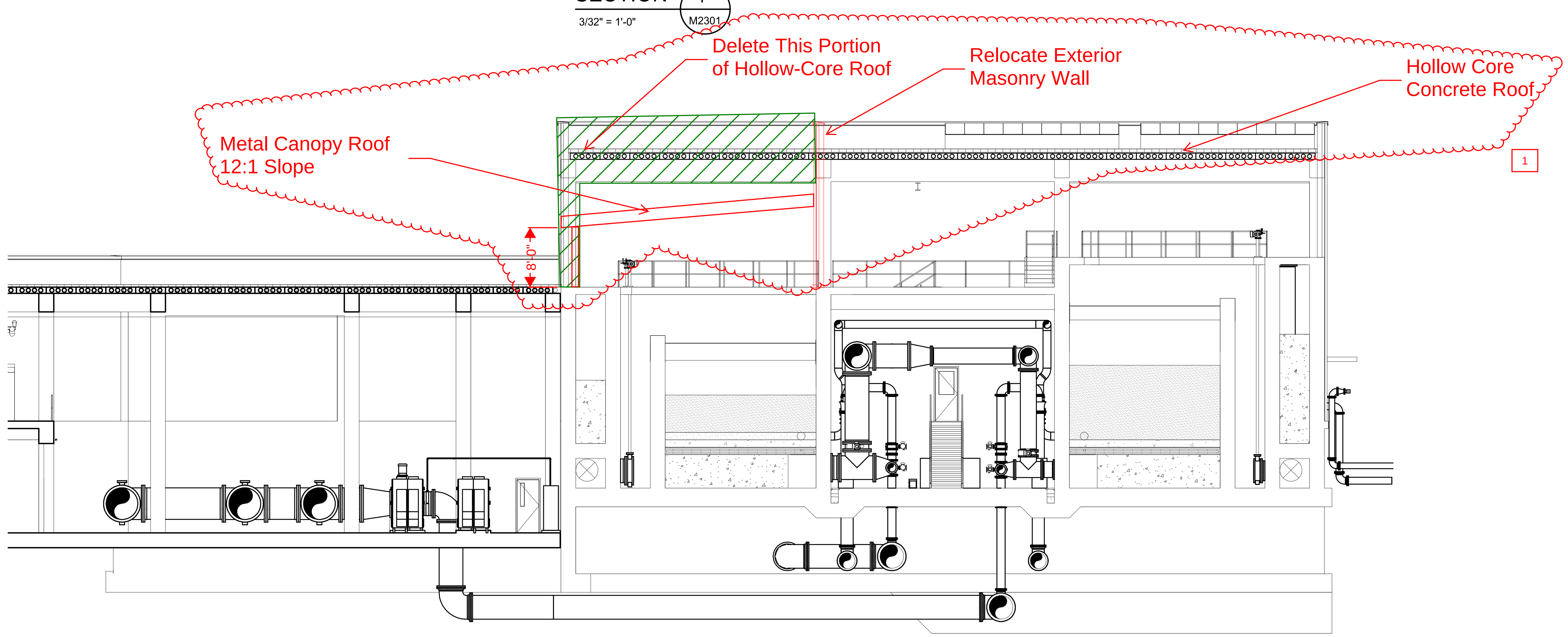
BIM 360://32480-001_HRSD James River Treatment Plant - SWIFT - WW/32480-001-2300-FLT-M.rvt
4/8/2020 4:00:24 PM



SECTION F
3/32" = 1'-0"
M2301

DRAWING / FACILITY REVISED BASED ON SWIFT VE ALT NO. 11A. COPY OF ORIGINAL DRAWING WAS MADE TO CREATE THIS BACKGROUND TO REFLECT THE MARKUP ASSOCIATED WITH REVISIONS

0



SECTION G
3/32" = 1'-0"
M2301

REV	REVISION DESCRIPTION	DATE	BY
0	SWIFT VE ALT NO. 11A	12/2020	US-A

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

SWIFT PROCESS BUILDING No. 2 -
BAF, GAC, AND INTERMEDIATE PUMP STATION
MECHANICAL
SECTIONS

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: M2306

BIM 360://10216644_HRSD_James River SWIFT DB_2020/2300-FLT-M.rvt
5/13/2020 1:56:05 PM

REV	REVISION DESCRIPTION	DATE	BY
0	SWIFT VE ALT NO. 10A	12/2020	US-A

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

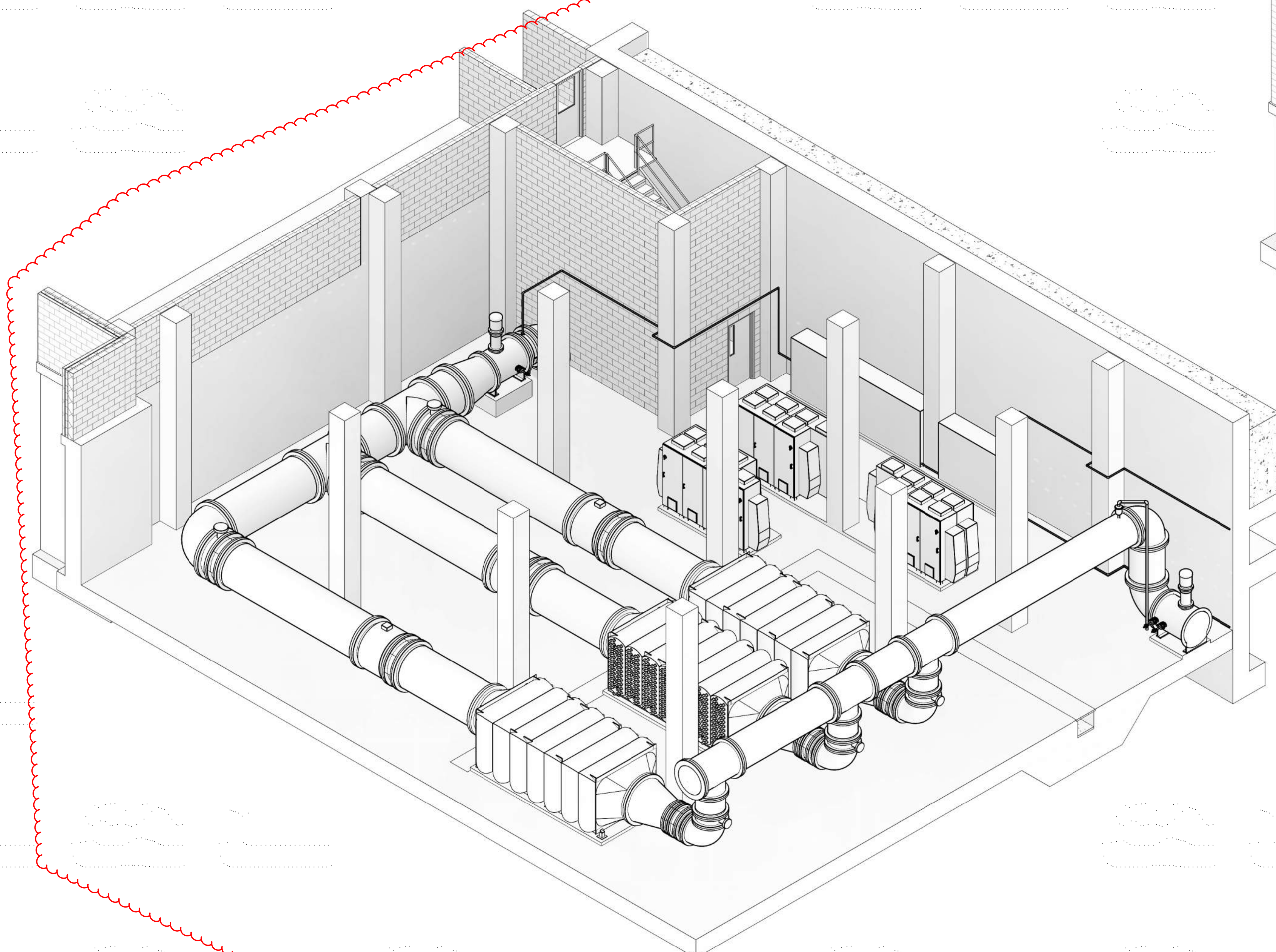
JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

SWIFT PROCESS BUILDING No. 2 -
BAF, GAC, AND INTERMEDIATE PUMP STATION
MECHANICAL
PLAN @ EL 40.00

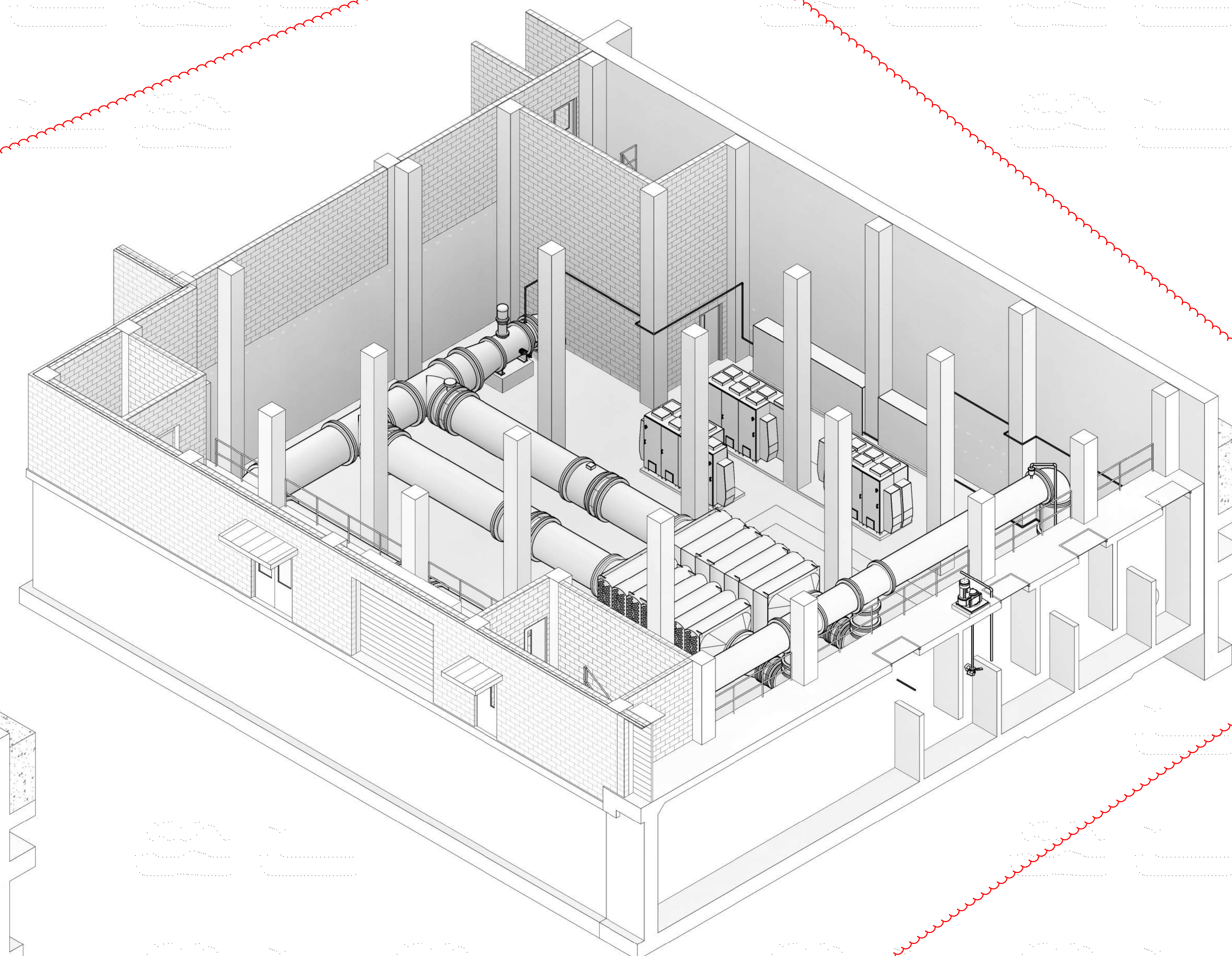
DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	M2307

1 Isometrics to be updated during final design

1



ISOMETRIC SECTION



ISOMETRIC VIEW

REV	ISSUED FOR	DATE	BY
1	SWIFT VE ALT NO. 12A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

SWIFT PROCESS BUILDING No. 2 - ULTRAVIOLET TREATMENT FACILITY MECHANICAL ISOMETRIC VIEWS

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	M2400

BIM 360://32480-001_HRSD James River Treatment Plant - SWIFT - WW/32480-001-2400-UV-M.rvt
4/8/2020 4:47:08 PM

REV	ISSUED FOR	DATE	BY
1	SWIFT VE ALT NO. 12A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

SWIFT PROCESS BUILDING No. 2 - ULTRAVIOLET TREATMENT FACILITY
MECHANICAL
BOTTOM PLAN

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	M2401

BIM 360://32480-001_HRSD James River Treatment Plant - SWIFT - VWV/32480-001-2400-UV-M.rvt
4/8/2020 4:47:10 PM

TOP PLAN
3/16" = 1'-0"

REV	ISSUED FOR	DATE	BY
1	SWIFT VE ALT NO. 12A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

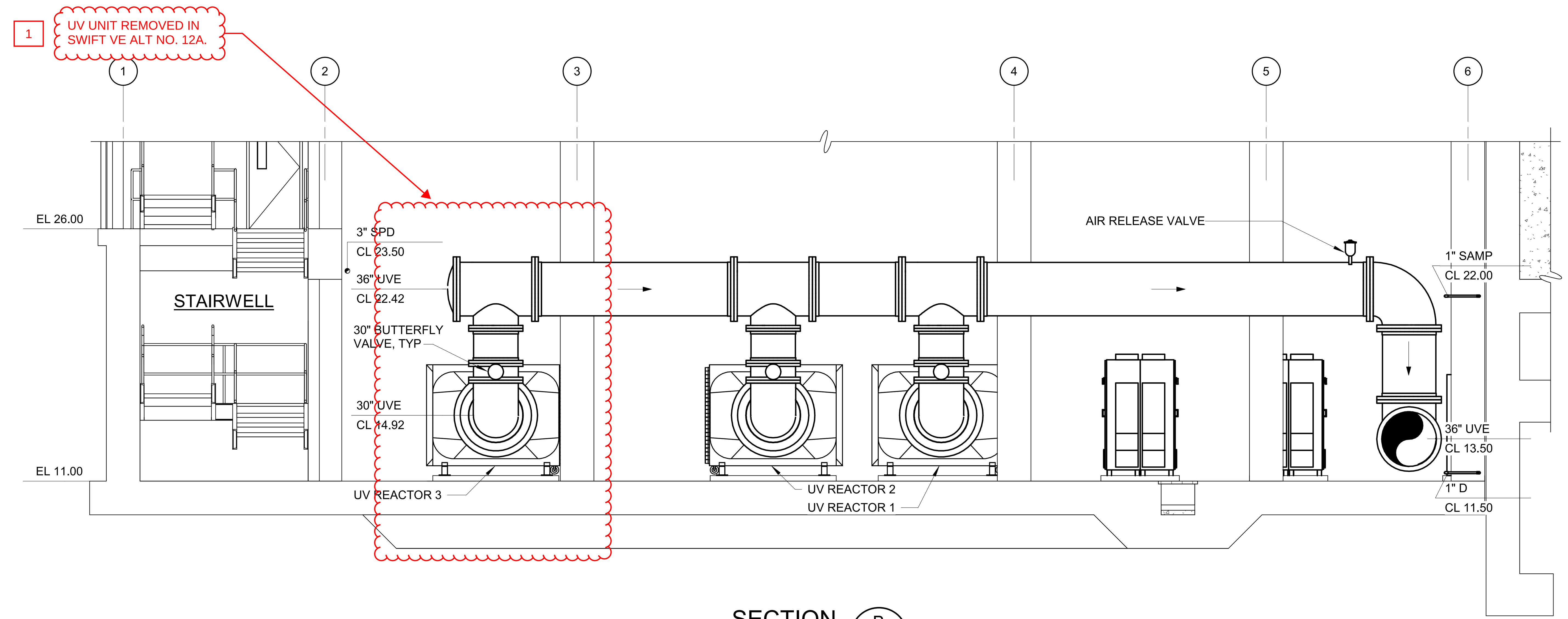
HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

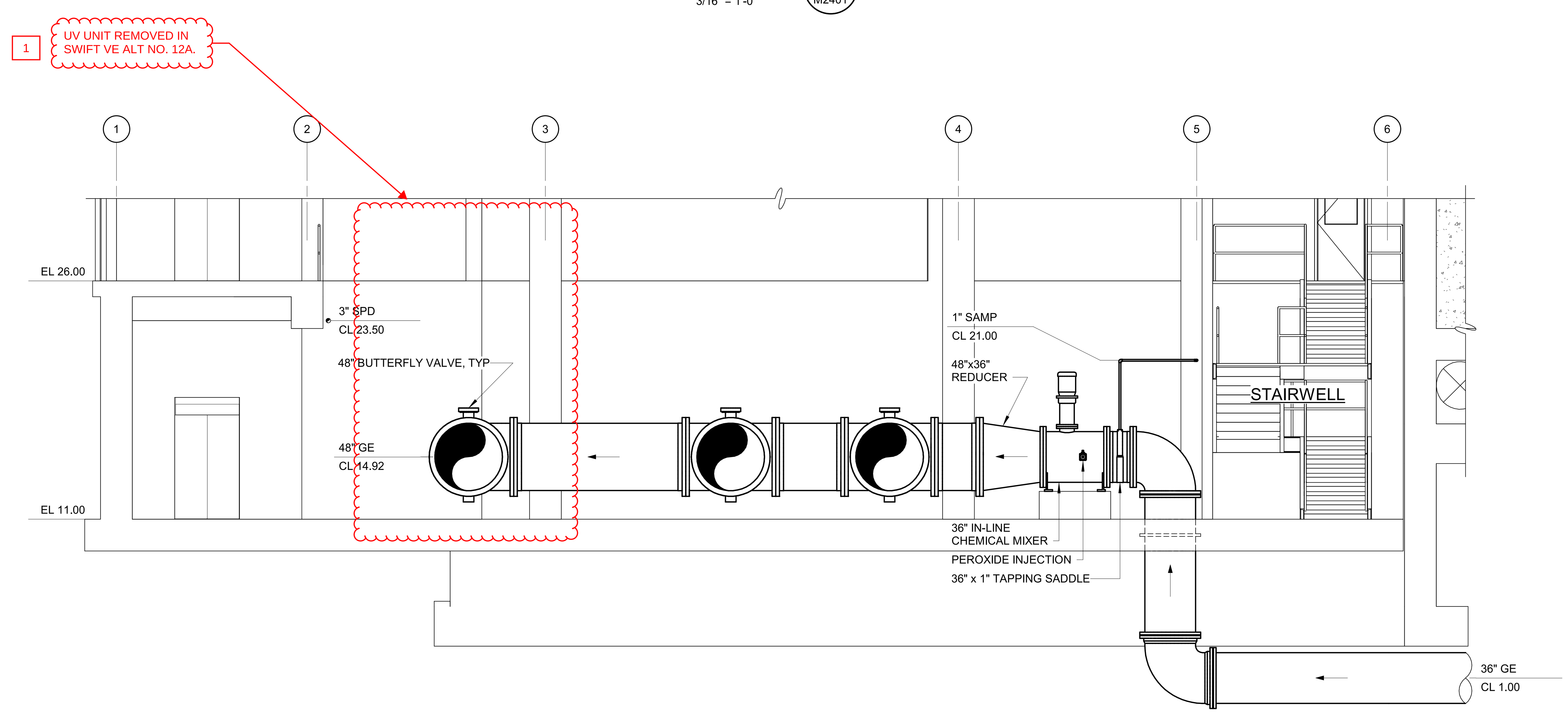
SWIFT PROCESS BUILDING No. 2 - ULTRAVIOLET TREATMENT FACILITY
MECHANICAL
TOP PLAN

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: M2402

BIM 360://32480-001_HRSD James River Treatment Plant - SWIFT - VW/32480-001-2400-UV-M.rvt
4/8/2020 4:47:11 PM



SECTION B
M2401
3/16" = 1'-0"



SECTION C
M2401
3/16" = 1'-0"

REV	ISSUED FOR	DATE	BY
1	SWIFT VE ALT NO. 12A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

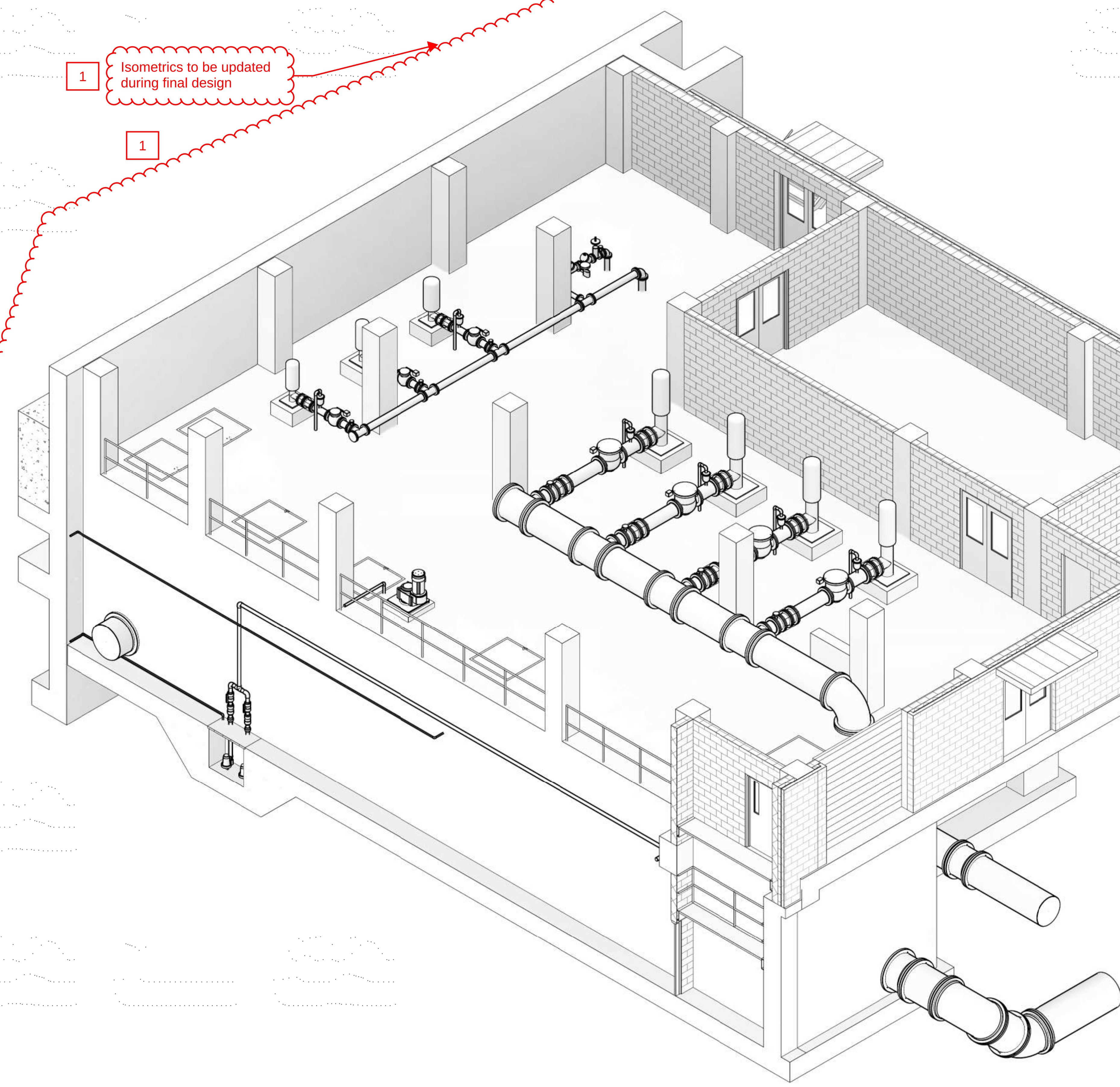
SWIFT PROCESS BUILDING No. 2 - ULTRAVIOLET TREATMENT FACILITY MECHANICAL SECTIONS

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	M2404

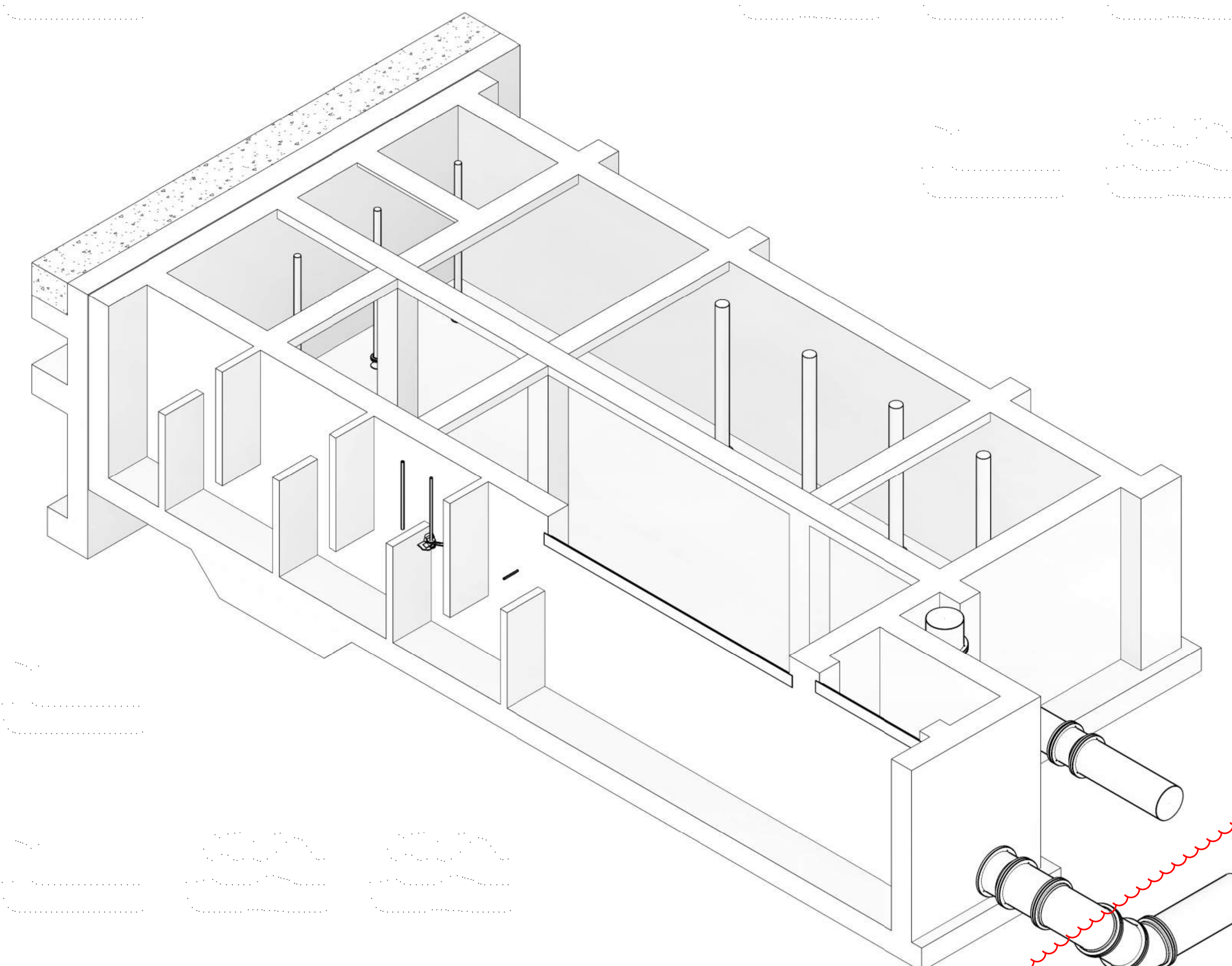
BIM 360://32480-001_HRSD James River Treatment Plant - SWIFT - WW/32480-001-2400-UV-M.rvt
4/8/2020 4:47:14 PM

1 Isometrics to be updated during final design

1



ISOMETRIC VIEW



ISOMETRIC SECTION

REV	ISSUED FOR	DATE	BY
1	SWIFT VE ALT NO. 12A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

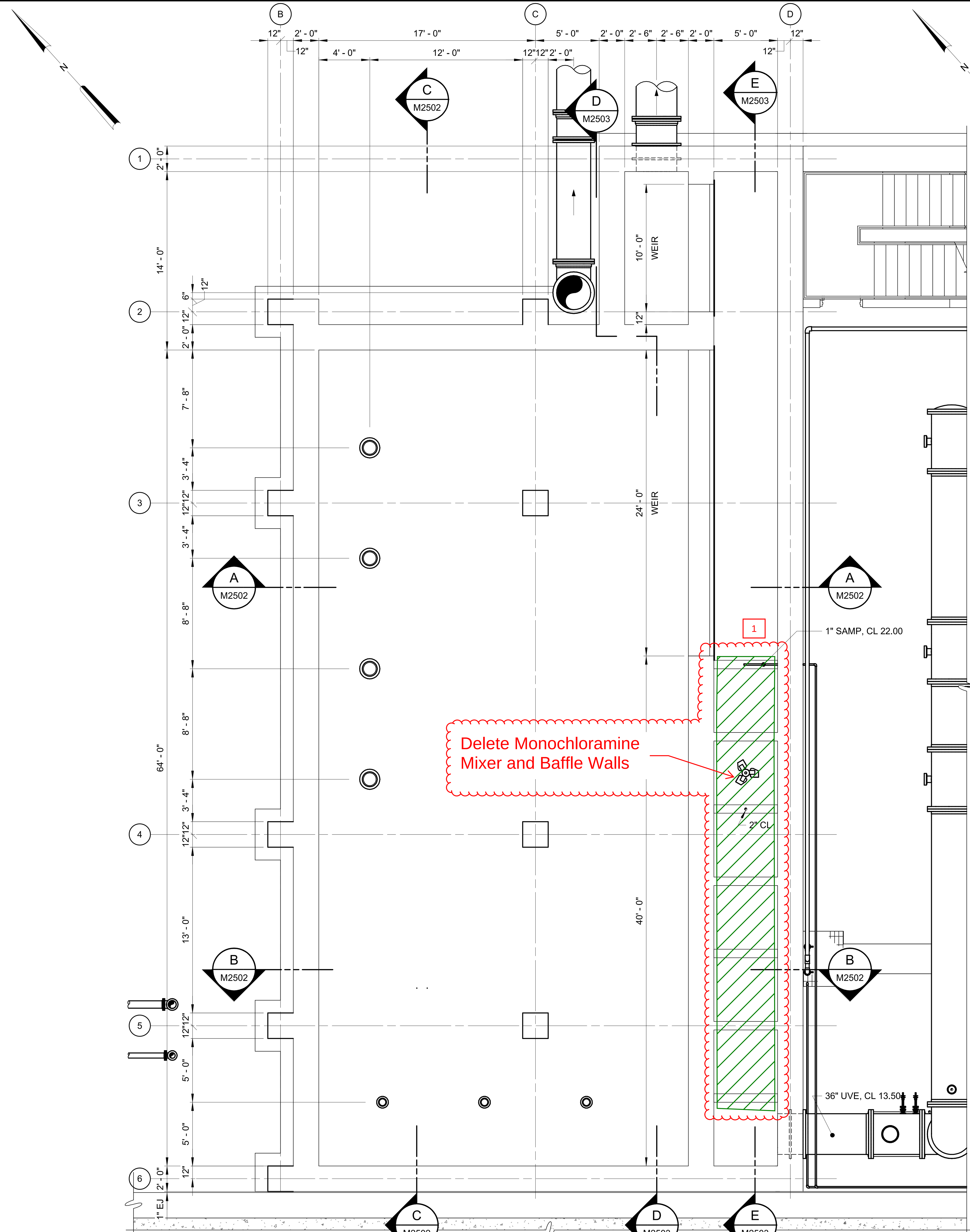
HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

