



PREPARED FOR:

BIG RIVER STEEL LLC

2027 East State Highway 198

Osceola, AR 72370

P: 870.819.3031

www.bigriversteel.com

**APPLICATION FOR
NPDES PERMIT
MODIFICATION
AND STATE
CONSTRUCTION
PERMIT**

**PHASE 2
PROJECT**

**NPDES PERMIT
No. AR0052582**

AFIN: 47-00991

OCTOBER 2019

Prepared by:

Harbor

5800 Evergreen Drive

Little Rock, AR 72205

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Environmental | Safety | Engineering

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October 30, 2019

Mr. Terry Liu, P.E.
Engineer
Water Permits Branch
Office of Water Quality
Division of Environmental Quality (DEQ)
Arkansas Department of Energy and Environment
5301 Northshore Drive
North Little Rock, Arkansas 72118-5317

RE: Application for NPDES Permit Modification and State Construction Permit
Big River Steel LLC, Osceola, Mississippi County, Arkansas
NPDES Permit No. AR0052582, AFIN: 47-00991
Expedited Review is Requested

Dear Mr. Liu:

Harbor Environmental and Safety (Harbor) is pleased to submit the enclosed application for modification of NPDES Permit No. AR0052582 on behalf of Big River Steel LLC (BRS) in Osceola, Arkansas. A State Construction Permit for the installation of new wastewater treatment equipment is also requested herein.

BRS operates a scrap steel to steel production facility located in Osceola, Arkansas (the "Facility"). BRS plans to construct and operate a Phase 2 project which will include, among other things, the installation of a new Electric Arc Furnace, a Continuous Caster, a Galvanizing Line, a Reversing Cold Mill, and other new units. The Phase 2 project will also include process improvements to the existing (Phase 1) production units. The overall manufacturing capacity will increase from 1.70 million tons per year of liquid steel (Phase 1, existing Facility) to an expected 4.10 million tons per year of liquid steel (Phase 2, existing and new units). The process improvements in the existing (Phase 1) Facility will increase the production capacity of that equipment from 1.70 million tons per year to 2.05 million tons per year of liquid steel. The new (Phase 2) production units are expected to provide an additional manufacturing capacity of 2.05 million tons per year of liquid steel. The air permits necessary to implement the Phase 2 project have already been obtained from DEQ.

Modification and expansion of the existing wastewater treatment plant will be required to support the Phase 2 production levels. The goals of the wastewater-related construction activities are as follows: (1) to install new treatment equipment to support the Phase 2 manufacturing operations;

(2) to upgrade certain existing Phase 1 wastewater treatment units to improve performance; and (3) to provide additional treatment capacity to support a long-range future expansion of the Facility. The *design* wastewater flow rate (including process wastewater, contact cooling water and non-contact cooling water) will increase from 1.150 million gallons per day (Phase 1, existing treatment plant) to 2.853 million gallons per day (Phase 2, existing and new wastewater treatment units).

Construction of the expanded wastewater treatment system is a key component of the overall Phase 2 project. The treatment equipment must be installed and operational as soon as possible so that various wastewater streams can be processed when the new production units come on-line in stages in mid-2020. Construction of the new and modified wastewater treatment units is scheduled to begin in February 2020 for completion in June 2020.

BRS requests that DEQ issue the State Construction Permit and modified NPDES Permit separately. The company plans to initiate construction of the new wastewater treatment equipment as soon as possible in 2020. Operation of the new (Phase 2) wastewater treatment plant under the modified NPDES Permit is expected to commence in mid-2020.

BRS currently operates under the authority of NPDES Permit No. AR0052582 effective on July 1, 2016; a permit minor modification was approved on October 14, 2016. The five-year term of the permit coverage expires on June 30, 2021. The NPDES permit covers two discharge points: (1) Outfall 001 – treated process wastewater plus contact cooling water and non-contact cooling water; and (2) Outfall 002 – stormwater runoff and quench water runoff from the Slag Yard. Both outfalls discharge to the Mississippi River.

The volume of process wastewater, contact cooling water, and non-contact cooling water to be treated on-site will increase due to the Phase 2 project. However, the influent concentrations of the various wastewater constituents (total suspended solids, oil and grease, dissolved metals, etc.) sent to the treatment plant will be, in general, equivalent to the concentrations currently generated and treated. Similarly, the concentrations of the constituents in the treated wastewater effluent discharged at Outfall 001 will remain relatively constant, whereas the mass discharge rates will be higher.

The Phase 2 project will not affect the volume of wastewater generated within the Slag Yard. This stream consists of stormwater runoff and quench water runoff. The water is stored in the Slag Yard Pond and subsequently discharged to the Mississippi River at Outfall 002. The footprint of the Slag Yard will not be increased during the Phase 2 project; the volume of quench water used should remain about the same. Therefore, there will not be any increase in the volume of stormwater runoff or quench water runoff generated within the Slag Yard; the mass and concentration loadings to the Slag Yard Pond should not increase. As a result, no changes to the current NPDES permit limits or conditions for Outfall 002 are requested herein.

The combined application for an NPDES Permit modification and a State Construction Permit consists of the following items:

- Appendix A DEQ Form 1 – General Information
- Appendix B DEQ Construction Permit Application Forms
- Appendix C DEQ Disclosure Statement
- Appendix D Process Description and Design Calculations for Wastewater Treatment System
- Appendix E Projected Technology-based and Water Quality-based Mass Permit Limits for Outfall 001 (Subject to Effluent Limitations Guidelines for Iron and Steel Manufacturing Point Source Category)
- Appendix F Process Flow Diagrams and Water Balance Diagram
- Appendix G Vicinity Map and Topographic Maps
- Appendix H Facility Site Maps and Diagrams
- Appendix I Federal Emergency Management Agency (FEMA) Flood Plain Maps
- Appendix J Construction Plans and Specifications for Wastewater Treatment Equipment (Certified by an Arkansas-registered Professional Engineer)

BRS respectfully requests that DEQ *expedite review* of the enclosed wastewater permit application to the extent possible. We will promptly answer any questions that arise during the permitting process. We will respond in a timely manner to any requests by DEQ for additional information.

Your consideration of the wastewater permit application is greatly appreciated. Please contact us at (501) 663-8800 if you have any questions or need further information.

Sincerely,

HARBOR ENVIRONMENTAL AND SAFETY



David Carstens
Sr. Project Manager
dcarstens@harborenv.com



Andrew Rike, P.E.
Principal
arike@harborenv.com

Encl.: Permit Application (Printed Copy)
Permit Application (Electronic Copy on Compact Disk)

Mr. Terry Liu, P.E. – DEQ Office of Water Quality
NPDES Permit and Construction Permit Application – Phase 2 Project
Big River Steel – Osceola, Arkansas
October 30, 2019 – Page 4

cc: Jessica Sears, P.E., DEQ
James Bell, BRS
Dean Caldwell, BRS
Joe Hall, BRS
Michele Vachon, BRS
Martin Booher, Esq., Baker Hostetler
Lisa Rotenberry, Harbor

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Appendix I Federal Emergency Management Agency (FEMA) Flood Plain Maps

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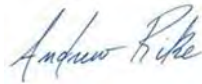
REVIEW PAGE

Prepared By:



David Carstens
Sr. Project Manager
Harbor Environmental and Safety

Reviewed By:



Andrew Rike, P.E.
Principal
Harbor Environmental and Safety

APPENDIX A – DEQ FORM 1 – GENERAL INFORMATION

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NPDES PERMIT APPLICATION FORM 1

ARKANSAS DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF WATER QUALITY
5301 Northshore Drive
North Little Rock, AR 72118-5317
www.adeq.state.ar.us/water

PURPOSE OF THIS APPLICATION

- ☐ INITIAL PERMIT APPLICATION FOR NEW FACILITY
☐ INITIAL PERMIT APPLICATION FOR EXISTING FACILITY
☐ MODIFICATION OF EXISTING PERMIT
☐ REISSUANCE (RENEWAL) OF EXISTING PERMIT
☒ MODIFICATION AND CONSTRUCTION OF EXISTING PERMIT
☐ CONSTRUCTION PERMIT

SECTION A- GENERAL INFORMATION

1. Legal Applicant Name (The permit will be issued under this name. This is the entity that controls and is responsible for operations and compliance.):

Big River Steel LLC

Note: The legal name of the applicant must be identical to the name listed with the Arkansas Secretary of State.

2. Operator Type: Private ☐ State ☐ Federal ☐ Partnership ☐ Corporation ☒ Other ☐

State of Incorporation: Delaware

3. Facility Name: Big River Steel LLC

4. Is the legal applicant identified in number 1 above, the owner of the facility? ☒ Yes ☐ No

5. NPDES Permit Number (If Applicable): AR0052582

6. NPDES General Permit Number (If Applicable): ARG

7. NPDES General Storm Water Permit Number (If Applicable): ARR001578

8. Permit Numbers and/or names of any permits issued by ADEQ or EPA for an activity located in Arkansas that is presently held by the applicant or its parent or subsidiary corporation which are not listed above:

<u>Permit Name</u>	<u>Permit Number</u>	<u>Held by</u>
<u>Title V Operating Permit</u>	<u>2305-AOP-R5</u>	<u>Big River Steel</u>
<u>Construction Stormwater General Permit</u>	<u>ARR154284</u>	<u>Big River Steel</u>

9. Give driving directions to the wastewater treatment plant with respect to known landmarks:

From Osceola, travel south on U.S. Highway 61, turn left on State Highway 198, travel about 2 miles east on Highway 198,
front gate of facility is located on right. Wastewater treatment plant is located on east side of cold rolling mill.

10. Facility Physical Location: (Attach a map with location marked; street, route no. or other specific identifier)

Street: 2027 East State Highway 198

City: Osceola

County: Mississippi

State: Arkansas

Zip: 72370

11. Facility Mailing Address for permit, DMR, and invoice (Street or Post Office Box):

Name: Joe Hall Title: Water Treatment Systems Supervisor
Street: N/A P.O. Box 707
City: Osceola State: Arkansas Zip: 72370
E-mail address*: jhall@bigriversteel.com Fax: N/A

* Is emailing all documents (permit, letters, DMRs, invoices, etc.) acceptable to the applicant? ☒ Yes ☐ No

12. Neighboring States Within 20 Miles of the permitted facility (Check all that apply):

Oklahoma ☐ Missouri ☐ Tennessee ☒ Louisiana ☐ Texas ☐ Mississippi ☐

13. Indicate applicable Standard Industrial Classification (SIC) Codes and NAICS codes for primary processes (See Item #3 of the instructions for assistance in determining the correct SIC and NAICS Codes):

3312 SIC Facility Activity under this SIC or NAICS:
331110 NAICS Iron and Steel Mills

14. Design Flow: 2.853 MGD Highest Monthly Average of the last two years Flow: 0.640 MGD (Outfall 001; 07/17-06/19)

15. Is the outfall equipped with a diffuser? ☒ Yes ☐ No

16. Responsible Official (as described on the last page of this application):

Name: James Bell Title: Director of Construction and Engineering
Address: P.O. Box 707 Phone Number: (870) 819-3031
E-mail Address: jbell@bigriversteel.com
City: Osceola State: Arkansas Zip: 72370

17. Cognizant Official (Duly Authorized Representative of responsible official as described on the last page of this application):

Name: Dean Caldwell Title: Environmental Director
Address: P.O. Box 707 Phone Number: (870) 819-3031
E-mail Address: dcaldwell@bigriversteel.com
City: Osceola State: Arkansas Zip: 72370

18. Name, address and telephone number of active consulting engineer firm (If none, so state):

Contact Name: David Carstens
Company Name: Harbor Environmental and Safety
Address: 5800 Evergreen Drive Phone Number: (501) 663-8800
E-mail Address: dcarstens@harborenv.com
City: Little Rock State: Arkansas Zip: 72205

19. Wastewater Operator Information

Wastewater Operator Name: Joe Hall License number: 010267
Class of municipal wastewater operator: I ☐ II ☐ III ☐ IV ☐
Class of industrial wastewater operator: Basic ☐ Advanced ☒

SECTION B: FACILITY AND OUTFALL INFORMATION

1. Facility Location (All information must be based on the **front door (gate)** location of the facility):

Lat: 35 ° 39 ' 14.43 " Long: 89 ° 57 ' 15.78 " County: Mississippi Nearest Town: Osceola

2. **Outfall** Location (The location of the end of the pipe discharge point.):

Outfall No. 001:

Latitude: 35 ° 39 ' 5.0 " Longitude: 89 ° 54 ' 47.0 "

Description of outfall location: Junction box on bank of Mississippi River (discharge pipeline for combined effluent extends into river)

Name of Receiving Stream (i.e. an unnamed tributary of Mill Creek, thence into Mill Creek; thence into Arkansas River):

Mississippi River

Outfall No. 002:

Latitude: 35 ° 39 ' 5.0 " Longitude: 89 ° 54 ' 47.1 "

Description of outfall location: Junction box on bank of Mississippi River

Name of Receiving Stream (i.e. an unnamed tributary of Mill Creek, thence into Mill Creek; thence into Arkansas River):

Mississippi River

3. **Monitoring** Location (If the monitoring is conducted at a location different than the above **Outfall** location):

Outfall No. 001:

Lat: 35 ° 38 ' 47 " Long: 89 ° 56 ' 43 "

Outfall No. 002:

Lat: 35 ° 38 ' 54 " Long: 89 ° 56 ' 06 "

Outfall No. N/A:

Lat: _____ ° _____ ' _____ " Long: _____ ° _____ ' _____ "

4. Type of Treatment system (Include all components of the treatment system and attach the process flow diagram):

See attachments for description of wastewater treatment system (Appendix D) and wastewater process flow diagram (Appendix F).

5. FLOW AND SAMPLE MEASUREMENT

How are effluent samples collected?

Outfall 001: Automated composite sampler; wastewater samples are collected immediately after sand filters, prior to discharge to effluent transfer pipeline to river.

Outfall 002: Grab samples only; collected from wastewater transfer pumps, prior to discharge to effluent transfer pipeline to river.

How is flow measured, i.e., v-notch weir, totalizing meter, Parshall flume, etc.?

Outfall 001: Electronic flow meter with totalizer.

Outfall 002: Flow calculated using pump capacities and hours of operation.

6. Is the proposed or existing facility located above the 100-year flood level? ☐ Yes ☒ No

NOTE: FEMA Map must be included with this application. Maps can be ordered at www.fema.gov.

If "No", what measures are (or will be) used to protect the facility? Protected by levee.

7. Population for Municipal and Domestic Sewer Systems: N/A

8. Backup Power Generation for Treatment Plants

Are there any permanent backup generators? Yes ☒ No ☐

If Yes, how many? 1 (Unit 600.3) Total Horsepower (hp) 2,146 hp
(1,600 kw)

If no, please explain. Include a description of how the WWTP will be restarted and actions taken to ensure compliance with permit limits once power is restored.

SECTION C – WASTE STORAGE AND DISPOSAL INFORMATION

1. Sludge Disposal Method (Check as many as are applicable):

☒ **Landfill**

Landfill Site Name Mississippi County Landfill ADEQ Solid Waste Permit No. 0136-S1-R4; 0294-S4-R1

☐ **Land Application:** ADEQ State Permit No. _____

☐ **Septic tank** Arkansas Department of Health Permit No.: _____

☐ **Distribution and Marketing:** Facility receiving sludge:

Name: _____ Address: _____

City: _____ State: _____ Zip: _____ Phone: _____

Rail: ☐ Pipe: ☐ Other: _____

☐ **Subsurface Disposal** (Lagoon for which the sole purpose is storing sludge):

Location of lagoon _____ How old is the lagoon? _____

Surface area of lagoon: _____ Acre Depth: _____ ft Does lagoon have a liner? ☐ Yes ☐ No

☐ **Incineration:** Location of incinerator _____

☐ **Remains in Treatment Lagoon(s):**

How old is the lagoon(s)? _____ Has sludge depth been measured? ☐ Yes ☐ No

If Yes, Date measured? _____ Sludge Depth? _____ ft If No, When will it be measured? _____

Has sludge ever been removed? Yes ☐ No ☐ If Yes, When was it removed? _____

☐ **Other** (Provide complete description): _____

SECTION D - WATER SUPPLY

Water Sources which are downstream of the outfall location, i.e., those which could be affected by the discharge from this facility (check as many as are applicable):

☒ **Private Well** - Distance from Discharge point: ☒ Within 5 miles ☐ Within 50 miles

☐ **Municipal Water Utility** (Specify City):

Distance from Discharge point: ☐ Within 5 miles ☐ Within 50 miles

☐ **Surface Water**- Name of Surface Water Source:

Distance from Discharge point: ☐ Within 5 miles ☐ Within 50 miles

Lat: _____ ° _____ ‘ _____ “ Long: _____ ° _____ ‘ _____ “

☐ **Other** (Specify): _____

Distance from Discharge point: ☐ Within 5 miles ☐ Within 50 miles

SECTION E: TRUST FUND REQUIREMENTS AND DISCLOSURE STATEMENT

1. Ark. Code Ann. § 8-4-203(b)(1)(A) forbids the Arkansas Department of Environmental Quality from issuing, modifying, renewing, or transferring a permit for a nonmunicipal domestic sewage treatment works without the applicant first fulfilling the trust fund requirements set forth in that section. Ark. Code Ann. § 8-4-203(b)(1)(B) defines “nonmunicipal domestic sewage treatment works” as a device or system operated by an entity other than a city, town, or county that treats, in whole or in part, waste or wastewater from humans or household operations and must continually operate to protect human health and the environment despite a permittee’s failure to maintain or operate the device or system. NDSTW’s can include, but are not limited to:

- Sewer Improvement Districts;
- Subdivisions,
- Mobile Home Parks,
- Property Owner’ Associates,
- RV parks, and
- Apartments

Exclusions Excluded from this application’s Section E.1. requirements for trust fund contribution fees are:

- State or federal facilities,
- Schools,
- Universities and colleges,
- Entities that continuously operate due to a connection with a city, town, or county, and
- Commercial or industrial entity that treats domestic sewage from its operations and does not accept domestic sewage from other entities or residences.

The trust fund form may be obtained from the ADEQ web site at:

<https://www.adeq.state.ar.us/water/permits/npdes/individual/pdfs/ndstw-trust-fund-certification-form.pdf>

Trust fund requirements are not applicable; BRS does not operate a nonmunicipal domestic sewage treatment works.

2. Disclosure Statement:

Ark. Code Ann. 8-1-106 requires that applicants for any type of permit or transfer of any permit, license, certification or operational authority issued by the Arkansas Department of Environmental Quality (ADEQ) file a Disclosure Statement with their application unless exempt for doing so under Ark. Code Ann. §8-1-106(b)(2). The filing of a Disclosure Statement is mandatory. No application can be considered administratively complete without a completed Disclosure Statement unless that facility is exempt. Publicly traded companies may submit the most recent 10k and 10Q filings to the Securities and Exchange Commission in lieu of the Disclosure Statement. The form may be obtained from the ADEQ web site at:

https://www.adeq.state.ar.us/ADEQ_Disclosure_Statement.pdf

See Appendix C for Disclosure Statement.

NOT APPLICABLE (N/A): ☐

SECTION F – INDUSTRIAL ACTIVITY

1. Does an effluent guideline limitation promulgated by EPA ([Link to a Listing of the 40 CFR Effluent Limit Guidelines](#)) under Section 304 of the Clean Water Act (CWA) apply to your facility?

YES ☒ (Answer questions 2 and 3) NO ☐

2. What Part of 40 CFR? 420

3. What Subpart(s)? D, E, F, G, I, J, K, L

4. Give a brief description of all operations at this facility including primary products or services (attach additional sheets if necessary):

Big River Steel operates a scrap steel to steel products manufacturing facility at the Osceola site. The plant produces a wide range of high-strength, lightweight steel products, primarily through the recycling of scrap metal.

5. Production: (projected for new facilities)

Product(s) Manufactured	Last 12 Months		Highest Production Year of Last 5 Years	
	lbs/day*		lbs/day*	
(Brand name)	Highest Month	Days of Operation	Monthly Average	Days of Operation
Hot Rolled Steel Coils (Actual, Phase 1)	10,116,933 lbs/day (Nov. 2018)	30 days	10,044,000 lbs/day (Feb. 2019)	28 days
Liquid Steel (Projected, Phase 2)	22,465,753 lbs/day	365 days/year	22,465,753 lbs/day	365 days/year

* These units could be off-lbs, lbs quenched, lbs cleaned/etched/rinsed, lbs poured, lbs extruded, etc.

Actual production data utilized cover 24-month period from June 2017 (start of commercial production) through May 2019.

Projected manufacturing data reflect facility's capacity upon completion of Phase 2 project (4.10 million tons/year of liquid steel).

NOT APPLICABLE (N/A): ☐

SECTION G - WASTEWATER DISCHARGE INFORMATION

Facilities that checked “Yes” in question 1 of Section F are considered Categorical Industrial Users and should skip to question 2.

1. **For Non-Categorical Users Only:** List average wastewater discharge, maximum discharge, and type of discharge (batch, continuous, or both), for each plant process. Include the reference number from the process flow schematic (reference Figure 1) that corresponds to each process. [New facilities should provide estimates for each discharge.]

No.	Process Description	Average Flow (GPD)	Maximum Flow (GPD)	Type of Discharge (batch, continuous, none)
N/A	N/A			

If batch discharge occurs or will occur, indicate: [New facilities may estimate.]

Number of batch discharges: _____ per day Average discharge per batch: _____ (GPD)

Time of batch discharges _____ at _____
(days of week) (hours of day)

Flow rate: _____ gallons/minute Percent of total discharge: _____

Answer questions 2, 3, 4, and 5 only if you are subject to Categorical Standards.

2. For Categorical Users: Provide the wastewater discharge flows for each of your processes or proposed processes. Include the reference number from the process flow schematic (reference Figure 1) that corresponds to each process. [Note: 1) New facilities should provide estimates for each discharge and 2) Facilities should denote whether the flow was measured or estimated.]

No.	Regulated Process	Average Flow (GPD)	Maximum Flow (GPD)	Type of Discharge (batch, continuous, none)
	See attached table.			

No.	Unregulated Process	Average Flow (GPD)	Maximum Flow (GPD)	Type of Discharge (batch, continuous, none)
	See attached table.			

SECTION H -TECHNICAL INFORMATION

Technical information to support this application shall be furnished in appropriate detail to understand the project. Information in this Part is required for obtaining a **construction permit** or for **modification** of the treatment system.

1. Describe the treatment system. Include the types of control equipment to be installed along with their methods of operation and control efficiency.

See Appendix J, Construction Plans and Specifications for WWTP.

2. One set of construction plans and specifications, approved (Signed and stamped) by a **Professional Engineer** (PE) registered in **Arkansas**, must be submitted as follows:
 - a. The plans must show flow rates in addition to pertinent dimensions so that detention times, overflow rates, and loadings per acre, etc. can be calculated.
 - b. Specifications and complete design calculations.
 - c. All treated wastewater discharges should have a flow measuring device such as a weir or Parshall flume installed. Where there is a significant difference between the flow rates of the raw and treated wastewater, a flow measuring device should be provided both before and after treatment.

Construction Plans and Specifications are provided as Appendix J. Design calculations are enclosed as Appendix D.

3. If this application includes a construction permit disturbing five or more acres, a storm water construction permit must be obtained by submitting a notice of intent (NOI) to ADEQ.

Construction activities are covered under existing Stormwater Construction General Permit No. ARR154284.

SECTION I: SIGNATORY REQUIREMENTS

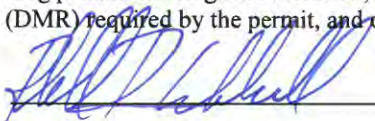
Cognizant Official (Duly Authorized Representative)

40 CFR 122.22(b) states that all reports required by the permit, or other information requested by the Director, shall be signed by the applicant (or person authorized by the applicant) or by a duly authorized representative of that person. A person is a duly authorized representative only if:

- (1) the authorization is made in writing by the applicant (or person authorized by the applicant);
- (2) the authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity responsibility, or an individual or position having overall responsibility for environmental matters for the company.

The applicant hereby designates the following person as a Cognizant Official, or duly authorized representative, for signing reports, etc., including Discharge Monitoring Reports (DMR) required by the permit, and other information requested by the Director:

Signature of Cognizant Official:



Date: 10/30/19

Printed name of Cognizant Official:

Randall Dean Caldwell

Official title of Cognizant Official:

Environmental Director

Telephone Number: (870) 819-3031

Responsible Official

The information contained in this form must be certified by a **responsible official** as defined in the "signatory requirements for permit applications" (40 CFR 122.22).

Responsible official is defined as follows:

Corporation, a principal officer of at least the level of vice president

Partnership, a general partner

Sole proprietorship: the proprietor

Municipal, state, federal, or other public facility: principal executive officer, or ranking elected official.

____ (Initial) "I certify that the cognizant official designated above is qualified to act as a duly authorized representative under the provisions of 40 CFR 122.22(b)." NOTE: If no duly authorized representative is designated in this section, the Department considers the applicant to be the responsible official for the facility and only reports, etc., signed by the applicant will be accepted by the Department.