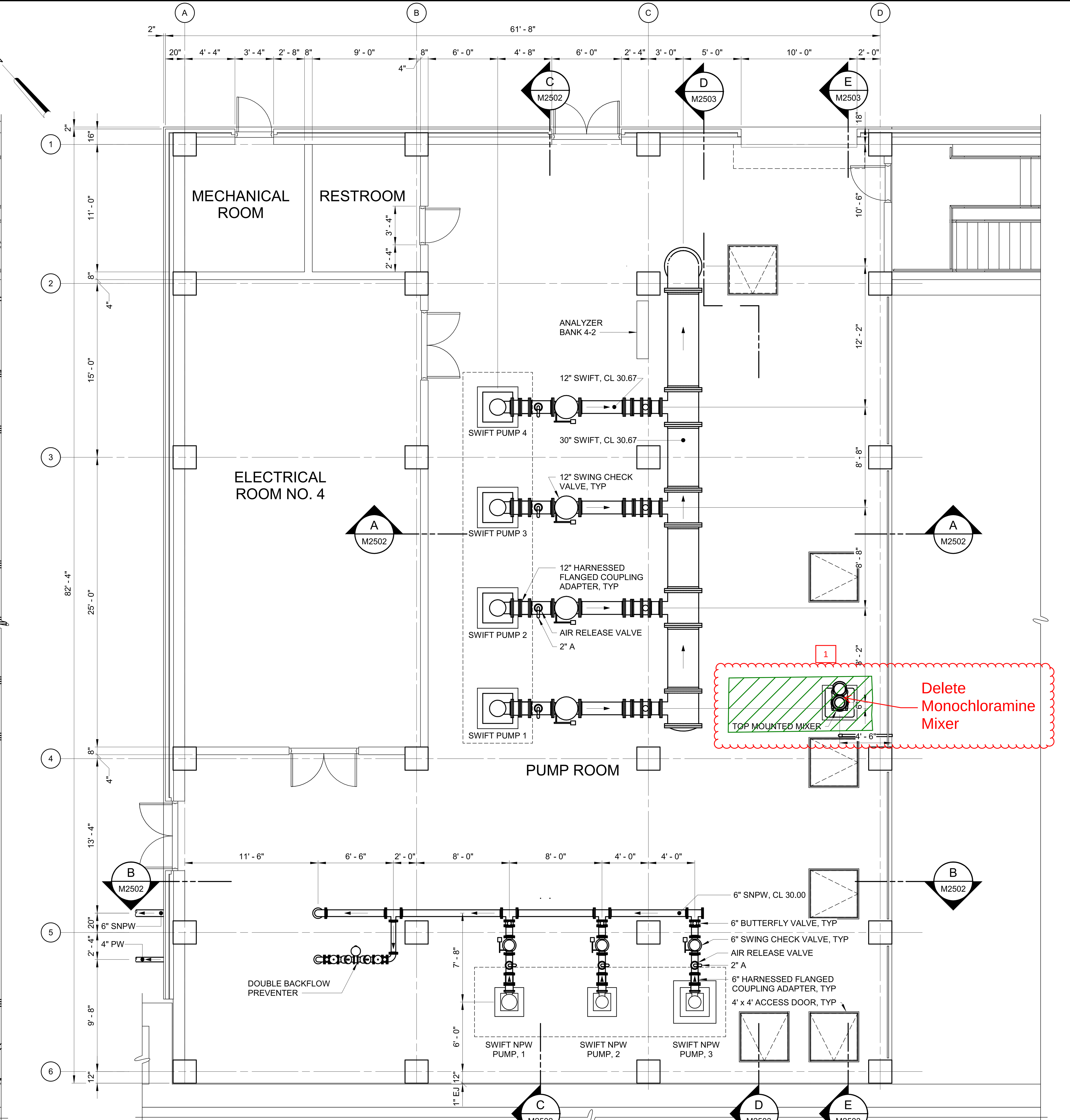
SWIFT PROCESS BUILDING No. 2 - SWIFT PUMP STATION MECHANICAL ISOMETRIC VIEWS

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	M2500

BIM 360://32480-001_HRSD James River Treatment Plant - SWIFT - WW/32480-001-2500-SW-M.rvt
4/8/2020 5:24:03 PM



BOTTOM PLAN
3/16" = 1'-0"



TOP PLAN
3/16" = 1'-0"

REV	ISSUED FOR	DATE	BY
1	SWIFT VE ALT NO. 11A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

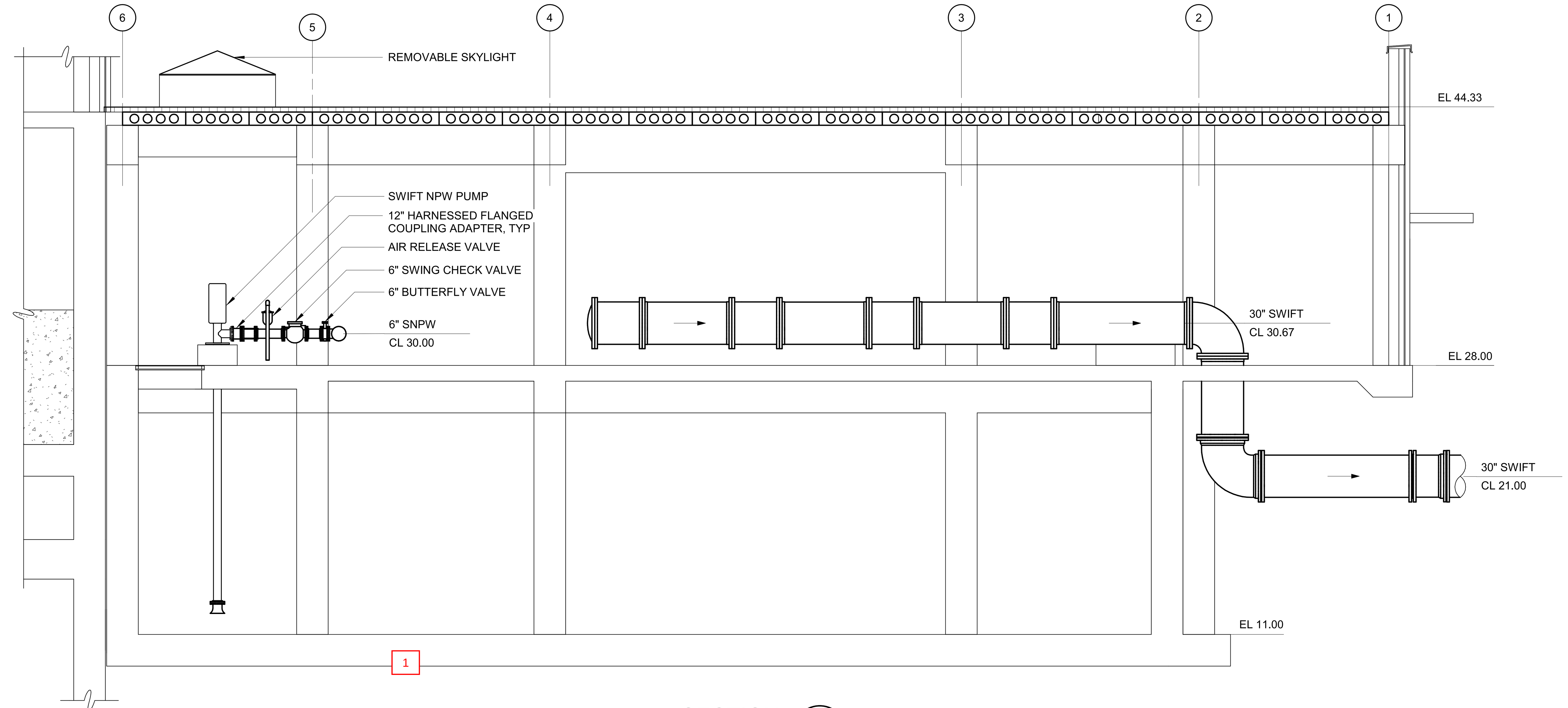
HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

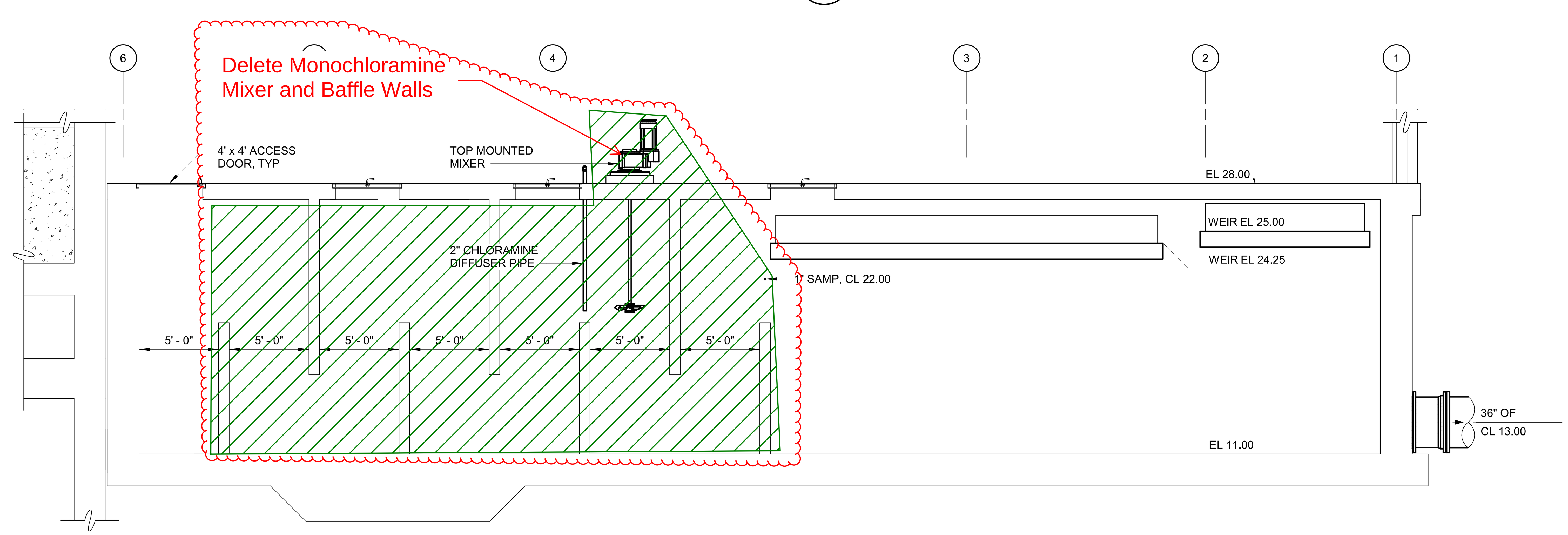
SWIFT PROCESS BUILDING No. 2 - SWIFT PUMP STATION MECHANICAL PLANS

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	M2501

BIM 360://32480-001_HRSD James River Treatment Plant - SWIFT - WW/32480-001-2500-SW-M.rvt
4/8/2020 5:24:06 PM



SECTION D
3/16" = 1'-0"
M2501



SECTION E
3/16" = 1'-0"
M2501

REV	ISSUED FOR	DATE	BY
1	SWIFT VE ALT NO. 12A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

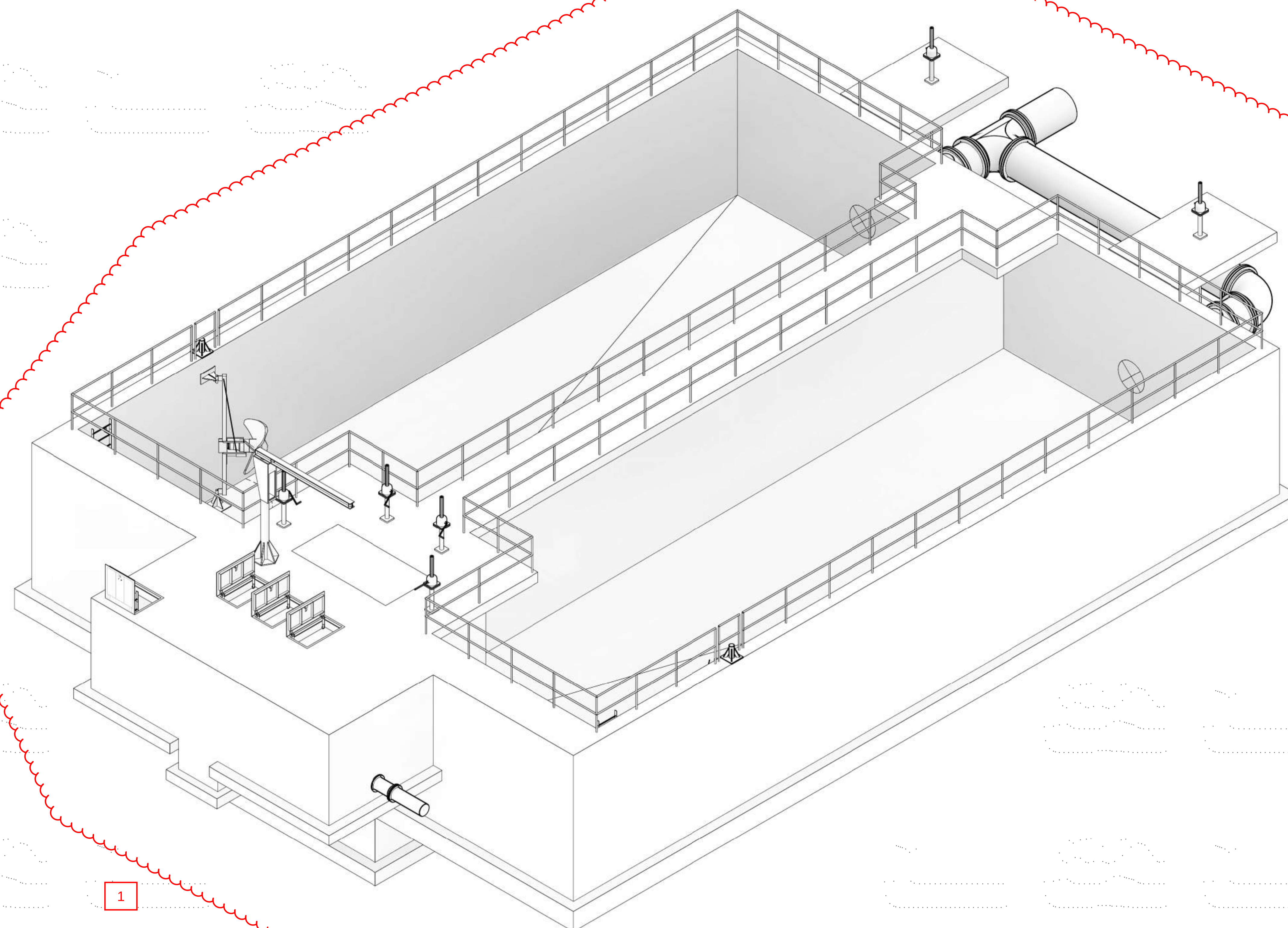
HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

SWIFT PROCESS BUILDING No. 2 -
SWIFT PUMP STATION
MECHANICAL
SECTIONS

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: M2503

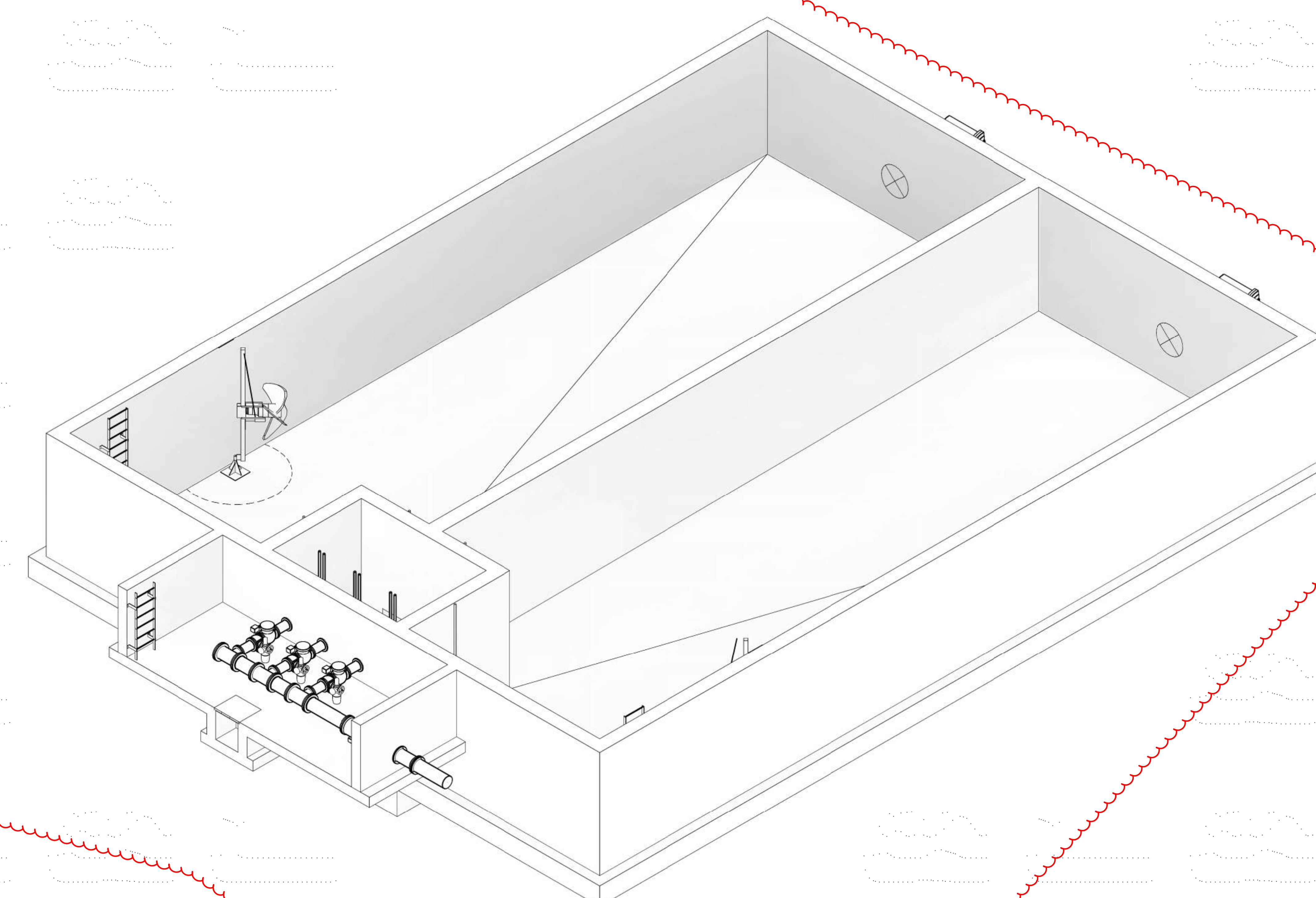
BIM 360://32480-001_HRSD James River Treatment Plant - SWIFT - WW/32480-001-2500-SW-M.rvt
4/8/2020 5:24:08 PM



1

STRUCTURE ORIENTATION AND CONFIGURATION REVISED TO ACCOMODATE SITE LAYOUT SHOWN IN ANRI VE ALT NO. 4A. SEE OVERALL SITE PLAN FOR REVISED LAYOUT.

ISOMETRIC VIEW



ISOMETRIC SECTION

REV	ISSUED FOR	DATE	BY
1	SWIFT VE ALT NO. 10A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

BACKWASH EQUALIZATION PUMP STATION
MECHANICAL
ISOMETRIC VIEWS

DATE: 2020

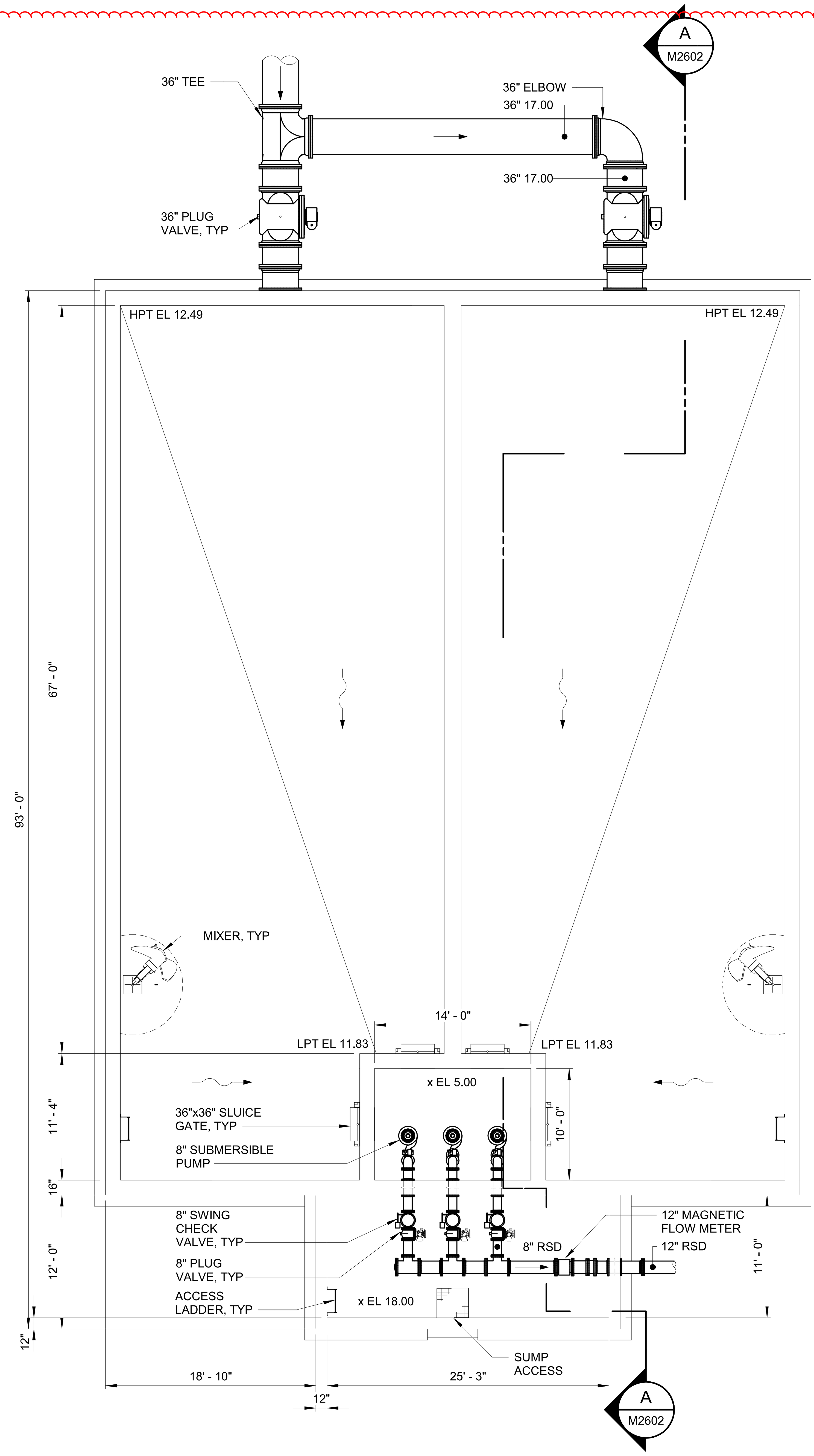
PROJECT NO.: 32480

CONTRACT NO.: -

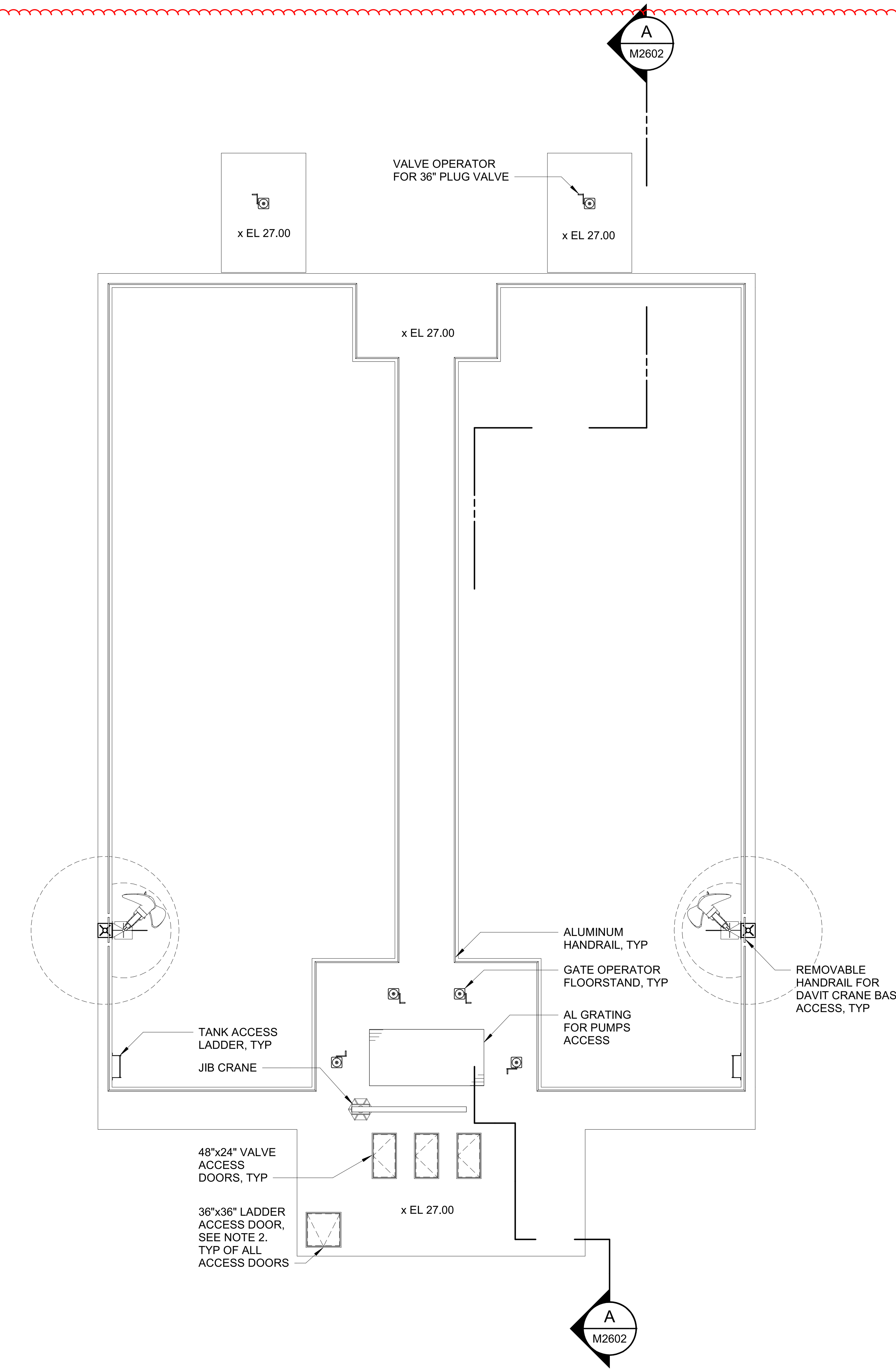
DRAWING NUMBER: M2600

BIM 360://32480-001_HRSD James River Treatment Plant - SWIFT - WW/32480-001-2600-RPS-M.rvt
4/9/2020 8:40:08 AM

NOTES:
1. ALL BASIN INFLUENT LINES ARE NOT SHOWN.
2. ROUTE ACCESS DOOR DRAIN TO EXTERIOR OF DOOR ASSEMBLY TO DRAIN TO GRADE.



BOTTOM PLAN
1/8" = 1'-0"



TOP PLAN
1/8" = 1'-0"

1

1 STRUCTURE ORIENTATION AND CONFIGURATION REVISED TO ACCOMODATE SITE LAYOUT SHOWN IN ANRI VE ALT NO. 4A. SEE OVERALL SITE PLAN FOR REVISED LAYOUT.