____ (Initial) "I certify that, if this facility is a corporation, it is registered with the Secretary of State in Arkansas. Please provide the full name of the corporation if different than that listed in Section A above."

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment for knowing violations. I further certify under penalty of law that all analyses reported as less than detectable in this application or attachments thereto were performed using the EPA approved test method having the lowest detection limit for the substance tested."

Signature of Responsible Official:



Date: 10/30/2019

Printed name of Responsible Official:

James Bell

Official title of Responsible Official:

Director of Construction & Engineering

Telephone Number: (870) 819-3031

Form 1, Section G.2 – Summary of Wastewater Streams Discharged to Treatment System

Stream	Process Area (Project Phase)	Type	Estimated Average Flow m ³ /hr (gpm)	Estimated Maximum Flow m ³ /hr (gpm)	Frequency
Emulsified Oily Discharges (Stream #1)	Entire Facility (Phase 1)	Emulsion	Not Available	60 (264)	Intermittent
Acid Discharges (Stream #2)	Entire Facility (Phase 1)	Acid	Not Available	35 (154)	Continuous
Alkaline Discharges (Stream #3)	Entire Facility (Phase 1)	Sumps and Alkaline Flows	Not Available	30 (132)	Continuous
Sump Pit Discharges (Stream #4)	Entire Facility (Phase 1)	Groundwater	Not Available	50 (220)	Continuous
Emulsified Oily Discharges (#1)	ACL Annealing and Coating (Phase 2)	WW1 Cleaning	3 (13)	40 (176)	Intermittent
Emulsified Oily Discharges (#1)	DCL1+MgO Decarb. and Coating (Phase 2)	WW1 Cleaning	3 (13)	40 (176)	Intermittent
Acid Discharges (#2)	APL Annealing and Pickling Line (Phase 2)	WAC Pickling Line	3 (13)	10 (44)	Continuous
Acid Discharges (#2)	APL Annealing and Pickling Line (Phase 2)	WWR Rinse Water	4 (18)	10 (44)	Continuous
Alkaline Discharges (#3)	APL Annealing and Pickling Line (Phase 2)	WWA Pickling Line	10 (44)	30 (132)	Continuous

Form 1, Section G.2 – Summary of Wastewater Streams Discharged to Treatment System

Stream	Process Area (Project Phase)	Type	Estimated Average Flow m ³ /hr (gpm)	Estimated Maximum Flow m ³ /hr (gpm)	Frequency
Alkaline Discharges (#3)	ACL Annealing and Coating (Phase 2)	WW2 Cleaning	3 (13)	40 (176)	Intermittent
Alkaline Discharges (#3)	FCL Flattening and Coating (Phase 2)	WW2 Cleaning	25 (110)	40 (176)	Intermittent
Alkaline Discharges (#3)	DCL1+MgO Decarb. and Coating (Phase 2)	WW2 Cleaning	3 (13)	40 (176)	Intermittent
Alkaline Discharges (#3)	DCL1+MgO Decarb. and Coating (Phase 2)	WW3 Coating Equipment	0	20 (88)	Intermittent
Alkaline Discharges (#3)	APL Annealing and Pickling Line (Phase 2)	Condensate	Not Available	3.5 (15)	Intermittent
Alkaline Discharges (#3)	ACL Annealing and Coating (Phase 2)	Condensate	Not Available	3.5 (15)	Intermittent
Alkaline Discharges (#3)	FCL Flattening and Coating (Phase 2)	Condensate	Not Available	3.5 (15)	Intermittent
Alkaline Discharges (#3)	HTA High-Temperature Annealing (Phase 2)	Condensate	Not Available	3.5 (15)	Intermittent

Form 1, Section G.2 – Summary of Wastewater Streams Discharged to Treatment System

Stream	Process Area (Project Phase)	Type	Estimated Average Flow m ³ /hr (gpm)	Estimated Maximum Flow m ³ /hr (gpm)	Frequency
Alkaline Discharges (#3)	DCL1+MgO Decarb. and Coating (Phase 2)	Condensate	Not Available	3.5 (15)	Intermittent
Sump Pit Discharges (#4)	APL Annealing and Pickling Line (Phase 2)	Industrial Water Pit Furnace	2 (9)	12 (53)	Intermittent
Sump Pit Discharges (#4)	ACL Annealing and Coating (Phase 2)	Industrial Water Pit Furnace	4 (18)	4 (18)	Intermittent
Sump Pit Discharges (#4)	ACL Annealing and Coating (Phase 2)	WW3 Coating Equipment	0	20 (88)	Intermittent
Sump Pit Discharges (#4)	FCL Flattening and Coating (Phase 2)	Industrial Water Pit Furnace	4 (18)	4 (18)	Intermittent
Sump Pit Discharges (#4)	DCL1+MgO Decarb. and Coating (Phase 2)	Industrial Water Pit Furnace	4.1 (18)	4.2 (18)	Intermittent
Sump Pit Discharges (#4)	HTA High- Temperature Annealing (Phase 2)	WWF	Not Available	75 (330)	Intermittent
Sump Pit Discharges (#4)	APL Annealing and Pickling Line (Phase 2)	Groundwater	Not Available	8 (35)	Intermittent
Sump Pit Discharges (#4)	ACL Annealing and Coating (Phase 2)	Groundwater	Not Available	8 (35)	Intermittent

Form 1, Section G.2 – Summary of Wastewater Streams Discharged to Treatment System

Stream	Process Area (Project Phase)	Type	Estimated Average Flow m ³ /hr (gpm)	Estimated Maximum Flow m ³ /hr (gpm)	Frequency
Sump Pit Discharges (#4)	FCL Flattening and Coating (Phase 2)	Groundwater	Not Available	8 (35)	Intermittent
Sump Pit Discharges (#4)	HTA High- Temperature Annealing (Phase 2)	Groundwater	Not Available	8 (35)	Intermittent
Sump Pit Discharges (#4)	DCL1+MgO Decarb. and Coating (Phase 2)	Groundwater	Not Available	8 (35)	Intermittent
Filter Backwash (Stream #5)	Phases 1 and 2	Total Non- Contact Backwash W1.1	46 (202)	Not Available	Intermittent
Contact Cooling Water (Stream #6)	Phases 1 and 2	Total Contact Blowdown W1.2	43 (189)	Not Available	Continuous
Non-Contact Cooling Water (Stream #7)	Phases 1 and 2	Total Non- Contact Blowdown W1.3	77 (339)	Not Available	Continuous

m³/hr = Cubic Meters per Hour
gpm = Gallons per Minute

[Search Incorporations, Cooperatives, Banks and Insurance Companies](#)[Printer Friendly Version](#)

LLC Member information is now confidential per Act 865 of 2007

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Corporation Name	BIG RIVER STEEL LLC
Fictitious Names	
Filing #	811027954
Filing Type	Foreign Limited Liability Company
Filed under Act	Foreign LLC; 1003 of 1993
Status	Good Standing
Principal Address	1425 OHLENDORF RD OSCEOLA, AR 72370
Reg. Agent	DAVID STICKLER
Agent Address	1425 OHLENDORF RD OSCEOLA, AR 72370
Date Filed	01/25/2013
Officers	JOHN CORRENTI , Incorporator/Organizer JULIE PAYNE , Tax Preparer

Foreign Name	N/A
Foreign Address	, AR
State of Origin	DE

[Purchase a Certificate of Good Standing for this Entity.](#)[Pay Franchise Tax for this corporation](#)

State Of Delaware

Entity Details

9/16/2019 8:40:33AM

File Number: 5270396

Incorporation Date / Formation Date: 1/4/2013

Entity Name: BIG RIVER STEEL LLC

Entity Kind: Limited Liability Company

Entity Type: General

Residency: Domestic

State: DELAWARE

Status: Good Standing

Status Date: 1/4/2013

Registered Agent Information

Name: THE CORPORATION TRUST COMPANY

Address: CORPORATION TRUST CENTER 1209 ORANGE ST

City: WILMINGTON

Country:

State: DE

Postal Code: 19801

Phone: 302-658-7581

Tax Information

Last AnnualReport Filed: 0

Tax Due: \$ 0

Annual Tax Assessment: \$300

Total Authorized Shares:

Filing History (Last 5 Filings)

Seq	Description	No of Pages	Filing Date mm/dd/yyyy	Filing Time	Effective Date mm/dd/yyyy
1	LLC	1	1/4/2013	6:11 PM	1/4/2013

APPENDIX B – DEQ CONSTRUCTION PERMIT APPLICATION FORMS

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ATTACHMENT 1 GENERAL FACILITY INFORMATION

1. Facility Name: Big River Steel LLC
2. Type of Facility: Steel Mill
3. Population Served:
Present: Not Applicable (N/A) Design: N/A

4. Flow:

	Present	Design
Average	0.526 MGD (actual 01/17-06/19)	1.997 MGD (modified WWTP)
Maximum	0.950 MGD (actual)	2.853 MGD (modified WWTP)
Peak	0.950 MGD (actual)	2.853 MGD (modified WWTP)

5. Water Quality:

Assumed ☒ Actual ☐ Source: _____

	Influent:		Effluent:	
BOD5	No data available	mg/L	No data available	mg/L
TSS	No data available	mg/L	25	mg/L
NH3-N	No data available	mg/L	No data available	mg/L

Basis for Assumptions, if made:

Effluent TSS concentration was estimated using engineering calculations.

6. Is the system above the 100-year flood plain? Yes ☐ No ☒

7. List Treatment System:

a. Existing:

- | | |
|--|--|
| 1. <u>Oil/Water Separation (DAF)</u> | 5. <u>Aeration for Iron Conversion</u> |
| 2. <u>Metals (Cr) Removal 1 (Not Operated)</u> | 6. <u>Sand Filtration</u> |
| 3. <u>Homogenization (Flow Equalization)</u> | 7. _____ |
| 4. <u>Metals Removal 2 (Clarification)</u> | 8. _____ |

b. Proposed:

- | | |
|--|--|
| 1. <u>Oil/Water Separation</u> | 5. <u>Aeration for Iron Conversion</u> |
| 2. <u>Homogenization (Flow Equalization)</u> | 6. <u>Sand Filtration</u> |
| 3. <u>Metals Removal 1 (DAF)</u> | 7. <u>Sludge Drying</u> |
| 4. <u>Metals Removal 2 (Clarification)</u> | 8. _____ |

ATTACHMENT 2
FLOW MEASUREMENT, SCREENING AND GRIT REMOVAL

A. Flow Measurement

1. Type Metering Device: Electronic Flow Meter (Existing Magnetic Meter)
2. Location: Influent _____ Effluent X
3. Indicating and Recording Mechanism: Electronic totalizer with memory, instantaneous flow display

B. Bar Screen

1. Area: Total N/A ft² Effective _____ ft².
2. Space Between Bars: _____ inches
3. Velocity: _____ ft/s 4. Slope of Screen: _____
5. Is Drainage Platform Provided? Yes ☐ No ☐
6. Method of Cleaning: Manual ☐ Mechanical ☐
7. Mechanical Screen:
Capacity _____ MDG Type _____
8. Auxiliary Bar Screen: Yes ☐ No ☐

C. Comminutoring Device

1. Location N/A
2. Size: _____ inches 3. Capacity: _____ MGD
2. Auxiliary Bar Screen: Yes ☐ No ☐

D. Grit Chamber

1. No. of Chambers N/A
2. Type _____
3. Cross Section Area:
Each _____ ft² Total _____ ft² Length _____ ft
Width _____ ft Diameter _____ ft
4. Calculated Velocity of Flow _____ ft/s
5. Method of Cleaning: Manual ☐ Mechanical ☐
6. Surge prevention: Yes ☐ No ☐
7. Method of Velocity Control _____
8. Detention Period:
Present _____ Seconds Design _____ Seconds
9. Drain Provided: Yes ☐ No ☐

ATTACHMENT 3
ACTIVATED SLUDGE
NOT APPLICABLE

1. Process:

Conventional ☐ Contact Stabilization ☐ Extended Aeration ☐
Sequence Batch Reactor ☐ Step Aeration ☐ Complete Mix ☐
Other _____

2. Number of Tanks: _____ 3. Are all tanks same size? Yes ☐ No ☐

4. Shape of Tank: _____ 5. Are waterstops provided? Yes ☐ No ☐

5. Inside Dimensions of Each Tank (ft):

Length _____ Width _____ Depth _____ Diameter _____

6. Effective Volume of each Tank: _____ gallons

7. Total Tank Volume: _____ gallons

8. Recirculation Rate: _____ MGD

9. Design Flow (including recirculation): _____ MGD

10. Percentage of Daily Flow of Return Sludge to Tank: _____

11. Detention Time: _____ minutes

12. Aeration Tank Organic Loading: _____ lb BOD₅/day/1000ft³

13. F/M Ratio: _____ lb BOD₅/day/ lb MLVSS

14. MLSS: _____ mg/L Assumed ☐ or Actual ☐

15. MLVSS/MLSS Ratio: _____

16. Are the inlets and outlets for each aeration tank suitably equipped to permit controlling the flow to any unit and to maintain reasonably constant liquid levels?
Yes ☐ No ☐

17. Freeboard in Aeration Tanks (minimum 24 inches): _____ inches

18. Is the type of aeration system able to provide the necessary oxygen requirements?
Yes ☐ No ☐

19. Sludge Return Pumps:

Number Pumps: _____ Type: _____ Capacity Each: _____ gpm
Total Capacity: _____ gpm Rated Heads: _____ ft
Computed Heads: _____ ft

20. Sequence Batch Reactors **Only**:

Cycle Duration: _____ minutes Mixing Duration: _____ minutes

Low water level: _____ ft High water level: _____ ft

Hydraulic Retention Time: _____ minutes

ATTACHMENT 4
AERATION SYSTEM

1. Required Air: N/A ft³/lb BOD5/day
2. Furnished Air: N/A ft³/ lb BOD5/day
3. Type of System: Diffused Air ☒ Mechanical ☐
4. Diffused Air Equipment:

Number Blowers 4 Total (2 per Basin) Capacity of each 250 ft³/m

Total Capacity of Blowers 1,000 ft³/m

Diffusers: Plates ☐ Fixed Tubes ☐ Swing Diffusers ☐
Impingement Aerator ☐ Jet Aerator ☒

5. Mechanical Aeration Equipment:

Number Units N/A Type of Unit _____

Capacity of Each Unit _____ hP

Operated Intermittently by Clock Time? Yes ☐ No ☐

BRS will operate one aeration basin (WB4) with two interconnected cells (WB4.1 and WB4.2). This basin will be used to convert dissolved iron in wastewater to insoluble iron for subsequent filtration (rather than biological treatment). Basin WB4 is an existing unit; aerators will be new equipment.

ATTACHMENT 5
LAGOONS
NOT APPLICABLE

1. Type: Controlled Discharge Facultative Lagoon System ☐
Flow-Through Facultative Lagoon System ☐
Aerated Lagoon System ☐
Combination ____

2. Number of Ponds: ____ 3. Number of Cells per Pond: ____

4. Ponds in Series or Parallel Operation: ____

5. Pond/Cell Depth (ft):

Pond Number	Maximum	Minimum	Average
1	_____	_____	_____
2	_____	_____	_____
3	_____	_____	_____

6. Freeboard of Each Pond (ft):

Pond 1: ____ Pond 2: ____ Pond 3: ____

7. Pond/Cell Width (ft):

Pond Number	Maximum	Minimum	Average
1	_____	_____	_____
2	_____	_____	_____
3	_____	_____	_____

8. Pond/Cell Length (ft):

Pond Number	Maximum	Minimum	Average
1	_____	_____	_____
2	_____	_____	_____
3	_____	_____	_____

9. Volume of Each Pond/Cell (gallons):

Pond Number	At Maximum Depth	At Minimum Depth	At Average Depth
1	_____	_____	_____
2	_____	_____	_____
3	_____	_____	_____

7. BOD Loading of Each Pond/Cell (mg/l):

Pond Number	Present	Design
1	_____	_____
2	_____	_____
3	_____	_____

8. Retention Time at Average Depth (minutes):

Pond Number	Present	Design
1	_____	_____
2	_____	_____
3	_____	_____

9. Liner Material of Each Pond:

Pond 1: _____ Pond 2: _____ Pond 3: _____

10. If synthetic liner, how is liner attached? Is liner vented?

12. How is the bank protected?

13. Slope of internal banks: _____

14. Outlet

Adjustable: Yes ☐ No ☐ Height above bottom of Pond: _____ ft

15. Is lagoon aerated? Yes ☐ No ☐

ATTACHMENT 6
RECIRCULATING SAND FILTER
NOT APPLICABLE

1. Type of Pretreatment: ____
2. Filter Media:
Material____Effective Size____mm
Uniformity Coefficient____Depth____ft
3. Underdrains:
Type____Slope____Bedding ____
4. Hydraulic Loading:____gpd/ft²
5. Organic Loading: ____ lb/day/ft²
6. Recirculation Ratio: ____
7. Recirculation Tanks:
Volume____gallons Number of Tanks ____
8. Dosing:
Time On____minutes Time Off____minutes
Frequency____Volume/orifice____gallons/orifice

BRS will install new sand filtration system (WSF1) for effluent polishing. Equipment does not meet definition of “recirculating sand filter.”

ATTACHMENT 7
CLARIFIERS

1. Type: Circular
2. Number of Tanks: 1 new unit
3. Surface Dimensions (ft):
Width_____Length_____Diameter 52 ft
4. Sidewall Depth: 8 ft
5. Detention Period (minutes):
At design flow >3.5 hours At peak flow >2.5 hours
6. Overflow Rate (gpd/ft²):
At design flow 923 At peak flow 1,318
7. Surface Area: 2,164 (each) ft²

ATTACHMENT 8
SLUDGE TREATMENT
NOT APPLICABLE

A. Sludge Digestion Tanks

1. Number of Units ____ 2. Type _____
3. Capacity: _____ 4. Single or Two Stage: _____
5. Type of Cover: _____ 6. Is Tank Insulated? Yes ☐ No ☐
7. Heating (pipe coils): Diameter of Pipes: _____ inches
Total Surface Area: _____ ft²
8. Heating (heat exchanger): Capacity of unit _____
9. Is there a cross connection between the liquor selector flushing line and the drinking water supply? Yes ☐ No ☐
10. Thermometers: Yes ☐ No ☐ 11. Flame or Drip Traps: _____
12. Waste Burner: Yes ☐ No ☐ 13. Manholes in Cover: Yes ☐ No ☐
14. Supernatant Outlets: Yes ☐ No ☐
15. Disposal of Supernatant: _____
16. Provisions for Recirculation of Sludge? Yes ☐ No ☐
17. Provisions for Sampling? Yes ☐ No ☐
18. Sludge Removal Lines: Yes ☐ No ☐
19. Explosion Proof switches, fixtures: Yes ☐ No ☐
20. Disposal of Wet Sludge: _____

B. Sludge Drying Beds

1. Number Units: ____ 2. Required Area: _____ ft²
3. Area Each Bed: _____ ft² 4. Total Area: _____ ft²
4. Area per Capita: Present _____ ft² Design _____ ft²

5. Gravel:
Layer Depths: _____ft, _____ft _____ft
Sizes: _____, _____, _____
6. Sand: Depth _____ft Size _____
7. Underdrains: Size _____ Spaced _____
8. Freeboard above Sand: _____ft
9. Slope of Delivery Pipe: _____
10. Suitable Splash Plate: Yes ☐ No ☐
11. Disposal of Sludge Bed Drainage: _____
12. Disposal of Dry Sludge: _____

Sludge Processing Area will be installed. Sludge will be dewatered on concrete slab prior to reuse, reclamation and/or disposal. Wood pellets (or similar absorbent) will be added to solidify sludge if needed. Sludge dryers and drying beds will not be operated.

ATTACHMENT 9
DISINFECTION
NOT APPLICABLE

A. CHLORINATION

1. Type of Chlorination: Tablet ☐ Gas ☐
2. Capacity: ____ #/24 hr 3. Location: ____
4. Ventilation: Yes ☐ No ☐
5. Point of Application in Process: ____
5. Contact Chamber:
Design Flow ____MGD Peak Flow ____MGD
Volume ____gallons

Inside Dimensions (ft)
Length ____ Width ____ Depth ____ Diameter v

Detention Time ____minutes Drain Provided? Yes ☐ No ☐
6. Scum Baffle: Yes ☐ No ☐
7. Point of Application: ____

B. ULTRA VIOLET

1. Design Flow : ____ MGD 2. Peak Flow: v MGD
3. Number of Channels: ____ 4. Number of Banks per Channel: ____
5. Space between lamps: ____ inches
6. UV Radiation Dosage: ____mW s/cm²

ATTACHMENT 10
FLOW EQUALIZATION

1. Use: Equalization (homogenization) of wastewater streams prior to treatment
2. Location in process: Downstream of emulsion, acid and alkali tanks
3. Type: Aboveground tank (Basin WB5)
4. Shape: Cylindrical
5. Dimensions (ft):
Width _____ Length _____ Diameter 14 ft Depth 26.5 ft (height)
6. Effective Volume: 26,000 gallons
7. Will excess flow being diverted to the equalization basin undergo preliminary treatment first? Yes ☒ No ☐
8. Is aeration or mechanical equipment used for mixing? Yes ☒ No ☐

ATTACHMENT 11
PRIMARY SEDIMENTATION
NOT APPLICABLE

A. Settling Tanks:

1. Type: ____ 2. Number of units: ____
3. Dimensions: (ft)
Width____Length____Diameter____Depth ____
- Surface Loading: ____gpd/ft²
6. Overflow Rate: ____ gpd/ ft. weir
7. Design of inlet and outlet baffles: ____
8. Design for skimming: ____
9. Disposal of scum: ____
10. Diameter sludge pipes: ____inches
11. Provision for flushing and draining sludge lines? Yes ☐ No ☐

B. Other:

Describe the type of primary sedimentation provided in detail. Provide pertinent design information and details.

ATTACHMENT 12
TRICKLING FILTERS
NOT APPLICABLE

A. High Rate:

1. Dimensions (ft):

Width

Length

Diameter

Depth

First Stage

Second Stage

2. Area (ft³):

3. Recirculation:

Ratio

How Controlled?

How Measured?

Where returned?

3. Organic Loading
(lb BOD/Ac-ft./day):

5. Hydraulic Loading
(Mg/Ac/day):

6. Type of distributor:

7. Dosing Method:

8. Minimum Head On
Distributor Arms (ft):

9. Size Filter Rock (inches):

10. Sodium Sulfate Cycle
Test

11. Provision for ventilation?

Yes ☐

No ☐

Yes ☐

No ☐

12. Provision for flooding?

Yes ☐

No ☐

Yes ☐

No ☐

13. Filter efficiency, after
settling %:

B. Standard Rate:

1. Dimensions (ft):
Width_____Length_____Diameter_____Depth _____
2. Area:_____ft³
2. Organic Loading:_____(lb BOD/Ac-ft./day)
3. Hydraulic Loading:_____(MGD/Ac)
4. Type of distributor: _____
5. Dosing Method: _____
6. Detention Time in Dosing Tank:_____minutes
7. Is Siphon Capacity Adequate? Yes ☐ No ☐
8. Minimum Head on Distributor Arms:_____ft
9. Size Filter Rock:_____inches
10. Sodium Sulfate Cycle Test: _____
11. Provision for Ventilation: Yes ☐ No ☐
12. Provision for flooding: Yes ☐ No ☐
13. Provision for Recirculation: Yes ☐ No ☐

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APPENDIX C – DEQ DISCLOSURE STATEMENT

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ARKANSAS DEPARTMENT OF ENVIRONMENTAL QUALITY DISCLOSURE STATEMENT

Instructions for the Completion of this Document:

- A. Individuals, firms or other legal entities with no changes to an ADEQ Disclosure Statement, complete items 1 through 5 and 18.**
- B. Individuals who never submitted an ADEQ Disclosure Statement, complete items 1 through 4, 6, 7, and 16 through 18.**
- C. Firms or other legal entities who never submitted an ADEQ Disclosure Statement, complete 1 through 4, and 6 through 18.**

If Not Submitting by ePortal, Mail Original to:

**ADEQ
DISCLOSURE STATEMENT
[List Proper Division(s)]
5301 Northshore Drive
North Little Rock, AR 72118-5317**

1. APPLICANT: (Full Name)

Big River Steel LLC

2. MAILING ADDRESS: (Number and Street, P.O.Box Or Rural Route)

P.O. Box 707

3. CITY, STATE, AND ZIPCODE:

Osceola, Arkansas 72370

4a. Applicant Type:

☐ Individual ☒ Corporate or Other Entity

4b. Reason for Submission:

☒ Permit ☐ License ☐ Certification ☐ Operational Authority

☐ New Application ☒ Modification ☐ Renewal Application (If no changes from previous disclosure statement, complete number 5 and 18.)

4c. Programs:

☐ Air ☒ Water ☐ Hazardous Waste ☐ Regulated Storage Tank ☐ Mining ☐ Solid Waste ☐ Used Tire Program

5. Declaration of No Changes:

The violation history, experience and credentials, involvement in current or pending environmental lawsuits, civil and criminal, have not changed since the last Disclosure Statement that was filed with ADEQ on March 15, 2018 (submitted to Office of Air Quality as part of renewal Title V Permit application).