BIM 360://32480-001_HRSD James River Treatment Plant - SWIFT - WW/32480-001-2600-RPS-M.rvt
4/9/2020 8:40:09 AM

REV	ISSUED FOR	DATE	BY
1	SWIFT VE ALT NO. 10A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

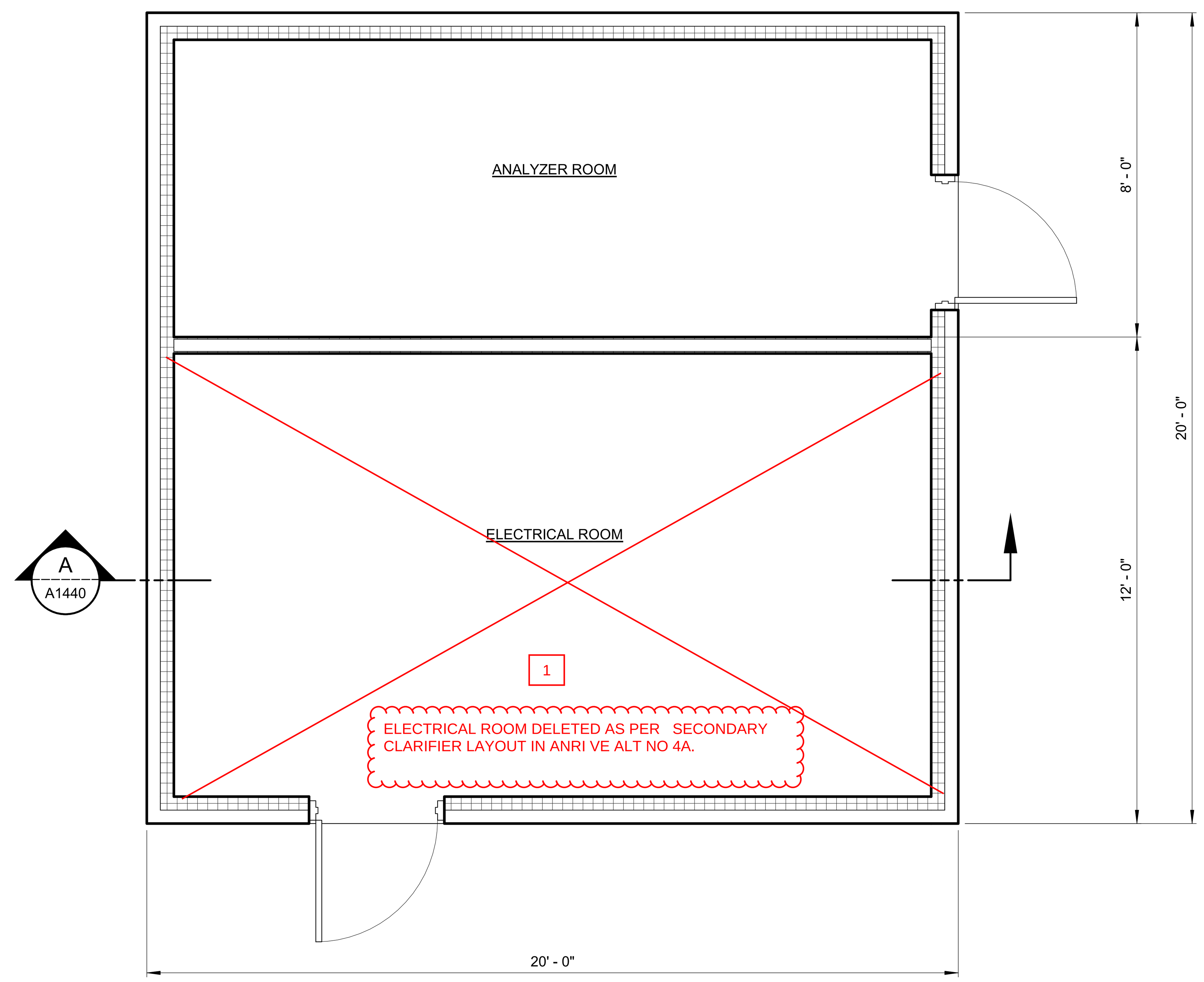
PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

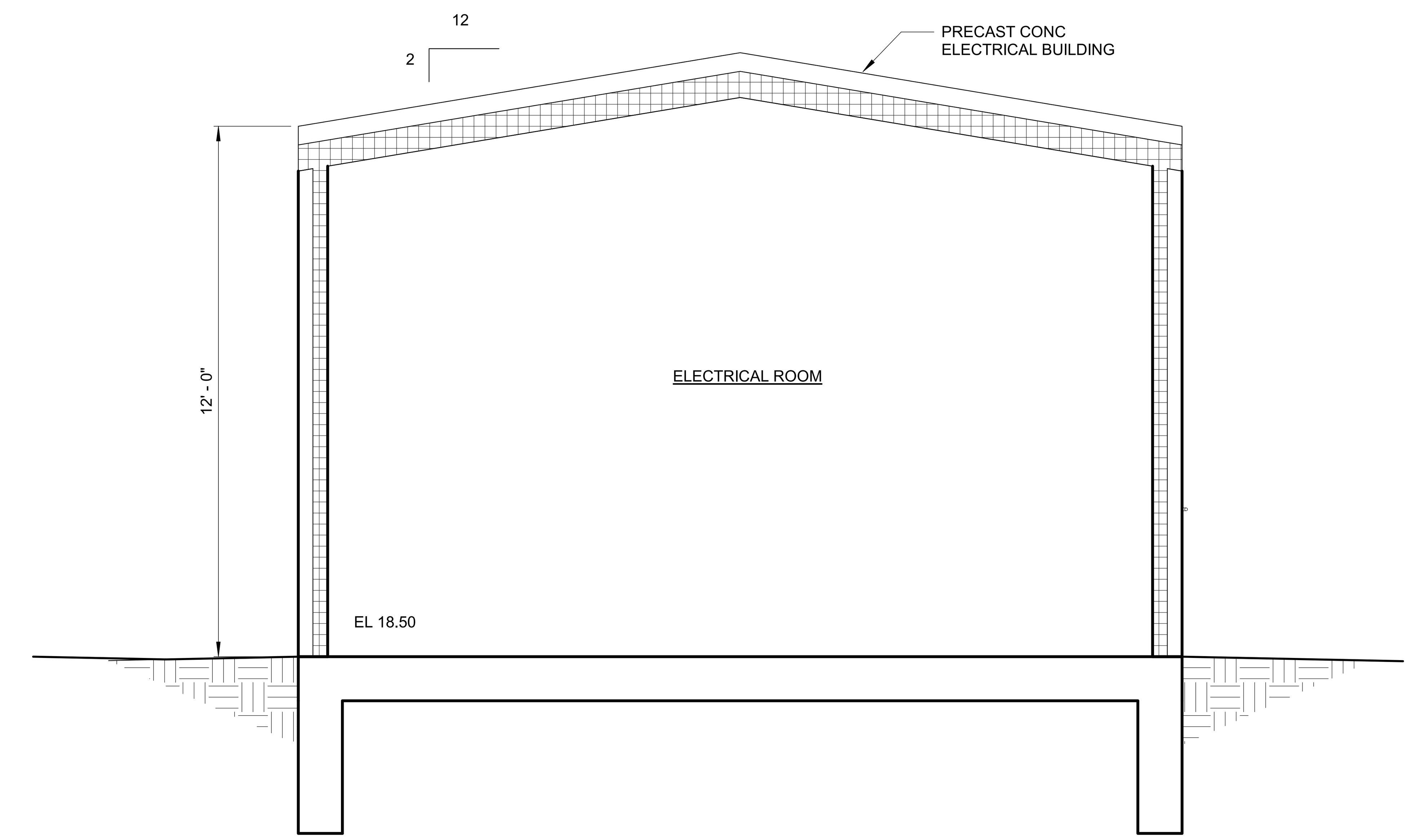
JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

BACKWASH EQUALIZATION PUMP STATION
MECHANICAL
PLANS

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	M2601



PLAN
3/8" = 1'-0"



SECTION A
3/8" = 1'-0"

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

SWIFT INFLUENT EQ ELECTRICAL BUILDING
ARCHITECTURAL
PLAN AND SECTION

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: A1440

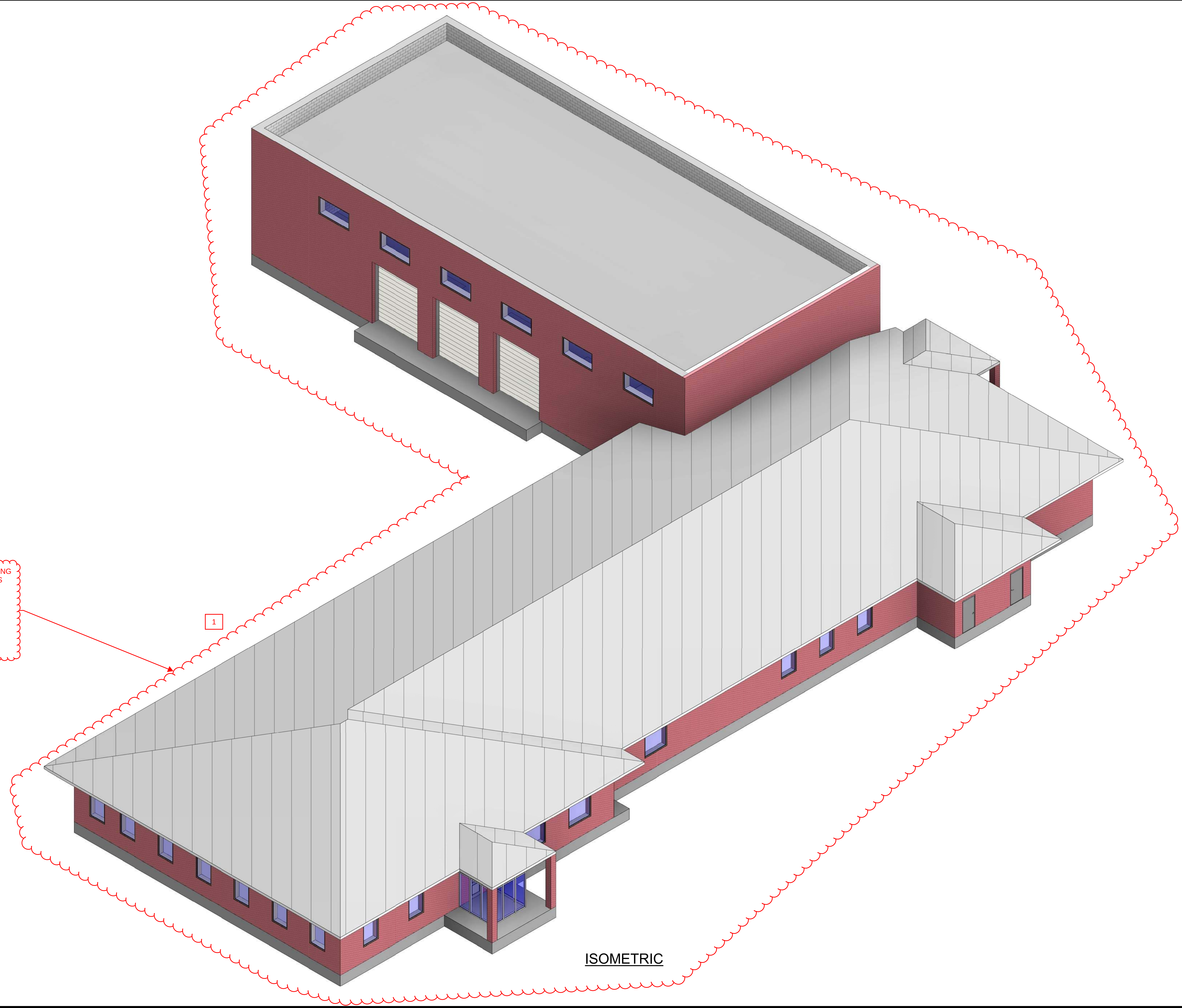
BIM 360://32480-001_HRSD James River Treatment Plant - SWIFT - WW/32480-002-1440-EL3-A.rvt
4/9/2020 8:40:00 AM

BIM 360://32480-001_HRSD James River Treatment Plant - SWIFT - WW/32480-002-123-ADM-A.rvt
4/9/2020 8:12:55 AM

1

ADMINISTRATION / MAINTENANCE BUILDING LAYOUT REVISED TO INCLUDE REVISIONS TO THE CONTROL ROOM PER ATTACHED DRAWING 1750.01.01.

1



ISOMETRIC

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

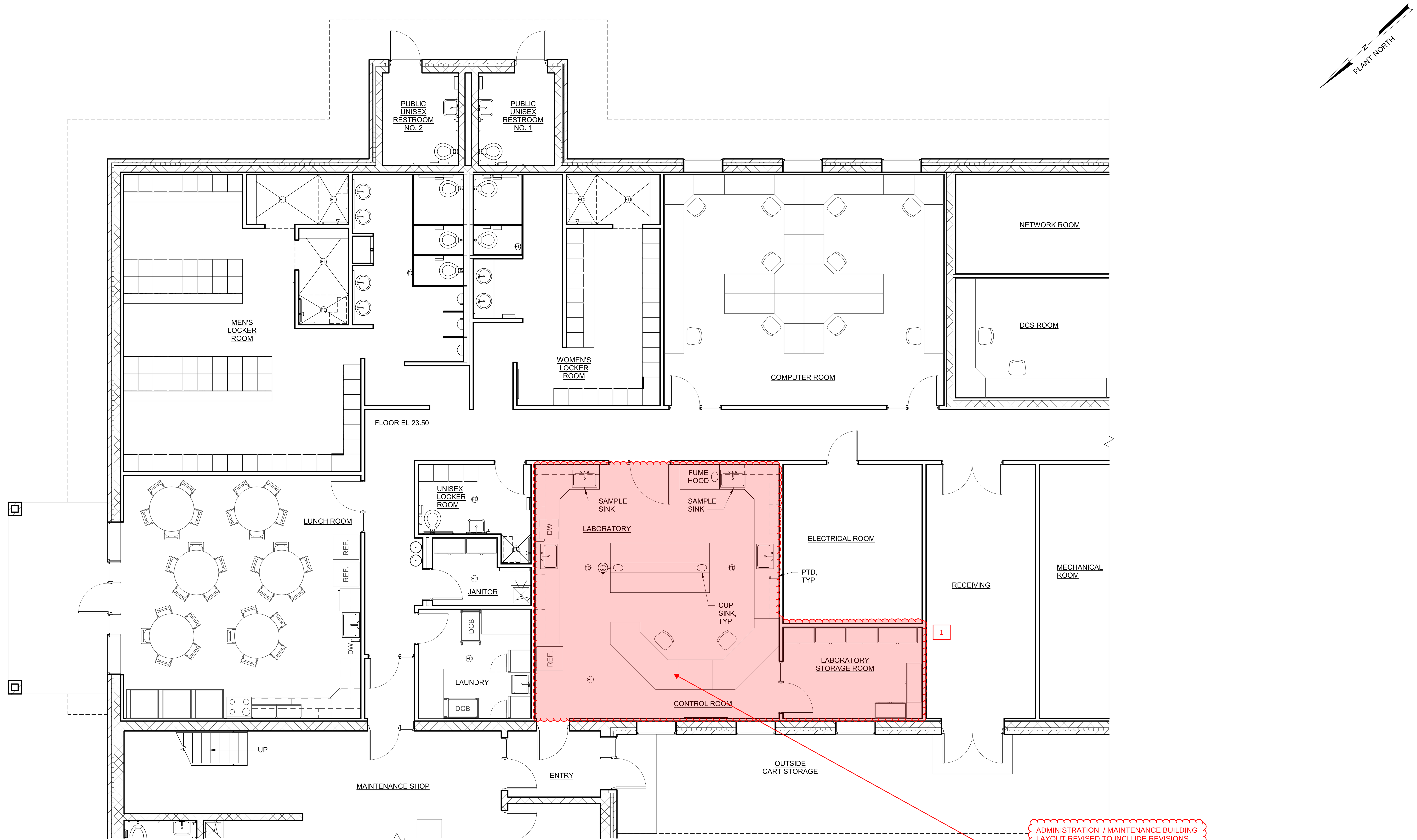
[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

ADMINISTRATION / MAINTENANCE BUILDING
ARCHITECTURAL
ISOMETRIC

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: A1700



ADMINISTRATION / MAINTENANCE BUILDING LAYOUT REVISED TO INCLUDE REVISIONS TO THE CONTROL ROOM PER ATTACHED DRAWING 1750.01.01.

1

PARTIAL FLOOR PLAN

3/16" = 1'-0"

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

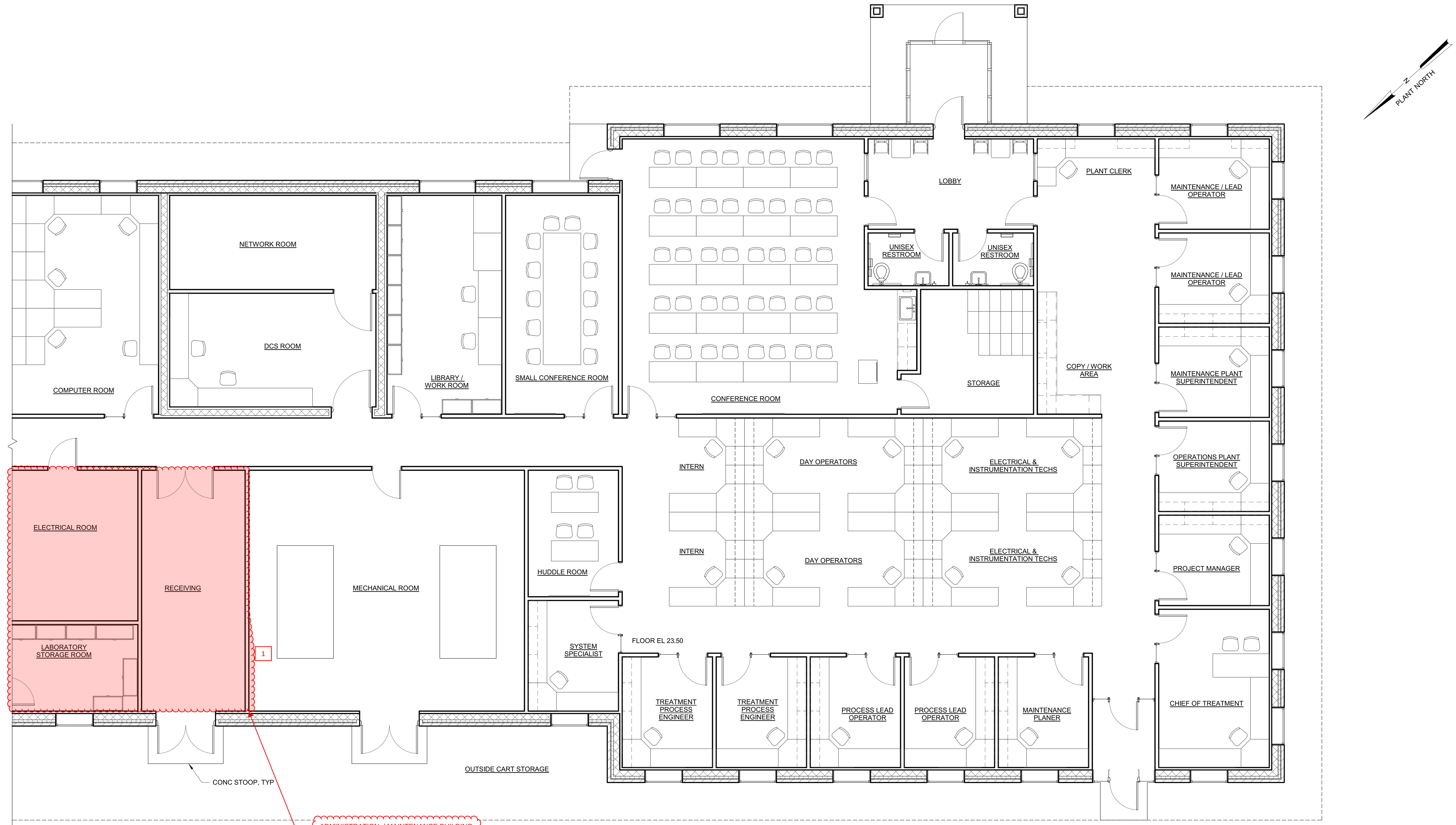
HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

ADMINISTRATION AREA ARCHITECTURAL PARTIAL FLOOR PLAN

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	A1701

BIM 360://32480-001_HRSD James River Treatment Plant - SWIFT - WW32480-002-123-ADM-A.rvt
4/9/2020 8:13:18 AM



ADMINISTRATION / MAINTENANCE BUILDING LAYOUT REVISED TO INCLUDE REVISIONS TO THE CONTROL ROOM PER ATTACHED DRAWING 1750.01.01.

1

PARTIAL FLOOR PLAN

3/16" = 1'-0"

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

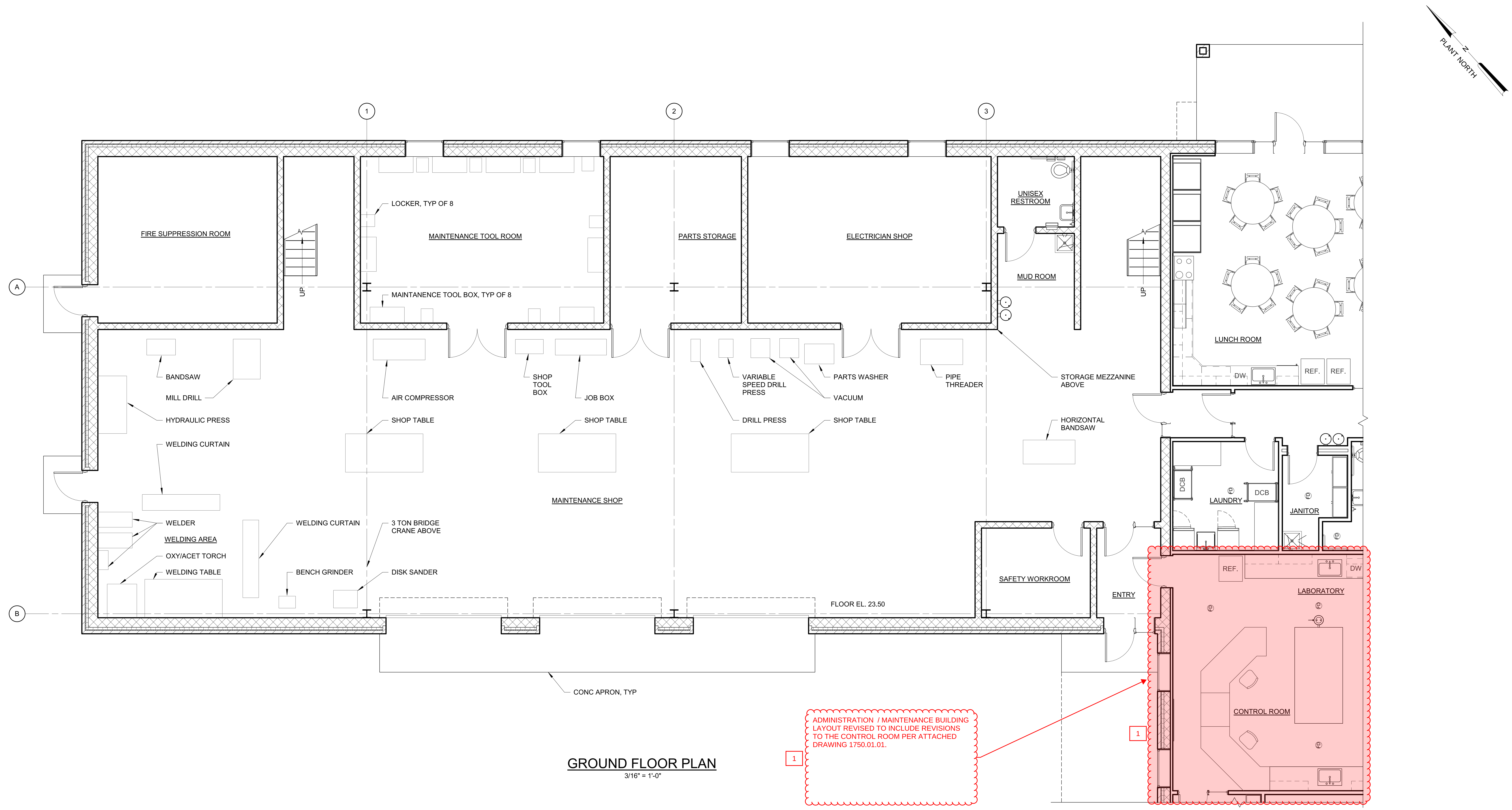
HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

ADMINISTRATION AREA ARCHITECTURAL PARTIAL FLOOR PLAN

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	A1702

BIM 360://32480-001_HRSD James River Treatment Plant - SWIFT - WW32480-002-123-ADM-A.rvt
4/9/2020 8:13:28 AM



GROUND FLOOR PLAN

3/16" = 1'-0"

1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSL	4/10/2020	--
REV	ISSUED FOR	DATE	BY

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

MAINTENANCE AREA ARCHITECTURAL GROUND FLOOR PLAN

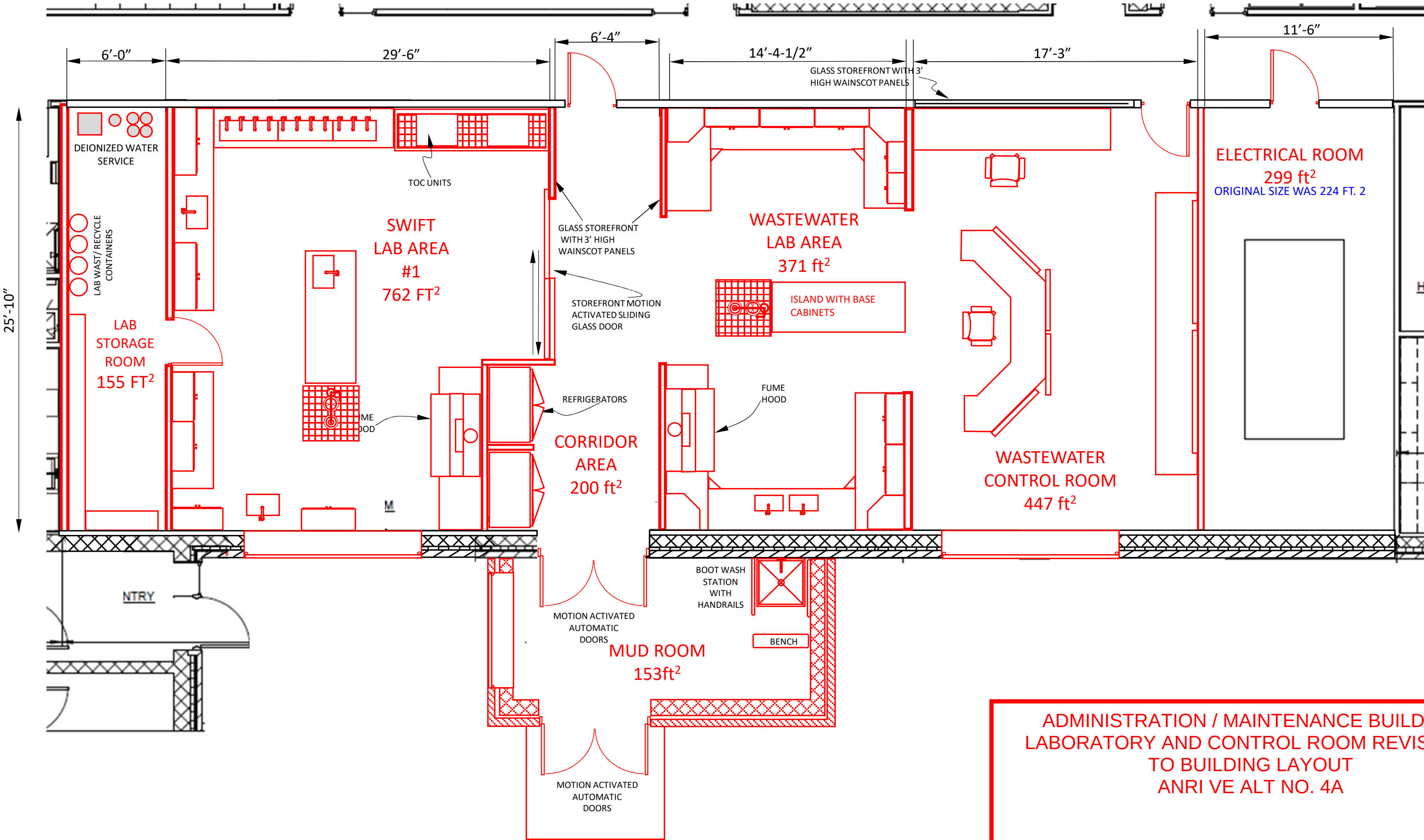
DATE: 2020

PROJECT NO.: 32480

CONTRACT NO.: -

DRAWING NUMBER: A1703

BIM 360://32480-001_HRSD James River Treatment Plant - SWIFT - WW/32480-002-123-ADM-A.rvt
4/9/2020 8:13:43 AM



ADMINISTRATION / MAINTENANCE BUILDING
LABORATORY AND CONTROL ROOM REVISIONS
TO BUILDING LAYOUT
ANRI VE ALT NO. 4A

DRAWING A1750.01.01

JAMES RIVER PLANT MODIFIED LAYOUT NEED MECHANICAL ROOM

REVISIONS

0	ANRI VE ALT NO. 4A	01/15/21	HRSD

File: C:\BMS\HAZEN-PW\D0158687\32480-002-E1021 Saved by: Save date: 4/2/2020 12:32 PM
PLOT DATE: 4/9/2020 9:55 AM BY: LMACGILL

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

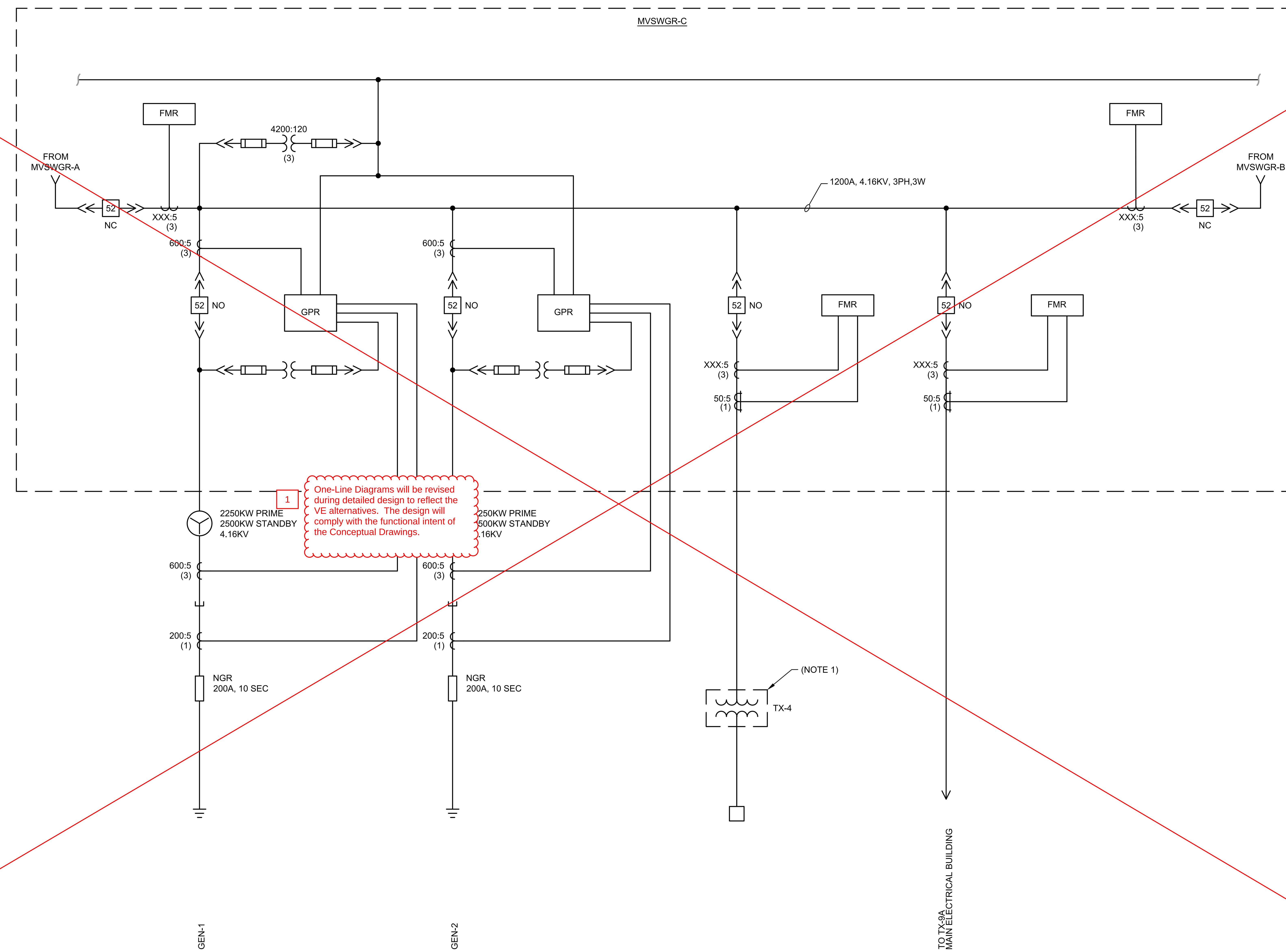
PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

ELECTRICAL ONE LINE DIAGRAM

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: E1021



NOTES:

1. RELOCATE EXISTING TX-4 TO PAD ON WEST END OF MAIN ELECTRICAL BUILDING FOR USE WITH TEMPORARY GENERATOR.

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

ELECTRICAL ONE LINE DIAGRAM

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	E1022

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

ELECTRICAL ONE LINE DIAGRAM

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: E1023

NOTES:

1. PROVIDE INTERIM UTILITY POWER AND GENERATOR BACKUP POWER FOR THIS EQUIPMENT. SEE SECTION INTERIM POWER IN THE BASIS OF DESIGN REPORT.
2. DISCONNECT AND REMOVE THIS EQUIPMENT. SEE SECTION CONSTRUCTION SEQUENCING IN THE BASIS OF DESIGN REPORT.
3. RECONNECT EQUIPMENT TO MVSWGR-A. SEE SECTION CONSTRUCTION SEQUENCE IN THE BASIS OF DESIGN REPORT.
4. PROVIDE TX-ADMIN BLDG NO. 2. RECONNECT EQUIPMENT TO SWGR-7B. SEE SECTION CONSTRUCTION SEQUENCE IN THE BASIS OF DESIGN REPORT.