6. Describe the experience and credentials of the Applicant, including the receipt of any past or present permits, licenses, certifications or operational authorization relating to environmental regulation. (Attach additional pages, if necessary.)

7. List and explain all civil or criminal legal actions by government agencies involving environmental protection laws or regulations against the Applicant * in the last ten (10) years including:

- 1. Administrative enforcement actions resulting in the imposition of sanctions;**
- 2. Permit or license revocations or denials issued by any state or federal authority;**
- 3. Actions that have resulted in a finding or a settlement of a violation; and**
- 4. Pending actions.**

(Attach additional pages, if necessary.)

*** Firms or other legal entities shall also include this information for all persons and legal entities identified in sections 8-16 of this Disclosure Statement.**

8. List all officers of the Applicant. (add additional pages, if necessary.)

NAME: _____ TITLE: _____

STREET: _____

CITY, STATE, ZIP: _____

NAME: _____ TITLE: _____

STREET: _____

CITY, STATE, ZIP: _____

NAME: _____ TITLE: _____

STREET: _____

CITY, STATE, ZIP: _____

9. List all directors of the Applicant. (Add additional pages, if necessary.)

NAME: _____ TITLE: _____

STREET: _____

CITY, STATE, ZIP: _____

NAME: _____ TITLE: _____

STREET: _____

CITY, STATE, ZIP: _____

NAME: _____ TITLE: _____

STREET: _____

CITY, STATE, ZIP: _____

10. List all partners of the Applicant. (Add additional pages, if necessary.)

NAME: _____ TITLE: _____

STREET: _____

CITY, STATE, ZIP: _____

NAME: _____ TITLE: _____

STREET: _____

CITY, STATE, ZIP: _____

NAME: _____ TITLE: _____

STREET: _____

CITY, STATE, ZIP: _____

11. List all persons employed by the Applicant in a supervisory capacity or with authority over operations of the facility subject to this application.

NAME: _____ TITLE: _____

STREET: _____

CITY, STATE, ZIP: _____

NAME: _____ TITLE: _____

STREET: _____

CITY, STATE, ZIP: _____

NAME: _____ TITLE: _____

STREET: _____

CITY, STATE, ZIP: _____

12. List all persons or legal entities, who own or control more than five percent (5%) of the Applicant's debt or equity.

NAME: _____ **TITLE:** _____

STREET: _____

CITY, STATE, ZIP: _____

NAME: _____ **TITLE:** _____

STREET: _____

CITY, STATE, ZIP: _____

NAME: _____ **TITLE:** _____

STREET: _____

CITY, STATE, ZIP: _____

13. List all legal entities, in which the Applicant holds a debt or equity interest of more than five percent (5%).

NAME: _____ **TITLE:** _____

STREET: _____

CITY, STATE, ZIP: _____

NAME: _____ **TITLE:** _____

STREET: _____

CITY, STATE, ZIP: _____

NAME: _____ **TITLE:** _____

STREET: _____

CITY, STATE, ZIP: _____

14. List any parent company of the Applicant. Describe the parent company's ongoing organizational relationship with the Applicant.

NAME: _____

STREET: _____

CITY, STATE, ZIP: _____

Organizational Relationship:

--

15. List any subsidiary of the Applicant. Describe the subsidiary's ongoing organizational relationship with the Applicant.

NAME: _____

STREET: _____

CITY, STATE, ZIP: _____

Organizational Relationship:

--

16. List any person who is not now in compliance or has a history of noncompliance with the environmental law or regulations of this state or any other jurisdiction and who through relationship by blood or marriage or through any other relationship could be reasonably expected to significantly influence the Applicant in a manner which could adversely affect the environment.

NAME: _____ **TITLE:** _____

STREET: _____

CITY, STATE, ZIP: _____

NAME: _____ **TITLE:** _____

STREET: _____

CITY, STATE, ZIP: _____

17. List all federal environmental agencies and any other environmental agencies outside this state that have or have had regulatory responsibility over the Applicant.

18. VERIFICATION AND ACKNOWLEDGEMENT

The Applicant agrees to provide any other information the director of the Arkansas Department of Environmental Quality may require at any time to comply with the provisions of the Disclosure Law and any regulations promulgated thereto. The Applicant further agrees to provide the Arkansas Department of Environmental Quality with any changes, modifications, deletions, additions or amendments to any part of this Disclosure Statement as they occur by filing an amended Disclosure Statement.

DELIBERATE FALSIFICATION OR OMISSION OF RELEVANT INFORMATION FROM DISCLOSURE STATEMENTS SHALL BE GROUNDS FOR CIVIL OR CRIMINAL ENFORCEMENT ACTION OR ADMINISTRATIVE DENIAL OF A PERMIT, LICENSE, CERTIFICATION OR OPERATIONAL AUTHORIZATION.

COMPLETE THIS SECTION ONLY IF SUBMITTING OTHER THAN BY EPORTAL:

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

APPLICANT
SIGNATURE:



TITLE: Director of Construction and Engineering

DATE: 10/30/2019

APPENDIX D – PROCESS DESCRIPTION AND DESIGN CALCULATIONS FOR WASTEWATER TREATMENT SYSTEM

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Appendix D

Process Description and Design Calculations for Wastewater Treatment System

A process description for the modified wastewater treatment system to be constructed by Big River Steel LLC (BRS) is enclosed. Design calculations and operating parameters for the various treatment units are provided. The major changes to the existing wastewater system are identified where necessary.

The Construction Plans and Specifications for the Phase 2 wastewater treatment components are provided in Appendix J of this permit application. Drawings of selected treatment units are enclosed therein as Sheets C1 through C28. Other pertinent documents include the following figures presented in Appendix F and Appendix H:

- Figure F-2 Wastewater Process Flow Diagram
- Figure F-3 Water Balance Diagram
- Figure H-4 Wastewater Facilities Map
- Figure H-5 Wastewater Treatment Plant Layout

Russula S.A. is the design engineering firm for the existing (Phase 1) and modified (Phase 2) wastewater treatment system. The information provided herein was obtained from the following Russula documents: (1) "Water Treatment Plant II, Wastewater Circuit, Technical Specification" (MTM/002 PS16/10296-Rev. 01, August 2019); and (2) "Chemical Delivery Circuits, Wastewater Water System" (MTM/04 PS19/01296/004-Rev.01, August 2019).

1.0 Description of Construction Project

BRS operates a scrap steel to steel products manufacturing facility located in Osceola, Arkansas (Mississippi County) (the "Facility"). The Facility is designed to produce a full range of high-strength steel products for key niche markets, primarily through the recycling of scrap metal.

BRS plans to significantly increase production at the Facility in mid to late 2020. The Phase 2 project will include, among other things, the installation of a new Electric Arc Furnace, a Continuous Caster, a Galvanizing Line, a Reversing Cold Mill, and other new units. The Phase 2 project will also include process improvements to the existing (Phase 1) production units. The overall manufacturing capacity will increase from 1.70 million tons per year of liquid steel (Phase 1, existing Facility) to an expected 4.10 million tons per year of liquid steel (Phase 2, existing and new units). The process improvements in the existing (Phase 1) Facility will increase the production capacity of that equipment from 1.70 million tons per year to 2.05 million tons per year of liquid steel. The new (Phase 2) production units are expected to provide an additional manufacturing capacity of 2.05 million tons per year of liquid steel.

Modification and expansion of the existing wastewater treatment plant will be required to support the Phase 2 production levels. The goals of the wastewater-related construction activities are as follows: (1) to install new treatment equipment to support the Phase 2 manufacturing operations; (2) to upgrade certain existing Phase 1 wastewater treatment units to improve performance; and (3) to provide additional treatment capacity to support a long-range future expansion of the Facility. The *design* wastewater flow rate (including contact cooling water and non-contact cooling water) will increase from 1.150 million gallons per day (Phase 1, existing treatment plant) to 2.853 million gallons per day (Phase 2, existing and new wastewater treatment units).

Raw water from the steel manufacturing operations is provided by four high-capacity groundwater wells. The water is prepared for use in a series of water treatment plants located throughout the Facility. The water is subsequently used in the contact cooling water and non-contact cooling water circuits for various process units. The maximum volume of water supplied to the Facility (Phases 1 and 2 combined) is estimated to be approximately 668 cubic meters per hour (m^3/hr), which is equivalent to 2,941 gallons per minute (gpm). Of that amount, about 499 m^3/hr (2,197 gpm) of water will be lost to evaporation in the plant's cooling towers. The remaining 169 m^3/hr (744 gpm) of water will consist of contact cooling water, non-contact cooling water, and process wastewater. BRS will recondition the effluent contact cooling water and non-contact cooling water streams in the water treatment plants; these streams will be recycled to the extent possible. The process wastewater, plus any unrecycled contact cooling water and non-contact cooling water, will be routed to the wastewater plant for treatment; these streams will be introduced at various stages of the treatment system. As noted above, the design capacity of the expanded wastewater treatment plant will be 2.853 million gallons per day, which is equivalent to a flow rate of 450 m^3/hr (1,981 gal/hr).

BRS currently operates under the authority of NPDES Permit No. AR0052582 effective on July 1, 2016; a permit minor modification was approved on October 14, 2016. The five-year term of the permit coverage expires on June 30, 2021. The NPDES permit covers two discharge points: (1) Outfall 001 – treated process wastewater, contact cooling water and non-contact cooling water; and (2) Outfall 002 – stormwater runoff and quench water runoff from the Slag Yard. Both outfalls discharge to the Mississippi River.

The volume of process wastewater, contact cooling water, and non-contact cooling water to be treated on-site will increase significantly due to the Phase 2 project. However, the influent concentrations of the various wastewater constituents (total suspended solids, oil and grease, dissolved metals, etc.) sent to the treatment plant will be, in general, equivalent to the concentrations currently generated and treated. Similarly, the concentrations of the constituents in the treated wastewater effluent discharged at Outfall 001 will remain relatively constant, whereas the mass discharge rates will be higher.

The Phase 2 project will not affect the volume of wastewater generated within the Slag Yard. This stream consists of stormwater runoff and quench water runoff. The water is stored in the Slag

Yard Pond and subsequently discharged to the Mississippi River at Outfall 002. The footprint of the Slag Yard will not be increased during the Phase 2 project; the volume of quench water used should remain about the same. Therefore, there will not be any increase in the volume of stormwater runoff or quench water runoff generated within the Slag Yard; the mass and concentration loadings to the Slag Yard Pond should not increase. As a result, no changes to the current NPDES permit limits or conditions for Outfall 002 are requested herein.

2.0 Description of Wastewater Streams

The process wastewater streams generated by BRS during its steel manufacturing operations are categorized in four (4) general groups. These streams are as follows:

- Emulsified Oily Discharges (Stream #1)
- Acid Discharges (Stream #2)
- Alkaline Discharges (Stream #3)
- Sump Pit Discharges (Stream #4)

It is important to note that groundwater which infiltrates into basements, equipment vaults and other below-ground structures at the Facility is a significant contributor to the Sump Pit Discharges (Stream #4).

All four process wastewater streams are generated at multiple locations throughout the existing Facility (Phase 1). Additional wastewater will be generated in the new production units (Phase 2). Both continuous and batch discharges are currently generated; the expanded wastewater treatment system will also receive both continuous and intermittent discharges. Refer to the following Table D-1 for more information on the existing and proposed wastewater streams. Said table is presented at the end of this narrative.

Additional non-process wastewater streams are also generated during the steel manufacturing operations. These streams are as follows:

- Sand Filter Backwash (Stream #5)
- Contact Cooling Water (NCW, Stream #6)
- Non-Contact Cooling Water (NCCW, Stream #7)

Again, all three non-process wastewater streams are currently generated and treated on-site. The volume of cooling water (both NCW and NCCW) will increase due to operation of the new (Phase 2) manufacturing units. The existing filter backwash stream is an intermittent discharge; the future backwash stream will also be generated intermittently. The current NCW and NCCW streams are continuous discharges; the future discharges will also be continuous.

3.0 Stages of Wastewater Treatment Process

The modified wastewater treatment system will have seven (7) general stages of operation. These stages are listed below:

- Stage #1 Oil Removal
- Stage #2 Homogenization
- Stage #3 Metals Removal
- Stage #4 Clarification
- Stage #5 Aeration for Iron Oxidization
- Stage #6 Filtration
- Stage #7 Sludge Processing

A description of each stage of the wastewater treatment process is presented in the following paragraphs. It is important to note that the pH ranges provided below for certain treatment operations are approximate; the actual pH levels will depend on the operating circumstances and wastewater chemistry. Also, while the application specifically states that sulfuric acid, sodium hydroxide and lime slurry will be used for pH adjustment, BRS notes that various other acid and alkaline compounds in addition to those chemicals may be used for this purpose depending on the treatment requirements.

Stage #1 – Oil Removal: The emulsified oily discharges (Wastewater Stream #1) from the Facility operations will be treated in two tanks. These treatment units will be used to break the emulsion and separate the two liquid phases (oil and water). The influent emulsified oil stream (#1) will be adjusted to approximately pH 2.5-4 (using sulfuric acid) to improve the phase separation. The wastewater will subsequently be adjusted to approximately pH 6-8 (using sodium hydroxide or lime slurry) after separation of the oil. The degreased wastewater stream will then be transferred to the main collection tank prior to further processing (Stage #2). The oil layer from the emulsion tanks will be sent to a sludge processing area for dewatering (Stage #7).

Two additional tanks will be operated to pre-treat various influent wastewater streams on an as-needed batch basis prior to oil removal (stage #1) or metals removal (Stage #4).

Stage #2 – Homogenization: The various influent wastewater streams will be homogenized (mixed) to equalize the hydraulic and chemical loadings for the down-stream treatment processes. The acid discharges (Stream #2) will be combined in two batch mixing tanks prior to treatment. The alkaline discharges (Stream #3) will be collected in a single mix tank pending processing.

The main collection tank will be used to combine the four influent streams: the treated wastewater (Stream #1) from the oil removal process (Stage #1); the acid discharges (Stream #2); the alkaline discharges (Stream #3); and the sump pit discharges (Stream #4).

Stage #3 – Metals Removal: The combined wastewater stream will contain dissolved metals including aluminum, chromium, iron, nickel and zinc. The metals will be removed via chemical treatment and precipitation. First, the pH of the wastewater will be adjusted upwards (using a lime slurry and/or sodium hydroxide) in a stabilizer tank. A coagulating agent will also be added. The wastewater will then be transferred to a second stabilizer tank for additional pH adjustment. A coagulant and/or a flocculating agent will also be added. The pH range used for dissolved metals precipitation will be approximately pH 10-11.

The pH-adjusted wastewater stream will subsequently be routed to a dissolved air floatation (DAF) unit. "Micro-bubbles" of air will cause the suspended solids (containing metals) and oil particles to coalesce and float to the surface of the tank for removal. Three streams will be generated in the DAF unit: wastewater; floating solids and oil; and heavy sludge. The wastewater will be transferred to two receiving tanks prior to additional solids removal (Stage #4). The floating solids and sludge layers will be routed to a sludge processing area for dewatering (Stage #7).

At this time, BRS plans to install and operate one new DAF unit at the wastewater treatment plant. However, this permit application includes a second DAF unit as a contingency. This unit may be installed in the future depending on the operating circumstances.

Stage #4 – Clarification: The wastewater from the DAF unit(s) will be transferred to two clarifier units. Entrained solids will be removed via gravity settling. The clarified wastewater will then be transferred to an aeration basin for further treatment (Stage #5). The sludge collected in the clarifiers will be routed to two filter presses. The sludge will be dewatered; the filter cake will be deposited in roll-off boxes. The filter cake will be managed in accordance with federal, state and local regulatory requirements.

Stage #5 – Aeration for Iron Oxidization: The treated wastewater from the clarifiers (Stage #4) will contain a significant level of dissolved iron in ferrous form (Fe^{+2}). The dissolved iron will be converted via oxidation to insoluble iron in ferric form (Fe^{+3}). The wastewater will be aerated in a treatment basin equipped with blowers and fine bubble diffusers. The aerated wastewater will then be routed to sand filters for solids removal (Stage #6).

Stage #6 – Filtration: The wastewater effluent will be filtered to remove total suspended solids (TSS), primarily the insoluble iron particles generated in Stage #5. The filtered effluent will subsequently be pumped to the Mississippi River and discharged at Outfall 001. The sand filters will be periodically backwashed to remove the captured TSS. The backwash will be routed to a collection basin for subsequent treatment.

Stage #7 – Sludge Processing: Sludge will be generated during the oil removal process (Stage #1) and the metals removal process (Stage #3). These streams will be routed to a sludge processing area for dewatering. This area will consist of a covered concrete slab with containment curbing. The sludge will be allowed to air dry. Wood pellets (or another suitable absorbent) may be added

to solidify the material if necessary. The dewatered sludge will be managed in accordance with federal, state and local regulatory requirements. (As noted above, the sludge from the clarifiers (Stage #4) will be dewatered in filter presses rather than at the sludge processing area.)

The existing wastewater treatment system (Phase 1) will be modified and reconfigured to implement the aforementioned seven operations (Phase 2). The existing oil/water separation process (a DAF unit) will be replaced with the new emulsion tanks (Stage #1). Additional treatment tanks and basins will be installed for wastewater homogenization and flow equalization (Stage #2). The existing metals removal process (Stage #3) will be modified significantly; a new DAF unit will be installed for this purpose. (A second DAF unit is included herein as a contingency.) The existing wastewater operations for clarification (Stage #4), aeration for iron conversion (Stage #5), and sand filtration (Stage #6) will be upgraded and expanded. Finally, a new sludge dewatering area (Stage #7) will be installed.

It is important to note that the NPDES permit application for Phase 1 (August 2015) included installation of a treatment unit for chromium-contaminated wastewater from passivation of the steel in the Cold Mill. As a result, this wastewater stream is reflected in the current NPDES permit. However, the passivation operation involving chromium is not performed by BRS at the Facility. The treatment equipment was installed but has not yet been operated. The Phase 2 project will not include a passivation operation involving chromium; that operation will continue to be performed at a third-party site.

4.0 Wastewater Treatment Units

A brief description of the various wastewater treatment units is presented below. Pertinent design and operating parameters are provided. Refer to Appendix J, Construction Plans and Specifications for more information. (The layout of the overall Phase 2 wastewater treatment plant is shown on Sheets C1 and C2.)

4.1 Emulsion Tanks EB1.1 and EB1.2

Emulsion Tanks EB1.1 and EB1.2 will be used to treat the emulsified oily discharges (Stream #1) generated during the Facility operations. These treatment units will be used to break the emulsion and separate the two liquid phases (oil and water). The resulting degreased wastewater stream will be transferred to the main collection tank prior to further processing (Stage #2). The oil layer from the two Emulsion Tanks will be sent to the adjacent Sludge Processing Area for dewatering and solidification (Stage #7).

The Emulsion Tanks will receive the following oily wastewater streams:

- Emulsified oily discharges (Line EF4).
- Water from the Sludge Processing Pit (WB10) (Line WS10).

In addition, the Emulsion Tanks will also be configured to receive the following streams if needed:

- Wastewater from Batch Tanks WB7.1 and WB7.2.
- Wastewater from Acid Tanks AT1.1 and AT1.2.
- Water from Basin WB1.1 to be used for cleaning the Emulsion Tanks (Line W1).
- Oily water from the Roll Shop Receiving Tank (WRLT1).
- Discharges from the containment areas for the Roll Shop Receiving Tank (WRLT1) and the Lubricant Tank (WLT1).

The wastewater treatment process will be performed on a continuous and/or batch basis, depending on the operating circumstances. The influent emulsified oily stream (#1) will be adjusted to approximately pH 2.5-4 (using sulfuric acid) to improve the phase separation. A coagulant will also be added. After pH adjustment, the contents of the tank will be allowed to separate into the oil and water layers. Once the phase separation has occurred, water from Collection Basin WB1.1 will be pumped into the bottom of the Emulsion Tank; the oil layer will then flow by gravity to the Sludge Processing Area. The Emulsion Tanks will also have moving wipers to transfer the floating sludge layer to the dewatering pad. The remaining wastewater will subsequently be adjusted to approximately pH 6-8 (using sodium hydroxide or lime slurry) prior to discharge to Receiving Basin WB5 for additional processing.

Each Emulsion Tank will be equipped with a mixer unit (Agitator EAG1.1.X). The mixers will be used to facilitate pH adjustment. After adjustment, the mixers will be shut off to allow separation of the oil and water layers.

The two Emulsion Tanks will be aboveground storage tanks (ASTs). Each vessel will have a capacity of 75 cubic meters (m³), which is equivalent to 19,813 gallons (gal). The tanks will be new units. (See Appendix J, Sheet C3.)

The Emulsion Tanks will be equipped for pH adjustment of the wastewater. The vessels will have separate automated dosing systems for sulfuric acid, sodium hydroxide, lime slurry and coagulant. The tanks will also have a chlorine dosing system; the chlorine will be used for periodic cleaning of the treatment units.

Pump Groups EP1.1.X and EP1.2.X will be used to transfer the degreased wastewater from the Emulsion Tanks to Receiving Tank WB5. The pump groups were selected based on the following operating conditions:

Pump Groups EP1.1.X (1 lead pump + 1 lag pump) and EP1.2.X (1+1)

- Flowrate = 80 m³/hr (352 gpm)
- Pressure = 2 bar (29 pounds per square inch atmosphere (psia))

The Emulsion Tanks will be installed within a secondary containment area. It will be equipped with a collection sump. Any leakage from the process equipment will be captured and transferred back into the tanks.

4.2 Batch Tanks WB7.1 and WB7.2

Batch Tanks WB7.1 and WB7.2 will be operated to pre-treat various influent wastewater streams on an as-needed basis prior to oil removal (stage #1) or metals removal (Stage #3). The wastewater will be subjected to pH adjustment upwards or downwards depending on the circumstances. The Batch Tanks will be configured to receive the following wastewater streams:

- Homogenized wastewater stream from Receiving Tank WB5 (Line W5).
- Homogenized acid discharges from Acid Tanks AT1.1 and AT1.2 (Line A1).
- Homogenized alkaline discharges from Alkali Tank AT2 (Line A2).
- Degreased emulsified oily discharges from Emulsion Tanks EB1.1 and EB1.2 (Line E1).
- Water from Transfer Basin WB8.1 (Line W8.1).
- Water from Transfer Basin WB8.2 (Line W8.2).
- Drainage from Stabilizer Tanks WB6.1 and WB6.2 (Line WS6).
- Discharge from the containment area for the Batch Tanks (Line WD6).
- Water from the Sludge Processing Pit (WB10) (Line WS10).
- Oily water from the Roll Shop Receiving Tank (WRLT1).
- Discharges from the containment areas for the Roll Shop Receiving Tank (WRLT1) and the Lubricant Tank (WLT1).

The two Batch Tanks will be ASTs. Each vessel will have a capacity of 100 m³ (26,417 gal). The tanks will be new units. (See Appendix J, Sheet C6.)

The Batch Tanks will be equipped for pH adjustment of the wastewater. The vessels will have separate automated dosing systems for sulfuric acid, sodium hydroxide and lime slurry. Other acids and bases may also be used for pH adjustment. The tanks will also have a chlorine dosing system for periodic cleaning of the treatment units.

Pump Groups WP7.1.X and WP7.2.X will be used to transfer the treated wastewater in the two Batch Tanks to Emulsion Tanks EB1.1 and EB1.2. The water may also be sent to Stabilizer Tank WB6.1. The pump groups were selected based on the following operating conditions:

Pump Groups WP7.1.X (1+ 1) and WP7.2.X (1+1)

- Flowrate = 80 m³/hr (352 gpm)
- Pressure = 2 bar (29 psia)

The Batch Tanks will be installed within a secondary containment area. It will be equipped with a collection sump. Any leakage from the process equipment will be captured and transferred via

Drain Pump WD6.1 into the Batch Tanks. The sump pump was selected based on the following operating conditions:

Pump WDP6.1

- Flowrate = 10 m³/hr (44 gpm)
- Pressure = 2 bar (29 psia)

4.3 Acid Tanks AT1.1 and AT1.2

Acid Tanks AT1.1 and AT1.2 will be used to homogenize the in-coming acid discharges (Stream #2) from the Facility prior to treatment. The vessels will be configured to receive the following wastewater streams:

- Acid discharges (Line EF1).
- Discharges from the acid containment area.

The two Acid Tanks will be ASTs. Each vessel will have a capacity of 80 m³ (21,134 gal). The tanks will be new units. (See Appendix J, Sheet C4.)

Acid Tanks AT1.1 and AT1.2 will be operated on an alternating batch basis. A given tank will be filled to the desired level. Once full, the contents of that tank will be pumped to Receiving Tank WB5. The influent flow will concurrently be routed to the other Acid Tank. The homogenized wastewater will pass through strainers (AS1.1 and AS1.2) during transfer to Tank WB5.

The contents of Acid Tanks AT1.1 and AT1.2 will be continually circulated to avoid phase separation (decanting) of the wastewater during storage. Pump Groups ARP1.1.X and ARP1.2.X will be operated for this purpose. The pumps will also be used to transfer wastewater between the two tanks if necessary. The pump groups were selected based on the following operating conditions:

Pump Groups ARP1.1.X (1+1) and ARP1.2.X (1+1)

- Flowrate = 40 m³/hr (176 gpm)
- Pressure = 1.5 bar (22 psia)

Pump Groups AP1.1.X and AP1.2.X will be used to transfer the wastewater from the two Acid Tanks to Receiving Tank WB5. The pump groups were selected based on the following operating conditions:

Pump Groups AP1.1.X (1+1) & AP1.2.X (1+1)

- Flowrate = 80 m³/hr (352 gpm)
- Pressure = 2 bar (29 psia)

The Acid Tanks will be installed within a secondary containment area. It will be equipped with a collection sump. Any leakage from the process equipment will be captured and transferred via Drain Pump ADP1.1 into the Acid Tanks. The sump pump was selected based on the following operating conditions:

Pump ADP1.1

- Flowrate = 10 m³/hr (44 gpm)
- Pressure = 2 bar (29 psia)

4.4 Alkali Tank AT2

Alkali Tank AT2 will be used to homogenize the in-coming alkaline discharges (Stream #3) from the Facility prior to treatment. The vessel will be configured to receive the following wastewater streams:

- Alkaline discharges (Line EF2).
- Discharges from the alkaline containment area.

In addition, the Alkali Tank can also receive the following stream if necessary:

- Discharges from the sump pits (Line EF3).

The Alkali Tank will be an AST. The vessel will have a capacity of 80 m³ (21,134 gal). The tank will be a new unit. (See Appendix J, Sheet C5.)

The contents of Alkali Tank AT2 will be continually circulated to avoid phase separation (decanting) of the wastewater during storage. Pump group ARP2.X will be operated for this purpose. The pump group was selected based on the following operating conditions:

Pump ARP2.X (1+1)

- Flowrate = 40 m³/hr (176 gpm)
- Pressure = 1.5 bar (22 psia)

Pump Group AP2.X will be used to transfer the wastewater from the Alkali Tank to Receiving Tank WB5. The homogenized alkaline stream can also be directed to Batch Tanks WB7.1 and WB7.2 or to Stabilizer Tank WB6.1, depending on the operating circumstances. The pump group was selected based on the following operating conditions:

Pump AP2.X (1+1)

- Flowrate = 80 m³/hr (352 gpm)
- Pressure = 2 bar (29 psia)

The Alkali Tank will be installed within a secondary containment area. It will be equipped with a collection sump. Any leakage from the process equipment will be captured and transferred via Drain Pump WDP2.1 into the Alkali Tank. The sump pump was selected based on the following operating conditions:

Pump WDP2.1

- Flowrate = 10 m³/hr (44 gpm)
- Pressure = 2 bar (29 psia)

4.5 Receiving Tank WB5

Receiving Tank WB5 is the main collection unit that will be utilized for homogenization of the process wastewater streams (Stage #2). It will be used to combine the following four influent streams: the treated wastewater (Stream #1) from oil removal process (Stage #1); the acid discharges (Stream #2); the alkaline discharges (Stream #3); and the sump pit discharges (Stream #4).

Receiving Tank WB5 will be configured to receive the following wastewater streams:

- Degreased emulsified oily discharges from Emulsion Tanks EB1.1 and EB1.2 (Line E1.1 and Line E1.2).
- Homogenized acid discharges from Acid Tanks AT1.1 and AT1.2 (Line A1).
- Homogenized alkaline discharges from Alkali Tank AT2 (Line A2).
- Discharges from the Sump Pits (Line EF3).
- Discharges from the Laboratory Sump WB11 (Line WD11).
- Discharges from the Basin WB5 containment area.

In addition, the following streams can also be routed to Receiving Basin WB5 if necessary:

- Alkaline discharges (Line EF2).
- Wastewater emptied from Basin WB1.1 prior to cleaning (Line W1).

Receiving Tank WB5 will be an AST. The vessel will have a capacity of 100 m³ (26,417 gal). The tank will be a new unit. (See Appendix J, Sheet C7.)

Receiving Tank WB5 will be equipped for pH adjustment of the wastewater to optimize the downstream metals precipitation process (Stage #3). The vessel will have separate automated dosing systems for sulfuric acid and sodium hydroxide. Other acids and bases may also be used for pH adjustment. The tank will also have a chlorine dosing system for periodic cleaning of the collection basin.

Receiving Basin WB5 will be equipped with a mixer unit (Agitator WAG5.1). It will be operated to improve homogenization of the commingled wastewater streams, facilitate pH adjustment, and avoid precipitation of suspended solids within the tank.

Pump Group WP5.X will be used to transfer the wastewater from Receiving Tank WB5 to Stabilizer Tank WB6.1. The pump group was selected based on the following operating conditions:

Pump Group WP5.X (2+1)

- Flowrate = 50 m³/hr (220 gpm)
- Pressure = 2 bar (29 psia)

Receiving Tank WB5 will be installed within a secondary containment area. It will be equipped with a collection sump. Any leakage from the process equipment will be captured and transferred via Drain Pump WDP5.1 into Tank WB5. The sump pump was selected based on the following operating conditions:

Pump WDP5.1

- Flowrate = 10 m³/hr (44 gpm)
- Pressure = 2 bar (29 psia)

4.6 Stabilizer Tanks WB6.1 and WB6.2

Stabilizer Tanks WB6.1 and WB6.2 will be operated as part of the metals removal process (Stage #3). Wastewater will be continuously pumped from Receiving Basin WB5 to Stabilizer Tank WB6.1. The pH of the wastewater will be adjusted upwards (using a lime slurry and/or sodium hydroxide). A coagulating agent will also be added. The wastewater will then flow by gravity to Stabilizer Tank WB6.2 for additional pH adjustment. A coagulant and/or a flocculating agent will also be added. The pH range used for dissolved metals precipitation will be approximately pH 10-11. The pH-adjusted wastewater will subsequently flow by gravity to the DAF Unit(s).

Stabilizer Tank WB 6.1 will primarily receive the following wastewater stream:

- Homogenized wastewater from Receiving Tank WB5 (Line W5).

In addition, the following streams may also be routed to Stabilizer Tank WB6.1 if necessary:

- Homogenized acid discharges from Acid Tanks AT1.1 and AT1.2 (Line A1).
- Homogenized alkaline discharges from Alkali Tank AT2 (Line A2).
- Treated wastewater from Batch Tanks WB7.1 and WB7.2 (Line W7).
- Water from Basin WB1.1 (Line W1) for purposes of cleaning the Stabilizer Tanks and/or the associated transfer line (WS6).

The two Stabilizer Tanks will be ASTs. Each vessel will have a capacity of 80 m³ (21,134 gal). The tanks will be new units. (See Appendix J, Sheet C8.)

The Stabilizer Tanks will be equipped for pH adjustment of the wastewater. Tank WB6.1 will have separate automated dosing systems for sodium hydroxide, lime slurry and a coagulant. Stabilizer Tank WB6.2 will have separate automated dosing systems for sodium hydroxide, lime slurry, a coagulant and a flocculant. Other acids and bases may also be used for pH adjustment.

To reiterate, the wastewater will flow by gravity through Stabilizer Tanks WB6.1 and WB6.2 to the DAF Unit(s). Pump Group WSP6.X can also be used to transfer water from the two Stabilizer Tanks to Collecting Basin WB2 or Batch Tanks WB7.1 and WB7.2, depending on the operating circumstances. The pump group was selected based on the following operating conditions:

Pump Group WSP6.X (2+ 1)

- Flowrate = 40 m³/hr (176 gpm)
- Pressure = 2 bar (29 psia)

The two Stabilizer Tanks will be installed within a secondary containment area. It will be equipped with a collection sump. Any leakage from the process equipment will be captured and transferred via Drain Pump WDP6.1 into the Stabilizer Tanks. (Pump WDP6.1 will also be used to empty the containment area for the Batch Tanks.) The sump pump was selected based on the following operating conditions:

Pump WDP6.1

- Flowrate = 10 m³/hr (44 gpm)
- Pressure = 2 bar (29 psia)

4.7 DAF Unit DAF2.1

A DAF Unit will be operated as part of the metals removal process (Stage #3). "Micro-bubbles" of air will be injected into the wastewater, which will cause the entrained solids (containing metals) and oil particles to coalesce and float to the surface of the tank for removal. The DAF Unit will receive the following wastewater streams:

- pH-adjusted wastewater from Stabilizer Tank WB6.2.
- pH-adjusted wastewater from Batch Tanks WB7.1 and WB7.2.

At this time, BRS plans to install and operate one DAF Unit (DAF2.1) at the wastewater treatment plant. However, this permit application includes a second DAF Unit (DAF 2.2) as a contingency. This unit may be installed in the future depending on the operating circumstances.

The DAF treatment process will be a continuous operation. Three streams will be generated: treated wastewater; floating solids and oil; and heavy sludge. The clear wastewater will flow by gravity to Transfer Basins WB8.1 and WB8.2 prior to additional solids removal (Stage #4). The floating solids and oil layer will flow by gravity to the adjacent Sludge Processing Area, whereas the heavy sludge layer will be pumped to this same area. The sludge will then be dewatered (Stage #7).

The micro-bubbles of air for the DAF process will be generated by recirculating a portion of the treated wastewater to saturate it with dissolved air at higher-than-atmospheric pressure. This stream will then be returned to the floatation chamber and mixed with the incoming water. The dissolved air will subsequently be released as micro-bubbles as the water returns to atmospheric pressure.

DAF Unit DAF2.1 is a new piece of equipment. It will have an operating capacity of 450 m³/hr (1,981 gpm). A DAF Unit is currently operated as part of the Phase 1 wastewater treatment system; the existing unit will be permanently removed from service. (See Appendix J, Sheet C9.)

Pump Group WSP1.X will be used to transfer the heavy sludge layer collected at the bottom of the DAF Unit to the adjacent Sludge Processing Area. The pump group was selected based on the following operating conditions:

Pump Group WSP1.X (1+1)

- Flowrate = 15 m³/hr (66 gpm)
- Pressure = 2 bar (29 psia)

The NCCW from Collection Basin WB1.1 can be routed to the DAF Unit to clean the sludge transfer line (WS1).

4.8 Transfer Basins WB8.1 and WB8.2

Transfer Basins WB8.1 and WB8.2 will serve as flow equalization basins. The wastewater will subsequently be pumped to Clarifiers WST1 and WST2.

Basins WB8.1 and WB8.2 will receive the following wastewater streams:

- Wastewater effluent from DAF Unit 1.
- Wastewater effluent from DAF Unit 2 (if and when installed).

In addition, the following stream may also be routed to Basins WB8.1 and WB8.2 if necessary:

- Wastewater from Collection Basin WB2.

The two Transfer Basins will be aboveground concrete tanks. Each unit will have a capacity of approximately 50 m³ (13,209 gal). The basins will be new units.

Pump Groups WP8.1.X and WP8.2.X will be used to transfer the wastewater from Transfer Basins WB8.1 and WB8.2 to Clarifiers WST1 and WST2. The pump groups were selected based on the following operating conditions:

Pump Groups WP8.1.X (1+1) and WP8.2.X (1+1)

- Flowrate = 450 m³/hr (1,981 gpm)
- Pressure = 2 bar (29 psia)

4.9 Collection Basin WB1.1

Collection Basin W1.1 will receive the following wastewater stream:

- Non-Contact Cooling Water (Line W1.3).

The NCCW will subsequently be pumped to Aeration Basin WB4 for treatment.

Collection Basin WB1.1 is an aboveground concrete tank. The unit has a storage capacity of 300 m³ (79,252 gal). Basin WB1.1 is an existing tank; some piping changes will be made to implement the Phase 2 wastewater construction project.

Basin WB1.1 will be equipped with a mixer unit (Agitator WAG1.1). It will be operated to prevent precipitation of suspended solids within the tank.

The Collection Basin will be equipped with a chlorine dosing system for periodic cleaning of the unit.

The capacity of Basin WB1.1 is large enough to accommodate the incoming wastewater stream. The tank has the following dimensions:

Collection Basin WB1.1

- Volume = 300 m³ (79,252 gal)
- Length = 15,700 millimeters (mm) (52 feet (ft))
- Width = 7,600 mm (25 ft)
- Height = 3,400 mm (11 ft)
- Height of Water Surface = 2,500 mm (8 ft)

Pump Group WP1.X will be used to transfer the wastewater from Collection Basin WB1.1 to Aeration Basin WB4. The pump group was selected based on the following operating conditions:

Pump Group WP1.X1 (1+1)

- Flowrate = 250 m³/hr (1,101 gpm)
- Pressure = 2 bar (29 psia)

4.10 Collection Basin WB2

Collection Basin WB2 will receive various intermittent wastewater streams. The unit will also be used as a temporary holding basin if necessary. Basin WB2 will be configured to receive the following wastewater streams:

- Contact cooling water discharges (Line W1.2).
- Backwash from the Sand Filters WSF1.X.
- Drainage from the DAF Unit(s).
- Drainage from Stabilizer Tanks WB6.1 and WB6.2.
- Water from Filter Press WSPF2.

The wastewater will subsequently be pumped to Transfer Basins WB8.1 and WB8.2 or Clarifiers WST1 and WST2 for treatment.

Collection Basin WB2 is an aboveground concrete tank. The unit has a storage capacity of 150 m³ (39,626 gal). Basin WB2 is an existing tank; some pump and piping changes will be made to implement the Phase 2 wastewater construction project.

The capacity of Basin WB2 is large enough is enough to accommodate the incoming streams; excess capacity is also provided for the temporary storage of wastewater if needed. The tank has the following dimensions:

Collection Basin WB2

- Volume = 150 m³ (39,626 gal)
- Length = 10,100 mm (33 ft)
- Width = 6,700 mm (22 ft)
- Height = 4,500 mm (15 ft)
- Height of Water Surface = 2,200 mm (7 ft)

Basin WB2 will be equipped with a mixer unit (Agitator WAG2). It will be operated to prevent precipitation of suspended solids within the tank.

Pump Groups WSP2.1.X and WSP2.2.X will be used to transfer wastewater from Collection Basin WB2 to Transfer Basins WB8.1 and WB8.2 and/or to Clarifiers WST1 and WST2. The pump groups were selected based on the following operating conditions:

Pump Groups WSP2.1.X (1+1) and WSP2.2.X (1+1)

- Flowrate = 200 m³/hr (881 gpm)
- Pressure = 1.5 bar (22 psia)

4.11 Clarifiers WST1 and WST2 and Filter Presses WSPF1 and WSPF2

Clarifiers WST1 and WST2 will be used to remove entrained solids from the wastewater (Stage #4) via gravity settling. (The Clarifiers are sometimes referred to as “thickeners.”) These units will receive the following streams:

- Water from Transfer Basin WB8.1 (Line W8.1).
- Water from Transfer Basin WB8.2 (Line W8.2).

The clarifiers will also be configured to receive the following stream:

- Water from Collection Basin WB2.

The treated wastewater from Clarifiers WST1 and WST2 will subsequently flow by gravity to Aeration Basin WB4 for further treatment (Stage #5).

The two clarifiers will be equipped with surface and bottom scrapers to remove floating oils and sludge. The sludge collected in the clarifiers will be pumped to Filter Presses WSPF1 and WSPF2. The sludge will be dewatered; the resulting filter cake will be deposited in roll-off boxes. The filter cake will be managed in accordance with federal, state and local regulatory requirements. The filtered water from the presses will flow by gravity to Basin WB2. The oil layer from the clarifiers will be routed to the Sludge Processing Area.

Clarifier WST1 is an existing aboveground concrete unit. New Clarifier WST2 will be installed as part of the Phase 2 wastewater construction project. It will be equivalent to the existing unit. (See Appendix J, Sheets C10-C12.) The two clarifiers will be operated individually or in parallel depending on the circumstances. The design parameters for each clarifier are provided below:

Clarifiers WST1 and WST2

- Hydraulic residence time = >2.45 hours
- Settling velocity = <1.1 meters/hour (<3.6 feet/hour)

The basic operating dimensions for each clarifier are as follows:

Clarifiers WST1 and WST2

- Volume = 552 m³ (145,823 gal)
- Diameter = 16,000 mm (52 ft)

- Surface area = 201 square meters (m^2) (2,164 square feet) (ft^2)
- Height of water surface from top of sludge cone = 2,500 mm (8 ft)

In the event of a shutdown of the treatment system, each clarifier will have a sludge storage volume of 127 m^3 (33,550 gallons).

Each clarifier will be equipped with a chlorine dosing system for periodic cleaning of the unit.

Filter Press WSPF1 is an existing unit. New Press WSPF2 will be installed as part of the Phase 2 wastewater construction project. It will be equivalent to the existing filter press. (See Appendix J, Sheet C13.)

Sludge Pumps WSP4.1 and WSP4.2 will be used to continuously transfer the sludge from Clarifiers WST1 and WST2 to Filter Presses WSPF1 and WSPF2. The pumps were selected based on the following operating conditions:

Sludge Pumps WSP4.1 and WSP4.2

- Flowrate = $90 \text{ m}^3/\text{hr}$ (396 gpm)
- Pressure = 12 bar (29 psia)

Sludge Pumps WSP4.1 and WSP4.2 will be installed within secondary containment areas. Each area will be equipped with a collection sump. Any leakage from the process equipment will be captured and transferred via Drain Pumps WDP4.1 and WDP4.2 into the respective Clarifier. The sump pumps were selected based on the following operating conditions:

Drain Pumps WDP4.1 and WDP4.2

- Flowrate = $2 \text{ m}^3/\text{hr}$ (9 gpm)
- Pressure = 1 bar (14.5 psia)

4.12 Aeration Basin WB4 and Overflow Basin WB3

The treated wastewater from the Clarifiers (Stage #4) will contain a significant level of dissolved iron in ferrous form (Fe^{+2}). The dissolved iron will be converted via oxidation (Stage #5) to insoluble iron in ferric form (Fe^{+3}) in Aeration Basin WB4. The aerated wastewater will then be routed to the sand filters for solids removal (Stage #6).

Aeration Basin WB4 will receive the following wastewater streams:

- Wastewater from Clarifier WST1 (Line WI4.11).
- Wastewater from Clarifier WST2 (Line WI4.12).
- NCCW from Basin WB1.1 (Line W1).

The aerated wastewater will subsequently flow by gravity to Overflow Basin WB3 prior to treatment in the sand filters.

Aeration Basin WB4 is an existing aboveground concrete tank. Some pump and piping changes will be made to implement the Phase 2 wastewater construction project. (See Appendix J, Sheets C20 and C21.)

Aeration Basin WB4 is subdivided into two interconnected tanks (WB4.1 and WB4.2). The design parameters for the tanks are provided below:

Aeration Tanks WB4.1 and WB4.2

- Hydraulic residence time = >20 minutes
- Minimum height of water surface = 2,000 mm (6.6 ft)

The basic operating dimensions for each aeration tank are as follows:

Aeration Tanks WB4.1 and WB4.2

- Volume = 72.5 m³ (19,152 gal)
- Length = 7,800 mm (26 ft)
- Width = 4,300 mm (14 ft)
- Height = 3,400 mm (11 ft)
- Height of Water Surface = 2,500 mm (8 ft)

Aeration Basin WB4 will be equipped with blowers and fine bubble diffusers. Blower Groups WBP4.1.X and WBP4.2.X will supply the air for the iron oxidization process. The blowers were selected based on the following operating conditions:

Blowers WBP4.1.X (1+1) and WBP4.2.X (1+1)

- Flowrate = 400 normal m³/hr (250 standard cubic feet per minute)
- Pressure = 0.7 bar (10 psia)

Overflow Basin WB3 will receive the gravity discharge from Aeration Basin WB4. It will serve as a holding basin for the aerated water prior to sand filtration.

Basin WB3 will be an aboveground concrete tank. It will have a capacity of 80 m³ (21,134 gal). The tank will be a new unit. (See Appendix J, Sheets C15 through C19.)

Pump Group WP3.X will be used to continuously transfer the wastewater from Overflow Basin WB3 to Sand Filters WSF1.1 through WSF.6. The pump group was selected based on the following operating conditions:

Pump Group WP3.X (1+1)

- Flowrate = 450 m³/hr (1,981 gpm)
- Pressure = 2.5 bar (36 psia)

4.13 Sand Filtration Units WSF1.1 through WSF1.6

The wastewater effluent will be filtered (Stage #6) to remove TSS, primarily the insoluble iron particles generated in the aeration process (Stage #5). The filtered effluent will subsequently be pumped to the Mississippi River and discharged at Outfall 001.

Sand Filtration System WSF1.X will receive the following wastewater stream:

- Aerated water from Overflow Basin WB3

Sand Filtration System WSF1.X will consist of six aboveground filter units (WSF1.1 through WSF1.6). (See Appendix J, Sheet C14.) The individual sand filters will be equipped for multiple operating configurations depending on the circumstances. Any group of three filters will have adequate capacity to treat the wastewater flow from Basin WB3. The design parameters for the filtration equipment are provided below:

Sand Filtration System WSF1.X

- Filtration velocity = ≤ 19 meters per hour (m/hr) (347 feet per minute (ft/min))
- Backwash velocity = 25 m/hr (457 ft/min)
- Air backwash velocity = ≤ 55.8 m/hr (1,020 ft/min)

The basic operating characteristics for the sand filters are as follows:

Sand filters WSF 1.X

- Number of filters = 6
- Diameter of each filter = 3,200 mm (10 ft)
- Height of each filter = 2,000 mm (6.6 ft)
- Total surface area = 7.92 m² (85 ft²)
- Total volume of each filter = 8 m³ (2,113 gal)
- Maximum backwash flow = 200 m³/hr (881 gpm)

Sand Filtration System WSF1.X will be new equipment. A sand filter system is currently operated as part of the Phase 1 wastewater treatment system; the existing system (eight filters) will be replaced with new System WSF1.X.

The sand filters will be periodically backwashed to remove the captured TSS. The equipment will be configured and automatically operated so that some filters remains in service while the other

units are being backwashed. The backwashed units will automatically return to service once the cleaning process has been completed.

As noted in Section 4.12, Pump Group WP3.X will be used to continuously transfer the wastewater through Sand Filters WSF1.1 through WSF.6. The pumps will be located at Overflow Basin WB3. The filtered wastewater effluent will be discharged from the Sand Filters into Collection Basin WB9. It will be used as a holding tank for the effluent prior to discharge to the river. This aboveground concrete tank will have a capacity of 105 m³ (27,738 gal). Basin WB9 will be a new unit. (See Appendix J, Sheets C15 through C19.)

Pump Group WP9.2.X will be used to transfer the final wastewater effluent from Collection Basin WB9 to the Mississippi River. The existing discharge pumps will be utilized. The pumps were selected based on the following operating conditions:

Pump Group WP9.2.X (1+1)

- Flowrate = 450 m³/hr (1,981 gpm)
- Pressure = 2.5 bar (36 psia)

The sand filters will be periodically backwashed to remove the captured TSS. The backwash will be routed to Basin WB2 for treatment.

Pump Group WP9.1.X will be used to backwash the sand filters. The pump group was selected based on the following operating conditions:

Pump Group WP9.1.X (1+1)

- Flowrate = 200 m³/hr (881 gpm)
- Pressure = 2.5 bar (36 psia)

Sand Filtration System WSF1.X will be equipped with an automated hydrogen peroxide dosing system for periodic cleaning of the filtration units. It will be connected to the wastewater inlet line (W3) to the filters and to the backwash inlet line (W9.1).

4.14 Sludge Processing Area

The Sludge Processing Area will be installed adjacent to the Emulsion Tanks and DAF Unit(s). It will be used for dewatering of the sludge prior to reuse, reclamation or disposal of the material.

The Sludge Processing Area will receive the following wastewater streams:

- Oil layer from Emulsion Tanks EB1.1 and EB1.2.
- Sludge and floating solids from DAF Unit DAF2.1 (and DAF2.2, if and when installed).
- Oil layers from Clarifiers WST1 and WST2.

The sludge from the Emulsion Tanks and DAF Unit(s) will flow by gravity to the Sludge Processing Area. The Emulsion Tanks will also have moving wipers to transfer the floating sludge layer to the dewatering pad. The oil from the Clarifiers will be pumped to the drying area.

The Sludge Processing Area will be a new unit. It will consist of a concrete pad with secondary containment. The Area will be approximately 25 meters long by 16 meters wide (82 feet by 52 feet). It will be equipped with a truck loading station.

If necessary, the sludge will be solidified by adding wood chips. The Sludge Processing Area will be equipped with a wood pellets silo, a conveyor, and mixing equipment for this purpose. BRS may also utilize other suitable absorbent materials for solidification of wastewater sludge. The dewatered sludge will be managed in accordance with federal, state and local regulatory requirements.