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

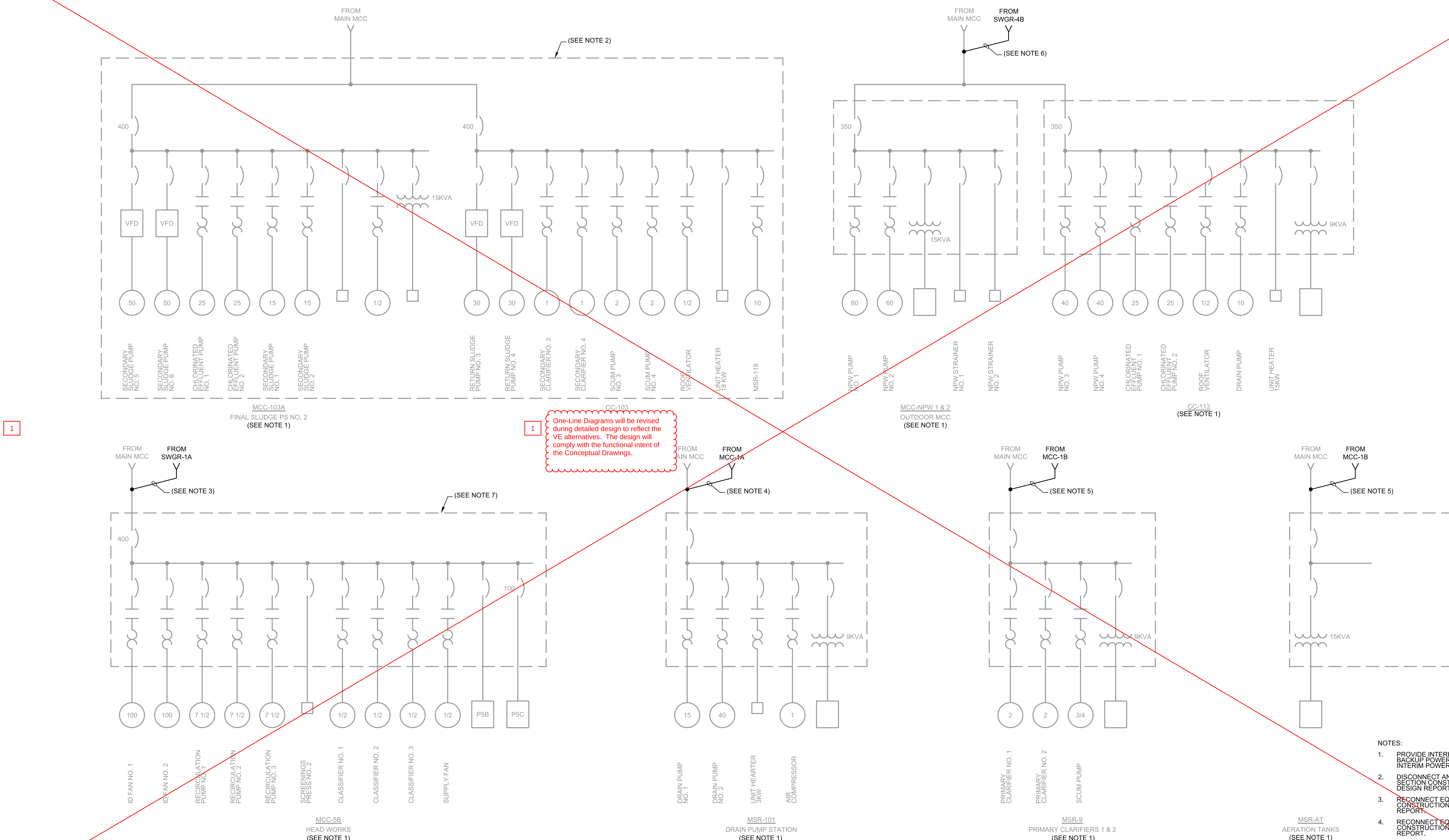
PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

ELECTRICAL ONE LINE DIAGRAM

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: E1024



NOTES:

1. PROVIDE INTERIM UTILITY POWER AND GENERATOR BACKUP POWER FOR THIS EQUIPMENT. SEE SECTION INTERIM POWER IN THE BASIS OF DESIGN REPORT.
2. DISCONNECT AND REMOVE THIS EQUIPMENT. SEE SECTION CONSTRUCTION SEQUENCING IN THE BASIS OF DESIGN REPORT.
3. RECONNECT EQUIPMENT TO SWGR-1A. SEE SECTION CONSTRUCTION SEQUENCE IN THE BASIS OF DESIGN REPORT.
4. RECONNECT EQUIPMENT TO MCC-1A. SEE SECTION CONSTRUCTION SEQUENCE IN THE BASIS OF DESIGN REPORT.
5. RECONNECT EQUIPMENT TO MCC-1B. SEE SECTION CONSTRUCTION SEQUENCE IN THE BASIS OF DESIGN REPORT.
6. RECONNECT EQUIPMENT TO SWGR-4B. SEE SECTION CONSTRUCTION SEQUENCE IN THE BASIS OF DESIGN REPORT.
7. REPLACE MCC-5B WITH MCC-5C / MCC-5D. SEE DRAWING E1026 FOR MCC-5C / 5D ONE LINE DIAGRAM.

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

ELECTRICAL ONE LINE DIAGRAM

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	E1025

NOTES:

1. PROVIDE INTERIM UTILITY POWER AND GENERATOR BACKUP POWER FOR THIS EQUIPMENT. SEE SECTION INTERIM POWER IN THE BASIS OF DESIGN REPORT.
2. DISCONNECT AND REMOVE THIS EQUIPMENT. SEE SECTION CONSTRUCTION SEQUENCING IN THE BASIS OF DESIGN REPORT.
3. RECONNECT EQUIPMENT TO SWGR-1B. SEE SECTION CONSTRUCTION SEQUENCE IN THE BASIS OF DESIGN REPORT.
4. RECONNECT EQUIPMENT TO MCC-1A. SEE SECTION CONSTRUCTION SEQUENCE IN THE BASIS OF DESIGN REPORT.
5. INSTALL MCC-5C / MCC-5D IN A WALK-IN WEATHER PROOF ENCLOSURE LOCATED IN THE EAST SIDE OF HEADWORKS BUILDING. COORDINATE FINAL LOCATION WITH OWNER.
6. RECONNECT EQUIPMENT TO MCC-1B. SEE SECTION CONSTRUCTION SEQUENCE IN THE BASIS OF DESIGN REPORT.

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

ELECTRICAL ONE LINE DIAGRAM

DATE: 2020

PROJECT NO.: 32480

CONTRACT NO.: -

DRAWING NUMBER: E1026

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

ELECTRICAL ONE LINE DIAGRAM

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: E1027

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

ELECTRICAL ONE LINE DIAGRAM

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	E1028

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

ELECTRICAL ONE LINE DIAGRAM

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: E1029

ELECTRICAL ROOM PLAN
1/4" = 1'-0"

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT N . 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

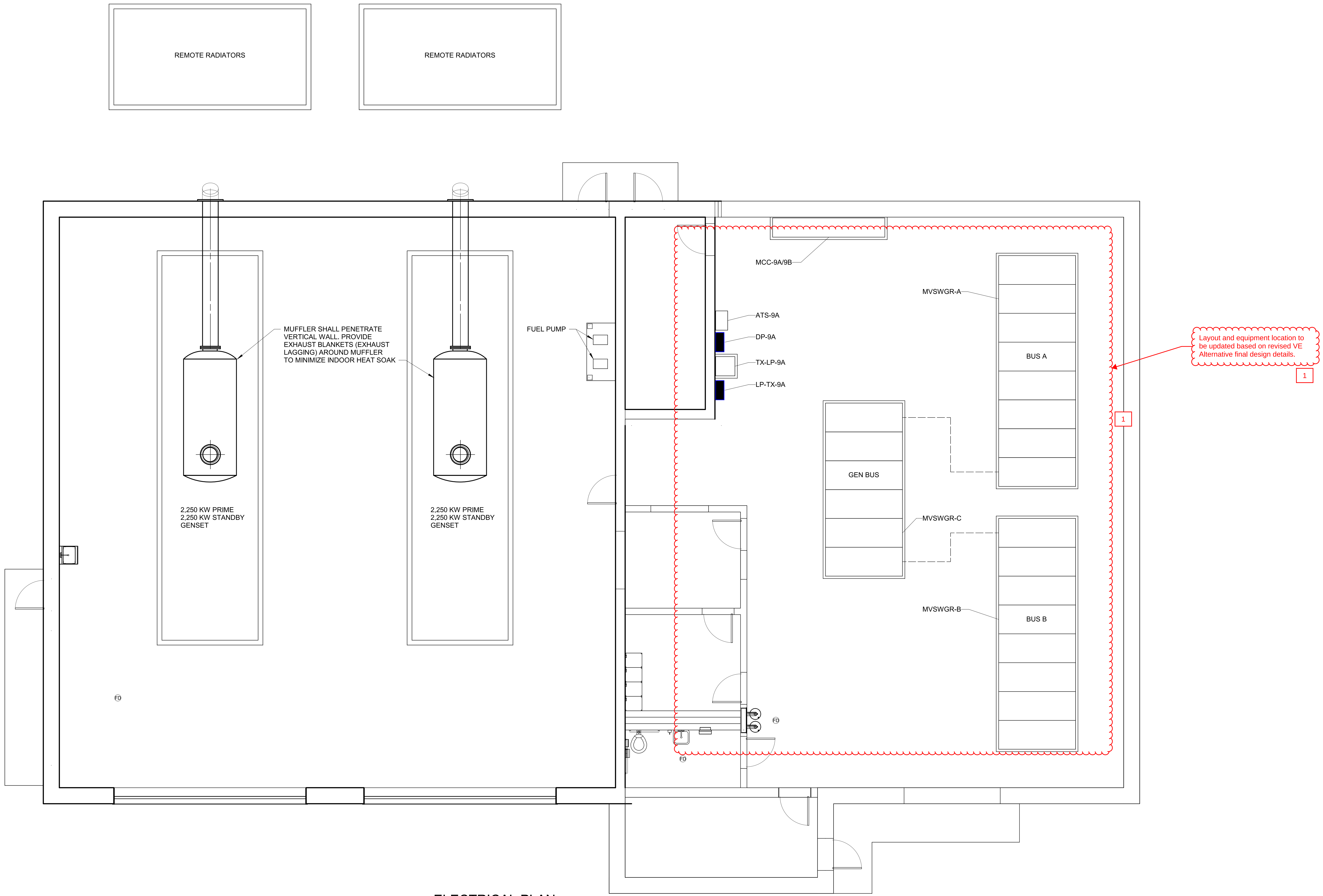
[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

ADMINISTRATION / MAINTENANCE BUILDING
ELECTRICAL
PLAN

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	E1701



ELECTRICAL PLAN

3/16" = 1'-0"

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

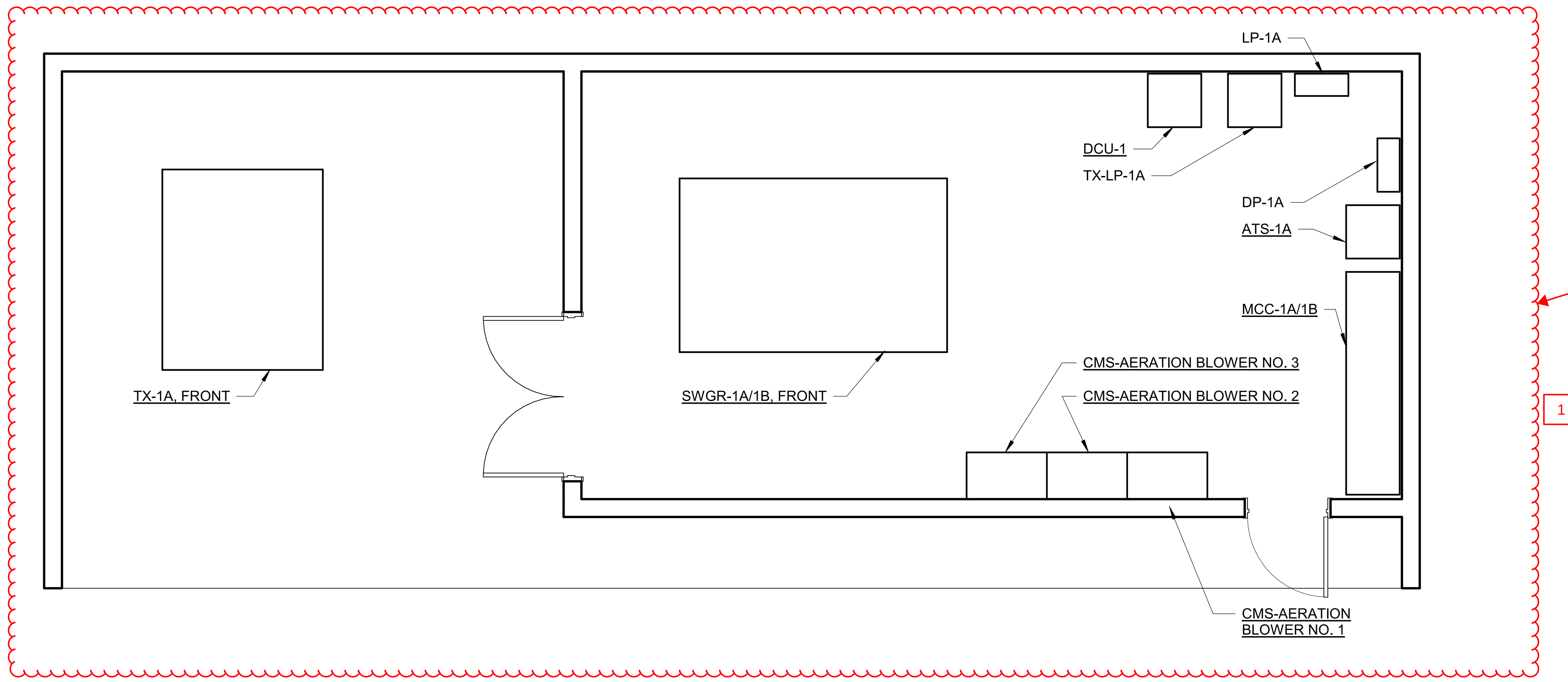
HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

MAIN ELECTRICAL BUILDING ELECTRICAL PLAN

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	E1801

BIM 360://32480-001_HRSD James River Treatment Plant - SWIFT - WW/32480-002-1800-ELE-E.rvt
4/9/2020 9:12:51 AM



Layout and equipment location to be updated based on revised VE Alternative final design details.

1

ELECTRICAL PLAN

1/4" = 1'-0"

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

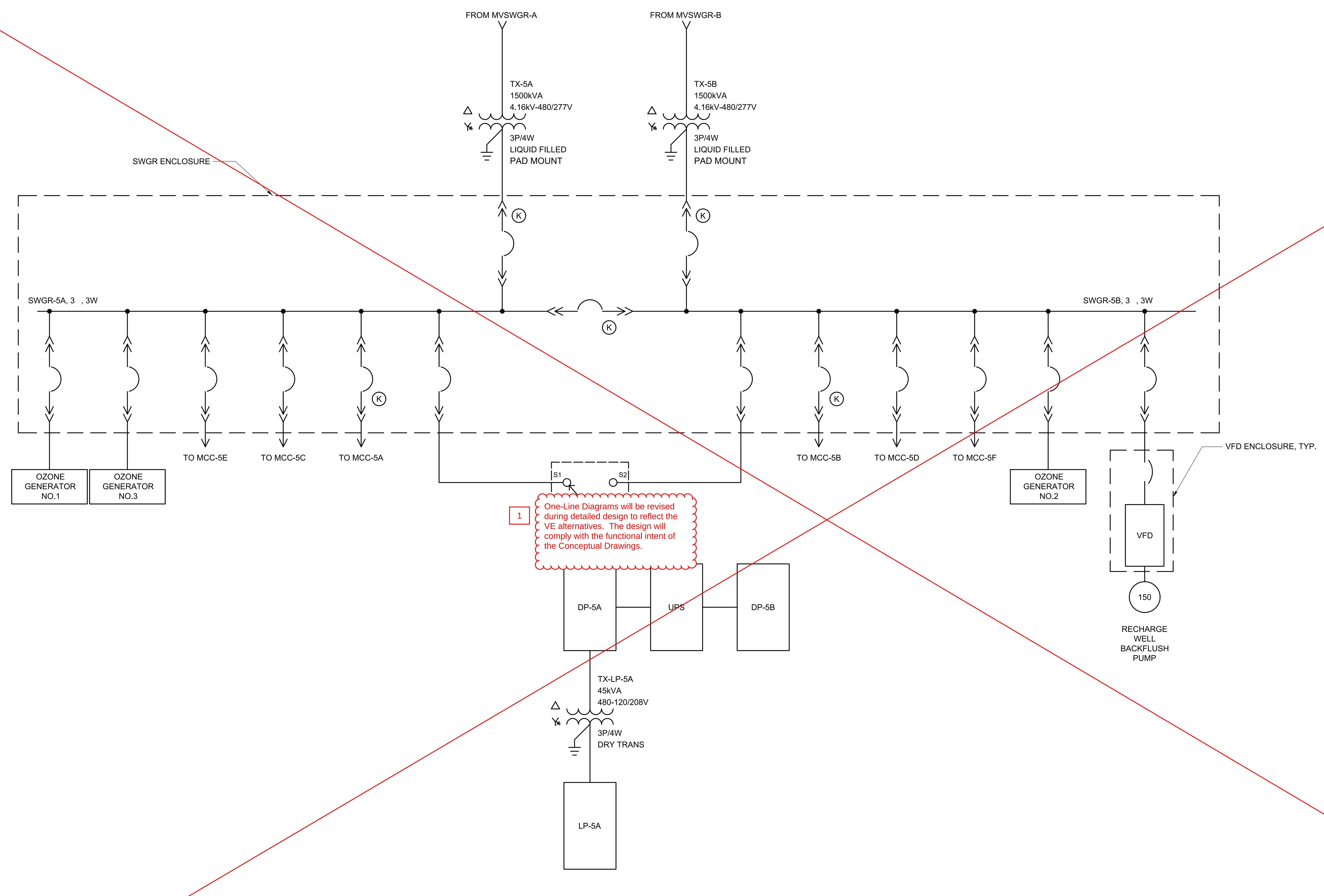
[redacted]

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

ELECTRICAL BUILDING NO. 2
ELECTRICAL
PLAN

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	E1821

BIM 360://32480-001_HRSD James River Treatment Plant - SWIFT - WW/32480-002-1820-EL2-E.rvt
4/9/2020 11:34:52 AM



SWGR-5A/B

SINGLE LINE DIAGRAM

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	–

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

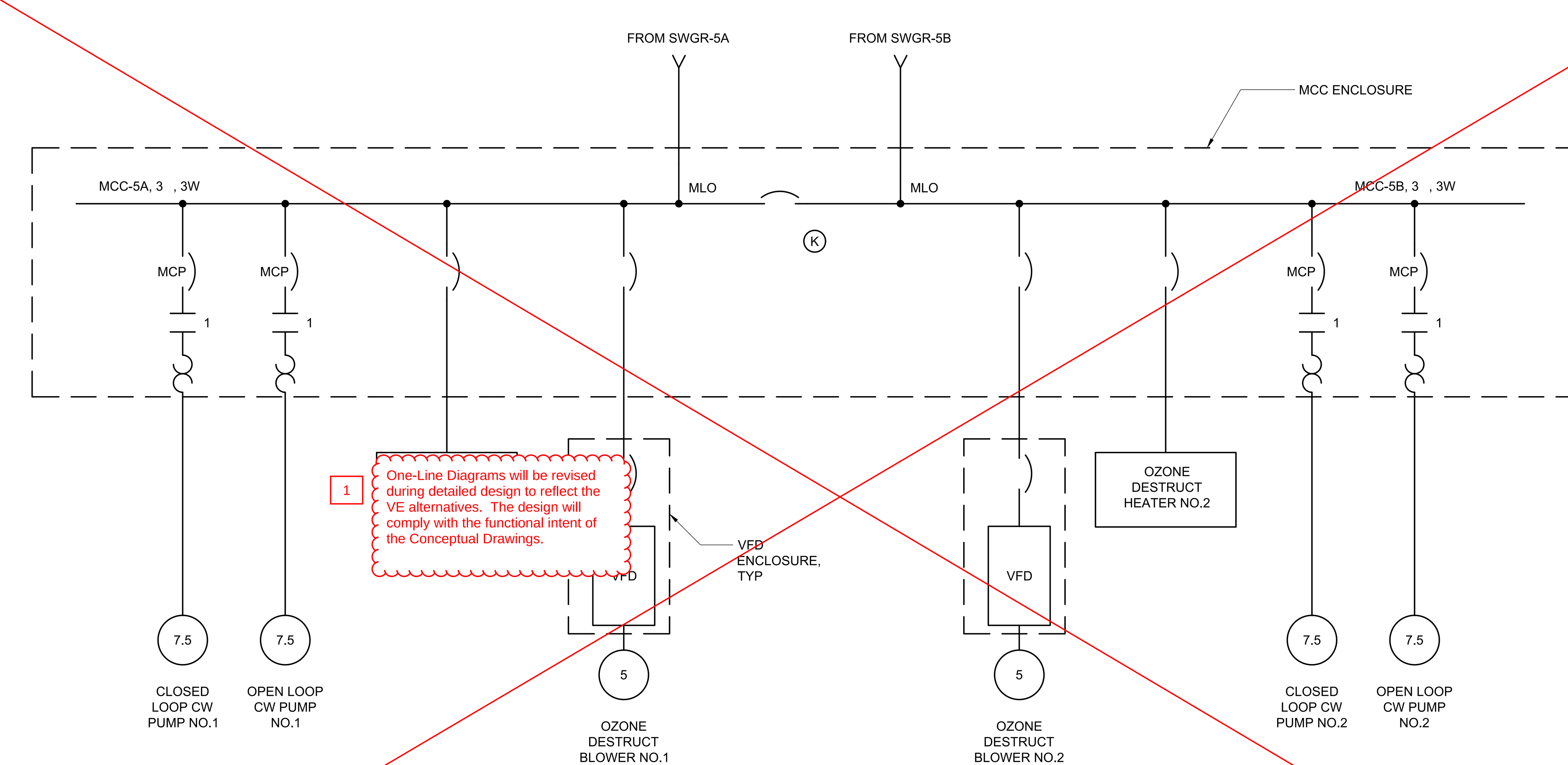
JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

SWIFT PROCESS BUILDING 1
ELECTRICAL
SWITCHGEAR SINGLE LINE DIAGRAM

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	E2201

NOTES:

1. ONLY LARGER LOADS ARE SHOWN ON THIS SINGLE LINE DIAGRAM , SMALLER LOADS NOT YET DEFINED, SUCH AS HVAC EQUIPMENT, ARE NOT SHOWN.



MCC-5A/B

SINGLE LINE DIAGRAM

1

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

SWIFT PROCESS BUILDING 1
ELECTRICAL
MCC SINGLE LINE DIAGRAM

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	E2202

NOTES:

1. ONLY LARGER LOADS ARE SHOWN ON THIS SINGLE LINE DIAGRAM , SMALLER LOADS NOT YET DEFINED, SUCH AS HVAC EQUIPMENT, ARE NOT SHOWN.

MCC-5C/D
SINGLE LINE DIAGRAM

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	–

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

SWIFT PROCESS BUILDING 1
ELECTRICAL
MCC SINGLE LINE DIAGRAM

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	E2203

BOTTOM PLAN

3/32" = 1'-0"

REV	ISSUED FOR	DATE	BY
1	SWIFT VE ALT NO. 10A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

SWIFT PROCESS BUILDING 1
ELECTRICAL
BOTTOM PLAN

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	E2204

BIM 360://32480-001_HRSD James River Treatment Plant - SWIFT - WW/32450-001-300-OZ-E.rvt
4/9/2020 3:23:45 PM

SWGR-6A/B

SINGLE LINE DIAGRAM

File: O:\32480-HRD\32480-001\CAD_BIM\ELECTRICAL\E2401 Saved by BLJ n n Save date: 4/20/2020 4:15 PM
PLOT DATE: 4/20/2020 4:27 PM BY: BLJOHNSON

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

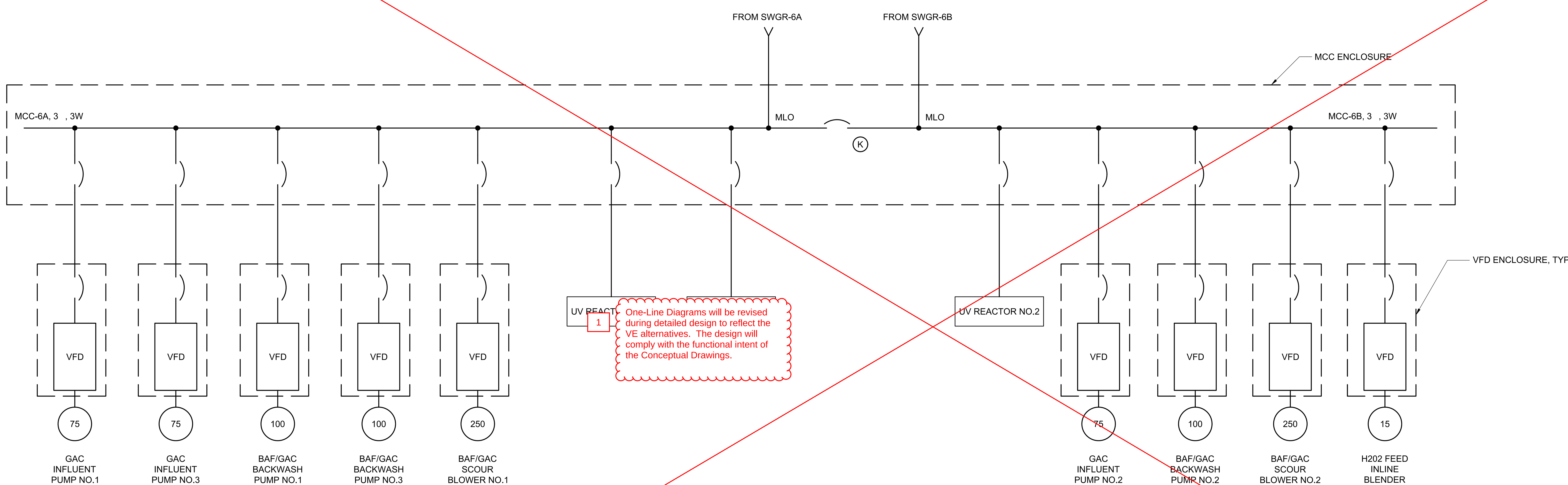
JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

SWIFT PROCESS BUILDING 2
ULTRAVIOLET TREATMENT FACILITY
ELECTRICAL
SWITCHGEAR SINGLE LINE DIAGRAM

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: E2401

NOTES:

1. ONLY LARGER LOADS ARE SHOWN ON THIS SINGLE LINE DIAGRAM , SMALLER LOADS NOT YET DEFINED, SUCH AS HVAC EQUIPMENT, ARE NOT SHOWN.