Oil and water from the sludge drying pad will flow by gravity to the Sludge Processing Pit (WB10). The material will subsequently be transferred to the Emulsion Tanks for treatment. Pump Group WSP10.X will be operated for this purpose. The pump group was selected based on the following operating conditions:

Pump Group WSP10.X (1+1)

- Flowrate = 25 m³/hr (110 gpm)
- Pressure = 2 bar (29 psia)

5.0 Ancillary Equipment

The modified wastewater treatment system will include a wide range of ancillary equipment. The supporting process units will include the following:

- Caustic System
- Lime Slurry System
- Chlorine System, Wastewater Building
- Chlorine System, Clarifiers Area
- Peroxide System
- Wood Pellets System
- Sulfuric Acid System
- Roll Shop Receiving Tank
- Lubricant Tank

It is important to note that BRS will operate chemical feed systems for the pH adjustment of various wastewater streams. Several acidic and alkaline materials (sodium hydroxide, lime slurry, etc.) will be dispensed from bulk storage tanks to small tote bins operated at the chemical feed points. These points will be equipped with automated feed pumps, pH meters, and controllers to

provide the proper dosage of chemicals. Depending on the operating requirements, certain wastewater treatment materials may be dispensed directly from tote bins via automated chemical feed systems; these units will not be connected to the bulk tanks.

BRS will also utilize chlorine and hydrogen peroxide for the cleaning of certain wastewater treatment equipment. These chemicals will also be dispensed from bulk storage tanks to tote bins equipped with automated chemical feed pumps and controllers.

The ancillary equipment is briefly described in the following paragraphs:

5.1 Caustic System

Aqueous sodium hydroxide solution ("caustic") will be used for pH adjustment of various wastewater streams. The "caustic circuit" will include two storage tanks, two recirculation pumps, and a pipe network which will dispense the chemical to local tote bins equipped with feed pumps. The system will provide caustic to the following locations:

- Receiving Tank WB5
- Emulsion Tanks EB1.1 and EB1.2
- Stabilizer Tanks WB6.1 and WB6.2
- Batch Tanks WB7.1 and WB7.2

Two bulk Caustic Storage Tanks, DT 2.1 and DT 2.2, will be operated at the wastewater treatment building. The capacity of each tank will be 25 m³ (6,500 gallons). The caustic tanks will be constructed of fiberglass reinforced plastic (FRP). The storage tanks will be new units. (See Appendix J, Sheet C23.)

Pump Group DAP 2.X will be used to transfer the sodium hydroxide solution. The pumps were selected based on the following operating conditions:

Pump Group DAP 2.X (1+1)

- Flowrate = 2.2 m³/hr (9.7 gpm)
- Pressure = 2 bar (29 psia)

5.2 Lime Slurry System

An aqueous calcium hydroxide (lime) slurry will be used for pH adjustment of various wastewater streams. The "lime slurry circuit" will include one storage silo, one auger to dose dry lime, one tank with mixer to prepare the lime slurry, two recirculation pumps, and a pipe network which will dispense the chemical to local tote bins equipped with feed pumps. The system will provide lime slurry to the following locations:

- Stabilizer Tanks WB6.1 and WB6.2
- Batch Tanks WB7.1 and WB7.2

BRS may also utilize lime slurry for pH adjustment in other treatment tanks depending on the operating requirements.

One bulk Lime Storage Silo, DT 3.1, will be operated at the wastewater treatment building. The capacity of the vessel will be 27,215 kilograms (60,000 pounds). The silo will be constructed of steel. The storage vessel will be a new unit. (See Appendix J, Sheet C24.)

One Lime Slurry Tank, DT 3.2, will be operated adjacent to the silo. The capacity of the vessel will be 4 m³ (1,000 gallons). The silo will be constructed of FRP. The mixing vessel will be a new unit.

Pump Group DAP 3.X will be used to transfer the lime slurry. The pumps were selected based on the following operating conditions:

Pump Group WP 3.X (1+1)

- Flowrate = 10 m³/hr (44 gpm)
- Pressure = 2 bar (29 psia)

The lime slurry will be continually circulated to avoid settling in the pipe network.

5.3 Chlorine System, Wastewater Building

A concentrated chlorine solution will be used for periodically cleaning the wastewater treatment tanks and associated piping. The "chlorine circuit" will include one storage tank, two recirculation pumps, and a pipe network which will dispense the chemical to local tote bins equipped with feed pumps. The system will provide chlorine to the following locations:

- Receiving Tank WB5
- Emulsion Tanks EB1.1 and EB1.2
- Stabilizer Tanks WB6.1 and WB6.2
- Batch Tanks WB7.1 and WB7.2

One bulk Chlorine Storage Tank, DT 4, will be operated in the wastewater treatment building. The capacity of the tank will be 4 m³ (1,000 gallons). The chlorine tank will be constructed of FRP. The storage tank will be a new unit. (See Appendix J, Sheet C25.)

Pump Group DAP 4.X will be used to transfer the chlorine solution. The pumps were selected based on the following operating conditions:

Pump Group DAP 4.X (1+1)

- Flowrate = To be determined
- Pressure = 2 bar (29 psia)

5.4 Chlorine System, Clarifiers Area

A chlorine solution will also be used for periodically cleaning the clarifiers (thickeners). The chlorine circuit will include one storage tank, two recirculation pumps, and a pipe network which will dispense the chemical to local tote bins equipped with feed pumps. The system will provide chlorine to the following locations:

- Clarifier WST1
- Clarifier WST2

One bulk Chlorine Storage Tank, DT 6, will be operated in the clarifiers area. The capacity of the tank will be 21 m³ (5,500 gallons). The chlorine tank will be constructed of FRP. The storage tank will be a new unit. (See Appendix J, Sheet C26.)

Pump Group DAP 6.X will be used to transfer the chlorine solution. The pumps were selected based on the following operating conditions:

Pump Group DAP 6.X (1+1)

- Flowrate = To be determined
- Pressure = 2 bar (29 psia)

5.5 Peroxide System

An aqueous hydrogen peroxide system will be used for periodically cleaning the sand filters and associated piping. The "peroxide circuit" will include one storage tank, two recirculation pumps, and a pipe network which will dispense the chemical. The system will provide peroxide to the following locations:

- Sand filters main inlet line (W3 line)
- Sand filters backwash inlet line (W9.1 line)

One bulk Peroxide Storage Tank, DT 5, will be installed at the wastewater treatment building. The capacity of the tank will be 25 m³ (6,600 gallons). The peroxide tank will be constructed of a suitable material. The storage tank will be a new unit. (See Appendix J, Sheet C27.)

Pump Group DAP 5.X will be used to transfer the peroxide solution. The pumps were selected based on the following operating conditions:

Pump Group DAP 5.X (1+1)

- Flowrate = To be determined
- Pressure = 2 bar (29 psia)

5.6 Wood Pellets System

Wood pellets will be used to solidify wet wastewater treatment sludge. The wood pellets system will include one storage silo and one auger to add the pellets to the sludge. The system will provide wood pellets to the following location:

- Sludge Processing Area

One pellet storage silo, DT 7, will be operated adjacent to the drying area. The capacity of the vessel will be 18,144 kilograms (40,000 pounds). The silo will be constructed of steel. The storage vessel will be a new unit. The pellet auger and pellet handling equipment will also be new. (See Appendix J, Sheet C28.)

BRS may utilize other suitable absorbent materials for solidification of wastewater sludge at the treatment plant.

5.7 Sulfuric Acid System

An aqueous sulfuric acid solution will be used for pH adjustment of various wastewater streams.

The design and operating characteristics for the sulfuric acid circuit have not yet been determined.

5.8 Roll Shop Receiving Tank

The Roll Shop Receiving Tank, WRLT1, will be used to store used oil generated in the Hot Mill Roll Shop. The material will subsequently be transferred to the adjacent Lubricant Tank for storage pending shipment off-site for recycling or disposal.

The Roll Shop Receiving Tank will be operated at the wastewater treatment building. The capacity of the tank will be 25 m³ (6,500 gallons). The storage tank will be constructed of steel. The vessel will be a new unit. (See Appendix J, Sheet C22.)

Pump Group WRLP1.X will be used to transfer the waste oil to the Lubricant Tank. The pumps were selected based on the following operating conditions:

Pump Group WRLP1.X (1+1)

- Flowrate = 35 m³/hr (154 gpm)
- Pressure = 1 bar (14.5 psia)

The Roll Shop Receiving Tank will be installed within a secondary containment area. It will be equipped with a collection sump. Any leakage from the process equipment will be captured and transferred via Drain Pump WDRLP1 into the Receiving Tank. The sump pump was selected based on the following operating conditions:

Pump WDRLP1

- Flowrate = 10 m³/hr (44 gpm)
- Pressure = 1.1 bar (16 psia)

5.8 Lubricant Tank

The Lubricant Tank, WLT1, will be used to store used oil generated in the Hot Mill Roll Shop and various other locations throughout the Facility. The material will subsequently be shipped off-site for recycling or disposal.

The Lubricant Tank will be operated at the wastewater treatment building. The capacity of the tank will be 25 m³ (6,500 gallons). The storage tank will be constructed of steel. The vessel will be a new unit. (See Appendix J, Sheet C22.)

Pump WLP1.1 will be used to transfer the waste oil from the Lubricant Tank to a tank truck for shipment off-site. The pump was selected based on the following operating conditions:

Pump WLP1.1

- Flowrate = 35 m³/hr (154 gpm)
- Pressure = 1 bar (14.5 psia)

The Lubricant Tank will be installed within a secondary containment area. It will be equipped with a collection sump. Any leakage from the process equipment will be captured and transferred via Drain Pump WDLP1 into the Lubricant Tank. The sump pump was selected based on the following operating conditions:

Pump WDLP1

- Flowrate = 10 m³/hr (44 gpm)
- Pressure = 1.1 bar (16 psia)

Upon request, BRS will provide DEQ with all available information, including additional equipment specifications, deemed necessary for completing the wastewater permitting process. This documentation will be forwarded to the Office of Water Quality in a timely manner.

Table D-1 – Summary of Wastewater Streams Discharged to Treatment System

Stream	Process Area (Project Phase)	Type	Estimated Average Flow m ³ /hr (gpm)	Estimated Maximum Flow m ³ /hr (gpm)	Frequency	Influent Characteristics
Emulsified Oily Discharges (Stream #1)	Entire Facility (Phase 1)	Emulsion	Not Available	60 (264)	Intermittent	Existing Stream
Acid Discharges (Stream #2)	Entire Facility (Phase 1)	Acid	Not Available	35 (154)	Continuous	Existing Stream
Alkaline Discharges (Stream #3)	Entire Facility (Phase 1)	Sumps and Alkaline Flows	Not Available	30 (132)	Continuous	Existing Stream
Sump Pit Discharges (Stream #4)	Entire Facility (Phase 1)	Groundwater	Not Available	50 (220)	Continuous	Existing Stream
Emulsified Oily Discharges (#1)	ACL Annealing and Coating (Phase 2)	WW1 Cleaning	3 (13)	40 (176)	Intermittent	pH-value ≈ 10-14 SU; Cleaning agent = 0.5% NaOH max.; Iron fines (TSS) = <500 mg/L; Temp. = 85° C
Emulsified Oily Discharges (#1)	DCL1+MgO Decarb. and Coating (Phase 2)	WW1 Cleaning	3 (13)	40 (176)	Intermittent	pH-value ≈ 14 SU; Iron fines = <500 mg/L; Roll. emulsion = 5-7 g/L; Temp. = 85° C

Table D-1 – Summary of Wastewater Streams Discharged to Treatment System

Stream	Process Area (Project Phase)	Type	Estimated Average Flow m ³ /hr (gpm)	Estimated Maximum Flow m ³ /hr (gpm)	Frequency	Influent Characteristics
Acid Discharges (#2)	APL Annealing and Pickling Line (Phase 2)	WAC Pickling Line	3 (13)	10 (44)	Continuous	pH value ≈ <1 SU; HCl = 200-220 g/L; Fe = 100-130 g/L; SiO ₂ = 9 g/L; Temp. = 90° C
Acid Discharges (#2)	APL Annealing and Pickling Line (Phase 2)	WWR Rinse Water	4 (18)	10 (44)	Continuous	pH value ≈ 1-2 SU; HCl = 0-20 g/L; Fe = 0-10 g/L; SiO ₂ = 3 g/L max.; Temp. = 90° C
Alkaline Discharges (#3)	APL Annealing and Pickling Line (Phase 2)	WWA Pickling Line	10 (44)	30 (132)	Continuous	pH value ≈ >7 SU; NaOH = <1%; Fe and SiO ₂ residuals; Temp. = 60° C
Alkaline Discharges (#3)	ACL Annealing and Coating (Phase 2)	WW2 Cleaning	3 (13)	40 (176)	Intermittent	pH-value ≈ 10-14 SU; Cleaning agent = 0.5% NaOH max.; Iron fines = <100 mg/L; Temp. = 85° C
Alkaline Discharges (#3)	FCL Flattening and Coating (Phase 2)	WW2 Cleaning	25 (110)	40 (176)	Intermittent	pH value ≈ >7 SU; MgO = 10 g/L max., 2 g/L avg.; Fe = 1% max., 0.3% avg.; Temp. = 85° C

Table D-1 – Summary of Wastewater Streams Discharged to Treatment System

Stream	Process Area (Project Phase)	Type	Estimated Average Flow m ³ /hr (gpm)	Estimated Maximum Flow m ³ /hr (gpm)	Frequency	Influent Characteristics
Alkaline Discharges (#3)	DCL1+MgO Decarb. and Coating (Phase 2)	WW2 Cleaning	3 (13)	40 (176)	Intermittent	pH-value ≈ 10-14 SU; Cleaning agent = 0.5% NaOH max.; Iron fines = <100 mg/L; Roll. emulsion = 5-7 g/L; Temp. = 85° C
Alkaline Discharges (#3)	DCL1+MgO Decarb. and Coating (Phase 2)	WW3 Coating Equipment	0	20 (88)	Intermittent	pH-value ≈ 7-10 SU; Coating agent = 150 g/L max. MgO, traces of CaO, Cl, SO ₄ ⁻² , B ₂ O ₃ , Mn, Fe, Al; Temp. = 40° C
Alkaline Discharges (#3)	APL Annealing and Pickling Line (Phase 2)	Condensate	Not Available	3.5 (15)	Intermittent	To Be Determined
Alkaline Discharges (#3)	ACL Annealing and Coating (Phase 2)	Condensate	Not Available	3.5 (15)	Intermittent	To Be Determined
Alkaline Discharges (#3)	FCL Flattening and Coating (Phase 2)	Condensate	Not Available	3.5 (15)	Intermittent	To Be Determined
Alkaline Discharges (#3)	HTA High-Temperature Annealing (Phase 2)	Condensate	Not Available	3.5 (15)	Intermittent	To Be Determined

Table D-1 – Summary of Wastewater Streams Discharged to Treatment System

Stream	Process Area (Project Phase)	Type	Estimated Average Flow m ³ /hr (gpm)	Estimated Maximum Flow m ³ /hr (gpm)	Frequency	Influent Characteristics
Alkaline Discharges (#3)	DCL1+MgO Decarb. and Coating (Phase 2)	Condensate	Not Available	3.5 (15)	Intermittent	To Be Determined
Sump Pit Discharges (#4)	APL Annealing and Pickling Line (Phase 2)	Industrial Water Pit Furnace	2 (9)	12 (53)	Intermittent	To Be Determined; T=40° C
Sump Pit Discharges (#4)	ACL Annealing and Coating (Phase 2)	Industrial Water Pit Furnace	4 (18)	4 (18)	Intermittent	To Be Determined; T=70° C
Sump Pit Discharges (#4)	ACL Annealing and Coating (Phase 2)	WW3 Coating Equipment	0	20 (88)	Intermittent	To Be Determined; T=40° C
Sump Pit Discharges (#4)	FCL Flattening and Coating (Phase 2)	Industrial Water Pit Furnace	4 (18)	4 (18)	Intermittent	To Be Determined; T=70° C
Sump Pit Discharges (#4)	DCL1+MgO Decarb. and Coating (Phase 2)	Industrial Water Pit Furnace	4.1 (18)	4.2 (18)	Intermittent	To Be Determined; T=70° C
Sump Pit Discharges (#4)	HTA High- Temperature Annealing (Phase 2)	WWF	Not Available	75 (330)	Intermittent	To Be Determined

Table D-1 – Summary of Wastewater Streams Discharged to Treatment System

Stream	Process Area (Project Phase)	Type	Estimated Average Flow m ³ /hr (gpm)	Estimated Maximum Flow m ³ /hr (gpm)	Frequency	Influent Characteristics
Sump Pit Discharges (#4)	APL Annealing and Pickling Line (Phase 2)	Groundwater	Not Available	8 (35)	Intermittent	To Be Determined
Sump Pit Discharges (#4)	ACL Annealing and Coating (Phase 2)	Groundwater	Not Available	8 (35)	Intermittent	To Be Determined
Sump Pit Discharges (#4)	FCL Flattening and Coating (Phase 2)	Groundwater	Not Available	8 (35)	Intermittent	To Be Determined
Sump Pit Discharges (#4)	HTA High-Temperature Annealing (Phase 2)	Groundwater	Not Available	8 (35)	Intermittent	To Be Determined
Sump Pit Discharges (#4)	DCL1+MgO Decarb. and Coating (Phase 2)	Groundwater	Not Available	8 (35)	Intermittent	To Be Determined
Filter Backwash (Stream #5)	Phases 1 and 2	Total Non-Contact Backwash W1.1	46 (202)	Not Available	Intermittent	Dirty process water with TSS
Contact Cooling Water (Stream #6)	Phases 1 and 2	Total Contact Blowdown W1.2	43 (189)	Not Available	Continuous	Dirty process water with TSS

Table D-1 – Summary of Wastewater Streams Discharged to Treatment System

Stream	Process Area (Project Phase)	Type	Estimated Average Flow m ³ /hr (gpm)	Estimated Maximum Flow m ³ /hr (gpm)	Frequency	Influent Characteristics
Non-Contact Cooling Water (Stream #7)	Phases 1 and 2	Total Non- Contact Blowdown W1.3	77 (339)	Not Available	Continuous	Not turbid

m³/hr = Cubic Meters per Hour

gpm = Gallons per Minute

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APPENDIX E – PROJECTED TECHNOLOGY-BASED AND WATER QUALITY-BASED PERMIT LIMITATIONS FOR OUTFALL 001

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Appendix E

Projected Technology-based and Water Quality-based Mass Permit Limitations for Outfall 001

BRS operates the Osceola facility under the authority of NPDES Permit No. AR0052582. The process wastewater from the steel manufacturing operations is treated on-site. The effluent from the wastewater treatment plant is discharged to the Mississippi River at Outfall 001.

The process wastewater effluent is subject to the Effluent Limitations Guidelines for the Iron and Steel Manufacturing Point Source Category (40 Code of Federal Regulations, Part 420). Several industrial subcategories are applicable to BRS. The Effluent Guidelines establish mass discharge limitations (i.e., pounds per day limits) for certain wastewater parameters. The discharge limits are based on the production levels for the applicable subcategories, and on the wastewater treatment technologies utilized and their performance levels. The current NPDES permit for BRS includes technology-based effluent limits for a number of wastewater constituents.

The process wastewater effluent must also comply with the requirements of the Arkansas water quality standards (Arkansas Pollution Control and Ecology Commission Regulation No. 2).

The calculated technology-based and water quality-based mass permit limits for Outfall 001 for the Phase 2 project are provided herein for the reviewer's convenience. The limitations reflect the proposed manufacturing levels and wastewater discharge flow rate. The anticipated effluent permit limits for selected wastewater constituents for the Phase 2 project are presented in the following tables. The engineering calculations are also enclosed.

Please refer to the Statement of Basis for current NPDES Permit No. AR0052582 dated October 14, 2016 for a discussion of the development of the technology-based and water quality-based permit limits for Outfall 001 for the Phase 1 project (construction of initial facility).

Table E-1 – Comparison of Technology-based and Water Quality-based Mass Limits
for Selected Pollutants

Parameter	Technology-based Limits		Water Quality-based Limits	
	Monthly Average Limit (lb/day)	Daily Maximum Limit (lb/day)	Monthly Average Limit (lb/day)	Daily Maximum Limit (lb/day)
Total Suspended Solids	585.31	1,514.91	NA	NA
Oil & Grease	195.38	461.00	237.90	356.90
Chromium, Total	0.24	0.59	NA	NA
Chromium, Hexavalent	0.07	0.20	534.58	1,072.61
Lead, Total	1.40	4.19	1,876.52	3,765.14
Nickel, Total	0.18	0.53	51,748	103,831
Zinc, Total	2.00	6.01	10,855	21,780
Naphthalene	0.03	0.06	194,281	389,814
Tetrachloroethylene	0.04	0.09	373,376	749,158

NA = Not Applicable

Table E-2 – Anticipated Effluent Limits for Outfall 001 (Monthly Average Mass Values)

Parameter	Monthly Average Limit (lb/day)	Basis of Limit
Total Suspended Solids	585.31	Technology-based Limit
Oil & Grease	195.38	Technology-based Limit
Chromium, Total	0.24	Technology-based Limit
Chromium, Hexavalent	0.07	Technology-based Limit
Lead, Total	1.40	Technology-based Limit
Nickel, Total	0.18	Technology-based Limit
Zinc, Total	2.00	Technology-based Limit
Naphthalene	0.03	Technology-based Limit
Tetrachloroethylene	0.04	Technology-based Limit

Table E-3 – Anticipated Effluent Limits for Outfall 001 (Daily Maximum Mass Values)

Parameter	Daily Maximum Limit (lb/day)	Basis of Limit
Total Suspended Solids	1,514.91	Technology-based Limit
Oil & Grease	356.90	Water Quality-based Limit
Chromium, Total	0.59	Technology-based Limit
Chromium, Hexavalent	0.20	Technology-based Limit
Lead, Total	4.19	Technology-based Limit
Nickel, Total	0.53	Technology-based Limit
Zinc, Total	6.01	Technology-based Limit
Naphthalene	0.06	Technology-based Limit
Tetrachloroethylene	0.09	Technology-based Limit

Title 40: Protection of Environment
PART 420—IRON AND STEEL MANUFACTURING POINT SOURCE CATEGORY

Harbor Environmental
BRS Permit Limit Projections
Phase 2
Revised October 2019

Subpart D—Steelmaking Subcategory

§420.44 New source performance standards (NSPS)

(a) *Basic oxygen furnace steelmaking—semi-wet combustion; and electric arc furnace steelmaking—semi-wet.*

Pollutant or pollutant property	Maximum for any 1 day	Average of daily values for 30 consecutive days			Mass, Max.	Mass, Monthly
	Kg/kg (pounds per 1,000 lb) of product		Production	Units	Daily (lb/day)	Avg. (lb/day)
TSS	0	0	22,464	1000 lb/day	0.00	0.00
Lead	0	0	22,464	1000 lb/day	0.00	0.00
Zinc	0	0	22,464	1000 lb/day	0.00	0.00
pH	0.0	0.0				

Discharge of pollutants from semi-wet basic oxygen furnace steelmaking to navigable waters is prohibited.

Subpart E—Vacuum Degassing Subcategory

§420.54 New source performance standards (NSPS)

Pollutant or pollutant property	Maximum for any 1 day	Average of daily values for 30 consecutive days			Mass, Max.	Mass, Monthly
	Kg/kg (pounds per 1,000 lb) of product		Production	Units	Daily (lb/day)	Avg. (lb/day)
TSS	0.0073	0.00261	4,494	1000 lb/day	32.81	11.73
Lead	0.0000939	0.0000313	4,494	1000 lb/day	0.42	0.14
Zinc	0.000141	0.0000469	4,494	1000 lb/day	0.63	0.21
pH	6.0 MIN	9.0 MAX				

Subpart F—Continuous Casting Subcategory

§420.64 New source performance standards (NSPS).

Pollutant or pollutant property	Maximum for any 1 day	Average of daily values for 30 consecutive days			Mass, Max.	Mass, Monthly
	Kg/kg (pounds per 1,000 lb) of product		Production	Units	Daily (lb/day)	Avg. (lb/day)
TSS	0.0073	0.00261	22,464	1000 lb/day	163.99	58.63
O&G	0.00313	0.00104	22,464	1000 lb/day	70.31	23.36
Lead	0.0000939	0.0000313	22,464	1000 lb/day	2.11	0.70
Zinc	0.000141	0.0000469	22,464	1000 lb/day	3.17	1.05
pH	6.0 MIN	9.0 MAX				

Subpart G—Hot Forming Subcategory

§420.74 New source performance standards (NSPS).

(c) *Flat mills* —(1) Hot strip and sheet mills, carbon and specialty.

Pollutant or pollutant property	Maximum for any 1 day	Average of daily values for 30 consecutive days			Mass, Max.	Mass, Monthly
	Kg/kg (pounds per 1,000 lb) of product		Production	Units	Daily (lb/day)	Avg. (lb/day)
TSS	0.0435	0.0163	22,464	1000 lb/day	977.18	366.16
O&G	0.0109	0.00545	22,464	1000 lb/day	244.86	122.43
pH	6.0 MIN	9.0 MAX				

Monthly average factor for O&G was calculated by ADEQ permit engineer in 2015.

Subpart I—Acid Pickling Subcategory

§420.94 New source performance standards (NSPS).

(b) *Hydrochloric acid pickling (spent acid solutions & rinse waters) —(4) Fume scrubbers*

Pollutant or pollutant property	Maximum for any 1 day	Average of daily values for 30 consecutive days			Mass, Max.	Mass, Monthly
	Kg per day per Fume Scrubber		No. of Fume Scrubbers		Daily (lb/day)	Avg. (lb/day)
TSS	5.72	2.45	2		25.22	10.80
O&G	2.45	0.819			10.80	3.61
Lead	0.0368	0.0123			0.16	0.05
Zinc	0.0491	0.0164			0.22	0.07
pH	6.0 MIN	9.0 MAX				

Limits for acid pickling subcategory are not production based; they are based on number of fume scrubbers operated.