1

MCC-6A/B
SINGLE LINE DIAGRAM

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

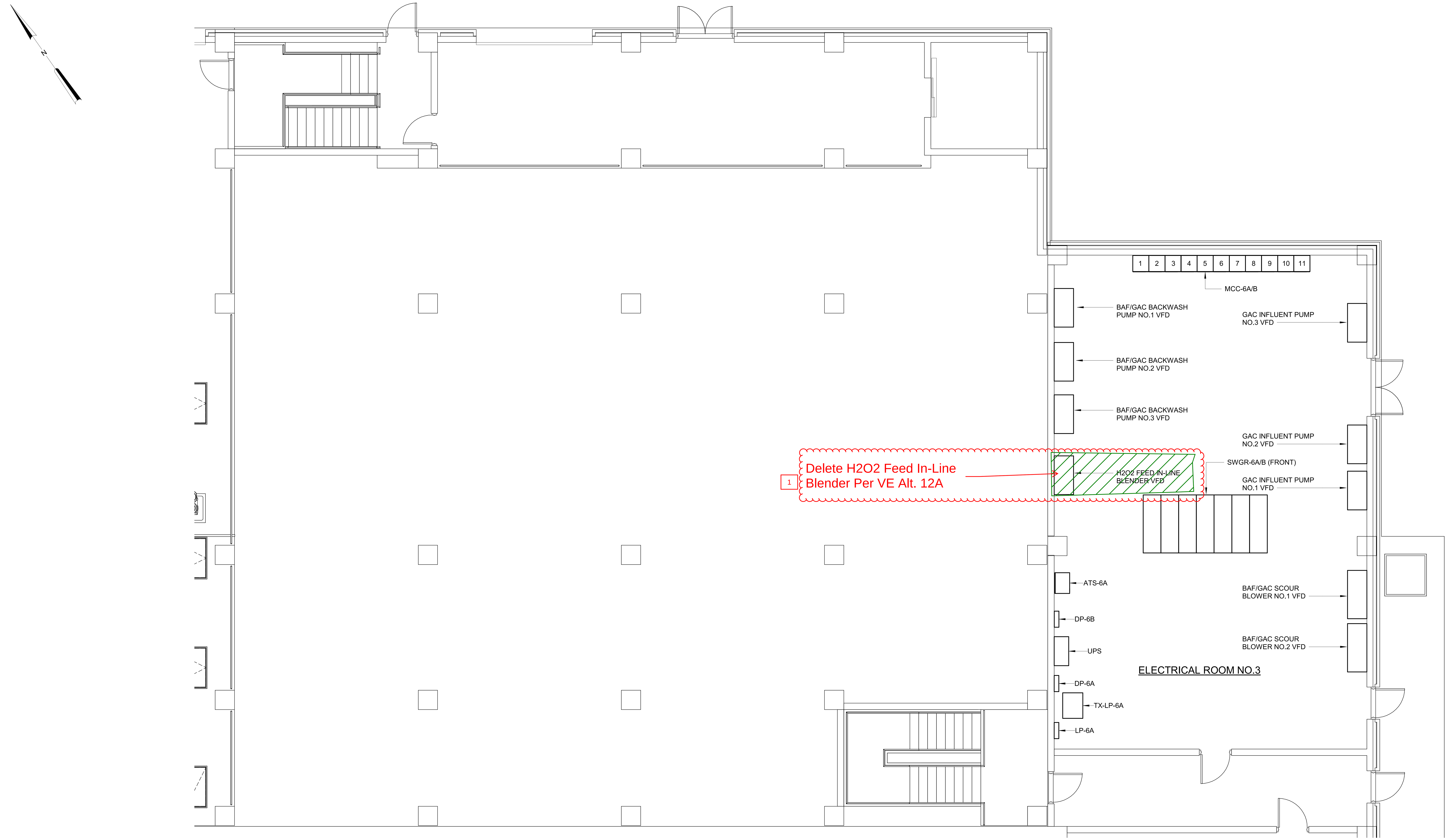
PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

SWIFT PROCESS BUILDING 2
ULTRAVIOLET TREATMENT FACILITY
ELECTRICAL
MCC SINGLE LINE DIAGRAM

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	E2402

File: O:\32480-HRD\32480-001\CAD_BIM\ELECTRICAL\E2402 Saved by BLJ□□n□□n Save date: 4/20/2020 4:16 PM
PLOT DATE: 4/20/2020 4:28 PM BY: BLJOHNSON



INTERMEDIATE PLAN

3/16" = 1'-0"

REV	ISSUED FOR	DATE	BY
1	SWIFT VE ALT NO. 12A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

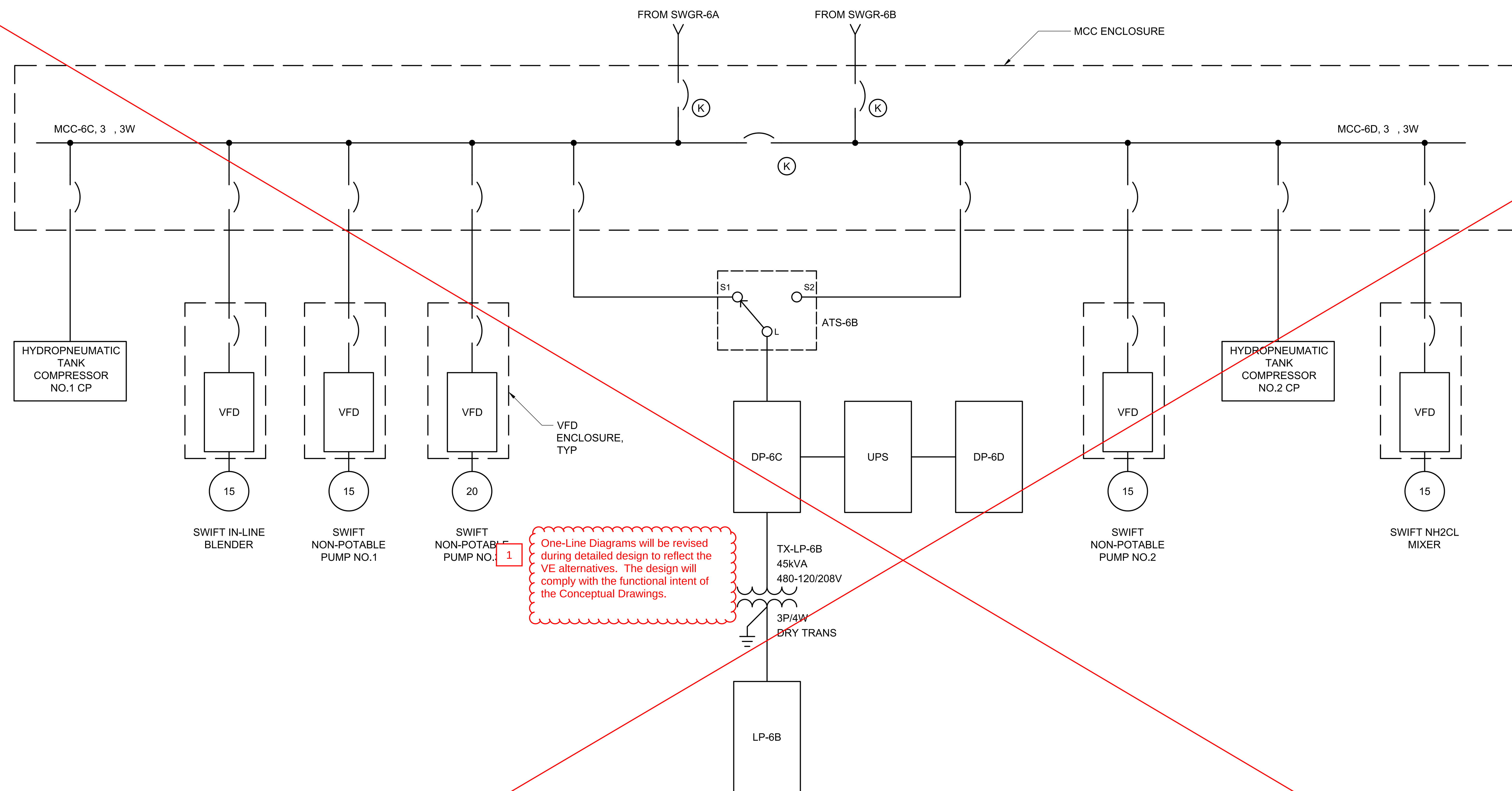
SWIFT PROCESS BUILDING 2
ULTRAVIOLET DISINFECTION FACILITY
ELECTRICAL
INTERMEDIATE PLAN

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	E2403

BIM 360://32480-001_HRSD James River Treatment Plant - SWIFT - WW/32480-001-2300-FLT-E.rvt
4/9/2020 2:55:32 PM

NOTES:

1. ONLY LARGER LOADS ARE SHOWN ON THIS SINGLE LINE DIAGRAM , SMALLER LOADS NOT YET DEFINED, SUCH AS HVAC EQUIPMENT, ARE NOT SHOWN.



1

MCC-6C/D

SINGLE LINE DIAGRAM

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

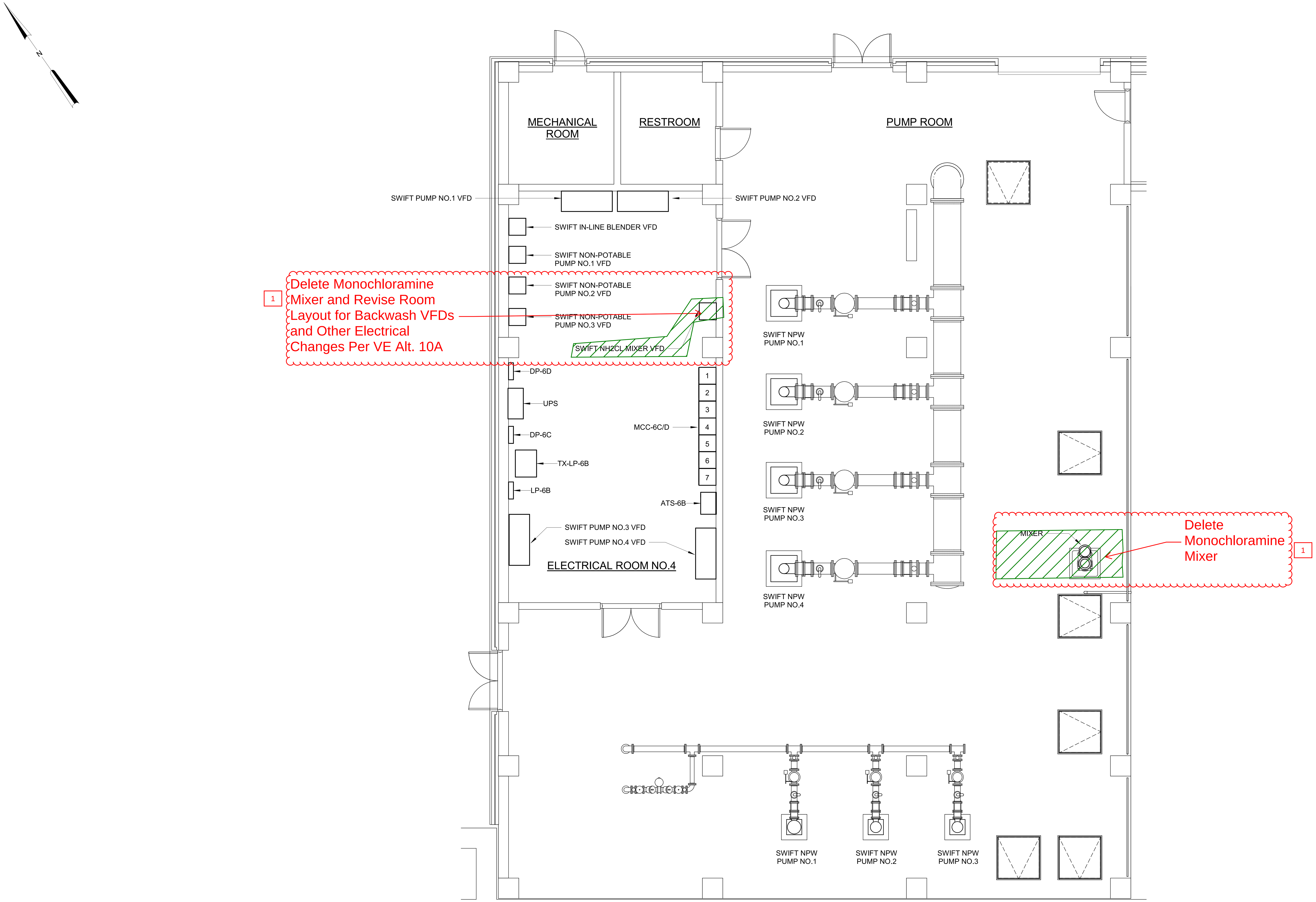
PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

SWIFT PROCESS BUILDING 2
SWIFT PUMP STATION
ELECTRICAL
MCC SINGLE LINE DIAGRAM

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	E2501



TOP PLAN

3/16" = 1'-0"

REV	ISSUED FOR	DATE	BY
1	SWIFT VE ALT NO. 10A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWINGS - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITIES (GN016360)

SWIFT PROCESS BUILDING 2
SWIFT PUMP STATION
ELECTRICAL
TOP PLAN

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	E2502

BIM 360://32480-001_HRSD James River Treatment Plant - SWIFT - WW/32480-001-2500-SW-E.rvt
4/8/2020 3:31:51 PM

NOTE:

1. DCU-1 LOCATED IN EXISTING ADMINISTRATION BUILDING SHALL BE MOVED TO NEW ELECTRICAL BUILDING 2 LOCATION. THIS RESPONSIBILITY SHALL BE ON THE DESIGN BUILDER TO COORDINATE WITH THE OWNER, MOPO SHALL BE DERIVED ON MOVING OF EQUIPMENT AND FIBER.

NOTE:

2. NETWORK CABINET IN ADMINISTRATION BUILDING SHALL BE MOVED BY THE DESIGN BUILDER TO TEMPORARY LOCATION IN ADMINISTRATION BUILDING #2. DESIGN BUILDER SHALL COORDINATE WITH OWNER ON MOVE. NETWORK CABINET SHALL BE MOVED TO NEW ADMINISTRATION BUILDING ONCE CONSTRUCTED AND COORDINATED.MOPO SHALL BE DERIVED BY DESIGN BUILDER,APPROVED BY ENGINEER AND OWNER.

CABLE LEGEND

C6	PRIMARY NETWORK CAT6 ETHERNET
FOSM	PRIMARY NETWORK FIBER OPTIC CABLE
C6	SECONDARY NETWORK CAT6 ETHERNET
FOSM	SECONDARY NETWORK FIBER OPTIC CABLE

REV	ISSUED FOR	DATE	BY
1	VE ALT GENARAL	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

INSTRUMENTATION SYSTEM ARCHITECTURE

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	I2

CABLE LEGEND

C6	PRIMARY NETWORK CAT6 ETHERNET
FOSM	PRIMARY NETWORK FIBER OPTIC CABLE
C6	SECONDARY NETWORK CAT6 ETHERNET
FOSM	SECONDARY NETWORK FIBER OPTIC CABLE

NOTE:

1. DESIGN BUILDER SHALL COORDINATE WITH EMERSON FOR CONNECTING ONE PAIR OF FIBER FROM RECHARGE WELL 8 TO RECHARGE WELL 5, INSIDE OF DCU-4 PATCH PANEL, TO ENSURE RING REDUNDANCY FOR WELL COMMUNICATION AND FUNCTIONALITY.

REV	ISSUED FOR	DATE	BY
1	VE ALT GENARAL	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

INSTRUMENTATION
SWIFT SYSTEM ARCHITECTURE

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	I3

File: C:\USERS\ZWEINTRAUB\ONEDRIVE - HAZEN AND SAWYER\PROJECTS\32480-HRD\32480-001\CAD_BIM\INSTRUMENTATION\0003 Saved by ZWeintraub Save date: 4/9/2020 10:43 AM
PLOT DATE: 4/9/2020 9:05 AM BY: ZWEINTRAUB

REV	ISSUED FOR	DATE	BY
1	VE ALT GENARAL	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

INSTRUMENTATION
DCS NETWORK UPS

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	I6

REV	ISSUED FOR	DATE	BY
2	ANRI VE ALT NO. 4A	12/22/20	US-A
1	ADDENDUM NO. 2	6/11/2020	
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

INSTRUMENTATION
IFAS EFFLUENT CHANNEL
AND SECONDARY CLARIFIER DRAIN PUMPS

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: I1200

REV	ISSUED FOR	DATE	BY
2	ANRI VE ALT NO. 4A	12/2020	US-A
1	ADDENDUM NO. 2	6/11/2020	
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

INSTRUMENTATION
SECONDARY CLARIFIERS
NO. R1 AND R2

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: I1201

NOTES:

1. 24VDC COIL INTERPOSING RELAY IN INTERPOSING RELAY PANEL X. FORM C CONTACT 10A @ 120V.
2. FLIGHT SENSORS, BOTH SIDES OF FLIGHT MUST TRIP WITHIN 5 SEC OR A MISALIGNMENT AND SHUT DOWN ALARM WILL BE GENERATED.
3. SEE DRAWING I1205 FOR SCUM SYSTEM.

REV	ISSUED FOR	DATE	BY
2	ANRI VE ALT NO. 4A	12/2020	US-A
1	ADDENDUM NO. 2	6/11/2020	
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

INSTRUMENTATION SECONDARY CLARIFIERS NO. R3 AND R4

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	I1202

REV	ISSUED FOR	DATE	BY
2	ANRI VE ALT NO. 4A	12/2020	US-A
1	ADDENDUM NO. 2	6/11/2020	
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

INSTRUMENTATION
SECONDARY CLARIFIERS
NO. R5 AND R6

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: I1203

REV	ISSUED FOR	DATE	BY
2	ANRI VE ALT NO. 4A	9/22/20	US-A
1	ADDENDUM NO. 2	6/11/2020	
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

INSTRUMENTATION
SECONDARY CLARIFIERS
NO. R7 AND R8

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: I1204

REV	ISSUED FOR	DATE	BY
2	ANRI VE ALT NO. 4A	9/22/20	US-A
1	ADDENDUM NO. 2	6/11/2020	
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

INSTRUMENTATION
SECONDARY CLARIFIERS
SCUM SYSTEM

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: I1205

REV	ISSUED FOR	DATE	BY
2	ANRI VE ALT NO. 4A	9/22/20	US-A
1	ADDENDUM NO. 2	6/11/2020	
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

INSTRUMENTATION
MBBR MIXERS AND VALVES IN BASINS AND ANALYZERS

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: I1300

THE INSTRUMENTATION AND CONTROLS PROVIDED WILL COMPLY WITH THE FUNCTIONAL INTENT OF THE CONCEPTUAL DRAWINGS 2

NOTES:

1. 24 VDC OIL INTERPOSING RELAY LOCATED IN INTERPOSING PANEL X FORM C CONTACT 10A 120V

REV	ISSUED FOR	DATE	BY
3	ANRI VE ALT NO. 4A	12/2020	US-A
2	ADDENDUM NO. 3	6/26/2020	JM/LM
1	ADDENDUM NO. ~~3~~ 2	6/11/2020	JM/LM
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

INSTRUMENTATION
MBBR AIR

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: I1303

CHLORINE CONTACT TANK GATE IMPROVEMENT SCHEDULE

CCT	SLUICE GATE LOCATION / DESCRIPTION	SIZE	PROPOSED IMPROVEMENTS	REF AS-BUILT DWGS
CCT1	EXISTING INFLUENT CHAMBER (TO CCT1)	60" x 60"	REPLACE	1968 JR SEWAGE TREATMENT PLANT
CCT1	EXISTING INFLUENT CHAMBER (TO CCT3)	54" DIA	REMOVE (FILL HOLE WITH CONCRETE)	
CCT1	EXISTING WET WELL	24" x 24"	REPLACE	
CCT1	EXISTING WET WELL (TO EFFLUENT CHAMBER)	24" x 24"	REPLACE	
CCT1	EXISTING WET WELL (TO EFFLUENT CHAMBER)	24" x 24"	REPLACE	
CCT2	EXISTING INFLUENT PIPE	42" DIA	REMOVE (BULKHEAD, SEAL PIPE OPENING)	1973 JR SEWAGE TREATMENT PLANT ADDITION
CCT2	EXISTING WET WELL INFLUENT GATE	60" x 60"	REPLACE	
CCT2	EXISTING CROSS-CONNECTION PIPE (TO CCT1 WET WELL)	24" x 24"	REPLACE	
CCT3	EXISTING INFLUENT BOX	48" x 48"	REMOVE	1980 JR INTERIM EXPANSION
CCT3	EXISTING BYPASS	24" x 24"	REPLACE	

NOTES:

1. 24VDC COIL INTERPOSING RELAY IN INTERPOSING RELAY PANEL X. FORM C CONTACT 10A @ 120V.
2. SUBMERSIBLE NON-VACUUM LIQUID CHEMICAL INDUCTION TYP MIXER. GAS MASTER SERIES 32.
3. DESIGN BUILDER TO REPLACE 7 EXISTING GATES WITH SIMILAR NEW GATES. SEE CCT GATE IMPROVEMENT SCHEDULE THIS SHEET AND BODR FOR ADDITIONAL INFORMATION.
4. DESIGN BUILDER TO REMOVE 3 EXISTING GATES. SEE CCT GATE IMPROVEMENT SCHEDULE THIS SHEET AND BODR FOR ADDITIONAL INFORMATION.

REV	ISSUED FOR	DATE	BY
3	ANRI VE ALT NO. 4A	12/2020	US-A
2	ADDENDUM NO. 4	7/06/2020	JM/LM
1	ADDENDUM 4 2	6/11/2020 7/06/2020	JM/LM
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE 0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

INSTRUMENTATION
JUNCTION - SPLITTER BOX CCTS AND PLANT EFFLUENT PIPING

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: I1500

REV	ISSUED FOR	DATE	BY
2	ANRI VE ALT NO. 4A	12/2020	US-A
1	ADDENDUM NO. 2	6/11/2020	
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

INSTRUMENTATION
WWTP PHOSPHORIC ACID SYSTEM

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	I1600

REV	ISSUED FOR	DATE	BY
2	ANRI VE ALT NO. 4A	12/2020	US-A
1	ADDENDUM NO. 2	6/11/2020	
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

INSTRUMENTATION
WWTP SODIUM BISULFITE TANKS AND FEED PUMPS

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: I1601

REV	ISSUED FOR	DATE	BY
2	ANRI VE ALT NO. 4A	12/2020	US-A
1	ADDENDUM NO. 2	6/11/2020	
0	REQUEST FOR PROPOSAL	4/10/2020	--

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

INSTRUMENTATION
WWTP SODIUM HYPOCHLORITE TANKS

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: I1602

REV	ISSUED FOR	DATE	BY
2	ANRI VE ALT NO. 4A	12/2020	US-A
1	ADDENDUM NO. 2	6/11/2020	
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

INSTRUMENTATION
WWTP SODIUM HYPOCHLORITE FEED PUMPS TO ODOR, RAS, AND IFAS

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: I1603

REV	ISSUED FOR	DATE	BY
2	ANRI VE ALT NO. 4A	12/2020	US-A
1	ADDENDUM NO. 2	6/11/2020	
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

INSTRUMENTATION
WWTP SODIUM HYPOCHLORITE FEED PUMPS AND DISINFECTION

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: I1604

NOTES:

1. CONTRACTOR WILL PROVIDE MOTOR PROTECTION RELAY ALARMS AND SETPOINTS ACCORDING TO SPECIFICATION 40 61 96.

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

INSTRUMENTATION
SWIFT INFLUENT PUMP STATION
MBBR
1

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: I2100

REV	ISSUED FOR	DATE	BY
2	SWIFT VE ALT NO. 10A	12/2020	US-A
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

INSTRUMENTATION
RAPID MIX SYSTEM

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: I2200

REV	ISSUED FOR	DATE	BY
1	SWIFT VE ALT NO. 10A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

INSTRUMENTATION
OZONE CONTACTOR

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: I2206

REV	ISSUED FOR	DATE	BY
1	SWIFT VE ALT NO. 12A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

INSTRUMENTATION
UV

DATE: 2020
PROJECT NO.: 32480
CONTRACT NO.: -
DRAWING NUMBER: I2400

REV	ISSUED FOR	DATE	BY
1	SWIFT VE ALT NO. 10A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE
0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

INSTRUMENTATION
SWIFT WATER PUMP STATION

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	I2500

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

INSTRUMENTATION
SODIUM HYPOCHLORITE SYSTEM

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	I2709

REV	ISSUED FOR	DATE	BY
1	ANRI VE ALT NO. 4A	12/2020	US-A
0	REQUEST FOR PROPOSAL	4/10/2020	--

[redacted]

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

0 1/2" 1"

PRELIMINARY DRAWING - FOR REVIEW PURPOSES ONLY - NOT RELEASED FOR CONSTRUCTION

[redacted]

HRSD

JAMES RIVER ADVANCED NUTRIENT REDUCTION IMPROVEMENTS (JR013400) AND SWIFT FACILITY (GN016360)

INSTRUMENTATION
PHOSPHORIC ACID SYSTEM

DATE:	2020
PROJECT NO.:	32480
CONTRACT NO.:	-
DRAWING NUMBER:	I2714

Attachment D

Preliminary CPM Schedule
Alternative 4A Critical Path Activities
03-10-2021

James River Swift Facility (**GN016360**) and James River Treatment Plant Advanced Nutrient Reduction Improvements **(JR013400)**

Activity ID	Activity Name	Start	Finish
000-00110	HRSD Commission Agenda Prep and Approval (1-26-20)	14-Jan-21	26-Jan-21
000-00090	HRSD Issue Agreement to US-A	27-Jan-21	17-Mar-21
000-00120	US-A Execute Agreement	18-Mar-21	24-Mar-21
001-00000	Notice to Proceed / Contract Commencement	25-Mar-21	
002-20000	NTP - Design Alternatives Evaluation Memo	25-Mar-21	
002-20100	PREPARE - TM No 1 - Design Alternatives Evaluation	25-Mar-21	05-May-21
002-20200	SUBMIT - OWNER - TM No. 1 - Design Alternatives Evaluation		05-May-21
002-20300	REVIEW - OWNER - TM No. 1 - Design Alternatives Evaluation	06-May-21	19-May-21
002-20400	WORKSHOP No. 2 - TM No. 1 - Design Alternatives Review		19-May-21
002-80000	NTP - 30% Design	20-May-21	
002-80100	PREPARE - 30% Design - Process Mechanical	20-May-21	13-Aug-21
002-80200	PREPARE - 30% Design - P&IDs	20-May-21	13-Aug-21
002-80300	PREPARE - 30% Design - Site Civil	20-May-21	13-Aug-21
002-80400	PREPARE - 30% Design - Yard Piping	20-May-21	13-Aug-21
002-80500	PREPARE - 30% Design - General	20-May-21	13-Aug-21
002-81100	REVIEW - QC / Constructability - Review / Incorporate Comments	16-Aug-21	27-Aug-21
002-81200	PREPARE - OWNER - 30% Design Deliverable	30-Aug-21	03-Sep-21
002-81300	SUBMIT - OWNER - Submit 30% Design Deliverable		03-Sep-21
002-81500	REVIEW - OWNER - 30% Design Review	07-Sep-21	04-Oct-21
002-81600	WORKSHOP No. 13 - 30% Design Review Meeting		04-Oct-21
002-81700	WORKSHOP No. 14 - HAZOP Review Meeting		04-Oct-21
002-81800	WORKSHOP No. 15 - DCS / Controls Coordination 1 of 2		04-Oct-21
002-90000	NTP - 60% Design	05-Oct-21	
002-90100	PREPARE - 60% Design - General	05-Oct-21	01-Dec-21
002-90200	PREPARE - 60% Design - Site Civil	05-Oct-21	01-Dec-21
002-90300	PREPARE - 60% Design - Yard Piping	05-Oct-21	01-Dec-21
002-90400	PREPARE - 60% Design - Process Mechanical	05-Oct-21	01-Dec-21
002-90500	PREPARE - 60% Design - Structural	05-Oct-21	01-Dec-21
002-90600	PREPARE - 60% Design - Architectural	05-Oct-21	01-Dec-21
002-90700	PREPARE - 60% Design - HVAC / Plumbing	05-Oct-21	01-Dec-21
002-90800	PREPARE - 60% Design - Electrical	05-Oct-21	01-Dec-21
002-90900	PREPARE - 60% Design - Instrumentation	05-Oct-21	01-Dec-21
002-91000	PREPARE - 100% Design - Temporary Electrical	05-Oct-21	01-Dec-21
002-91100	PREPARE - 100% Design - Temporary Chemical	05-Oct-21	01-Dec-21
002-91200	PREPARE - 100% Design - Erosion & Sediment Control	05-Oct-21	01-Dec-21
002-91300	PREPARE - 100% Design - Deep Foundation (Piles)	05-Oct-21	01-Dec-21
002-91500	REVIEW - QC / Constructability - Review / Incorporate Comments	02-Dec-21	15-Dec-21
002-91600	PREPARE - OWNER - 60% Design Deliverable	16-Dec-21	22-Dec-21
002-91700	SUBMIT - OWNER - Submit 60% Design Deliverable		22-Dec-21
002-91900	REVIEW - OWNER - 60% Design Review	23-Dec-21	24-Jan-22
002-92000	WORKSHOP No. 17 - 60% Design Review		24-Jan-22
002-92300	PREPARE - 60% Design -Stipulated Price	25-Jan-22	07-Feb-22
002-92400	SUBMIT - 60% Stipulated Prices Deliverable		07-Feb-22
004-11100	Prepare and Submit ANRI Stipulated Price (60%)	08-Feb-22	07-Mar-22
004-21100	Prepare and Submit SWIFT Final Estimate (60%)	08-Feb-22	07-Mar-22
004-11200	ANRI - Cost Review Workshop		07-Mar-22
004-21200	SWIFT - Cost Review Workshop		07-Mar-22
004-11300	HRSD Review & Comment - ANRI Final Estimate	08-Mar-22	28-Mar-22
004-21300	HRSD Review & Comment - SWIFT Final Estimate	08-Mar-22	28-Mar-22
004-02000	Final Cost Adjustments and Negotiations	29-Mar-22	04-Apr-22
001-11111	Milestone 1 - Stipulated Price Complete / Commence Const.		04-Apr-22
004-09999	Stipulated Price Complete !!		04-Apr-22
101-10000	Mobilize to JRTP Site	05-Apr-22	12-Apr-22
101-10010	Install Initial Erosion Control Measures	13-Apr-22	21-Apr-22
101-20100	Haul Off Berm Spoils at Gymnastics Center	22-Apr-22	03-May-22
101-20110	Grade & Pave New Access Road & Parking @ Gymnastics	04-May-22	18-May-22
101-20200	Relocate / Install New Perimeter Security Fencing	19-May-22	24-May-22
101-70000	Relocate Electric Ductbanks and Feeds at New Secondary Clarifiers	26-May-22	15-Jun-22
101-70010	Relocate Utilities and Drains at New Secondary Clarifiers	16-Jun-22	06-Jul-22
101-70020	Relocate Return Sludge Lines at Secondary Clarifiers	07-Jul-22	21-Jul-22
141-10000	Drain & Clean Old Clarifiers #1 & #2	22-Jul-22	25-Jul-22
141-20000	Isolate / Cut & Cap Pipe - De Term Elect.	26-Jul-22	28-Jul-22
141-21100	Demo Clar #1 Mech, Piping, Etc.	29-Jul-22	03-Aug-22
141-21200	Demo Clar #1 Concrete	04-Aug-22	10-Aug-22
141-22100	Demo Clar #2 Mech, Piping, etc.	04-Aug-22	10-Aug-22
141-22200	Demo Clar #2 Concrete	11-Aug-22	17-Aug-22
120-00000	Begin Circular Secondary Clarifiers	18-Aug-22	
120-20010	Drive SC1 Sheet Piles	18-Aug-22	20-Sep-22
120-20100	Excavate SC1	21-Sep-22	28-Oct-22
120-21010	Exc & Install SC1 Influent Pipe	31-Oct-22	10-Nov-22
120-21200	Drill SC-1 Auger Cast Piles	11-Nov-22	20-Dec-22
120-21210	Exc Piles / Prep Subgrade SC1	22-Dec-22	06-Jan-23
120-30010	Form & Pour SC1 Influent Box Slab & Walls	09-Jan-23	07-Feb-23
120-30020	Form & Pour SC1 Mat Slab	09-Feb-23	28-Feb-23

US-A
Ulliman Schutte – Alberici Joint Venture

James River SWIFT Facility (GN016360)

James River Advanced Nutrient Reduction Improvements (JR013400)

PROPOSAL AMENDMENT PRELIMINARY SCHEDULE: CRITICAL PATH

REVISED: 03/10/2021

HRSD

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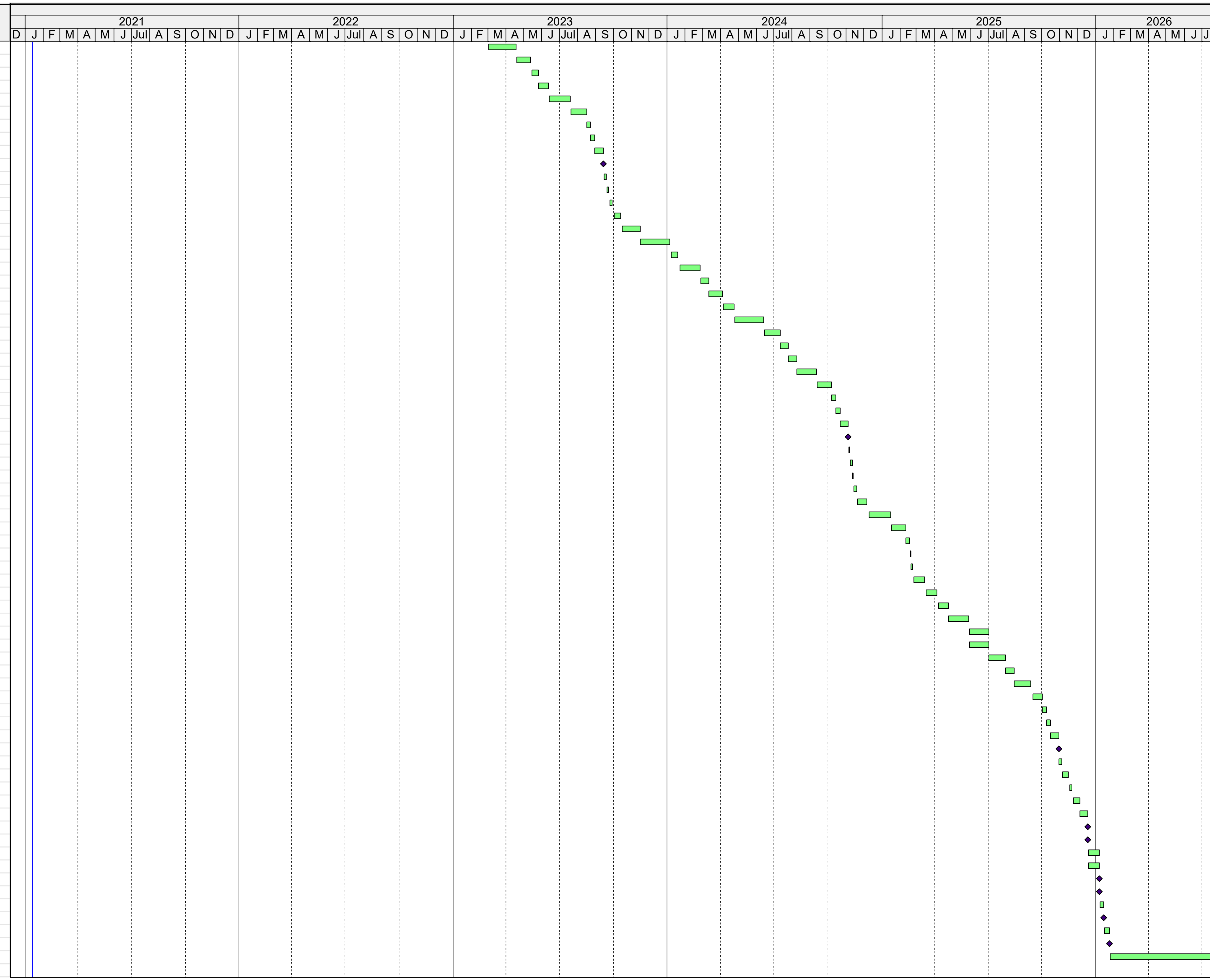
Activity ID	Activity Name	Start	Finish
120-35010	Form & Pour SC1 Walls	02-Mar-23	18-Apr-23
120-35020	Form & Pour SC1 Effluent Trough	19-Apr-23	12-May-23
120-35030	Form & Pour SC1 Effluent Boxes (Temp & Permanent)	15-May-23	26-May-23
120-50100	Leak Test SC1	26-May-23	12-Jun-23
120-51100	SC1 Process Equipment Installation	13-Jun-23	19-Jul-23
120-65100	SC1 Electrical & Instrumentation (Temp. Elec. from Admin 1)	20-Jul-23	16-Aug-23
120-80110	Initial SC1 Start-Up (Equipment Physical Check-out)	16-Aug-23	23-Aug-23
120-80210	SC1 Equipment Testing (Functional and Performance)	23-Aug-23	30-Aug-23
120-80310	SC1 Unit Process Start-up / Acceptance Testing	30-Aug-23	14-Sep-23
120-80510	SC1 Complete		14-Sep-23
143-10000	Drain & Clean Old Clarifiers #3	15-Sep-23	18-Sep-23
143-20000	Isolate / Cut & Cap Pipe - De Term Elect.	20-Sep-23	22-Sep-23
143-21100	Demo Clar #3 Mech, Piping, Etc.	25-Sep-23	29-Sep-23
143-21200	Demo Clar #3 Concrete	02-Oct-23	13-Oct-23
120-20210	Drive SC2 Sheet Piles	16-Oct-23	15-Nov-23
120-20200	Excavate SC2	16-Nov-23	05-Jan-24
120-22210	Exc & Install SC2 Influent Pipe	08-Jan-24	19-Jan-24
120-21230	Drill SC-2 Auger Cast Piles	22-Jan-24	26-Feb-24
120-21240	Exc Piles / Prep Subgrade SC2	27-Feb-24	11-Mar-24
120-30210	Form & Pour SC2 Influent Box Slab & Walls	12-Mar-24	04-Apr-24
120-30220	Form & Pour SC2 Mat Slab	05-Apr-24	24-Apr-24
120-35210	Form & Pour SC2 Walls	25-Apr-24	13-Jun-24
120-35220	Form & Pour SC2 Effluent Trough	14-Jun-24	11-Jul-24
120-35230	Form & Pour SC2 Effluent Boxes (Temp & Permanent)	12-Jul-24	25-Jul-24
120-50200	Leak Test SC2	25-Jul-24	08-Aug-24
120-51200	SC2 Process Equipment Installation	09-Aug-24	11-Sep-24
120-65200	SC2 Electrical & Instrumentation	12-Sep-24	07-Oct-24
120-82110	Initial SC2 Start-Up (Equipment Physical Check-out)	07-Oct-24	14-Oct-24
120-82210	SC2 Equipment Testing (Functional and Performance)	14-Oct-24	21-Oct-24
120-82310	SC2 Unit Process Start-up / Acceptance Testing	21-Oct-24	04-Nov-24
120-82510	SC2 Complete		04-Nov-24
120-65110	SC1 Connect to Perm. Elec.	06-Nov-24	07-Nov-24
125-16000	Drain & Clean Old Clarifier #4	08-Nov-24	11-Nov-24
125-26000	Isolate / Cut & Cap Pipe - De Term Elect. SC-4	12-Nov-24	13-Nov-24
125-26100	Demo Clar #4 Mech, Piping, Etc.	14-Nov-24	19-Nov-24
125-26200	Demo Clar #4 Concrete	20-Nov-24	06-Dec-24
125-26010	Drive MBBR IPS & Splitter Box Perimeter Sheet Pile	10-Dec-24	16-Jan-25
125-26400	Mass Excavate - MBBR IPS Area	17-Jan-25	10-Feb-25
125-26410	Mass Excavate - Splitter Box Area	11-Feb-25	17-Feb-25
125-26160	Prep Subgrade & Stone - MBBR IPS Area	18-Feb-25	19-Feb-25
125-26170	Prep Subgrade & Stone - Splitter Box Area	20-Feb-25	21-Feb-25
125-36110	Form & Pour MBBR IPS Base Slab	24-Feb-25	14-Mar-25
125-36115	Form & Pour MBBR IPS Lower Walls	17-Mar-25	04-Apr-25
125-36120	Form & Pour Splitter Box Base Slab	07-Apr-25	24-Apr-25
125-36500	Form & Pour MBBR IPS Upper Walls	25-Apr-25	29-May-25
125-36510	Form & Pour Splitter Box Walls	30-May-25	02-Jul-25
125-36600	Shore, F&P MBBR IPS Deck	30-May-25	02-Jul-25
125-36700	Cure, Strip Shoring, Point & Patch	03-Jul-25	31-Jul-25
125-56110	Leak Test MBBR IPS & Splitter Box	31-Jul-25	14-Aug-25
125-56100	MBBR IPS Process Equipment & Pipe Installation	15-Aug-25	12-Sep-25
125-66100	MBBR IPS Process & Splitter Box Electrical and I&C	15-Sep-25	01-Oct-25
125-86110	Initial MBBR IPS Start-Up (Equipment Physical Check-out)	01-Oct-25	08-Oct-25
125-86210	MBBR IPS Equipment Testing (Functional and Performance)	08-Oct-25	15-Oct-25
125-86310	MBBR IPS Unit Process Start-up / Acceptance Testing	15-Oct-25	29-Oct-25
125-86510	MBBR IPS & Splitter Box Complete		29-Oct-25
125-56200	Tie-in SC-1, SC-2, and SC-5 Effluent Pipes to MBBR IPS & Splitter Box	30-Oct-25	04-Nov-25
106-53600	Lay 54" SCE [DIP] (SB to CCT #2)	05-Nov-25	14-Nov-25
106-53620	Lay 54" SCE [DIP] (SB to CCT #3)	17-Nov-25	21-Nov-25
106-53610	Lay 54" SCE [DIP] (SB to CCT #1)	24-Nov-25	04-Dec-25
120-80400	JB / SB and MBBR IPS Facility Performance / Demonstration Testing	04-Dec-25	18-Dec-25
001-44444	Milestone 4 - Secondary Clarifiers Online		18-Dec-25
120-99999	Circular Secondary Clarifiers Complete		18-Dec-25
220-80310	SWIFT Bldg. #1 Operational Demonstration	19-Dec-25	07-Jan-26
230-80310	SWIFT Bldg #2 - Operational Demonstration	19-Dec-25	07-Jan-26
220-99999	SWIFT Process Building #1 Complete!		07-Jan-26
230-99999	SWIFT Process Building #2 Complete!		07-Jan-26
003-11100	VDEQ Final Facility Inspection	08-Jan-26	14-Jan-26
003-11200	VDEQ Issue Certificate to Operate		14-Jan-26
001-TEST	Full-Scale Operational Demonstration Test	15-Jan-26	24-Jan-26
001-SUB	Substantial Completion (December 18, 2025)		24-Jan-26*
001-CLOSE	Final Sitework / Punchlist / Contract Closeout	25-Jan-26	25-Jul-26
001-FINAL	Final Completion !!! (June 18, 2026)		25-Jul-26*



US-A
Ulliman Schutte – Alberici Joint Venture

James River SWIFT Facility (GN016360)

James River Advanced Nutrient Reduction Improvements (JR013400)

PROPOSAL AMENDMENT PRELIMINARY SCHEDULE: CRITICAL PATH

REVISED: 03/10/2021

HRSD

swift Sustainable Water Initiative for Tomorrow

Attachment E

Division 01 Requirements

James River Swift Facility (**GN016360)** and James River Treatment Plant Advanced Nutrient Reduction Improvements **(JR013400)**

Date: March 2021

ATTACHMENT E DIVISION 01 REQUIREMENTS
for the Design-Build of
JAMES RIVER SWIFT FACILITY and
JAMES RIVER TREATMENT PLANT ADVANCED NUTRIENT REDUCTION IMPROVEMENTS
CIP No. GN016360 and JR013400
City of Newport News, Virginia

The changes identified in this attachment are based on the Value alternates 4A, 10A, 11A, and 12A included in the revised CCL. The changes defined in this attachment for the Value Engineering Alternatives will be the only revisions accepted for the Contract Division 01 requirements.

DIVISION 01 REQUIREMENTS

A. SECTION 01 10 00 - Stipulated Price Requirements - Provide the following changes:

1. DELETE 1.02.A.8.b.
2. DELETE 1.02.A.8.d. and Replace with “Junction/Splitter Box”
3. DELETE 1.02.A.8.g.

B. SECTION 01 11 00 – Summary of Work - Provide the following changes:

1. REVISE 1.02.B.1.e. after the words “…*Feed Equipment Facilities*” add the following language: “Existing facilities to remain in service with modifications”
2. REVISE 1.02.B.1.m.1). delete the words: “*Main Administration Building including*” and after the words “*Incoming Power Distribution*” add “after new Main Electric Building in service”
3. DELETE 1.02.B.1.m.2).
4. DELETE 1.02.B.1.m.3).
5. DELETE 1.02.B.1.m.7).
6. REVISE 1.02.B.2.g. delete the words: “*and Advanced Oxidation”*

C. SECTION 01 15 20 – Maintenance of Plant Operations - Provide the following changes:

1. DELETE 1.01.B. the sentence, *“A construction sequencing approach associated with the Conceptual Documents is included in this section.”*
2. REVISE 1.02.I.2.a. after the words “*Administration Building No.”* add “1 or “
3. DELETE 1.02.J.1.
4. REVISE 1.04.E. after the words “*No more than two IFAS tanks can be out of service at one time”* to add the following language:

   “unless approved by Owner. The following factors may allow for three IFAS Reactors to be taken offline at one time:

   a. Time of year considering cold weather conditions and meeting nutrient requirements – plant must hold TP, more flexibility with TN.
   b. Time of year considering typical high flow events in August and September.

c. Owner will need to increase media fill fraction to 65%

d. Design-Builder to provide length of time the three IFAS Reactors will be offline for approval

e. Owner will consider time to reestablish growth on the media, which will be dependent on time of the year.

f. Design-Builder will need to consider a High Flow Management Plan for Owner approval that may include the following:

1) Block off effluent pipe and bring weir wall up accommodating usage of out of service tanks as EQ tanks. Design-Builder shall provide ability to pump out, as needed.

2) With three IFAS Reactors out of service, plan shall utilize one IFAS Reactor as overflow and provide ability to pump around to clarifiers."

5. REVISE 1.04.F. after the words "Secondary Clarifiers" delete in its entirety and add the following language:

1. *"The Design-Builder shall provide temporary provisions so that up to 57 MGD of flow can pass from the IFAS effluent to the in-service Secondary Clarifiers then to the CCTs, with 6-inches of freeboard, during Secondary Clarifier and Junction/Splitter Box Construction.*
2. *Existing Secondary Clarifier Nos. 1 and 2 shall be taken out of service while existing Secondary Clarifier Nos. 3, 4 and 5 remain in service until the first new 130-ft diameter secondary clarifier has been tested, approved by the Owner and placed into service.*
3. *Existing Secondary Clarifier No. 3 shall be taken out of service of service for construction of the second new 130-ft diameter secondary clarifier.*
4. *Existing Secondary Clarifier Nos. 4 and 5 shall remain in service until the second new 130-ft diameter secondary clarifier has been tested, approved by the Owner, and placed into service*."

6. DELETE 1.04.G.1.

7. DELETE 1.04.G.4

8. DELETE 1.04.G.5

9. REVISE 1.04.H.1 delete the words: "*The existing JRTP DCS network system requires relocation from Administration Building No. 1 for interim operation of the JRTP (see Section 01 50 00, Temporary Facilities).*"

10. REVISE 1.04.H.2 delete the words "*as follows*"

11. DELETE 1.04.H.2.a.

12. REVISE 1.04.H.2.b.1) after the words: "*Administration Building No.*" change 2 to 1.

13. DELETE 1.04.I.1

14. REVISE 1.04.I.2 after the words: "*Administration Building No.*" change 2 to 1.

15. DELETE 1.05.B

16. DELETE 1.05.C

D. SECTION 01 31 13 – Project Coordination - Provide the following changes:

1. REVISE 1.02.B.8 (Added by Addendum) after the words: “Owner Maintenance Shop:” delete in its entirety and add the following language:

   1) The Owner maintenance shop (Utility Building) is proposed on the site adjacent to the existing maintenance section of the Administration Building No. 1. The Owner proposes to construct the maintenance shop in advance of Design-Builder mobilization. The maintenance shop impervious area, approximately 2,000 square feet shall be included in the Design-Builder’s site design and stormwater quantity and quality permitting.

   2) The maintenance shop shall be included in the utility power and permeant generator back-up requirements of the JRTP. The power consumption shall be similar to the existing small shop’s requirements.

E. SECTION 01 50 00 – Temporary Facilities – Provide the following changes:

1. REVISE 1.01.A after the words: “…*temporary facilities for*” delete the words “*JRTP staff and”*
2. REVISE 1.01.D after the words: “…*offices of the*” delete the words “*Owner”*
3. REVISE 1.02.D after the words: “…*construction trailers for*” delete the words “*the Owner and”*
4. DELETE 1.06.C
5. REVISE 1.08.A after the words: “…*Building No. 2*” delete the words “*and adjacent trailer”*
6. DELETE Figure 01 50 00-1: Proposed Administration Building No. 2 Layout
7. DELETE Figure 01 50 00-2: Proposed Administration Building No. 2 DCS/Business Network Layout.

F. SECTION 01 76 00 – Start-Up, Testing and Commissioning – Provide the following changes:

1. DELETE 1.06.D.4.a.2)
2. DELETE 1.06.D.4.b.3)
3. DELETE 1.06.E.6.b.4)

Attachment F

Agreed upon Deviations from Technical Proposal

James River Swift Facility (**GN016360)** and James River Treatment Plant Advanced Nutrient Reduction Improvements **(JR013400)**

ULLMAN SCHUTTE-ALBERICI JOINT VENTURE
AGREED UPON DEVIATIONS FROM TECHNICAL PROPOSAL

The deviations identified in this attachment are to the Technical Proposal submitted for the Request for Proposal, James River SWIFT Facility (GN016360) and James River Treatment Plant Advanced Nutrient Reduction Improvements (JR013400) Design-Build Project (James River SWIFT Project) *Technical Proposal* submitted by the Ullman Schutte-Alberici Joint Venture (US-A) on August 6, 2020.

Letter of Transmittal

A. What sets US-A above the rest?
    1. Text Box (page 03)
        a. Delete: "Accelerated Completion"

PART 1: Project Understanding

A. What sets US-A above the rest?
    1. Text Box (page 03)
        a. Delete: "Accelerated Completion"

PART 2: Design Narrative

PART 2.A Describe the Design Approach to the Project

B. TABLE 2-3 DESIGN DELIVERABLES
    1. TITLE: TM No. 1– Design Alternative Evaluation
        a. Delete: "*Validate concept and select alternatives for preliminary design*" and replace with: "Update the Value Engineering Alternative Concept Design Document to define how the Basis of Design Report intent and functional requirements will be achieved."

PART 2.B Conceptual Site Utilization Plan

A. Add the words *"(Note: Dates and work activities described below are subject to change in accordance with selected value engineering alternatives)"* after the sentence that states *"A summary of important development throughout each of the five phases and the approximate timing is a follows:"*
B. Section Titled: Phase 1 -Work Beginning late 2021 into 2022 (Exhibit 2-4)
    1. Add the words "Confirm with HRSD New SWIFT Access Road location" at the beginning of the bullet that states "Establishment of Design-Builder Office Complex, Parking and Laydown"
C. EXHIBIT 2-4: PHASE 1-WORK BEGINNING LATE 2021 INTO 2022
    1. Add the words "*Dates and Facilities described in this exhibit subject to change based on selected value engineering alternatives"* after the title Exhibit 2-4: Phase 1-Work Beginning Late 2021 into 2022
    2. Delete the words "*New SWIFT Access Rd.*". See Figure 1

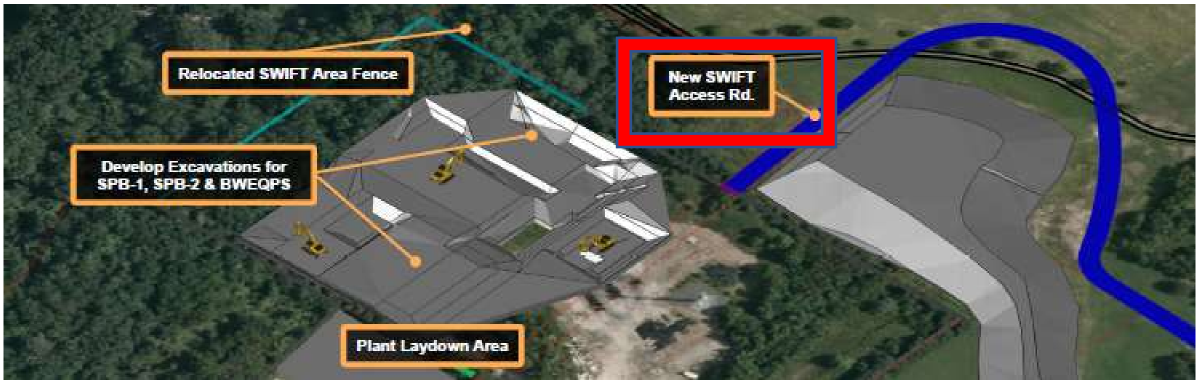


Figure 1 – Access Road

D. EXHIBIT 2-5: PHASE 2-WORK BEGINNING EARLY TO MID 2022
   1. Add the words *"Dates and Facilities described in this exhibit subject to change based on selected value engineering alternatives"* after the title Exhibit 2-5: Phase 2-Work Progression Early to Mid 2022

E. EXHIBIT 2-6: PHASE 3-WORK PROGRESSION THROUGH MARCH 2022 AND 2023
   1. Add the words *"Dates and Facilities described in this exhibit subject to change based on selected value engineering alternatives"* after the title Exhibit 2-6: Phase 3-Work Progression Through 2022 and 2023

F. EXHIBIT 2-7: PHASE 4-WORK PROGRESSION 2023 AND 2024
   1. Add the words *"Dates and Facilities described in this exhibit subject to change based on selected value engineering alternatives"* after the title Exhibit 2-7: Phase 4-Work Progression 2023 and 2024

G. EXHIBIT 2-8: PHASE 5-WORK PROGRESSION 2024 THROUGH 2025
   1. Add the words *"Dates and Facilities described in this exhibit subject to change based on selected value engineering alternatives"* after the title Exhibit 2-8: Phase 5-Work Progression 2024 through 2025

PART 4: Work Plan

Part 4A Proposed Work Plan

A. Table 4-1: RESPONSIBILITIES OF EACH MEMBER OF THE TEAM IN DELIVERING A SUCCESSUFL CONTROLS SYSTEM
   1. Move the three Bullets for the Recharge Well #1-#10 PLC Panel Design, Programming, and Testing & Commissioning from the "Designer/Integrator" column to the "Instrumentation Subcontractor" column in Table 4-1: Responsibilities of Each Member of the Team in Delivery of a Successful Control System: .

B. EXHIBIT 4-3: STIPULATED PRICE DESIGN DEVELOPMENT
   1. Add the words *"Package 1 work scope to be revised based on selected value engineering alternatives"* under the title *"Exhibit 4-3: Stipulated Price Design Development".*

C. TABLE 4-4: DEVELOPMENT OF THE STIPULATED PRICE AGREEMENT:

1. Revise the dates in Table 4-4: Development of the Stipulated Price Agreement as follows:
    - *"Kick-off and Partnering Meetings* *March 2021– April 2021*
    - *Design Alternatives Workshops and Evaluations* *March 2021 – May 2021*
    - *Geotechnical & Subsurface Investigations* *April 2021 – May 2021*
    - *Environmental Study* *April 2021 – August 2021*
    - *Preliminary Engineering Report Submittal* *August 2021*
    - *30% Design Submittal* *September 2021*
    - *Final Engineering Report Submittal* *November 2021*
    - *60% Design Submittal* *December 2021*
    - *100% Design Submittal of Early Critical Work Activities* *January 2022*
    - *Stipulated Price Submittal* *January 2022*
    - *Milestone 1 Stip. Price Agreement & Construction NTP* *April 2022"*

D. EXHIBIT 4-41: ANRI AND SWIFT FACILITIES TESTING, STARTUP AND COMMISSIONING
   1. Add the words "*Commissioning Activities will be revised during final design in accordance with selected alternatives" under the title "Exhibit 4-41: ANRI and SWIFT Testing, Startup and Commissioning"*

E. EXHIBIT 4-42: ANRI AND SWIFT FACILITIES TESTING, STARTUP AND COMMISSIONING
   1. Add the words "*Commissioning Activities will be revised during final design in accordance with selected alternatives" under the title "Exhibit 4-42: ANRI and SWIFT Testing, Startup and Commissioning"*

Part 4B Risk Management Plan, Key Items, Critical Components to Success, Three Biggest Risk Items

A. PRELIMINARY RISK REGISTER
   1. 2 Planning and Design
      a. Delete the column in its entirety *"2.4 Peroxide quenching"*
      b. Delete the column in its entirety *"2.10 Reduced MBBR hydraulic capacity to maintain individual cell isolation and operational flexibility"*
      c. Delete the column in its entirety *"2.12 BODR required modeling at various facilities. Optimizing hydraulics may require modifications to the concept design"*
      d. Delete the column in its entirety *"2.14 MBBR/Secondary Clarifier Gallery does not meet building code compliance for egress"*
      e. Delete the column in its entirety *"2.16 Temporary electrical and chemical facilities rely on connections with existing systems which may not be suitable"*

Part 5 Project Schedule

A. Delete in its entirety *"Part 5A: Preliminary CPM Schedule For Design and Construction of the Project"*

B. Delete in its entirety "Part 5B: Proposed Approach for Achieving Early Substantial Completion"

Part 6 Innovative Approach to the Project

A. Delete in its entirety *"Part 6: Innovative Approach to the Project in its entirety"*

PART 7 Understanding State and Local Permit Requirements

Part A

A. Paragraph Titled: MAJOR/MINOR WATER QUALITY IMPACT ASSESSMENT
   1. Delete the words: *““US-A’s environmental professionals interpret the Virginia Administrative Code (9VAC25- 830-150) to mean that this project will be exempt from Chesapeake Bay Preservation Area (CBPA) regulations and this assessment will not be required.”* after the words *“…will disturb any Resource Protection Areas (RPAs).”*

Appendix A

A. Delete in its entirety *“Appendix A: Preliminary Schedule Critical Path in its entirety.”*
B. Delete in its entirety “Appendix A.1*: Complete Preliminary CPM Schedule Sorted by WBS*”

Appendix B

A. Appendix B Cover Page
   1. Add the words *“Drawing and Specification List will be revised during final design based on selected value engineering alternatives.”* After the *“List of Preliminary Drawings & Technical Specifications”*

EMERSON

Emerson
Power & Water Solutions
200 Beta Drive
Pittsburgh, PA 15238
Tel 1 (412) 963-4000

April 2, 2020

Hampton Roads Sanitation District
James River Wastewater Treatment Plant
101 City Farm Rd., Newport News, VA 23602

Attention: Ryan Duke

Subject: James River Advanced Nutrient Reduction Improvements and SWIFT Facility
Emerson Process Management Power & Water Solutions, Inc.
Budgetary Estimate No. WAM20010019 Rev. 2

Dear Ryan Duke:

Emerson Process Management Power & Water Solutions, Inc., part of the Emerson Automation Solutions family of business units (Emerson), is pleased to furnish, for budgetary purposes only, an estimate for James River Advanced Nutrient Reduction Improvements and SWIFT Facility in response to your request. This budgetary estimate is based on Emerson standard products, Emerson previous experience on similar applications, an estimated I/O count, the P&IDs dated January 2020. It does not necessarily reflect a detailed analysis of your requirements.

Emerson is recognized throughout the world as a leader in the process control system industry, with a successful history of major accomplishments. Emerson has provided Ovation control systems for nearly 2,000 of our customer's facilities and automate more than 12 billion gallons of water per day. We will select key individuals to implement the project who possess proven process and managerial skills. We look forward to reviewing with you the ways that our in-depth experience, our resources and our commitment to the process control industry can be direct toward meeting your current and future process control requirements.

Emerson also recognizes the increasing concern with cybersecurity. Emerson has implemented a comprehensive Security Support Policy that is followed for all projects giving our customers a baseline of protection. In addition, Emerson offers a wide range of products and services to further assist in this area.

Thank you for the opportunity to submit this budgetary estimate. Should you require more detailed information at a future date, we would welcome the opportunity to submit a firm contract offer in response to your final specification.

If you should have any questions or require additional information, please feel free to contact your local representative, Greg Lippert at (412) 551-0847 / Gregory.Lippert@emerson.com, your local project manager, Gregg Zabelsky at (412) 963-4371 / Gregg.Zabelsky@emerson.com, or me at (412) 963-3729 / Chelsea.Amick@emerson.com.

Very truly yours,

Chelsea Amick

Chelsea Amick
Senior Proposal Engineer
Emerson Automation Solutions, Power & Water

Cc: Rick Raike
Gregg Zabelsky
Greg Lippert

Attachment(s): Bill of Material

Commercial Description for the Hampton Roads Sanitation District, James River Advanced Nutrient Reduction Improvements and SWIFT Facility

This document defines the commercial basis under which Emerson makes this budgetary estimate to Hampton Roads Sanitation District for the James River Advanced Nutrient Reduction Improvements and SWIFT Facility distributed control project at the James River Wastewater Treatment Plant.

Terms and Conditions	Emerson's offer is based on the terms and conditions set forth in the Preferred Customer Agreement between Emerson and HRSD, "PCA0907HRSD 1", dated August 20, 2019.
Legal Name and Address for Doing Business	Emerson Process Management Power & Water Solutions, Inc. 200 Beta Drive Pittsburgh, PA 15238
Scope	Refer to attached Bill of Material.
Pricing	The budgetary estimate for the James River Advanced Nutrient Reduction Improvements and SWIFT Facility as described is **$4,061,275.** This budgetary estimate breakout for the two projects is as follows assuming both projects will be released and completed on the same project schedule: **1.** James River Advanced Nutrient Reduction Improvements project CIP No. JR013400: **$1,758,122.** **2.** James River SWIFT project CIP No. GN016360: **$2,303,153.** Notes: 1. Taxes are excluded. 2. Delivery shall be FOB origin. 3. Freight and handling charges are included.
Delivery	The typical lead-time for delivery of James River Advanced Nutrient Reduction Improvements and SWIFT Facility is approximately 20 weeks after approval of Hardware Submittal.
Bid Validity	This estimate is provided for budgetary purposes only and does not constitute a firm contract offer for purchase.
Proprietary and Confidential Information	This estimate and any subsequent communications relative to this estimate are considered to be proprietary and confidential information of Emerson. Accordingly, such proprietary and confidential information shall not be published, used, reproduced, transmitted, or disclosed to others outside your organization without prior written consent by Emerson.

BUDGETARY ESTIMATE TO

Hampton Roads Sanitation District

FOR THE

James River Advanced Nutrient Reduction Improvements and SWIFT Facility

OVATION™ AUTOMATION TECHNOLOGY
BILL OF MATERIAL

PROPOSAL NO. WAM20010019 REVISION 2
DATE: 04/02/2020

Table of Contents

1.0 PROJECT OVERVIEW

Emerson Process Management Power & Water Solutions, Inc., part of the Emerson Automation Solutions family of business units (Emerson) makes this budgetary offer to Hampton Roads Sanitation District for supply of services, equipment, and materials for expanding the existing James River distributed control system (DCS) under the James River Advanced Nutrient Reduction Improvements (CIP No. JR013400) and SWIFT Facility (CIP No. GN016360) project.

Emerson will provide complete engineering services to implement the process control, designed by others, for the James River Advanced Nutrient Reduction Improvements and SWIFT Facility project processes including detailed project engineering, control strategy implementation, system testing, system start-up and ongoing support of James River Advanced Nutrient Reduction Improvements and SWIFT Facility. Emerson will complete the engineering and implementation in a timely manner.