Subpart J—Cold Forming Subcategory

§420.104 New source performance standards (NSPS).

(a) *Cold rolling mills —(2) Recirculation—multiple stands.*

Pollutant or pollutant property	Maximum for any 1 day	Average of daily values for 30 consecutive days			Mass, Max.	Mass, Monthly
	Kg/kg (pounds per 1,000 lb) of product		Production	Units	Daily (lb/day)	Avg. (lb/day)
TSS	0.0025	0.00125	14,088	1000 lb/day	35.22	17.61
O&G	0.00104	0.000417	14,088	1000 lb/day	14.65	5.87
Chromium	0.0000418	0.0000167	14,088	1000 lb/day	0.59	0.24
Lead (NA)	0.0000188	0.0000063	14,088	1000 lb/day	0.26	0.09
Nickel	0.0000376	0.0000125	14,088	1000 lb/day	0.53	0.18
Zinc (N/A)	0.0000125	0.0000042	14,088	1000 lb/day	0.18	0.06
Naphthalene	0.0000042	0.0000021	14,088	1000 lb/day	0.06	0.03
Tetrachloroethylene	0.0000063	0.00000315	14,088	1000 lb/day	0.09	0.04
pH	6.0 MIN	9.0 MAX				

Limits for chromium and nickel apply in lieu of limits for lead and zinc when cold rolling wastewaters are treated with descaling or comb. acid pickling wastewaters.

Monthly average factors for naphthalene and tetrachloroethylene were calculated by ADEQ permit engineer in 2015.

Subpart K—Alkaline Cleaning Subcategory

§420.114 New source performance standards (NSPS).

(a) *Batch and continuous.*

Pollutant or pollutant property	Maximum for any 1 day	Average of daily values for 30 consecutive days			Mass, Max.	Mass, Monthly
	Kg/kg (pounds per 1,000 lb) of product		Production	Units	Daily (lb/day)	Avg. (lb/day)
TSS	0.0146	0.00626	3,288	1000 lb/day	48.00	20.58
O&G	0.00626	0.00209	3,288	1000 lb/day	20.58	6.87
pH	6.0 MIN	9.0 MAX				

Subpart L—Hot Coating Subcategory

§420.124 New source performance standards (NSPS).

(a) Galvanizing,terne coating and other coatings—(1) Strip, sheet, and miscellaneous products.

Pollutant or pollutant property	Maximum for any 1 day	Average of daily values for 30 consecutive days			Mass, Max.	Mass, Monthly
	Kg/kg (pounds per 1,000 lb) of product		Production	Units	Daily (lb/day)	Avg. (lb/day)
TSS	0.0438	0.0188	5,308	1000 lb/day	232.49	99.79
O&G	0.0188	0.00626	5,308	1000 lb/day	99.79	33.23
Lead	0.000282	0.0000939	5,308	1000 lb/day	1.50	0.50
Zinc	0.000376	0.000125	5,308	1000 lb/day	2.00	0.66
Chromium (hexavalent)	0.0000376	0.0000125	5,308	1000 lb/day	0.20	0.07
pH	6.0 MIN	9.0 MAX				

TOTAL VALUES

	Mass, Max Daily (lb/day)	Mass, Monthly Avg. (lb/day)	Flow Rate MGD	Max. Daily (mg/L)	Monthly Avg. (mg/L)	Max. Daily (µg/L)	Monthly Avg. (µg/L)
TSS	1,514.91	585.31	2.853	63.67	24.60	63,667.83	24,599.02
O&G	461.00	195.38	2.853	19.37	8.21	19,374.51	8,211.19
Chromium	0.59	0.24	2.853	0.02	0.01	24.75	9.89
Chromium (hexavalent)	0.20	0.07	2.853	0.01	0.00	8.39	2.79
Lead	4.19	1.40	2.853	0.18	0.06	176.11	58.69
Nickel	0.53	0.18	2.853	0.02	0.01	22.26	7.40
Zinc	6.01	2.00	2.853	0.25	0.08	252.73	84.06
Naphthalene	0.06	0.03	2.853	0.00	0.00	2.49	1.24
Tetrachloroethylene	0.09	0.04	2.853	0.00	0.00	3.73	1.87
pH	6.0 MIN	9.0 MAX					

Mass limits for lead do not include contribution from Subpart J; loadings of chromium and nickel are used as alternatives.

Mass limits for zinc do not include contribution from Subpart J; loadings of chromium and nickel are used as alternatives.

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Water Quality-based Effluent Limits for Oil and Grease

Effluent Concentration Limits

= 10 mg/L (monthly average)

= 15 mg/L (daily maximum)

per Regulation 2, Section 2.510

Effluent Flow Rate

= 2.853 MGD

Effluent Mass Limits

= (Concentration limit in mg/L) * (Flow rate in MGD) * (8.34 conversion factor)

= (10 mg/L) * (2.853 MGD) * (8.34)

= 237.9 lb/day (monthly average)

= (15 mg/L) * (2.853 MGD) * (8.34)

= 356.9 lb/day (daily maximum)

Water Quality-based Effluent Limits for PPS Organic Compounds

Effluent Mass Limits for Phase 1

Naphthalene

= 78,339 lb/day (monthly average)

= 157,183 lb/day (daily maximum)

Tetrachloroethylene

= 150,555 lb/day (monthly average)

= 302,080 lb/day (daily maximum)

per current NPDES permit, statement of basis

Design Effluent Flow Rate

= 2.853 MGD (proposed)

= 1.150 MGD (current)

Revised Effluent Mass Limits for Phase 2

= (previous mass limit) * (proposed flow rate in MGD) ÷ (current flow rate in MGD)

Naphthalene

= (78,339 lb/day) * (2.853 MGD) ÷ (1.150 MGD)

= 194,281 lb/day (monthly average)

= (157,183 lb/day) * (2.853 MGD) ÷ (1.150 MGD)

= 389,814 lb/day (daily maximum)

Tetrachloroethylene

= (150,555 lb/day) * (2.853 MGD) ÷ (1.150 MGD)

= 373,376 lb/day (monthly average)

= (302,080 lb/day) * (2.853 MGD) ÷ (1.150 MGD)

= 749,158 lb/day (daily maximum)

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Comparison of Technology-based and Water Quality-based Mass Limits for Selected Pollutants

Parameter	Technology-based Limits		Water Quality-based Limits	
	Monthly Average Limit (lb/day)	Daily Maximum Limit (lb/day)	Monthly Average Limit (lb/day)	Daily Maximum Limit (lb/day)
Total Suspended Solids	585.31	1,514.91	N/A	N/A
Oil & Grease	195.38	461.00	237.90	356.90
Chromium, Total	0.24	0.59	N/A	N/A
Chromium, Hexavalent	0.07	0.20	534.58	1,072.61
Lead, Total	1.40	4.19	1,876.52	3,765.14
Nickel, Total	0.18	0.53	51,748.92	103,831.70
Zinc, Total	2.00	6.01	10,855.02	21,780.08
Naphthalene	0.03	0.06	194,281.00	389,814.00
Tetrachloroethylene	0.04	0.09	373,376.00	749,158.00

Water quality-based limits for hexavalent chromium, lead, nickel and zinc were calculated using DEQ's permit limit calculation spreadsheet (attached).

Anticipated Limits Parameter	Monthly Average Mass	
	lb/day	Basis of Limit
Total Suspended Solids	585.31	Technology-based Limit
Oil & Grease	195.38	Technology-based Limit
Chromium, Total	0.24	Technology-based Limit
Chromium, Hexavalent	0.07	Technology-based Limit
Lead, Total	1.40	Technology-based Limit
Nickel, Total	0.18	Technology-based Limit
Zinc, Total	2.00	Technology-based Limit
Naphthalene	0.03	Technology-based Limit
Tetrachloroethylene	0.04	Technology-based Limit

Anticipated Limits Parameter	Daily Maximum Mass	
	lb/day	Basis of Limit
Total Suspended Solids	1,514.91	Technology-based Limit
Oil & Grease	356.90	Water Quality-based Limit
Chromium, Total	0.59	Technology-based Limit
Chromium, Hexavalent	0.20	Technology-based Limit
Lead, Total	4.19	Technology-based Limit
Nickel, Total	0.53	Technology-based Limit
Zinc, Total	6.01	Technology-based Limit
Naphthalene	0.06	Technology-based Limit
Tetrachloroethylene	0.09	Technology-based Limit

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	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	CALCULATIONS OF ARKANSAS WATER QUALITY-BASED EFFLUENT LIMITATIONS															
2	The spreadsheet logic will function correctly when ALL yellow cells with "?" have data entered.															
3	Do not enter data in yellow cells marked "Reserved". White cells marked "Reserved" have computer program (Reserved)															
4	STEP 1:	INPUT TWO LETTER CODE FOR ECOREGION (Use Code at Right)					DL									
5																
6																
7	FACILITY															
8																
9	Permittee															
10	NPDES Permit No.															
11	Outfall No.(s)															
12	Plant Effluent Flow (MGD)															
13	Plant Effluent Flow (cfs)															
14																
15	RECEIVING STREAM															
16																
17	Is this a large river? (see list at right)(enter "1" if yes, "0" if no; make entry as a number)															
18	Name of Receiving Stream:															
19																
20	Is this a lake or reservoir? (enter '1' if yes, '0' = no; make entry as a number)															
21	(Reserved)															
22	(Reserved) DO NOT INPUT DATA INTO CELL H22, H23 & H24....LEAVE BLANK→															
23	(Reserved)															
24	(Reserved)															
25	(Reserved)															
26	(Reserved)															
27	(Reserved)															
28																
29	Ecoregion TSS (mg/l) (For Large River, See List to Right)															
30	Ecoregion Hardness (mg/l) For Large Rivers Ecoregion TSS and Hardness may not apply															
31	Enter 7Q10 (cfs) as the Critical Flow (Reserved) (Reserved)															
32	Long Term Ave / Harmonic Mean Flow (cfs)															
33	Using Diffusers (Yes/No)															
34	pH (Avg)															
35	Percent (%) of Critical Flow for Chronic Criteria															
36	Percent (%) of Critical Flow for Acute Criteria															
37	Water Effect Ratio (WER)															
38	Ave Monthly Limit LTA Multiplier (Ref: page 103 TSD for WQ-Based Toxics Control)															
39	Max Daily Limit LTA Multiplier (Ref: " " " " ")															
40	Max Daily Limit LTA Multiplier for Human Health (Ref: 2009 CPP; Section 5.27.2)															

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
41	STEP 2:	INPUT AMBIENT AND EFFLUENT DATA														
42		CALCULATE IN-STREAM WASTE CONCENTRATIONS														
43																
44	DATA INPUT			For less than 20 data points enter geometric mean concentration as micro-gram per liter (ug/l or ppb).												
45				For 20 or more data points in set enter highest concentration as micro-gram per liter (ug/l or ppb).												
46																
47				Effluent value reported as "< detection level" (DL) but the DL is greater than MQL, the 1/2 DL is used.												
48				Effluent value reported as "< detection level" (DL) and the DL is smaller than MQL, "0" is used.												
49				If a firm value is reported, even less than MQL, the reported value is used.												
50																
51				The following formulae is used to calculate the Instream Waste Concentration (IWC)												
52				(Please refer to CPP for detail)												
53				$IWC = [(F*Qa*Cb) + (Qe*2.13*Ce)] / (F*Qa + Qe)$												
54				Where:												
55				IWC = Instream Waste Concentration												
56				F = Fraction of stream allowed for mixing												
57				Ce = Reported concentration in effluent												
58				Cb = Ambient stream concentration upstream of discharge												
59				Qe = Plant effluent flow												
60				Qb = Critical low flow of stream at discharge point expressed as the 7Q10 or harmonic mean flow for human health criteria												
61				Upstream Flow (Qb)= (% of 7Q10) X 7Q10 for Chronic and Acute												
62																
63	The following formulae convert metals reported in total form to dissolved form if criteria are in dissolved form															
64																
65	$Kp = Kpo * (TSS**a)$					Kp = Linear partition coefficient; Kpo and a can be found in table below										
66	$C/Ct = 1 / (1 + Kp*TSS* 10^{-6})$					TSS = Total suspended solids concentration found in receiving stream (or in effluent for intermittent stream)										
67	Total Metal Criteria (Ct) = Cr / (C/Ct)					C/Ct = Fraction of metal dissolved; and Cr = Dissolved criteria value										
68																
69		*Stream Linear Partition Coefficient (Insert "Dissolved" Conc in Column B to convert to "Total")										Lake Linear Partition Coefficient				
70	Total Metals	Dissolved Value in Stream		Kpo	alpha (a)	Kp	C/Ct	Total Value				Kpo	alpha (a)	Kp	C/Ct	Total Value
71																
73	Cadmium			4000000	-1.13	381564.8022	0.246760137	0.00				3520000.00	-0.92	519636.77	0.1939076	0
74	Chromium(3)			3360000	-0.93	485809.0372	0.204646612	0.00				2170000.00	-0.27	1237728.63	0.0917277	0
75	Copper			1040000	-0.74	223227.0135	0.358961238	0.00				2850000.00	-0.9	438595.20	0.2217904	0
76	Lead			2800000	-0.8	530500.7983	0.190693894	0.00				2040000.00	-0.53	677629.77	0.1557381	0
77	Mercury			2900000	-1.14	270941.4263	0.315703262	0.00				1970000.00	-1.17	172922.28	0.4195725	0
78	Nickel			490000	-0.57	149773.434	0.454920253	0.00				2210000.00	-0.76	455034.04	0.2155046	0
79	Zinc			1250000	-0.7	291572.8099	0.300067592	0.00				3340000.00	-0.68	812166.88	0.1333807	0
80	Silver			2400000	-1.03	281856.8248	0.307233386	0.00				2400000.00	-1.03	281856.82	0.3072334	0
81		<i>*Note: Use this section to convert lab concentrations shown as "dissolved" to "total"</i>														
82												Dissolved	Total			

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	
83	The following formulas are used to calculate water quality criteria based on Regulation No. 2 (Act 472 of Ark 1949)										WQC (ug/l)	WQC(ug/l)					
84	Cadmium			Acute			WER X CF1 X e(1.128[ln(hardness)]-3.828)				2.95		CF1 = 1.136672 - [0.041838*ln(hardness)]				
85				Chronic			WER X CF2 X e(0.7852[ln(hardness)]-3.490)				0.88		CF2 = 1.101672 - [0.041838*ln(hardness)]				
86																	
87	Chromium Tri			Acute			WER X 0.316 X e(0.819[ln(hardness)]+3.688)				461.76						
88				Chronic			WER X 0.86 X e(0.819[ln(hardness)]+1.561)				149.79						
89																	
90	Chromium Hex			Acute			WER X 0.982 X 16				15.71						
91				Chronic			WER X 11 X 0.962				10.58						
92																	
93	Copper			Acute			WER X 0.96 X e(0.9422[ln(hardness)]-1.464)				13.95						
94				Chronic			WER X 0.96 X e(0.8545[ln(hardness)]-1.465)				9.48						
95																	
96	Lead			Acute			WER X e(1.273[ln(hardness)]-1.460)*CF3				51.30		CF3 = 1.46203 - [0.145712*ln(hardness)]				
97				Chronic			WER X e(1.273[ln(hardness)]-4.705)*CF3				2.00						
98																	
99	Mercury			Acute			WER X 0.85 X 2.4				2.04						
100				Chronic			WER X 0.012				0.01						
101																	
102	Nickel			Acute			WER X 0.998 X e(0.8460[ln(hardness)]+3.3612)				1184.29						
103				Chronic			WER X 0.997 X e(0.8460[ln(hardness)]+1.1645)				131.53						
104																	
105	Zinc			Acute			WER X 0.978 X e(0.8473[ln(hardness)]+0.8604)				95.73						
106				Chronic			WER X 0.986 X e(0.8473[ln(hardness)]+0.7614)				87.42						
107																	
108	Silver			Acute			WER X 0.85 X e(1.72[ln(hardness)]-6.52)				2.40						
109																	
110	Cyanide			Acute			WER X 22.36				22.36						
111				Chronic			WER X 5.2				5.20						
112																	
113	Selenium			Acute			WER X 20				20.00						
120				Chronic			WER X 5				5.00						
121																	
122	The following formulas are applicable to the Jet Stream Model for lakes for calculating the Dilution Factor (DF):																
123			DF = ((2.8 * D * 3.1416^0.5) / X)			where DF is % of effluent at distance X, D is the diameter of the outfall pipe											
124			and X is aquatic life criteria--25 feet for ZID; 100 feet for mixing zone; human health criteria 200 feet for mixing zone.														
125			DF =	#VALUE!	Acute	#VALUE!	Chronic	#VALUE!	Bioacc.								
126																	

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	
127	The following formulas are used to calculate the instream waste concentration (IWC) for each pollutant:																
128																	
129			IWC = [(Frac X Critical Flow X Cb) + (2.13 X Ce X Qd)] / [Frac X Critical Flow + Qd] where the critical flow is the 7Q10 except for lakes with the Jet Stream Model.														
130			Use EPA Statistical Factor of 2.13 for less than 20 Ce data points with the Geometric Mean of the Ce's; use 1 for more than 20 data points with the maximum Ce.														
131			IWC = (DF X Ce) + Cb for lakes with Jet Stream Model.														
132	POLLUTANTS		Number of Data points	MQL	EPA Statistical	Background Conc.	Effluent Conc.	Domestic Supply IWC	Acute Aquatic IWC	Chronic Aquatic IWC	Bioacc. IWC	[Reserved]	Arkansas Acute Aquatic	Arkansas Chronic Aquatic	Arkansas Bioacc.	EPA Bioacc.	
133				ug/l	Factor	Cb ug/l	Ce ug/l	IWC ug/l	IWC ug/l	IWC ug/l	IWC ug/l		ug/l	ug/l	ug/l	ug/l	
137	METALS AND CYANIDE																
138	1. Antimony Total		1	60	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999.00	9999999.00	9999999	6,400	
139	2. Arsenic Total		1	0.5	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999.00	9999999.00	9999999	1.4	
140	3. Beryllium Total		1	0.5	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999.00	9999999.00	4	4	
141	4. Cadmium Total		1	1	2.13	0	0	0.00	0.00	0.00	0.00	9999999	11.94	3.58	9999999	5*	
142	6. Chromium (Tri)		1	10	2.13	0	999999	7.90	131.60	31.60	2.63	9999999	2256.37	731.94	9999999	100*	
143	7. Chromium (hex)		1	10	2.13	0	999999	7.90	131.60	31.60	2.63	9999999	15.71	10.58	9999999	100*	
144	8. Copper Total		1	0.5	2.13	0	0	0.00	0.00	0.00	0.00	9999999	38.87	26.41	9999999	13,000	
145	9. Lead Total		1	0.5	2.13	0	999999	7.90	131.60	31.60	2.63	9999999	269.04	10.48	9999999	50	
146	10. Mercury Total		1	0.005	2.13	0	0	0.00000	0.00000	0.00000	0.00000	9999999	6.46	0.012	9999999	2*	
147	12. Nickel Total		1	0.5	2.13	0	99999999	790.08	13160.40	3159.98	263.37	9999999	2603.30	289.12	9999999	46,000	
148	13. Selenium Total		1	5	2.13	0	0	0.00	0.00	0.00	0.00	9999999	20.00	5.00	9999999	42,000	
149	14. Silver Total		1	0.5	2.13	0	0	0.00	0.00	0.00	0.00	9999999	7.82	9999999.00	9999999	-	
150	15. Thallium Total		1	0.5	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999.00	9999999.00	9999999	4.7	
151	16. Zinc Total		1	20	2.13	0	9999999	79.01	1316.04	316.00	26.34	9999999	319.04	291.33	9999999	260,000	
152	129. Phenols, Total		1	5	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999.00	9999999.00	9999999	-	
153	17. Cyanide Total		1	10	2.13	0	0	0.00	0.00	0.00	0.00	9999999	22.36	5.2	9999999	4,000	
156	DIOXIN													*Primary Drinking Water MCL			
157	18. 2-3-7-8-TCDD		1	0.00001	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	1.00E-06		
159	VOLATILE COMPOUNDS																
160	19. Acrolein		1	50	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999		
161	20. Acrylonitrile		1	20	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999		
162	21. Benzene		1	10	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999		
163	22. Bromoform		1	10	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999		
164	23. Carbon Tetrach		1	2	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999		
165	24. Chlorobenzene		1	10	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999		
166	25. Chlorodibromomethane		1	10	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999		
167	26. Chloroethane		1	50	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999		
168	27. 2-Chloroethylvinyl ether		1	10	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999		
169	28. Chloroform		1	10	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999		
170	29. Dichlorobromomethane		1	10	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999		
171	30. 1-1-Dichloroethane		1	10	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999		
172	31. 1-2-Dichloroethane		1	10	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999		
173	32. 1-1-Dichlorethylene		1	10	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999		
174	33. 1,2 Dichloropropane		1	10	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999		
175	34. 1,3 Dichloropropylene		1	10	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999		
176	35. Ethylbenzene		1	10	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999		
177	37. Methyl Chloride		1	50	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999		
178	36. Methyl bromide		1	50	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999		
179	38. Methylene chloride		1	20	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999		
180	39. 1-1-2-2-Tetrachloroethar		1	10	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999		
181	40. Tetrachloroethylene		1	10	2.13	0	99999999	790.08	13160.40	3159.98	263.37	9999999	9999999	9999999	9999999		
182	41. Toluene		1	10	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999		
183	42. 1,2-trans-dichloroethyler		1	10	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999		
184	44. 1-1-2-Trichloroethane		1	10	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999		
185	43. 1-1-1-Trichloroethane		1	10	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999		
186	45. Trichloroethylene		1	10	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999		

*Primary Drinking Water MCL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
187	46. Vinyl Chloride		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
189	ACID COMPOUNDS															
190	47. 2-Chlorophenol		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
191	48. 2-4-Dichlorophenol		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
192	49. 2-4-Dimethylphenol		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
193	50. 4,6-Dinitro-o-Cresol		1	50	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
194	51. 2,4-Dinitrophenol		1	50	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
195	52-53. Nitrophenols		1	20	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
196	54. 4-Chloro-3-methylphenol		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
197	55. Pentachlorophenol		1	5	2.13	0	0	0.00	0.00	0.00	0.00	999999	8.72	6.69	999999	
198	56. Phenol		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
199	57. 2-4-6-Trichlorophenol		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
201						Ambient Background Conc.	Effluent Conc.	Domestic Supply	Acute Aquatic	Chronic Aquatic	Human Health	[Reserved]	Acute Aquatic Criteria	Chronic Aquatic Criteria	Human Health Criteria	
202	BASE/NEUTRAL COMPOUNDS				2.13	Cb	Ce	IWC	IWC	IWC	IWC		ug/l	ug/l	ug/l	
203	58. Acenaphthene		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
204	59. Acenaphthylene		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
205	60. Anthracene		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
206	61. Benzidine		1	50	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
207	62. Benzo(a) anthracene		1	5	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
208	63. Benzo(a) pyrene		1	5	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
209	64. 3,4-benzoflouranthene		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
210	65. Benzo(g,h,i)perylene		1	20	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
211	66. Benzo(k) fluoranthene		1	5	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
212	67. Bis(2-chloroethoxy)meth		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
213	68. Bis(2-chloroethyl) Ether		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
214	69. Bis(2-Chloroisopropyl) ether		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
215	70. Bis(2-ethylhexyl)phthalate		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
216	71. 4-Bromophenyl phenyl ether		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
217	72. Butylbenzyl phthalate		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
218	73. 2-chloronaphthalene		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
219	74. 4-chlorophenyl phenyl ether		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
220	75. Chrysene		1	5	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
221	76. Dibenzo(a,h)anthracene		1	5	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
222	77-79. Dichlorobenzene(1,2,4)		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
223	80. 3,3' Dichlorobenzidine		1	5	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
224	81. Diethyl Phthalate		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
225	82. Dimethyl phthalate		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
226	83. Di-n-Butyl phthalate		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
227	84. 2-4-Dinitrotoluene		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
228	85. 2-6-Dinitrotoluene		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
229	86. Di-n-octyl phthalate		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
230	87. 1,2-diphenylhydrazine		1	20	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
231	88. Fluoranthene		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
232	89. Fluorene		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
233	90. Hexachlorobenzene		1	5	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
234	91. Hexachlorobutadiene		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
235	92. Hexachlorocyclopentadiene		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
236	93. Hexachloroethane		1	20	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
237	Hexachlorocyclohexane		1		2.13	0	0	0.00	0.00	0.00	0.00	999999	2	0.08	0.0373	
238	94. Indeno(1,2,3-cd)pyrene		1	5	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
239	95. Isophorone		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
240	96. Naphthalene		1	10	2.13	0	9999999	790.08	13160.40	3159.98	263.37	999999	999999	999999	999999	
241	97. Nitrobenzene		1	10	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
242	98. N-nitrosodimethylamine		1	50	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
243	99. N-nitrosodi-n-propylamine		1	20	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	
244	100. N-nitrosodiphenylamine		1	20	2.13	0	0	0.00	0.00	0.00	0.00	999999	999999	999999	999999	