This budgetary offer was based on the following information / assumptions:

- The I/O module count includes 25% spare I/O capacity. The I/O base count includes 25% spare base capacity.
- Six (6) workshops have been included. The workshop topic and durations are detailed in Section 4 of this document.
- No EDS licensing or configuration services are included.
- No upgrade to the existing Ovation software is included. The software for this project will be developed on the Ovation software level running at the plant at the time of hardware release to manufacturing.
- OPH licensing is included for an additional 10,000 points to the existing system.
- The included UPS's are sized for runtimes of at least 60 minutes under 100% load.
- Termination lists will be provided which details each I/O point's wiring information at the Ovation equipment. Loop drawings are not included.
- Ethernet and fiber optic cables running outside the Emerson provisioned cabinets are to be provided by others.
- The cabling between the Ovation network equipment and the PLCs will be supplied by the Design Builder.
- A bank of 317 days of field service time is included for this project scope. A detail of the estimation is provided in Section 6.1 of this document. Seven days are included for coordination with design builder for the installation of new network cabinet, moving DCU-1's location, and installation of media converters in existing network cabinet.
- No SureService or training are included.
- Power Fail Restart functionality is included. Field service to verify the operation at site is included as part of the bank of field service days.
- The project duration is based on 48 months from receipt of purchase order from the Design Builder to completion of the offered scope. A project duration of more than 48 months will require a mutually agreed change to the contract to address any increases in cost or scope.
- No installation drawings or installation services are included.
- Includes up to 25 days of engineering support during the design phase of the project with the Design Builder.
- The network cabinet required for the relocation of DCU-1 will be provided early in the project schedule as mutually agreed with the Design Builder.

2.0 OVATION HARDWARE

2.1 Ovation Hardware Components

2.1.1 Ovation Controller

The offered system will consist of redundant Ovation controllers, each with:

1 – Set of 115VAC, 60HZ basic drop electronics
1 – Single attached copper network interface cards

The following table provides the quantities of Ovation controllers, cabinets, and related hardware offered for this project. The controllers are assumed to be installed in environmentally controlled areas. Each controller will attach to the fast Ethernet network via copper cable. Remote I/O nodes will connect to the controllers using fiber optic cable. Cabinets are sized to include 25% spare I/O bases.

TABLE 2.1.1 OVATION CONTROLLER CABINETS

Item	Description	SWIFT Process Building No. 2	MBBR Building
A	Redundant controller mounted in cabinet w/local Ovation I/O (Vented NEMA 12)[1]	2	2
B	Local extended I/O Cabinets (Vented NEMA 12)[1]	2	2
C	Ethernet I/O network switch – 8 Copper ports of 100 MBPS and 2 Combo ports of GBPS	2	2
D	Controller patch panel – 12 ports	1	1
E	Ethernet I/O Connectivity Kits – 100 MBPS with 2 No. SM Fiber ST connection Media Converter	4	4
F	Remote I/O nodes	3	2

Notes:

1. Cabinets are 78”H x 36”W x 24”D with equipment mounted in the front and rear of the cabinet (requires front and rear access).
2. Controller cabinets must be within 30 feet of their associated Local extended I/O cabinets.

2.0 OVATION HARDWARE (Cont.)

2.1.2 Ovation Remote Location

TABLE 2.1.2 REMOTE I/O LOCATIONS

Item	Description	Main Electrical Building	SWIFT Process Building No. 1	Chemical Building No. 1	SWIFT Influent EQ Electrical Building	Chemical Building No. 2
A	Remote I/O interface cabinet (Redundant, Fiber, Remote Node Interface) (sealed NEMA 12)[1]	1	1	1	1	1
B	Remote I/O expansion cabinet (sealed NEMA 12)[1]	0	1	1	0	0
C	Remote cabinet fiber optic patch panel (12 connections)	1	1	1	1	1
D	Fiber Patch cord[2], 3 ft.	4	4	4	4	4

Each Ovation local, extended, remote or extended remote I/O cabinet houses up to 32 I/O modules. A vertical plate is mounted in the center of the cabinet, dividing the space into front and rear. Up to 16 modules may be mounted in the front and up to 16 may be mounted in the rear. The terminal blocks are located next to the I/O modules on a contiguous I/O base unit. Cabinets are sized to include 25% spare I/O bases.

Notes:

1. Cabinets are 78"H x 36"W x 24"D with equipment mounted in the front and rear of the cabinet (requires front and rear access).
2. Patch cables are provided for ports that are used.
3. Remote I/O interface cabinets must be within 30 feet of their associated Remote I/O expansion cabinets.

2.0 OVATION HARDWARE (Cont.)

2.1.3 Input/Output Modules (local control)

The following table lists the quantities of local Ovation I/O modules (including spares) to be installed in the Ovation cabinets listed in Table 2.1.1. The point counts represent the base I/O identified in the specification. Modules include 25% carded spare I/O.

TABLE 2.1.3.1 LOCAL I/O MODULES (WITH 25% SPARE I/O)

Item	Module Type	SWIFT Process Building No. 2	MBBR Building
A	**Analog input** (8pt/module) (14 bit, 4-20mA)	24	20
B	**Analog output** (4pt/module) (4-20mA with diagnostics)	10	19
C	**Digital input** (16pt/module) (24/48VAC single ended)	29	46
D	**Digital output** (16pt/module, 0-60VDC)	15	15
E	**Analog input, Ovation DIN Rail Terminal Cable Assembly, 4.5 ft.**	24	20
F	**Analog output, Ovation DIN Rail Terminal Cable Assembly, 4.5 ft.**	10	19
G	**Digital input, Ovation DIN Rail Terminal Cable Assembly, 4.5 ft.**	29	46
H	**Digital output, Ovation DIN Rail Terminal Cable Assembly, 4.5 ft.**	15	15

Notes:

1. Emerson will receive from the Design Builder, the 120VAC power feeds and furnish the power distribution inside the cabinet.

TABLE 2.1.3.2 LOCAL I/O POINT COUNT (WITHOUT 25% SPARE I/O)

Item	Module Type	SWIFT Process Building No. 2	MBBR Building
A	**Analog input**	152	87
B	**Analog output**	31	36
C	**Digital input**	364	313
D	**Digital output**	189	169
E	**Soft I/O**	241	110

2.0 OVATION HARDWARE (Cont.)

2.1.4 Input/Output Modules (remote I/O)

The following table lists the quantities of remote Ovation I/O modules (including spares) to be installed in the Ovation cabinets listed in Table 2.1.2. The point counts represent the base I/O identified in the specification. Modules include 25% carded spare I/O.

TABLE 2.1.4.1 REMOTE I/O MODULES (WITH 25% SPARE I/O)

Item	Module Type	Main Electrical Building	SWIFT Process Building No. 1	Chemical Building No. 1	SWIFT Influent EQ Electrical Building	Chemical Building No. 2
A	**Analog input** (8pt/module) (14 bit, 4-20mA)	3	14	10	1	4
B	**Analog output** (4pt/module) (4-20mA with diagnostics)	5	11	10	1	5
C	**Digital input** (16pt/module) (24/48VAC single ended)	7	11	13	3	8
D	**Digital output** (16pt/module, 0-60VDC)	2	3	3	2	2
E	**Analog input, Ovation DIN Rail Terminal Cable Assembly, 4.5 ft.**	3	14	10	1	4
F	**Analog output, Ovation DIN Rail Terminal Cable Assembly, 4.5 ft.**	5	11	10	1	5
G	**Digital input, Ovation DIN Rail Terminal Cable Assembly, 4.5 ft.**	7	11	13	3	8
H	**Digital output, Ovation DIN Rail Terminal Cable Assembly, 4.5 ft.**	2	3	3	2	2

Notes:

1. The Design Builder will supply the 120VAC power feeds; Emerson will furnish the power distribution inside the cabinet.

TABLE 2.1.4.2 REMOTE I/O POINT COUNT (WITHOUT 25% SPARE)

Item	Module Type	Main Electrical Building	SWIFT Process Building No. 1	Chemical Building No. 1	SWIFT Influent EQ Electrical Building	Chemical Building No. 2
A	**Analog input**	19	84	60	6	25
B	**Analog output**	16	33	29	3	16
C	**Digital input**	84	132	156	30	101
D	**Digital output**	22	33	34	16	24
E	**Soft I/O**	175	100	0	9	0

2.0 OVATION HARDWARE (Cont.)

2.1.5 Custom Cabinet Hardware

The following table lists the quantities of custom Ovation hardware to be installed in the Ovation cabinets listed in Table 2.1.1 & 2.1.2.

TABLE 2.1.5 CUSTOM CABINET HARDWARE

Item	Hardware Description	Qty
A	Light kit 115/230VAC (front/rear door) • QTY: 2 per Controller and Remote I/O cabinet • QTY: 1 per Network cabinet	36
B	Cabinet outlet kit • QTY: 2 per Controller and Remote I/O cabinet • QTY: 1 per Network cabinet	36

2.0 OVATION HARDWARE (Cont.)

2.2 User Interface Equipment

The following table provides the quantities of user interface and peripheral equipment offered.

Item	Qty	Description
A	2	**Operator workstation capable of supporting one or two monitors, manufacturer: Dell**

2.0 OVATION HARDWARE (Cont.)

2.3 Ovation Communication Network Hardware

The following table provides information on the communication network hardware.

TABLE 2.3 COMMUNICATION NETWORK HARDWARE

Item	Description	Qty
A	Cisco Ethernet fan out network switches (24 ports), rack mount • QTY: 2, SWIFT Process Building No. 2 network cabinet • QTY: 2, MBBR Building network cabinet • QTY: 2, New Electrical Building #2	6
B	Cisco Ethernet IP Traffic network switches (16 SFP ports, 8 10/100 Base T-Ports, 2 Dual Purpose Gigabit), rack mount • QTY: 2, SWIFT Process Building No. 2 network cabinet • QTY: 2, MBBR Building network cabinet • QTY: 1, Main Electrical Building network cabinet • QTY: 2, SWIFT Process Building No. 1 network cabinet • QTY: 1, SWIFT Influent EQ Electrical Building network cabinet	8
C	Small Form-Factor Pluggable (SFP) Modules, 1000 Base-LH • QTY: 16 per Item B switch	128
D	Cisco Ethernet IP Traffic network switch (24 10/100 Ports with 2 Dual-Purpose Ports) • QTY: 1, New Electrical Building #2	1
E	Cisco Ethernet IP Traffic network switches (8 RJ45 ports, 2 Gigabit combo RJ45/SFP ports), includes 2 100BASE-LX SFP Modules, din rail mount • QTY: 1, Chemical Building No. 1 UPS cabinet • QTY: 1, Chemical Building No. 2 UPS cabinet • QTY: 4, SWIFT Process Building No. 2 • QTY: 10, Recharge Well Area	16
F	Cisco Ethernet data link router/switch (8 ports), rack mount • QTY: 1, Main Electrical Building network cabinet • QTY: 1, SWIFT Process Building No. 1 network cabinet • QTY: 1, SWIFT Influent EQ Electrical Building network cabinet	3
G	Cisco Ethernet data link router/switch (16 ports), rack mount • QTY: 2, SWIFT Process Building No. 2 network cabinet • QTY: 2, MBBR Building network cabinet • QTY: 2, New Electrical Building #2	6
H	Patch panel 19” chassis system w/ 24 fiber ports • QTY: 1, Main Electrical Building network cabinet • QTY: 1, SWIFT Process Building No. 1 network cabinet • QTY: 1, SWIFT Influent EQ Electrical Building network cabinet • QTY: 1, Electrical Building 2 • QTY: 1, Chemical Building No. 1	5
I	Patch panel 19” chassis system w/ 36 fiber ports • QTY: 2, SWIFT Process Building No. 2 network cabinet • QTY: 1, MBBR Building network cabinet • QTY: 2, Administration Building	5
J	Fiber patch cord, 3ft.	66

K	Network equipment cabinet (78"H x 24"W x 32"D) w/cabinet power distribution	6
L	Media converter 19" chassis with 16 slots • QTY: 1, Administration Building network cabinet • QTY: 1, New Electrical Building #2	2
M	Media converter, SM, ST • QTY: 8, Administration Building network cabinet • QTY: 8, New Electrical Building #2	16
N	UPS wall mount cabinet (48"H x 36"W x 16"D) for Chemical Building No. 1 and Chemical Building No. 2 • Carbon steel with zinc-plated mounting plate • Hinged Window Kit • Vent with Filter	2
O	UPS – 1000VA, 120V with two 2U External Battery and IS-RELAY card • QTY: 1, Main Electrical Building network cabinet • QTY: 1, SWIFT Process Building No. 1 network cabinet • QTY: 1, Chemical Building No. 1 network cabinet • QTY: 1, SWIFT Influent EQ Electrical Building network cabinet • QTY: 1, Chemical Building No. 2	5
P	UPS – 6000VA, 208V with one External Battery and IS-RELAY card • QTY: 1, SWIFT Process Building No. 2 • QTY: 1, MBBR Building network cabinet • QTY: 1, New Electrical Building #2	3

Notes:

1. UPS runtime is assumed to be at least 60 minutes under 100% load.
2. Patch cables are provided for ports that are used at the DCS side.
3. Ethernet and fiber optic cables running outside the Emerson provisioned cabinets are to be provided by the Design Builder.

3.0 OVATION SYSTEM CONFIGURATION & SOFTWARE

3.1 System Configuration

The following table provides information on the system application and configuration software.

TABLE 3.1 APPLICATION AND CONFIGURATION SOFTWARE

Item	Description	Qty
A	**Implementation & testing of database points** Using Microsoft® Access® or Excel® format, Hampton Roads Sanitation District will provide the initial I/O database, which will include all required hardware-related attributes (point name, description, signal type, sensor type, sensor range, etc.) and assignment to a specific area of the plant (Ovation cabinet grouping). Emerson will supplement the data by adding module types, module locations, channel assignments on specific modules, etc., and then return to Hampton Roads Sanitation District for the addition of optional software-related attributes (alarm limit, priority, characteristics, etc.). After all of the desired attributes are complete, Emerson will create the controller database.	Up to 2615 Hard –wired points, Up to 635 Soft points
B	**Termination list** Using the populated database, Emerson will generate a termination list, which defines where the field I/O will wire into the Ovation hardware.	1 List
C	**Control implementation** For each control function, the Design Builder will provide a functional description for each process area detailing equipment operation and alarming requirements. This will involve defining alarm priorities and alarm cutout information, as well as filtering and grouping of alarms by plant area. Emerson will use this document to develop the logic in Ovation Control Builder. Emerson will modify this functional description document to reflect the details of how the control system is programmed. This document will be used to verify the process's operation during startup and commissioning activities. Functional SAMA control sheets, P&ID drawings and/or electrical schematics shall also be provided by the Design Builder for Emerson's reference during programming. Emerson will provide submittals of the logics in two passes. The first pass will contain samples of the SAMA logic sheets with devices grouped by similar function. Upon receipt of the approval, the final submittal will be generated and will contain SAMA functional for every device in that particular set.	1 Lot
D	**Alarm management**	Included in Item C above
E	**High Performance Graphics** Implementation of the existing process graphics and new graphics required for the project. The display layouts and the High Performance Graphics Philosophy and Design Standards are being developed under a separate contract.	Up to 134 Originals Up to 16 Duplicates

Item	Description	Qty
F	Third-party interface graphics	Included in Item E above
G	**Unique faceplate displays with the following features:** ▪ Up to 8 stations per diagram ▪ Based on standard SmartMA control stations for analog and digital control	Included in Item E above
H	**Text display windows with the following features:** ▪ Maximum of 10 permissive conditions per window ▪ Based on standard Emerson window sizes and colors ▪ Includes poke fields	Included in Item E above
I	**Historian & reporting system** Hampton Roads Sanitation District shall define the points that are to be retained by the Ovation process historian. ▪ Hampton Roads Sanitation District	Up to 3
J	**Power Fail Restart Functionality** Configure and test the power fail restart functionality prior to startup based on definition by the Design Builder.	1 lot
K	**Ovation Process Historian Point Increase** 5,000-point scale-up to an existing OPH system	2

3.0 OVATION SYSTEM CONFIGURATION & SOFTWARE (Cont.)

3.2 Data Link Interface

The following table defines the type and quantities of foreign devices being interfaced to along with the required engineering. Hampton Roads Sanitation District is responsible for supplying the list of points to be configured and transmitted through these links.

TABLE 3.3 DATA LINK INTERFACES

Item	Qty	Redundancy	Points	Description
A	7	No	26 points / PLC	Ethernet/<DH+> protocol from DCS to Allen Bradley interface for the Ozone system.
B	10	No	31 points / PLC	Ethernet/<DH+> protocol from DCS to Allen Bradley interface for the Recharge Wells.
C	5	No	24 points / PLC	Ethernet/<DH+> protocol from DCS to Allen Bradley interface for the UV system.
D	25	No	7 points / PLC	Modbus TCP protocol from DCS to Power Monitors
E	74	No	5 points / PLC	Modbus TCP protocol from DCS to VFDs

Notes:

1. The Ethernet data links are brought into Ethernet switch/routers located in the network equipment cabinets.
2. Foreign device interface cable will be supplied by the Design Builder.

4.0 PROJECT MANAGEMENT

A key factor in the success of any project is experienced project management. For the James River Advanced Nutrient Reduction Improvements and SWIFT Facility, Emerson has included time for an experienced person to plan, control, monitor, and report the status of the overall project.

During the kickoff meeting, the project schedule will be finalized with the Design Builder, and the system hardware and application software freeze dates will be established. Any hardware and/or software change, requested after the applicable freeze date, may represent additional scope of supply, and result in a contractual change (delivery schedule and/or price).

Emerson will perform the following project management functions:

TABLE 5.0 PROJECT MANAGEMENT FUNCTIONS

Item	Description
A	**Project kickoff meeting** Emerson will coordinate with the Design Builder's and Hampton Roads Sanitation District's schedules and conduct in person a project kickoff meeting with the Design Builder and Hampton Roads Sanitation District, within one month after receiving the purchase order. Subjects to be covered in the meeting include: ▪ Project plan ▪ Commercial issues ▪ Project schedule ▪ System hardware and application software ▪ Drawings and documentation
B	**System configuration and hardware manufacturing schedule** The proposed system configuration and project schedule included in the offer will be finalized during the kickoff meeting. Emerson will perform the system manufacturing according to the hardware manufacturing schedule.
C	**Project schedule** With the Design Builder's and Hampton Roads Sanitation District's input, the Emerson project engineer will develop a detailed project schedule and keep it updated as a tool for management and tracking. Project reporting will originate from the project engineer. Progress reports will be provided monthly through the project. The reports will address the status of the project development against milestones as defined in the project schedule. All changes in project scope, schedule, and/or status will be documented at this time.
D	**Workshops** Emerson has budgeted for the following 20 days for workshops. The days may be allocated differently as needed: • Hardware/Network Design Workshop – 3 days • Database Workshop – 3 days • Preliminary Graphics Workshop – 3 day • Final Graphics Workshop – 3 days • Functional Description/P&ID Review Workshop – 5 days • Pre-commissioning Workshop – 3 days Additional workshop days shall be allocated as coordinated with the Design Builder and Hampton Roads Sanitation District's input.

E	Contract administration and monthly status reports
F	Initialization and verification of the system hardware at the Emerson factory
G	**Factory acceptance tests -** Up to two (2) weeks of factory testing at Emerson facilities are included in the offer. Emerson engineers and technicians will perform the following factory acceptance tests with the Hampton Roads Sanitation District project team at our facilities in Pittsburgh, PA. **Controller and I/O cabinet test -** Ovation cabinets will be individually tested utilizing the Ovation Signature Test process which provides a semi-automated check of Ovation cabinets configuration and operation. Test results will be documented and filed in the project Quality Assurance folders. Cabinets will be prepared for shipment after the test. **Workstation and network test -** Workstation and network equipment will be tested at site using hours from the bank of field service days. **Software test -** Application software will be verified utilizing the Ovation project virtual environment (OPVE) on virtual controllers. Emerson can provide a remote connection for Hampton Roads Sanitation District to participate in the testing remotely if required. Hampton Roads Sanitation District engineers are responsible for their travel and living expenses.
H	**Overall project follow-up** The Emerson project engineer will provide overall project follow up to ensure that the project is executed according to the agreed upon scope and schedule, and that the highest possible level of satisfaction for James River Advanced Nutrient Reduction Improvements and SWIFT Facility is achieved.

5.0 OVATION DOCUMENTATION

Engineering drawings

A USB drive containing a single set of engineering drawings in PDF format will be provided with the project. Included in the drawings will be both standard system drawings and project specific drawings. The types of drawings are generally as follows: system layout, system cables, controller and I/O cabinet assemblies, controller and I/O cabinet components, Ovation add-on kits, workstations, workstation additions, Emerson kit drawings and CISCO equipment.

User guides

The USB drive library, termed SmartDocs, provides manuals in PDF format for easy searching and electronic viewing, as well as for download and print.

In addition, Emerson provides free access to the online SmartDocs library, a comprehensive library of all Power & Water Solutions' user documentation including the most up-to-date manual released plus all manual updates. The online SmartDocs library provides manuals in html and PDF and offers an online ordering capability so you can order hard copy versions of a manual.

Documentation media

Two (2) sets of electronic documentation, via USB drives, which include the following drawings:

- System layout drawing – block diagram of the Ovation equipment, data highway & Ethernet cabling, power cabling, ground cabling and peripheral cabling
- Standard hardware drawings – Ovation cabinet, power distribution diagram
- Termination list (loop drawings not included)
- Hardware configuration – bill of material
- Graphics diagram screens
- Ovation control builder drawings
- Ovation reference manuals
- Factory Acceptance Testing Plan

Third-party equipment – Any third-party vendor documentation received with the equipment will be shipped to you with the original third-party packaging.

6.0 START UP, COMMISSIONING, AND SURESERVICE™

6.1 Field Service Engineering

A total of 317 days as a bank for field service engineering, travel and living expenses for Emerson field engineers is included. Travel time to the site is charged to the bank of days. The bank's utilization is calculated using weekday rates; no weekends or holidays are included. Any additional time beyond the bank of days will require a mutually agreed upon change order.

The field service engineering bank was estimated based on the following activities:

Field Activity	Days
Ovation system installation oversight	20
Ovation system setup Power and grounding checks of the Ovation equipment Verify Ovation network operation Loading of the new workstations Loading the application software onto the Ovation system	20
Datalink setup and configuration Establishing communication to 3rd party devices with the 3rd party OEM	45
Support hardwired loop checks from the Ovation system	100
Support soft I/O loop checks from the Ovation system	15
Support functional testing	95
Support during Site Acceptance Test	15
Coordination with Design Builder for install of new network cabinet in DCU 1 location and also install of media converters in existing network cabinet.	7
TOTAL	**317**

The Emerson field engineer will provide weekly charge reports for time charged against the bank of days.

Charges against the bank shall be as follows on a per field service engineer basis (no night shift differential will be charged).

Weekdays

First 8 hours that day @ 1 hour worked – 1 hour charged

Additional hours that day @ 1 hour worked = 1.5 hours charged

Saturdays

All hours that day @ 1 hour worked – 1.5 hours charged

Sundays & Holidays

All hours that day @ 1 hour worked = 2 hours charged

6.0 START-UP, COMMISSIONING and SURESERVICE™ (Cont.)

6.2 Post Commissioning SureService™

New SureService modules or an extension of existing SureService modules are not included with this budgetary estimate.

7.0 TRAINING

Emerson's Ovation training is not included with this budgetary estimate.

Rice, Shannon

From: HRSDERP Workflow <hrsderp@hrsd.com>
Sent: Monday, March 22, 2021 5:53 PM
To: Rice, Shannon
Subject: For Your Information: Sent: Online Discussion Message for Solicitation 404776-2,2 (JR SWIFT Facility (GN016360) and JRTP Advanced NRI (JR01340
Attachments: Notification Detail.html

From	**SCOTT CROWDER**	Number	**404776-2,2**
To	**Rice, Shannon**	Title	**JR SWIFT Facility (GN016360) and JRTP Advanced NRI (JR013400)**
Sent	**22-MAR-2021 17:50:51**		
ID	**4384690**		

Solicitaions Preview **Immediately upon publishing**
Solicitaions Open **Immediately upon publishing**
Solicitaions Close **October 02, 2020 11:00 am Eastern Time**

Company **ULLIMAN SCHUTTE - ALBERICI JOINT VENTURE**
Subject **Design-Build Contract**
Message **Shannon - the Agreement is acceptable. We will look for the POs in Unifier. Thanks so much for your help with this. - Scott -------Original Message-------Good afternoon Scott, HRSD's Commission approved the referenced contract on January 26, 2021. I am forwarding the Notice of Award, Agreement, and Bonds. The Notice of Award is for your records. Please review the Agreement and let me know if it is acceptable prior to the close of business today (March 22, 2021 at 6 p.m. local time) via ERP. We are no longer requiring original signatures on contracts. Matt Schutte will formally accept the contract in Unifier, I will send an email to both of you after the POs are integrated to Unifier (March 23, 2021). Print two copies of the Bonds, have them signed and witnessed, and return them to me as per agreed upon in the Agreement. Please let me know if you have any questions. Thank you. Shannon**

To respond to this message, please click here.

PROFESSIONAL SERVICES AGREEMENT

for the

PROGRAM MANAGEMENT of SWIFT FULL SCALE IMPLEMENTATION (GN016320)

This AGREEMENT is entered into and becomes effective this thirty-first day of July, 2018, by and between Hampton Roads Sanitation District (hereinafter referred to as HRSD) and AECOM Technical Services, Inc. (hereinafter referred to as the FIRM).

W I T N E S S E T H

That whereas HRSD intends to execute the Sustainable Water Initiative for Tomorrow (SWIFT) Full Scale Implementation Program that will add multiple advanced water treatment processes to select HRSD wastewater treatment facilities to produce a highly treated water (SWIFT Water) that complies with drinking water standards and is compatible with the receiving aquifer (hereinafter referred to as the PROGRAM) and desires the FIRM to provide professional services including program management, preliminary engineering report services, design services, pre-construction and procurement support services, contract administration services, field engineering and inspection services, startup and testing services, operations and training services, and post-startup and certification services for the PROGRAM;

NOW THEREFORE, HRSD and the FIRM, in consideration of these premises and mutual covenants herein set forth, mutually agree as follows:

I. SCOPE OF WORK

A. Program Management Services

1. FIRM shall provide program management services as described in the attached scope of services document, titled "SWIFT Full Scale Implementation Program Management Scope of Work – Year One (FY2019)" and dated July 19, 2018.

B. Additional Services:

1. The FIRM shall provide or have performed additional services at the written direction and approval of HRSD.

II. PROJECT STATUS REPORTING

A. The FIRM shall provide monthly project status reporting including work completed, upcoming milestones, and other issues affecting the project quality, cost and/or schedule. The FIRM shall submit an electronic schedule to HRSD.

B. The FIRM shall coordinate their efforts using HRSD's Enterprise Project Management System (Unifier) as appropriate for defined submittals and processes.

C. The FIRM shall use HRSD's Online Oracle ERP system for all financial related matters including, but not limited to, consultant and contractor pay requests, engineering amendments and contractor change orders.

III. OWNERSHIP AND USE OF DOCUMENTS

A. All of the work product including but not limited to plans, specifications, designs, drawings, estimates, field notes, investigations, design analysis, reports, studies and derivative works thereof, in any format, prepared by the FIRM in executing this PROGRAM shall remain the property of the FIRM. The FIRM permanently and irrevocably assigns to HRSD a royalty-free, nonexclusive, non-transferable license for all work products and intellectual property, as well as all derivative works thereof, which are prepared in the performance of this Agreement by the FIRM and by its subconsultants including the right to reproduce, copy, distribute and display by HRSD, at its discretion, consistent with the license granted herein. The license and all rights which inure to HRSD shall survive the termination or disengagement of either the FIRM or its subconsultants, or both, from the work, whether such termination or disengagement is voluntary or otherwise.

B. All contracts entered into between the FIRM and its subconsultants in furtherance of the work shall incorporate the provisions of this paragraph by reference or contain a provision which permanently and irrevocably assigns to HRSD a royalty-free, nonexclusive, non-transferable license for HRSD's use, reproduction, distribution and display of all documents and intellectual property created by the FIRM and by its subconsultants for this work as well as all derivative works thereof including, but not limited to plans, specifications, designs, drawings, estimates, field notes, investigations, design analysis, reports and studies and any derivative works thereof, in any format. The FIRM shall, upon HRSD's request, submit to HRSD all contracts that the FIRM enters into with its subconsultants in furtherance of this work, or such other documents that demonstrate to HRSD's satisfaction, the FIRM's assignment to HRSD of the above license in accordance with this paragraph.

C. In the event that a claim is made by any person, firm or entity, including the FIRM, or a subconsultant of the FIRM, against HRSD, or HRSD's officers, agents or employees for an alleged copyright infringement or unauthorized use, reproduction, distribution or display of such intellectual property or any derivative work thereof, provided such derivative works were produce by FRIM, or for the alleged violation of any common law or statutory rights with respect to such property including, without limitation, any derivative works thereof, the FIRM shall indemnify and save harmless HRSD and HRSD's officers, agents and employees from any and all claims and/or causes of action against them for damages or injury to any person or property arising out of or in connection with

HRSD's use, reproduction, distribution or display of such intellectual property contained in the FIRM's work product or any derivative works thereof, including but not limited to, reasonable attorney, consultant and expert witness fees and expenses. The FIRM also shall be affirmatively required to secure such rights or to indemnify HRSD for all costs of obtaining such rights or comparable rights in such intellectual property or comparable intellectual property. The FIRM shall pay all royalties and license fees which may be due on the inclusion of any patented or copyrighted materials, methods or systems selected by the FIRM and incorporated into the work product. The FIRM shall indemnify and hold HRSD harmless from all suits or claims for infringement of any patent rights or copyrights contained in the FIRM's work product.

D. All work product of the FIRM, whether in hard copy or in electronic form, are instruments of service for the PROGRAM, whether the PROGRAM is completed or not. HRSD acknowledges that the work product is not intended or represented to be suitable for use on the PROGRAM unless completed by the FIRM, or for use or reuse by HRSD or others on extensions of the PROGRAM, or any other project, or for any other purpose, without written verification or adaption by the FIRM which written consent shall not be unreasonable withheld. The work product provided to HRSD shall not bear a copyright seal which would preclude HRSD from licensed use of the project documents as defined herein. HRSD agrees not to reuse the work product for purposes not defined herein without the expressed written consent of the FIRM which written consent shall not be unreasonable withheld and any such use or reuse, or any modification of the work product, will be at HRSD's sole risk and without liability or legal exposure to the FIRM. Written notice will be provided by HRSD to the FIRM's Registered Agent of the intent to reuse part, or all, of the work product and the FIRM shall provide response within ten (10) days. If the FIRM or its Registered Agent does not respond within 10 days, it shall be deemed to have given consent. The FIRM's refusal shall not be unreasonable withheld without cause.

E. Any inventions, patents, copyrights, computer software or other intellectual property developed during the course of, or as a result of, the PROGRAM shall remain the property of the FIRM. Any inventions, patents, copyrights, computer software or other intellectual property developed jointly during the course of, or as a result of, the PROGRAM shall remain the joint property of the FIRM and HRSD. All rights associated with such joint property will be negotiated at the proper time and will be subject to further or subsequent agreement.

IV. HRSD PROVIDED SERVICES

A. HRSD shall assist and cooperate with the FIRM to perform the services in a timely and effective manner.

B. HRSD shall provide to the FIRM full information as to the requirements of the project.

C HRSD shall provide to the FIRM all available information pertinent to the project including previous reports and other relevant data.

D. HRSD shall provide to the FIRM copies of all HRSD procedures, design preferences, design standards, specifications and front end documents for use in developing the construction plans and specifications and other bidding documents.

E. HRSD shall examine all design documents including reports, studies, technical memorandum, equipment and material information, sketches, drawings, construction plans and specifications and other bidding documents presented by the FIRM within a reasonable time so as not to delay the FIRM.

F. HRSD shall give prompt written notice to the FIRM whenever HRSD observes or otherwise becomes aware of any defect or changed circumstances in the project.

G. HRSD shall provide certain services by other means including permit and application fees, advertisement for bids, and similar items.

V. PERIOD OF SERVICE

A. The FIRM shall forward all submittals required for review by HRSD to be received at least fourteen (14) days prior to the respective review meeting.

B. The FIRM shall conduct the work and complete all deliverables within the time period specified or negotiated in accordance with the proposed schedule.

C. The FIRM shall provide contract administration through the final construction completion date and for sixty (60) days thereafter.

D. The FIRM shall provide field engineering and inspection through the final construction completion date and for sixty (60) days thereafter.

E. The FIRM shall suspend any or all services for reasonable periods of time as directed by HRSD without modification to the AGREEMENT for:

1. Periods required in between the preliminary engineering report and the final design and/or in between the final design and construction to obtain regulatory or local jurisdiction approvals and permits including Special Use Permits.

2. Periods normally required to advertise, bid, and award the construction contract.

VI. PAYMENTS TO FIRM

In consideration of agreement by the FIRM to above, HRSD agrees to pay the FIRM as follows:

A. HRSD shall pay the FIRM for services by one of the following two methods. The method of payment shall be specified in the agreement or amendment.

1. Reimbursement based on:

a. The following salary rate schedule.

Labor Classification	Minimum	Maximum	Billing Rate
Principal	$88.52	$145.17	$300.00
Subject Matter Expert/TAT	$77.25	$160.45	$300.00
Program Manager	$95.00	$107.47	$260.00
Delivery Managers	$80.47	$97.89	$238.00
Senior Project Professional	$53.11	$103.47	$223.00
Project Professional	$37.02	$58.20	$158.00
Professional	$28.97	$38.87	$105.00
Financial	$24.72	$39.14	$105.00
Project Admin	$17.71	$33.75	$90.00
Senior Technician	$35.14	$45.63	$125.00
Technician	$20.92	$34.35	$90.00

All Principals and Subject Matter Experts will be billed at a direct salary multiplier of 2.75 or $300 per hour, whichever is lower. Program Management services will be billed at a direct salary multiplier of 2.75 or $275 per hour, whichever is lower. Technical Design services will be billed at a direct salary multiplier of 3.0, subject to the same billing cap rates.

b. Outside Services, excluding those provided by Hazen and Sawyer, plus a markup of a maximum ten percent (10%).

c. Direct costs excluded from the labor rate multiplier include transportation, meals, lodging, shipping, equipment, and supplies.

2. Negotiated Lump Sum amount.

B. HRSD and FIRM shall negotiate an equitable adjustment for the compensation listed in Section VI.A.1.a. on an annual basis.

C. Payment requests from the FIRM for services rendered and reimbursable expenses incurred on Task Orders completed during the month shall be submitted to HRSD no more than monthly. One copy of the payment request is to be submitted along with the completed and updated diversity statement. Approved invoices will be paid within thirty days of submittal.

D. All reimbursable direct costs shall be limited to those amounts listed in *HRSD Guidelines for Reimbursable Charges Related to Professional and Non-Professional Services*. Costs exceeding the limits described in this document will only be paid if acceptable documentation is provided with the invoice.

E. For the work described in Paragraph I.A.1. (Program Management Services – FY 2019), compensation will in accordance with the rate schedule in Paragraph VI.A.1.a. with a Maximum Authorization of $5,264,440.

F. For the work described in Paragraph I.B. (Additional Services), compensation will be as authorized in writing by HRSD.

VII. PERSONNEL AND FACILITIES

A. The FIRM represents that it possesses the appropriate licenses required to provide Professional Services in the Commonwealth of Virginia and meets all requirements of the Virginia Department of Professional and Occupational Regulation (DPOR), including a valid certificate of authority. The FIRM shall have a valid Business Entity Branch Office Certificate authorized by the Virginia State Corporation Commission and DPOR.

B. The FIRM represents that it has a duly qualified Professional Engineer or Architect providing direct control and personal supervision over the work.

C. The FIRM represents that it has adequate personnel and facilities necessary to accomplish the work within the required times.

VIII. AUTHORIZED REPRESENTATIVE

A. HRSD authorizes its Director of Engineering or Chief of Design & Construction to give directions to the FIRM.

B. The FIRM shall identify to HRSD the person(s) authorized to receive direction from HRSD and to act on behalf of the FIRM.

IX. MODIFICATIONS

A. HRSD may at any time by written order make changes within the general scope of this AGREEMENT in the services or work to be performed.

B. The FIRM shall not be authorized to do any extra work or to increase or diminish the work specified to be done unless he/she shall receive an amendment to this AGREEMENT properly signed by both parties, and that he/she shall, whenever and by whomsoever ordered to increase or diminish the work, secure an amendment to this AGREEMENT, in writing, properly signed by both parties. Failure on the part of the FIRM to obtain an amendment to this AGREEMENT on account of such increase or diminution of the work shall constitute a waiver of all subsequent claims therefor.

X. SUSPENSION OF WORK

A. HRSD may order the FIRM in writing to suspend, delay or interrupt all or any part of the work for such period of time as HRSD may determine to be appropriate for its convenience.

XI. ACCOUNTING SYSTEM

A. The FIRM shall have an accounting system which accounts for costs in accordance with generally accepted accounting principles. This system will provide for the identification, accumulation and segregation of allowable and unallowable project costs among projects. The FIRM must propose and account for costs in a matter consistent with normal accounting procedures.

XII. INSURANCE

A. The FIRM shall secure and maintain the following insurance policies:

1. Workers' Compensation Insurance with statutory limits and Employer's Liability Insurance with limits of $100,000/$500,000/$100,000. A waiver of subrogation shall apply in favor of HRSD.

2. Commercial General Liability Insurance with limits of $1,000,000 per occurrence and $2,000,000 annual aggregate. The policy shall provide premises and products liability as well as blanket contractual liability. The policy shall name HRSD as an additional insured for both ongoing and completed operations and shall include a waiver of subrogation in favor of HRSD.

3. Commercial Automobile Insurance with $1,000,000 combined single limits per accident.

4. Professional Liability/Errors and Omissions coverage with limits of $10,000,000 per claim and $10,000,000 annual aggregate. Such coverage shall be maintained for a minimum of three years after professional services are completed.

B. Certificates of insurance shall be provided to HRSD within ten days of the execution of this AGREEMENT.

XIII. STANDARD OF CARE

A. The FIRM is not a guarantor of the services provided for herein but shall be held to the standard of care imposed upon professional services firms under the laws of the Commonwealth of Virginia.

B. The FIRM is not responsible for the means, methods, techniques, sequences, or procedures of construction employed by the CONTRACTOR or the safety precautions and programs incident to the work of the CONTRACTOR. Also the FIRM shall not be responsible for the negligent acts or omissions of the CONTRACTOR during the construction of the facilities.

C. The FIRM, its employees and all subconsultants shall not engage in any activity that would be considered a conflict of interest. Conflicts of interest are defined in the Commonwealth of Virginia APELSCIDLA Board of Regulations. All potential conflicts of interest shall be fully disclosed to HRSD and shall be agreed to in writing by all interested parties before the activity or issue may commence.

XIV. TERMINATION OF AGREEMENT

A. HRSD may terminate this AGREEMENT at any time by giving the FIRM ten (10) days written notice of such termination. Such notice shall be made either personally at one of the offices of the FIRM or sent by certified mail, return receipt requested, to the principal office of the FIRM. The FIRM may terminate this AGREEMENT upon ten (10) days written notice if HRSD does not pay the FIRM's invoices rendered for a period of sixty (60) days or if HRSD otherwise substantially fails to fulfill its obligations under this AGREEMENT.

B. In the event that the AGREEMENT is terminated by either HRSD or the FIRM, the FIRM shall be compensated for all services performed to the date of termination including reimbursable expenses then due. In no case shall billings exceed the limits established.

C. If AGREEMENT is to be terminated for cause, FIRM shall be provided a written Notice to Cure affording it ten (10) days to address any alleged deficiencies specified in the Notice prior to commencing with termination process.

XV. ASSIGNMENT OF AGREEMENT

A. HRSD and the FIRM bind themselves and their successors, administrators and assigns to the other party of this AGREEMENT and to the successors, administrators and assigns of such other party, in respect to all covenants of this AGREEMENT, except as above, neither HRSD nor the FIRM shall assign, sublet or transfer their interest in this AGREEMENT without the written consent of the other. Nothing herein shall be construed as creating any personal liability on the part of any officer or agent of any public body which may be a party thereto.

XVI. NON-DISCRIMINATION

A. The FIRM shall not discriminate against an employee or applicant for employment on the basis of race, religion, color, sex, national origin, age, disability or any other basis prohibited by law relating to discrimination in employment. Further, the FIRM shall not (i) discriminate against a faith-based organization on the basis of the organization's religious character or (ii) impose conditions that (a) restrict the religious character of the faith-based organization, except, in accord with Virginia Code §2.2-4343.1(F), that no funds shall be expended on contracts for sectarian worship, instruction, or proselytizing, or (b) impair, diminish, or discourage the exercise of religious freedom by the recipients of such goods, services or disbursements. The FIRM shall post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this non-discrimination clause. The FIRM shall state that the FIRM is an equal opportunity employer in all solicitations or advertisements for employees placed by or on behalf of the FIRM. Notices, advertisements and solicitations placed in accordance with federal law, rules and regulations shall be deemed sufficient for the purpose of meeting the purpose of this section. The FIRM shall include the provisions of the foregoing clauses in every subcontract or purchase order over $10,000 so that the provisions will be binding upon each subcontractor or vendor.

XVII. FORCE MAJEURE

A. It is mutually understood and agreed that neither party hereto shall be held responsible for damages caused by delay or failure to perform hereunder when such delay or failure is due to fires, strikes, floods, acts of God, legal acts of public authorities, or delays or defaults caused by public carriers that cannot reasonably be forecast or provided against.

XVIII. LIMITATIONS

A. Neither party to this Agreement shall be liable to the other party or any third party claiming through the other respective party, for consequential damages, that may result from this Agreement, or out of any goods or services furnished hereunder. The total aggregate liability of FIRM to HRSD for all claims, losses, costs or damages whatsoever arising out of the performance or non-intentional breach of this Agreement shall not exceed the greater of one-hundred percent (100%) of the compensation paid to FIRM under this Agreement or $10,000,000.

The agreement and all subsequent amendments to the agreement will be approved and executed using HRSD's Enterprise Resource Planning (ERP) system. Physical signatures (on this agreement and future amendments) will not be required if acknowledged by FIRM through the ERP system.

SWIFT Full Scale Implementation Program Management

Scope of Work – Year One (FY 2019)

Prepared by
AECOM+HAZEN

July 19, 2018

SWIFT Program Management

Task 1. Program Administration Scope of Work

Task 2. Schedule and Cost Management Scope of Work

Task 3. Quality Management Scope of Work

Task 4. Additional Services

Program Management

Scope of Work

Task 1 Program Administration

1.1 Program Administration

FIRM shall provide Program Management services that align to HRSD organizational goals and are required for the planning, implementation and completion of full scale SWIFT facilities designated by HRSD under the SWIFT Full Scale Implementation Program (FSIP), collectively referred to herein as "the Program".

A. Program Administration shall include the following activities:

1. Direct and coordinate all efforts of the Program Management team as approved by HSRD.
2. Manage the performance of the FIRM against the approved Scope of Work, contract schedule and budget.
3. Coordinate activities between HRSD, the FIRM, and other consultants that are currently interfacing with the Program.
4. Confirm staffing levels are consistent with the staffing requirements identified and approved during the negotiations of this Agreement.
5. Provide the necessary program and project management staffing to support design development and preparation of bridging documents.
6. Conduct monthly progress meetings with appropriate HRSD personnel and provide daily coordination with other department personnel as needed.
7. Submit monthly reports to HRSD summarizing conditions affecting the Program elements according to format required by Section XIV of the HRSD Design & Construction Standards. The FIRM shall conduct monthly meetings with the HRSD Chief of Design & Construction – SWIFT and other key stakeholders to discuss the current status as reported.
8. Submit monthly work confirmations to HRSD in a timely manner through ERP. Monthly reports as described previously must be attached to the appropriate work confirmation.
9. Coordinate reviews with HRSD staff and manage FIRM's deliverable distribution and comment resolution for all program deliverables.
10. Work with HRSD to develop Chartering agenda and contact invitees to solicit initial input on goals, success metrics. FIRM shall conduct a 1.5 to 2-day facilitated **Chartering/Partnering Workshop** concluding with an executed project charter.
11. Defining success for the overall SWIFT FSIP initiative will be led by HRSD and will include knowledge, goal transfer and definition of HRSD strategic initiatives to the FIRM via a formal **"On-Boarding Workshop"** and shall include on-going, informal interactions.

12. FIRM will conduct a program level **Commissioning Requirements Workshop** to define bridging document requirements that reflect training requirements, demonstration periods, field testing, asset integration and operational integration plans.

B. FIRM shall mobilize a SWIFT FSIP Program Management Office (PMO) in AECOM's Norfolk office with space and infrastructure to support staff from HRSD and the FIRM to facilitate program delivery. Mobilization of the PMO includes phone and internet access and provision for facilities, including program offices, office equipment, services, and supplies needed for complete performance of this Agreement. The task also includes up to three **Data Management Workshops** to develop the operating space needs of the PMO and assess compatibility with HRSD IT requirements.

C. FIRM shall organize and conduct a **Kickoff Workshop** with HRSD within 5 days of NTP for introductions of key staff and their roles and responsibilities, review the approved scope of work, and discuss initial communications between FIRM and HRSD.

D. FIRM shall be responsible for organizing and chairing special meetings, workshops and presentations as needed to manage the Program with HRSD and other HRSD subconsultants. FIRM shall:

1. Provide objectives for the meeting when the meeting is scheduled;
2. Provide an agenda, prior to the meeting;
3. Capture a summary of the discussion during the meeting and distribute to the attendees for comments;
4. Finalize and distribute minutes for all formal meetings, workshops and presentations. Minutes shall include Action Items with assignments.

E. FIRM shall participate in SWIFT QST as requested by HRSD.

F. FIRM shall prepare and manage a FIRM Safety Plan and oversee compliance with Program Safety Requirements as defined by the PMP and SWIFT consultant and contractors. FIRM shall report safety performance metrics and issues as part of the SWIFT Status Reports.

1.2 Community Benefits Plan

A. The FIRM shall develop a Community Benefits Plan (CBP) that shall be submitted to and approved by HRSD. FIRM shall report on status of CBP as part of the monthly progress report based on mutually agreed to reporting metrics.

B. The FIRM shall allocate 100 hours of time for supporting HRSD-lead community based events.

C. The FIRM shall make its staff available for HRSD training prior to supporting HRSD-lead community based events.

1.3 Program Management Plan and Program Procedures

A. The FIRM shall develop a programmatic framework for repeatable, sustained and success in project delivery. FIRM shall work with HRSD to develop a SWIFT FSIP Program Management Plan (PMP) and supporting procedures that define best practice processes for controlling, managing, and reporting the projects and the Program. The PMP shall incorporate relevant HRSD procedures and provide recommendations for revising or enhancing existing procedures to optimize program management and delivery. Potential sections of the PMP include:

- Program Description and Program Team Mission
- Organization and Governance
- Communications Management
- Document Management
- Schedule and Budget Management
- Change Management
- Quality Management
- Risk Management
- Engineering and Design
- Procurement and Contracts Management
- Permitting and Regulatory Compliance Management
- Environmental Health & Safety
- Public Information and Stakeholder Management
- Construction Management
- Program Design Manual
- Asset Management

B. FIRM shall conduct a **SWIFT Governance Workshop** with HRSD to discuss overall delivery approach, discussion of SWIFT standards, the purpose of the PMP, the scope of the PMP, and the development process, schedule and collaboration requirements with HRSD.

C. After collection and review of relevant HRSD standards, procedures and form templates, the FIRM team shall draft the PMP and conduct reviews with HRSD designated staff and finalize the PMP for HRSD approval. PMP shall be submitted to SWIFT QST for review and approval. Delivery shall be coordinated with monthly SWIFT QST schedule.

D. FIRM shall provide draft procedures and/or revisions to existing procedures as required to support execution of the PMP for review and approval by HRSD.

E. Sustainability and Envision Approach: The FIRM will collaborate with HRSD to develop Envision-based sustainability standards for the Program including the following:

   1. Prepare and conduct a **SWIFT Program Sustainability Approach Workshop**. The Workshop will be conducted with various stakeholders throughout HRSD, including the sustainability group to gain consensus on over-arching SWIFT Program sustainability goals across all HRSD work groups. The Envision Sustainable Infrastructure Rating System (version 3) will be the basis of the workshop discussion agenda.
   2. Prepare a memorandum documenting the sustainability vision and goals developed during the SWIFT Program Sustainability Approach Workshop.

F. FIRM shall facilitate and lead a **FSIP Procurement Strategy Meeting** to define pre-procurement options, opportunities, benefits and risks associated with the programmatic equipment pre-purchasing in addition to developing a project specific framework/strategy.

1.4 Program Management Information System

FIRM shall support enhancements to Unifier, which shall be carried out by HRSD and its Unifier consultant, as the PMIS for SWIFT FSIP.

A. The initial activity shall be a review of current usage and functionality of Unifier and the HRSD – Capabilities Assessment & Unifier Healthcheck, dated January 24, 2018.

B. Based on the program management processes defined in Subtask 1.03, FIRM shall work with HRSD and the Unifier consultant to finalize the scope of functional requirements for enhancements to be developed by the Unifier consultant. If requested by HRSD (additional service) and in conjunction with HRSD's Unifier consultant, FIRM will provide an evaluation of alternative PMIS systems for consideration.

C. The FIRM shall conduct a review of HRSD's ERP and provide recommendations for functional integration with Unifier for SWIFT FSIP for review and discussion with HRSD and the Unifier consultant. The review shall be integrated with developing functional recommendations for enhancements to Unifier.

D. FIRM shall work with HRSD to define the required asset management requirements for SWIFT FSIP, review the current asset management practices and system and provide recommendations for enhancements. FIRM shall conduct an **Asset Management Workshop** with HRSD to review HRSD Asset Management Standards, discuss asset inventory, and BIM CMMS coordination. This effort shall be integrated with developing functional recommendations for enhancements to Unifier.

E. FIRM shall support HRSD and the Unifier consultant on the development of the Unifier consultant's work plan for Unifier enhancements and integrations, participate in configuration requirements workshops conducted by the Unifier consultant, and participate in User Acceptance Testing.

1.5 Document Control

FIRM shall implement a document management system that shall capture, manage, store, preserve, and deliver content and documents related to the Program.

The document control strategy will be developed with a data migration strategy to facilitate data migration from the interim to the ultimate PMIS repository.

The document control components/strategy shall be reviewed and approved by HRSD for both interim and long-term measures and shall consist of the following:

A. Interim Document Management System

FIRM shall develop recommendations for setting up the initial Program file structure in Unifier to enable early capture and management of Program documents for HRSD. This file structure shall be reviewed and updated as needed when the SWIFT document management plan in the PMP is finalized.

B. Communication Protocols

The FIRM recognizes communication protocols shall need to be developed on three (3) levels: Internally among Program Personnel, Program wide between the FIRM and HRSD, and Public Outreach communications.

A. Internal Program Communication Protocols:

1. A Communication Approval Matrix, provided to all Program personnel, shall be developed that shall identify the document type, purpose, recipient, originator, reviewer and signatory authority. This matrix shall ensure consistent communications from the Program have undergone the appropriate level of review.

B. HRSD and Program Communication Protocols

1. A Communication Matrix shall be developed with HRSD staff that shall provide the communication plan between HRSD and the FIRM.

C. FIRM shall work with HRSD to define the requirements for developing and maintaining a Program Calendar visible to Program staff HRSD/FIRM/Others. The system or tool to be used shall be determined in conjunction with HRSD's evaluation of Unifier by others. This work does not include software development and/or configuration.

D. Key Performance Indicators

The FIRM shall identify with HRSD metrics to allow HRSD to evaluate the Program and project status related to Key Performance Indicators (KPIs). KPIs for the Program and projects shall be established in a **FSIP KPI Workshop** with HRSD in conjunction with the development of the PMP in Subtask 1.3. FIRM shall work with HRSD to determine the best medium for reporting KPIs in conjunction with the evaluation of Unifier. Examples of KPIs may include:

1. Comparison of Program Budget vs. Actuals
2. Program Schedule Completion Planned vs. Actual (Schedule variance)
3. Procurement Schedules Planned vs. Actual
4. Project Costs Estimates vs. Bids

5. Project Costs Budget vs. Actuals
6. Project Schedule Completion Planned vs. Actual (Schedule variance)
7. Number of local contractors and goods and services suppliers participating
8. Percentage of bids submitted by local contractors

E. Document Control Support

FIRM shall manage Program documents to ensure timely capture and storage of program reports, plans, and other documents. This support shall include the maintenance of the interim document management system and updates and changes as required.

1.6 Permitting and Regulatory Approval

FIRM shall prepare for and lead a program level **SWIFT FSIP Permitting Workshop**. The focus of the workshop shall be to identify and document permits required for the Program and assign "owners" of managing the permitting approach in accordance with the PMP. This workshop shall identify critical permitting efforts required prior to beginning design efforts on any specific treatment plant SWIFT facilities.

The outcome of the workshop will be a SWIFT FSIP Permitting Approach Plan to document the strategy to successfully navigate the permitting process required for the SWIFT FSIP.

1.7 Risk Management

A. FIRM shall develop and implement a systematic SWIFT FSIP risk management program and manage risks by providing a process for identifying, assessing, and responding to risks throughout all phases of SWIFT implementation. The process and procedures shall be defined in Subtask 1.3 as a section of the PMP and presented to and reviewed with SWIFT QST. FIRM shall prepare a risk register that identifies program risks, assigns a probability factor consequence factor for each risk, performs a quantitative analysis to assign risk impacts, defines treatments for managing the risks, and identifies and assigns risk treatment actions. Potential risks shall include those relative to other HRSD projects that may impact the Program.

B. The risk register shall be initially developed through a **Risk Management Workshop** and updated by workshop after 6 months. FIRM shall manage and maintain the risk register and update and report on the status of the risks and treatment actions each month.

1.8 Workshops and Deliverables

A. Workshops

Chartering/Partnering Workshop
Data Management Workshops
Kickoff Workshop
SWIFT Governance Workshop
SWIFT Program Sustainability Approach Workshop
Asset Management Workshop
FSIP KPI Workshop
Risk Management Workshop
SWIFT FSIP Permitting Workshop
On-Boarding Workshop
Commissioning Requirements Workshop
FSIP Procurement Strategy Meeting

B. Deliverables

Program Charter
Community Benefits Plan
SWIFT FSIP Monthly Status Reports
AECOM Safety Plan
AECOM contract status reports
Draft and Final PMP
Draft and Final Program Procedures
Unifier Functional Requirements
ERP Integration Requirements
Asset Management Requirements for SWIFT
Communications Approval Matrix
Communications Matrix
Public Outreach Plan
Program KPIs
Risk Register and updates
SWIFT FSIP Permitting Approach Plan

Task 2 Schedule and Cost Management

2.1 Develop SWIFT Program Schedule and Budget

The FIRM shall develop and implement a systematic SWIFT program controls system to facilitate regular monitoring and reporting of program parameters, including schedule and cost, the reporting of variances, and the implementation of corrective actions.

A. FIRM shall validate and verify class 4 project estimates prepared by Jacobs. FIRM shall assess whether the cost estimating approach is reasonable and addresses complete project costs. FIRM shall evaluate the approach to soft costs, contingencies and escalation and that this approach has been consistently applied to all project estimates.

B. FIRM shall develop the Program Work Breakdown Structure (WBS) and a Master Program Schedule for all proposed full-scale SWIFT facilities and provide a structure for program, project tasks, activities, scopes of work and budgets. FIRM shall conduct a **FSIP Schedule Validation Workshop** to discuss pre-PER steps to implement SWIFT at all locations (i.e. Lambert's Point investigations, Boat Harbor wastewater transfer options, etc.).

C. FIRM shall develop the Master Program Budget and shall monitor, report and update impacts on overall SWIFT FSIP program.

D. The FIRM shall develop the Baseline Program Schedule, Budget and Cashflow based on the final Bridging Documents for Williamsburg TP. FIRM shall finalize the method to estimate durations for planning, design, permitting, real estate acquisition, contractor procurement, construction and start-up of projects. The Master Program Schedule, Budget and Cashflow shall define the work of the Program, its total cost and expected cash flow.

E. Details of specific full-scale SWIFT facilities will be incorporated and reflected in the Program Budget and Master Schedule as details develop from the 30% BODR.

2.2 Maintain Program Schedule and Budget

FIRM shall maintain and update the Master Program Schedule and Master Program Budget status of active projects and program activities on a monthly basis. The FIRM shall track and analyze variances from the baseline schedule and budget for monthly status reporting.

2.3 Support for Annual CIP Development

FIRM shall provide data to Chief of Design & Construction – SWIFT as required for input into Hyperion for FSIP related CIP projects for development of FY2020 CIP, including but not limited to schedule, budget, cost and risk.

Prepare SWIFT FSIP Capital Improvement Program (CIP) Schedule Development, Monitoring and Updates

2.4 Workshops and Deliverables

A. Workshops

FSIP Schedule Validation Workshop

B. Deliverables

Project Cost Estimate Technical Memorandum
WBS
Master Program Schedule
Master Program Budget and Cashflow

Task 3 Quality Management

3.1 Quality Control Program

The FIRM shall be responsible for the quality control of its deliverables. The FIRM shall implement a quality control program (Quality Plan) that shall ensure quality standards are a component of the deliverable review process. HRSD Design and Construction Standards will be incorporated as applicable in addition to Program specific standards. Quality Plan will be provided to HRSD for review and comment.

The Quality Plan shall establish clear lines of QA/QC responsibility for HRSD and the FIRM.

3.2 Quality Assurance

FIRM shall provide QA and review for each project/contract for SWIFT. This shall include verifying compliance with the requirements of the scopes of work and SWIFT FSIP quality requirements as defined in the PMP, quality audits, and managing and conducting the review of deliverables.

3.3 Workshops and Deliverables

A. Workshops

None

B. Deliverables

AECOM Quality Plan
Deliverable review comments
Quality Audit Reports

Task 4 Additional Services

A. Additional Program Management services may be required that are not currently scoped to the level of detail required to define an associated cost. Therefore an annual budget is provided to allow for these additional services to be executed, if required. These Program Management Additional Services shall be provided only on an as-authorized basis. Requests shall be made by the FIRM for authorization of Additional Services. Requests shall define the objective, proposed staffing, schedule, duration, deliverable(s), and cost in accordance with the pre-approved rate tables. The authorization request must be submitted sufficiently in advance of the contemplated start date needed for proposed services to allow HRSD's Chief of Design & Construction – SWIFT to have adequate time for assessment without causing interruption or disruption of services required under this Agreement. The authorization shall be obtained in writing from the Chief of Design & Construction - SWIFT or other designee authorized by the Contracting Officer.

1. Additional scope related work may include but is not limited to:

    a. Land acquisition assistance
    b. Public communications/outreach beyond Community Benefits Plan support
    c. Federal funding - grant assistance
    d. Value Engineering Studies
    e. Dashboards or other custom IT components
    f. IT set-up for Project Management Office
    g. Additional P6 seat licenses (base scope includes two seat licenses and network hosting fees)
    h. Federal and state regulatory support (not detailed in the scope of services)
    i. Planning support for future SWIFT facilities (not including WBTP which are included in a separate Contract)
    j. Geotechnical Investigations for Site Investigations of SWIFT facilities (not including WBTP which are included in a separate Contract)
    k. Surveying for Land Acquisition of SWIFT facilities (not including WBTP which are included in a separate Contract)
    l. Equipment pre-procurement outside of initial workshop
    m. Involvement in the development of Program Benefits
    n. Tasks associated with water quality influent requirements (e.g. upstream wastewater conditioning)
    o. Carbon regeneration strategy for FSIP
    p. Other services not specifically identified, but requested by HRSD.

Hartman, Tricia

From: Bodniewicz, Bohdan <Bohdan.Bodniewicz@aecom.com>
Sent: Monday, August 20, 2018 3:56 PM
To: Hartman, Tricia
Subject: RE: Program Management of SWIFT Full Scale Implementation

Tricia – I've reviewed both the Professional Services Agreement and Amendment No.1 for the Williamsburg SWIFT facility and both are ready to go. Thanks again.

-bo

From: Hartman, Tricia <THARTMAN@HRSD.COM>
Sent: Monday, August 20, 2018 12:03 PM
To: Bodniewicz, Bohdan <Bohdan.Bodniewicz@aecom.com>
Subject: RE: Program Management of SWIFT Full Scale Implementation

I have revised the payment section in the Professional Services Agreement and incorporated your hourly rate schedule. Please review and let me know if it is satisfactory. I also need confirmation on Amendment No. 1 for the Williamsburg SWIFT Facility so I can issue the PO in ERP.

Tricia

From: Bodniewicz, Bohdan [mailto:Bohdan.Bodniewicz@aecom.com]
Sent: Wednesday, August 15, 2018 5:21 PM
To: Hartman, Tricia
Cc: Zuravnsky, Lauren
Subject: RE: Program Management of SWIFT Full Scale Implementation

Thanks Tricia –

We did a quick review and have no comments on the scope. We do note that the contract document do not indicated how the fee for Program Management services will be reimbursed. I'm standing next to Lauren and suggested inserting language that reimbursement will be in accordance with our rate sheet and then have the rate sheet attached.

Beyond that we are good to go. Thanks again for your efforts!

-bo

From: Hartman, Tricia <THARTMAN@HRSD.COM>
Sent: Wednesday, August 15, 2018 1:55 PM
To: Bodniewicz, Bohdan <Bohdan.Bodniewicz@aecom.com>
Cc: Zuravnsky, Lauren <LZuravnsky@hrsd.com>
Subject: Program Management of SWIFT Full Scale Implementation

Forwarded for your review is the proposed Professional Services Agreement and Amendment No. 1 for the above referenced project approved by the Commission on July 31, 2018. Please review and let me know via e-mail whether the contracts are satisfactory as written. I will finalize the process in ERP and issue a purchase order for the work.

Also attached is the ranking summary of the firms for this project.

Please contact me if you have questions or need to discuss the proposed Professional Services Agreement or Amendment.

Tricia Hartman | HRSD Contract Specialist
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