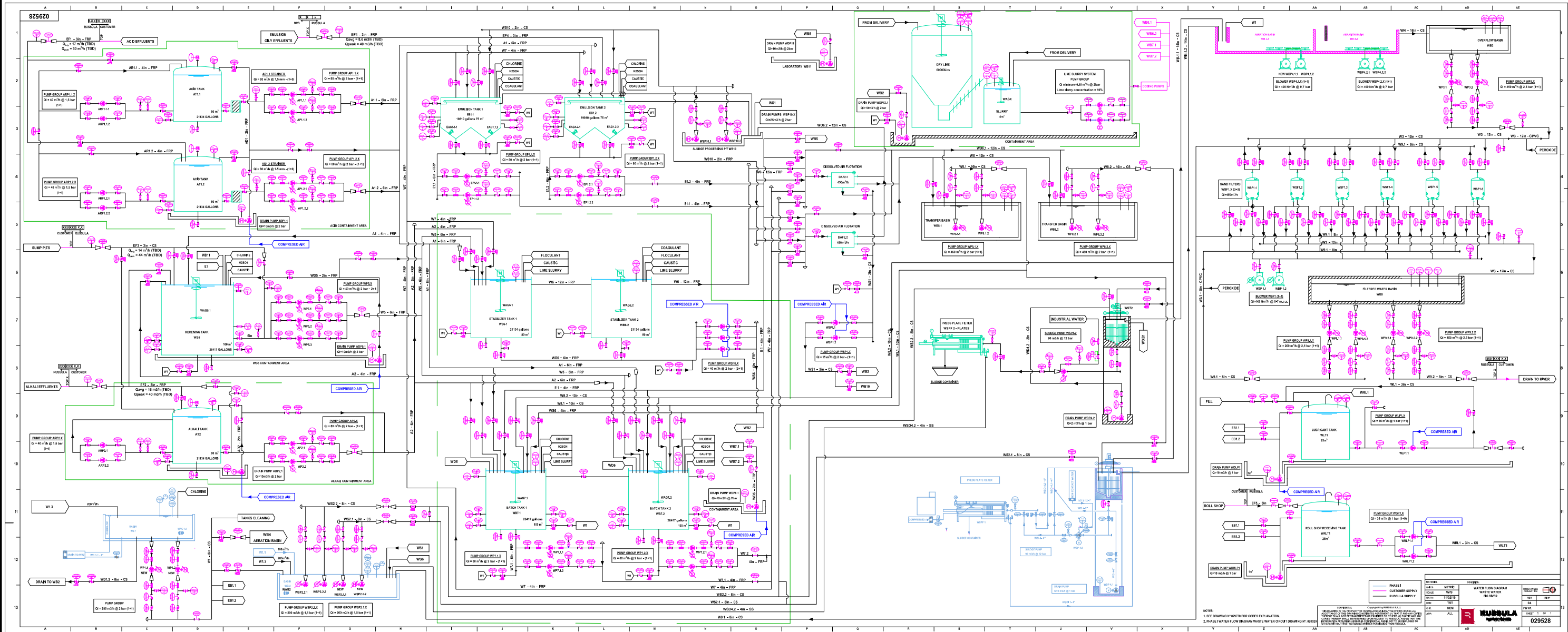
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
245	101. Phenanthrene		1	10	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
246	103. 1,2,4-trichlorobenzene		1	10	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
247																
248	PESTICIDES															
249	104. Aldrin		1	0.01	2.13	0	0	0.00	0.00	0.00	0.00	9999999	3	9999999	9999999	
250	105. Alpha-BHC		1	0.05	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
251	106. Beta-BHC		1	0.05	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
252	107. Gamma-BHC		1	0.05	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
253	108. Delta-BHC		1	0.05	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
254	109. Chlordane		1	0.2	2.13	0	0	0.00	0.00	0.00	0.00	9999999	2.4	0.0043	0.005	
255	110. 4,4'-DDT		1	0.02	2.13	0	0	0.00	0.00	0.00	0.00	9999999	1.1	0.001	9999999	
256	111. 4,4'-DDE		1	0.1	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
257	112. 4,4'-DDD		1	0.1	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
258	113. Dieldrin		1	0.02	2.13	0	0	0.00	0.00	0.00	0.00	9999999	2.5	0.0019	0.0012	
259	114. Alpha-endosulfan		1	0.01	2.13	0	0	0.00	0.00	0.00	0.00	9999999	0.22	0.056	9999999	
260	115. Beta-endosulfan		1	0.02	2.13	0	0	0.00	0.00	0.00	0.00	9999999	0.22	0.056	9999999	
261	116. Endosulfan sulfate		1	0.1	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
262	117. Endrin		1	0.02	2.13	0	0	0.00	0.00	0.00	0.00	9999999	0.18	0.0023	9999999	
263	118. Endrin aldehyde		1	0.1	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
264	119. Heptachlor		1	0.01	2.13	0	0	0.00	0.00	0.00	0.00	9999999	0.52	0.0038	9999999	
265	120. Heptachlor epoxide		1	0.01	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
266	121. PCB-1242		1	0.2	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999.00	0.014	0.0004	
267	122. PCB-1254		1	0.2	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999.00	0.014	0.0004	
268	123. PCB-1221		1	0.2	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999.00	0.014	0.0004	
269	124. PCB-1232		1	0.2	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999.00	0.014	0.0004	
270	125. PCB-1248		1	0.2	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999.00	0.014	0.0004	
271	126. PCB-1260		1	0.2	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999.00	0.014	0.0004	
272	127. PCB-1016		1	0.2	2.13	0	0	0.00	0.00	0.00	0.00	9999999	9999999.00	0.014	0.0004	
273	128. Toxaphene		1	0.3	2.13	0	0	0.00	0.00	0.00	0.00	9999999	0.73	0.0002	0.0063	
274	130. Chlorpyrifos		1	0.07	2.13	0	0	0.00	0.00	0.00	0.00	9999999	0.083	0.041	9999999	
275																
276																
277																
278																

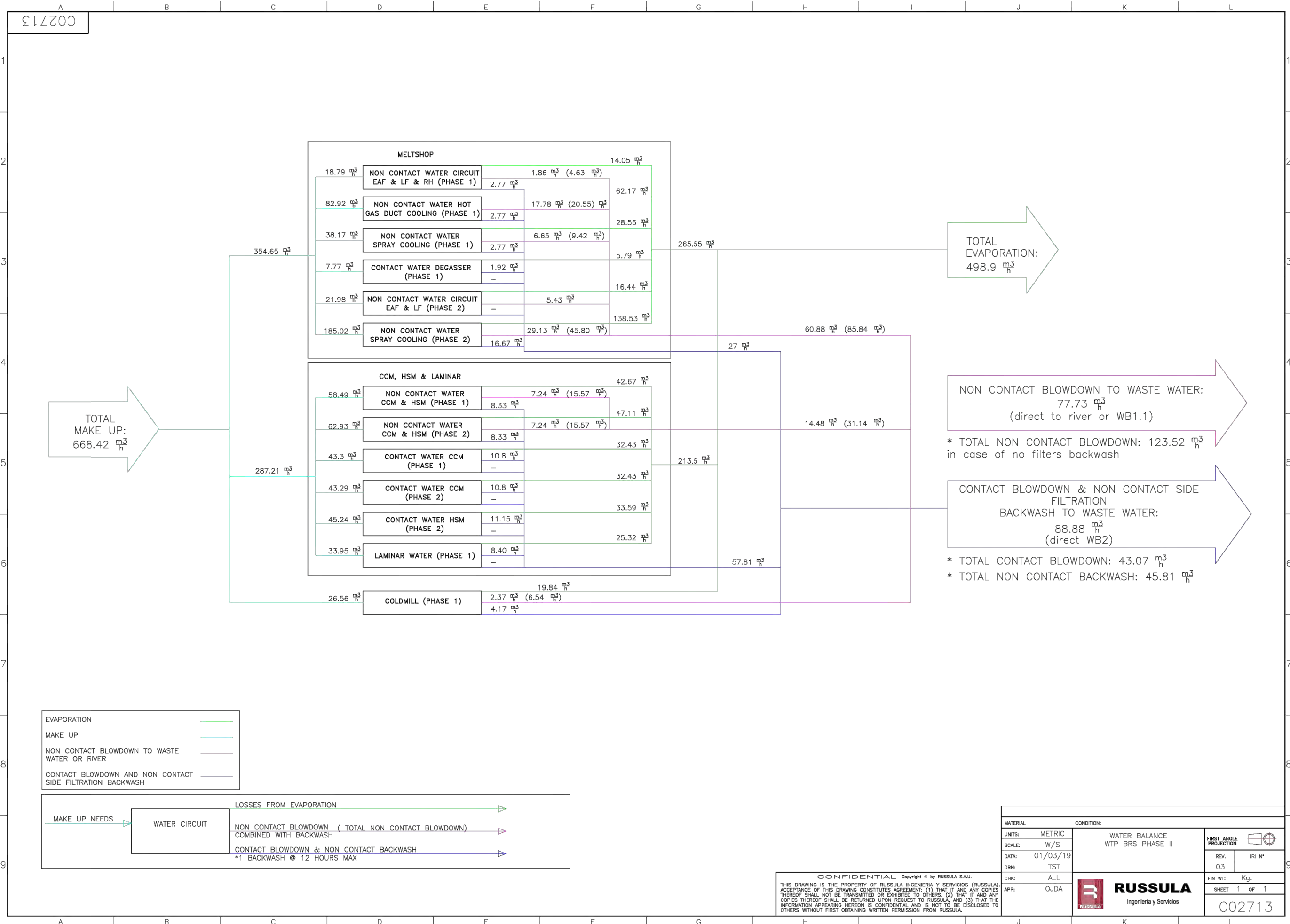
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
279	STEP 3:	APPLICABLE WATER QUALITY-BASED LIMITS														
280																
281																
282								ADEQ HUMAN HEALTH CRITERIA								
			Permit Daily Maximum	Permit Monthly Average	Permit Daily Maximum	Permit Monthly Average		Permit Daily Maximum	Permit Monthly Average	Permit Daily Maximum	Permit Monthly Average					
283	POLLUTANTS															
284			ug/l	ug/l	lb/day	lb/day		ug/l	ug/l	lb/day	lb/day					
285	Alpha-BHC		NO	NO	NO	NO		NO	NO	NO	NO					
286	Beta-BHC		NO	NO	NO	NO										
287	Gamma-BHC		NO	NO	NO	NO										
288	Delta-BHC		NO	NO	NO	NO										
289	Pentachlorophenol		NO	NO	NO	NO										
290	Aldrin		NO	NO	NO	NO										
291	Chlordane		NO	NO	NO	NO		NO	NO	NO	NO					
292	4,4'-DDT		NO	NO	NO	NO										
293	4,4'-DDE		NO	NO	NO	NO										
294	4,4'-DDD		NO	NO	NO	NO										
295	Dieldrin		NO	NO	NO	NO		NO	NO	NO	NO					
296	Alpha-endosulfan		NO	NO	NO	NO										
297	Beta-endosulfan		NO	NO	NO	NO										
298	Endosulfan sulfate		NO	NO	NO	NO										
299	Endrin		NO	NO	NO	NO										
300	Endrin aldehyde		NO	NO	NO	NO										
301	Heptachlor		NO	NO	NO	NO										
302	Heptachlor epoxide		NO	NO	NO	NO										
303	Toxaphene		NO	NO	NO	NO		NO	NO	NO	NO					
304	Chlorpyrifos		NO	NO	NO	NO										
305	Cadmium Total		NO	NO	NO	NO										
306	Chromium (hex)		45079.2905	22467.1705	1072.61754	534.5843041										
307	Copper Total		NO	NO	NO	NO										
308	Lead Total		158239.0236	78865.1082	3765.14249	1876.517962										
309	Mercury Total		NO	NO	NO	NO										
310	Nickel Total		4363773.0558	2174870.8156	103831.703	51748.91968										
311	Selenium Total		NO	NO	NO	NO										
312	Silver Total		NO	NO	NO	NO										
313	Zinc Total		915359.4966	456208.1092	21780.0822	10855.02488										
314	Chromium (Tri)		NO	NO	NO	NO										
315	Cyanide Total		NO	NO	NO	NO										
316	Beryllium Total		NO	NO	NO	NO		NO	NO	NO	NO					
317	PCB-1242		NO	NO	NO	NO		NO	NO	NO	NO					
318	PCB-1254		NO	NO	NO	NO		NO	NO	NO	NO					
319	PCB-1221		NO	NO	NO	NO		NO	NO	NO	NO					
320	PCB-1232		NO	NO	NO	NO		NO	NO	NO	NO					
321	PCB-1248		NO	NO	NO	NO		NO	NO	NO	NO					
322	PCB-1260		NO	NO	NO	NO		NO	NO	NO	NO					
323	PCB-1016		NO	NO	NO	NO		NO	NO	NO	NO					
324	2-3-7-8-TCDD		NO	NO	NO	NO		NO	NO	NO	NO					

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APPENDIX F – PROCESS FLOW DIAGRAMS AND WATER BALANCE DIAGRAM

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APPENDIX G – VICINITY MAP AND TOPOGRAPHIC MAPS

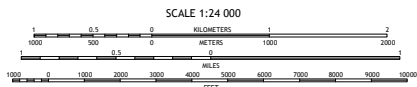
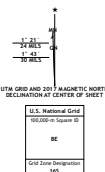
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Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84) Projection and
1 000-meter grid; Universal Transverse Mercator, Zone 16S
10 000 feet (3 048 meters) contour interval; Zone 16S
10 000 feet (3 048 meters) contour interval; Zone 16S
10 000 feet (3 048 meters) contour interval; Zone 16S

This map is not a legal document. Boundaries may be
generated for this map scale. Private lands within government
reservations may not be shown. Obtain permission before
entering private lands.

Map, December 2015
U.S. Census Bureau, 2010
Roads, 2016
National, 2016
Hydrography, 2016
Contours, 2016
Boundaries, 2016
Public Land Survey System, 2016
Wetlands, 2016



CONTOUR INTERVAL: 5 FEET
NORTH AMERICAN DATUM OF 1983
This map was produced to conform with the
National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 5.6.19

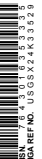


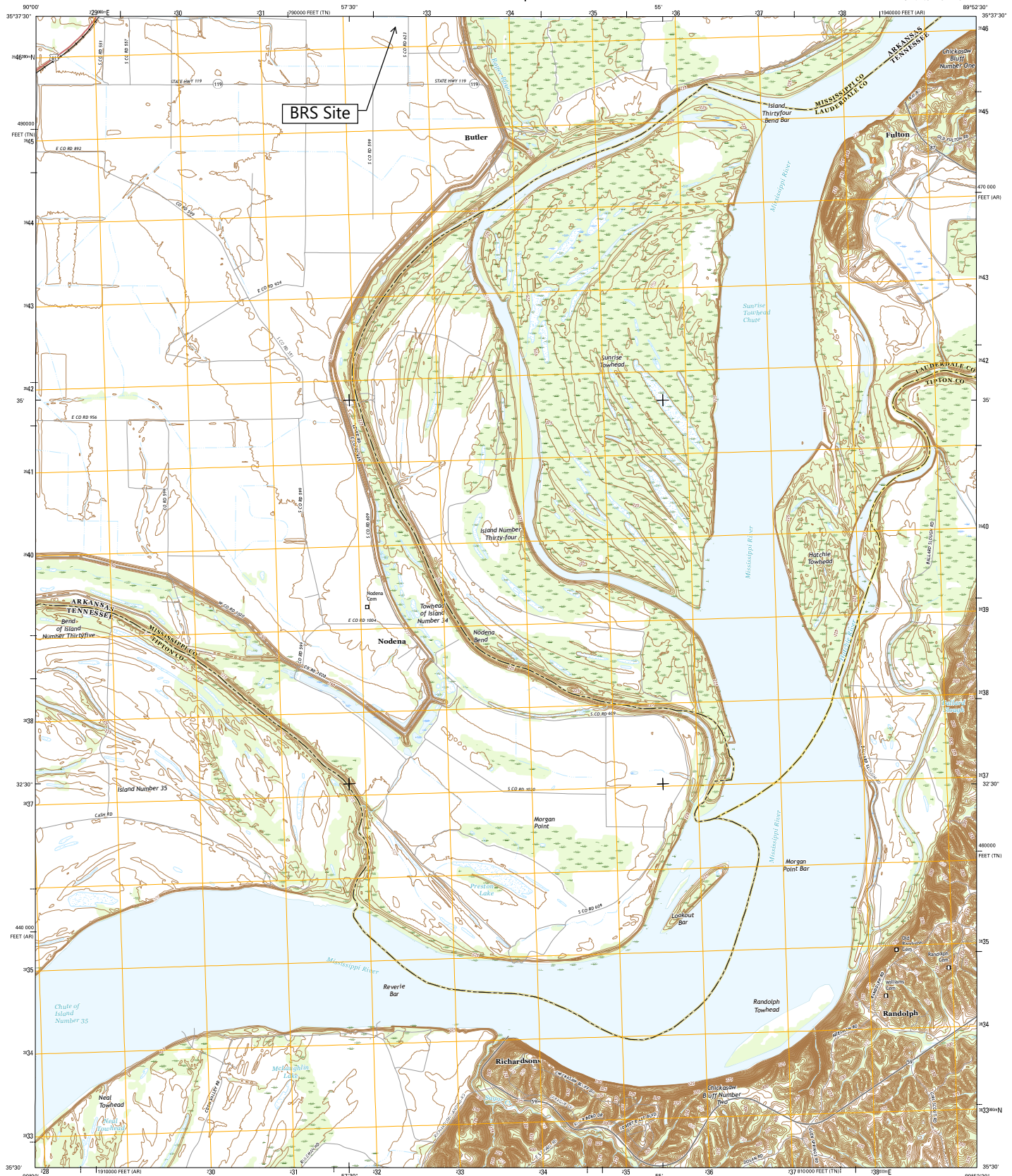
ROAD CLASSIFICATION	
Expressway	Local Connector
Secondary Hwy	Local Road
Ramp	4WD
Interstate Route	US Route
	State Route

1	2	3	1 Dell
4	5	6	2 Luxora
7	8	9	3 Moran
			4 Osceola
			5 Goldsboro
			6 Wilson
			7 Anderson
			8 Old Edge

OSCEOLA, AR-TN
2017

Figure G-2



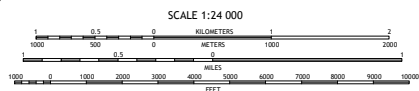
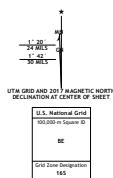


Produced by the United States Geological Survey

North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84)
1,000-meter grid; Universal Transverse Mercator, Zone 16S
10 000-foot basic; Tennessee Coordinate System of 1983,
Arkansas Coordinate System of 1983 (north zone)

This map is not a legal document. Boundaries may be
generated for this map scale. Private lands within government
reservations may not be shown. Obtain permission before
entering private lands.

Imagery:NAIP, December 2015
Roads:U.S. Census Bureau, 2015
Names:National Hydrography Dataset, 2015
Hydrography:National Hydrography Dataset, 2015
Contours:National Elevation Dataset, 2016
Boundaries:Multiple sources; see metadata file 1972-2016
Public Land Survey System:BLM, 2015
Wetlands:FWS National Wetlands Inventory 1977-2014



CONTOUR INTERVAL: 5 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the
National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 5.6.19

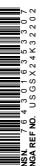


1	2	3	1 Keller
4	5	6	2 Osceola
7	8	9	3 Goldsboro
			4 Wilson
			5 Elk Edge
			6 Pecan Point
			7 Drummonds
			8 Maudslayi

ROAD CLASSIFICATION	
Expressway	Local Connector
Secondary Hwy	Local Road
Ramp	4WD
Interstate Route	US Route
	State Route

NODENA, AR-TN
2017

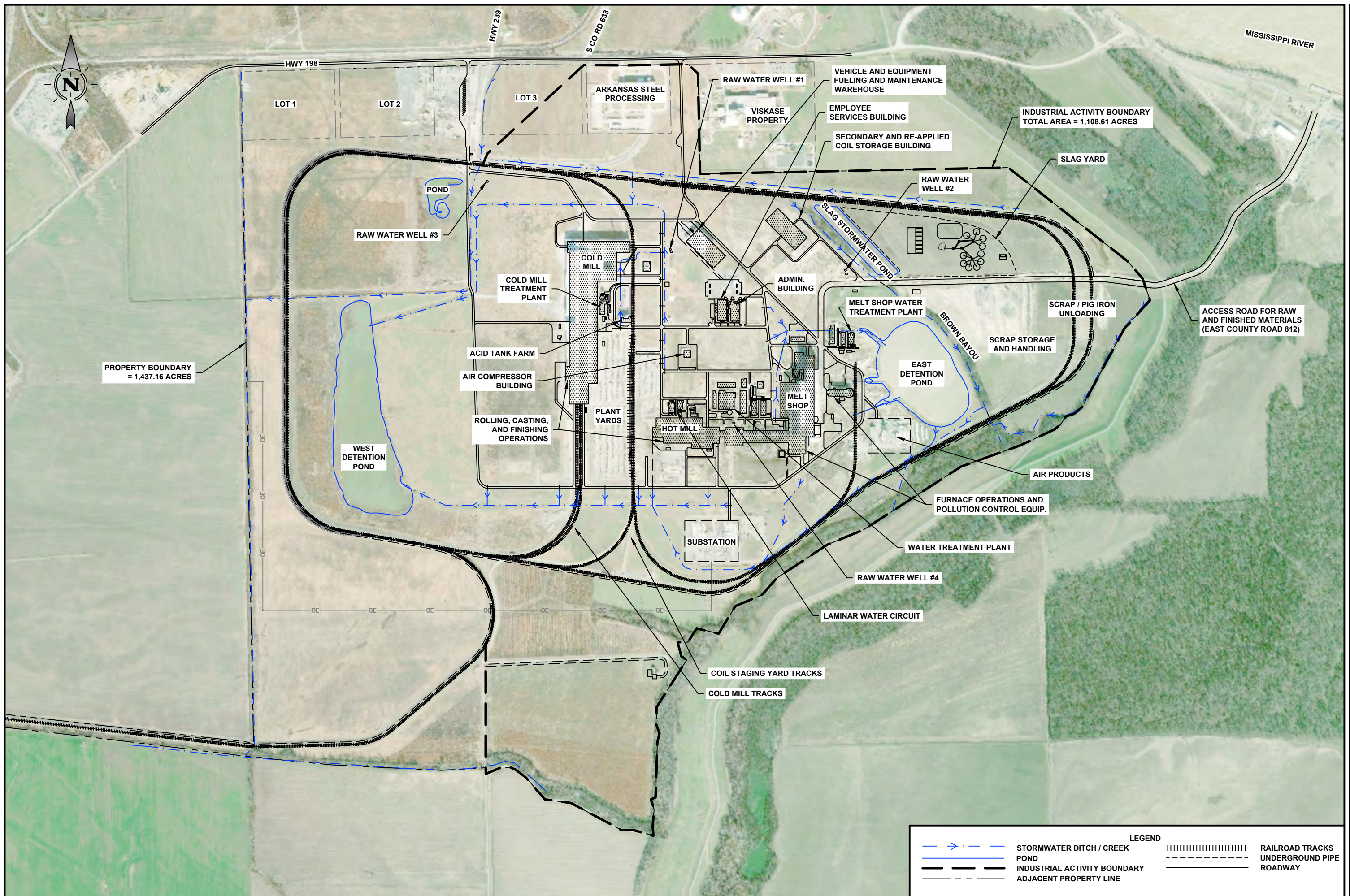
Figure G-3

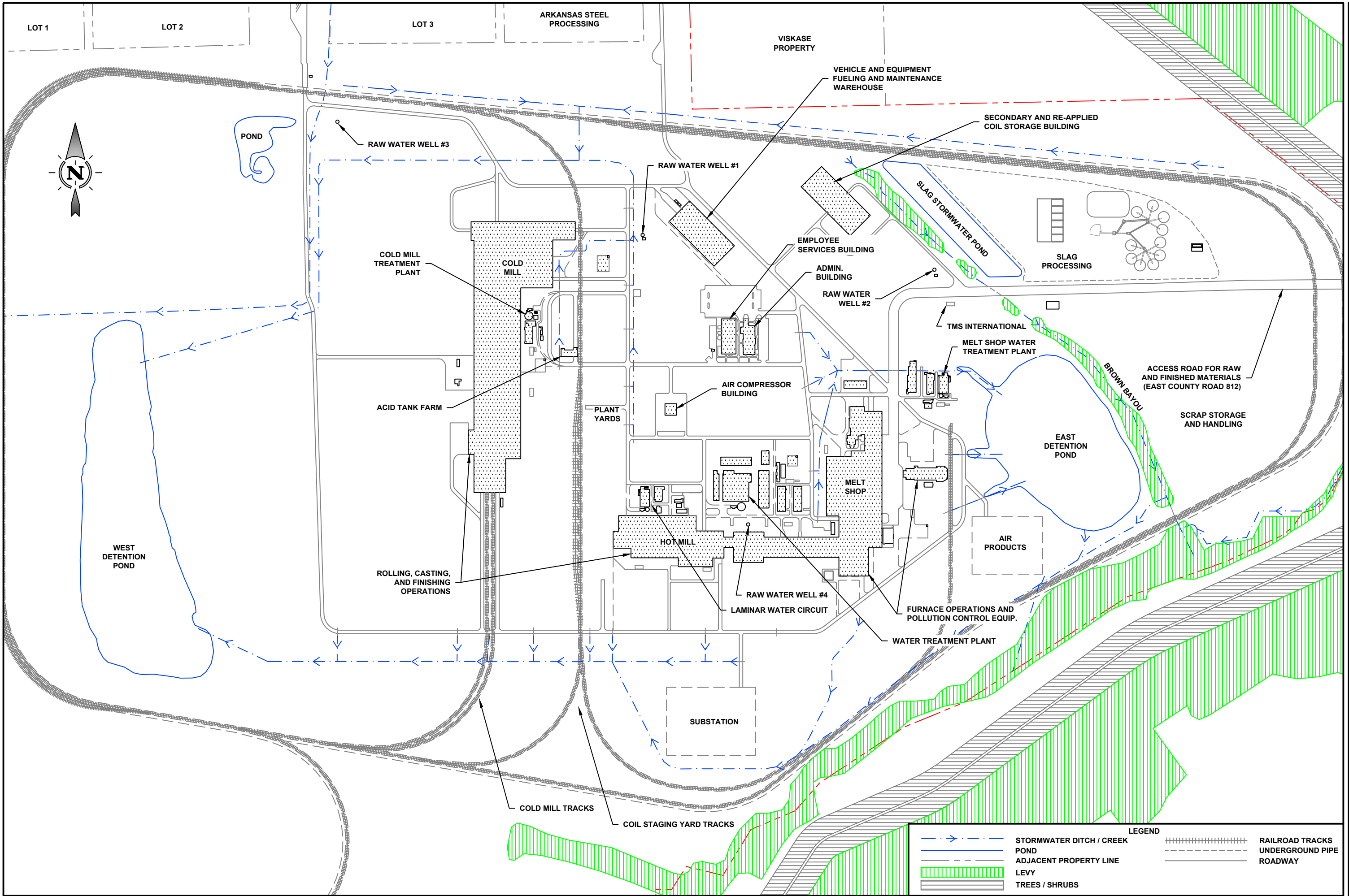


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APPENDIX H – FACILITY SITE MAPS AND DIAGRAMS

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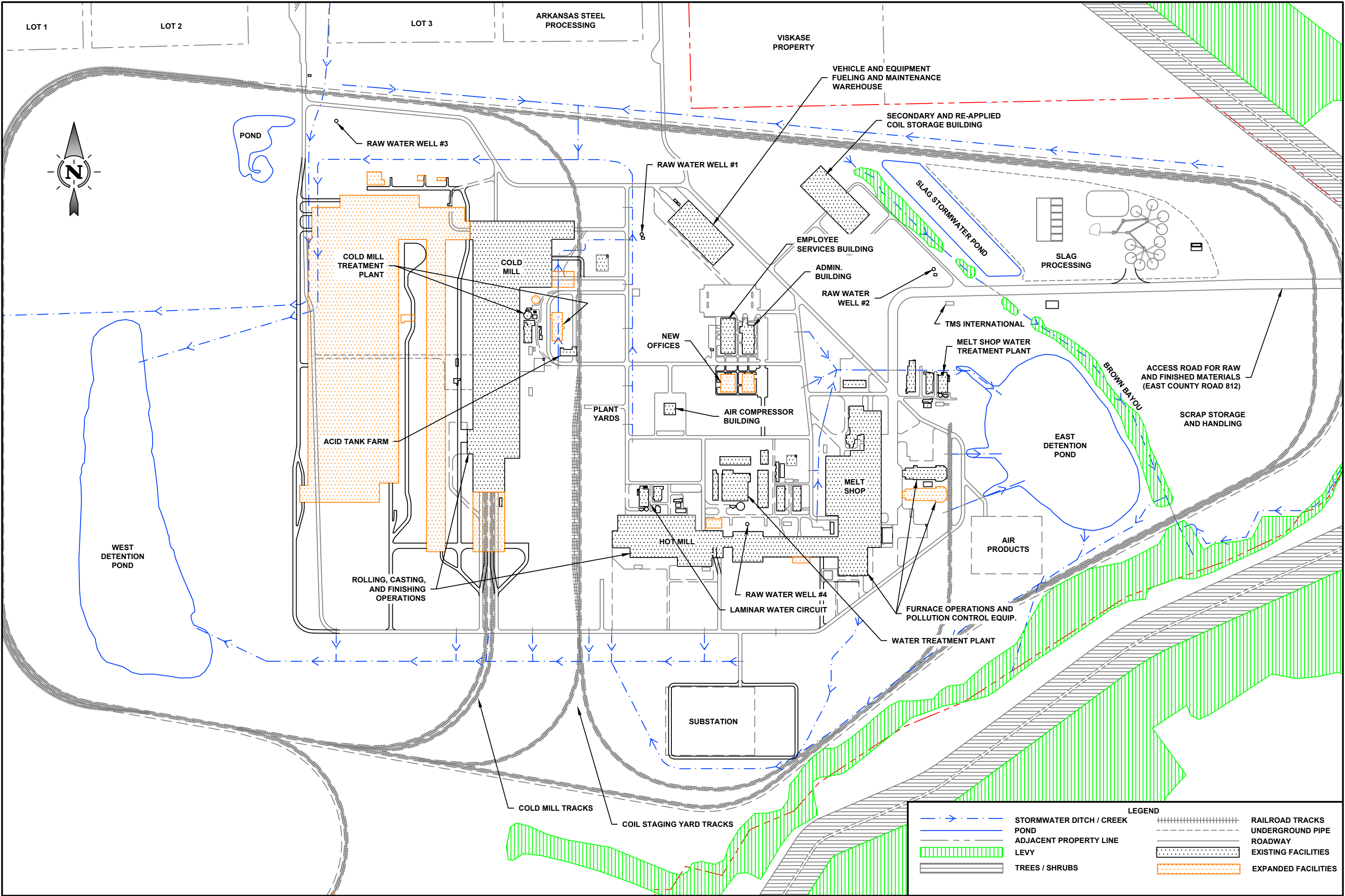






5800 Evergreen Drive
Little Rock, AR 72205
Ph (501)663-8800
Fax (501)588-0123
www.harborenv.com

BIG RIVER STEEL WASTEWATER PERMIT APPLICATION		ARKANSAS
SITE MAP - CURRENT FACILITY		OSCEOLA
DATE	X-X-X	
REVISION DESCRIPTION		
NO	X	X
Drawn By: AES		
Date: 8-13-19		
Project No: BHLP-19236		
Scale: 1" = 600'		
H-2		



Harbor

5800 Evergreen Drive
Little Rock, AR 72205
Ph (501)663-8800
Fax (501)588-0123
www.harborenv.com

BIG RIVER STEEL
WASTEWATER PERMIT APPLICATION

OSCEOLA

ARKANSAS

DATE
X-X-X

NO
X X

REVISION DESCRIPTION

Drawn By:
AES

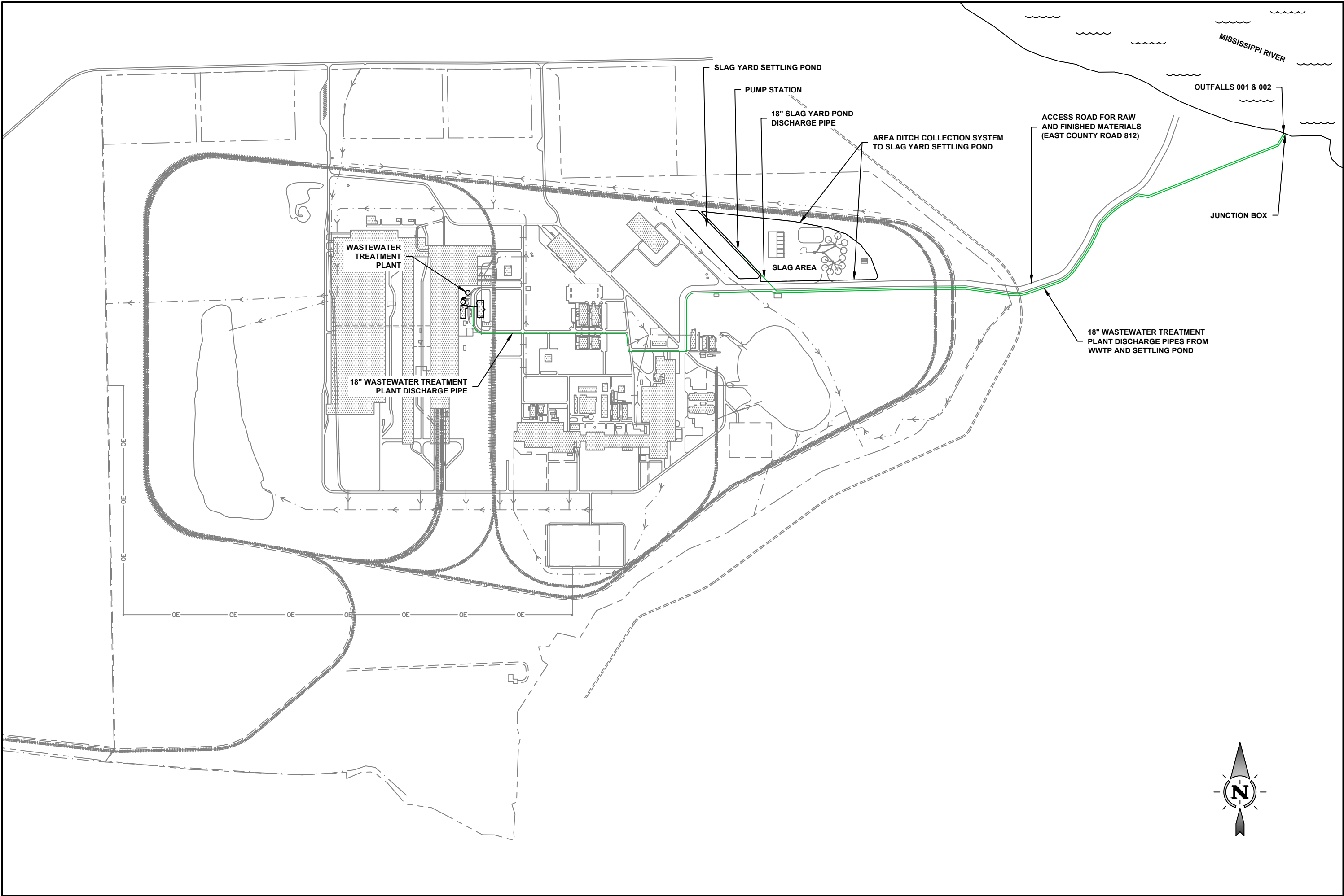
Date:
8-13-19

Project No:
BHLP-19236

Scale:
1" = 600'

H-3

SITE MAP - EXPANDED FACILITY





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Fax (501)588-0123
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BIG RIVER STEEL		ARKANSAS	
WASTEWATER PERMIT APPLICATION		WASTEWATER FACILITIES	
OSCEOLA			
DATE	NO	REVISION DESCRIPTION	
X-X-X	X	X	
Drawn By: AES			
Date: 8-13-19			
Project No: BHL-19236			
Scale: 1" = 1000'			
H-4			

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APPENDIX I – FEMA FLOOD PLAIN MAPS

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NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from flood drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **Floodways** have been determined, users are encouraged to consult the **Flood Profiles and Floodway Data** and/or **Summary of Stillwater Elevations** tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded values for elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 1/2 mile North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the **Summary of Stillwater Elevations** table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the **Summary of Stillwater Elevations** table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The projection used in the preparation of this map was the **Arkansas State Plane north zone (FIPSZONE 0301)**. The horizontal datum was **NAD83**, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

Flood elevations on this map are referenced to the **North American Vertical Datum of 1988**. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov/> or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, NIMS12
National Geodetic Survey
SSMC-3, #202
1315 East West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov/>.

Base map information shown on the FIRM was provided in digital format by the Arkansas Geographic Information Office (AGIO). This data was created in State Plane NAD 83 coordinates, U.S. Survey Feet and was produced at scales 1:1200 (1"=100'), 1:4,800 (1"=400'). Aerial photography was captured in 2006.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the **Flood Profiles and Floodway Data** tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

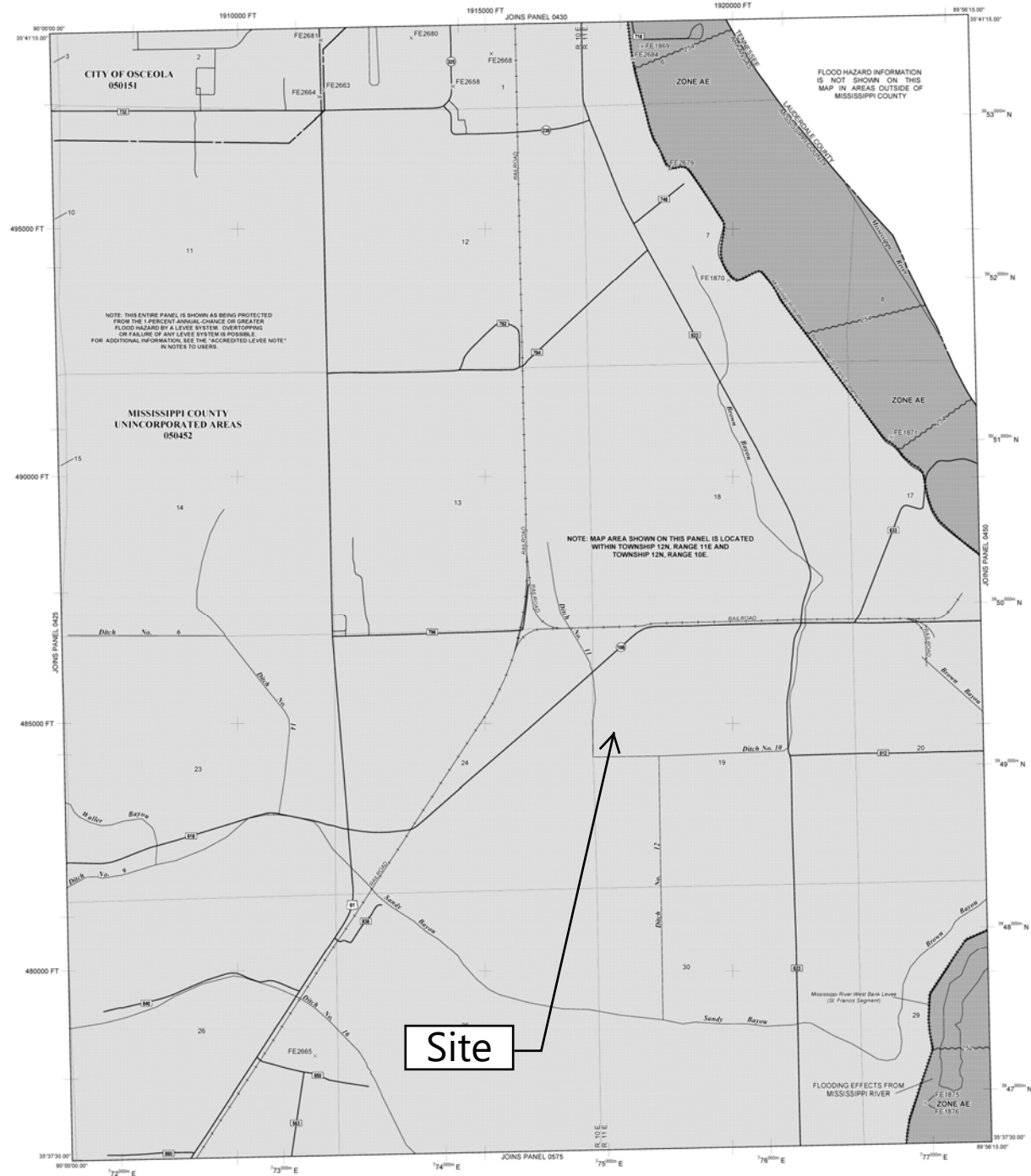
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limits locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels, community map repository addresses, and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at <http://www.msc.fema.gov/>.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call: 877-FEMA-MAP (1-877-356-2627) or visit the FEMA website at <http://www.fema.gov/>.

Accreted Levee Notes to Users. Check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance-level) and Emergency Action Plan, on the levee system(s) shown as providing protection for areas on this panel. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA Website at <http://www.fema.gov/business/hfp/index.shm>.



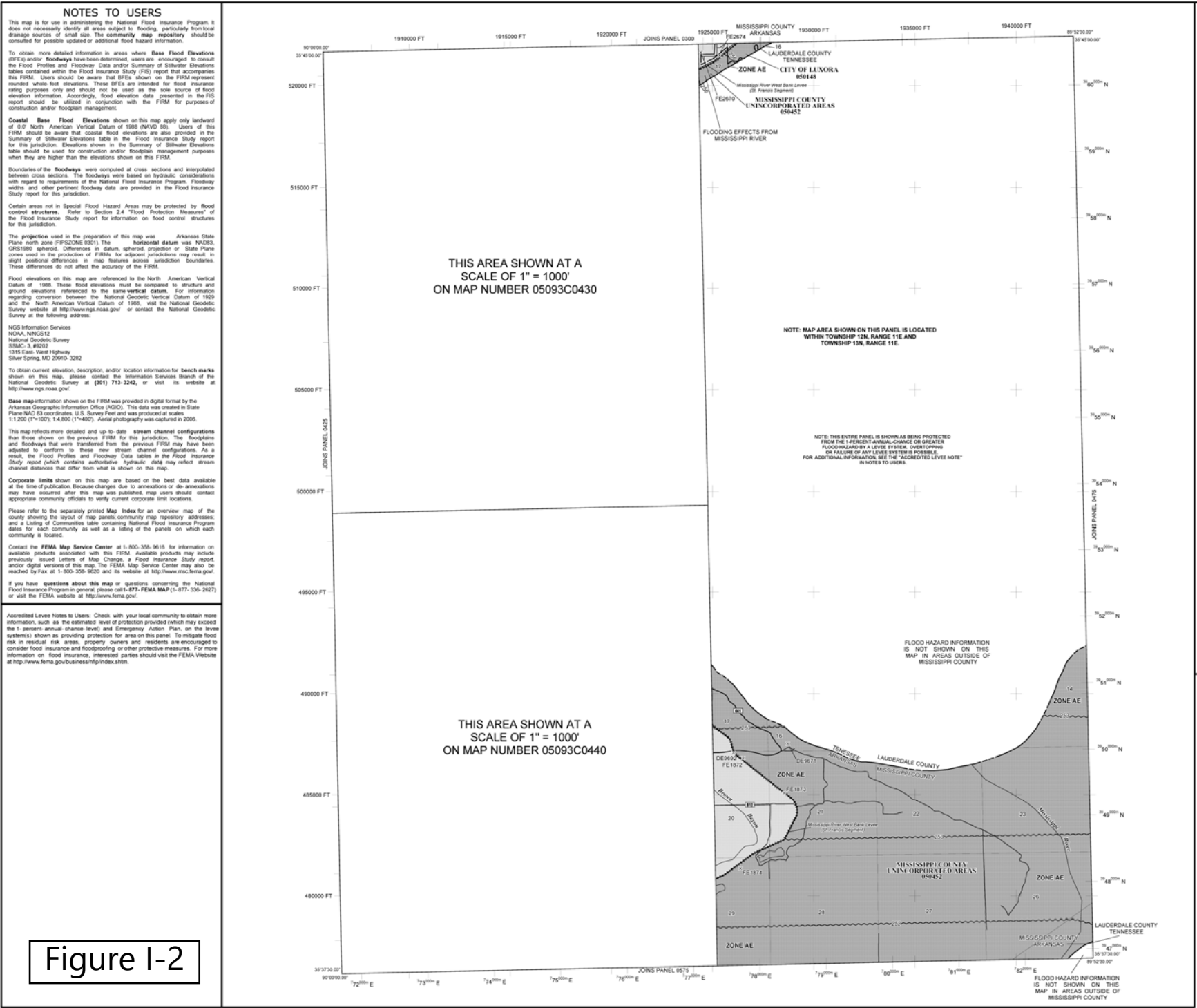


Figure I-2

APPENDIX J – CONSTRUCTION PLANS AND SPECIFICATIONS FOR
WASTEWATER TREATMENT SYSTEM

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PHASE II WASTEWATER FACILITIES

FOR

BIG RIVER STEEL LLC

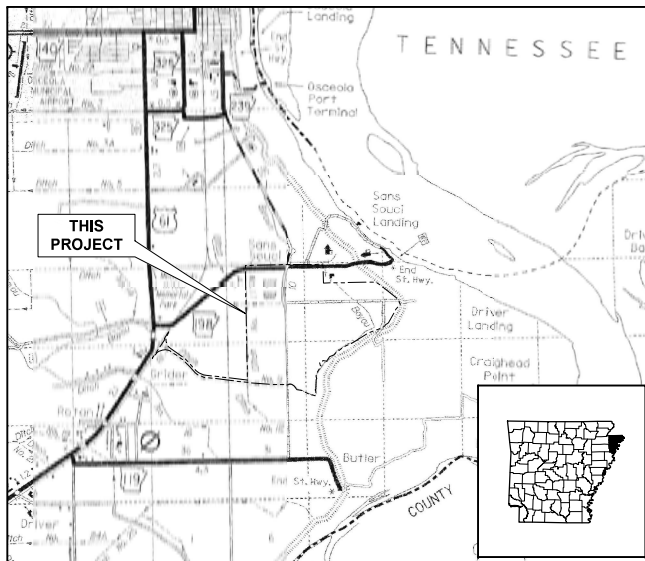
OSCEOLA ARKANSAS

INDEX

SHEET TITLE	SHEET NUMBER
WASTEWATER TREATMENT PLANT LAYOUT #1.....	C1
WASTEWATER TREATMENT PLANT LAYOUT #2.....	C2
EMULSION TANK EB1.X.....	C3
TANK AT1.X.....	C4
TANK AT2.....	C5
TANK WB7.X.....	C6
TANK WB5.....	C7
TANK WB6.X.....	C8
PMP-255W DAF.....	C9
COLD MILL THICKENER - PHASE II - SHEET #1.....	C10
COLD MILL THICKENER - PHASE II - SHEET #2.....	C11
COLD MILL THICKENER - PHASE II - SHEET #3.....	C12
FILTER PRESS WSPF2.....	C13
SAND FILTER WSF1.X.....	C14

DATE
OCTOBER 2019

HARBOR PROJECT NUMBER
BHLP-19236



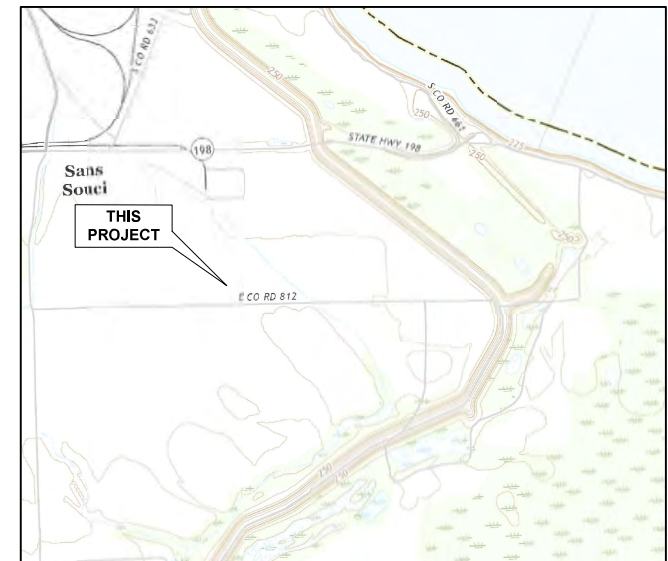
VICINITY MAP
SCALE: 1" = 4,000'



Harbor
5800 Evergreen Drive
Little Rock, AR 72205
(501) 663-8800

INDEX cont.

SHEET TITLE	SHEET NUMBER
WASTE WATER BASINS WB3 & WB9 - SHEET #1.....	C15
WASTE WATER BASINS WB3 & WB9 - SHEET #2.....	C16
WASTE WATER BASINS WB3 & WB9 - SHEET #3.....	C17
WASTE WATER BASINS WB3 & WB9 - SHEET #4.....	C18
WASTE WATER BASINS WB3 & WB9 - SHEET #5.....	C19
WASTEWATER BASINS WB 4.1 & WB 4.2 - SHEET #1.....	C20
WASTEWATER BASINS WB 4.1 & WB 4.2 - SHEET #2.....	C21
TANK WLT1 & WRLT1.....	C22
CAUSTIC TANK DT 2.1 & DT 2.2.....	C23
LIME SLURRY SYSTEM.....	C24
CHLORINE TANK DT4.....	C25
CHLORINE TANK DT5.....	C26
PEROXIDE TANK DT5.....	C27
WOOD PELLETS SILO DT 7.....	C28



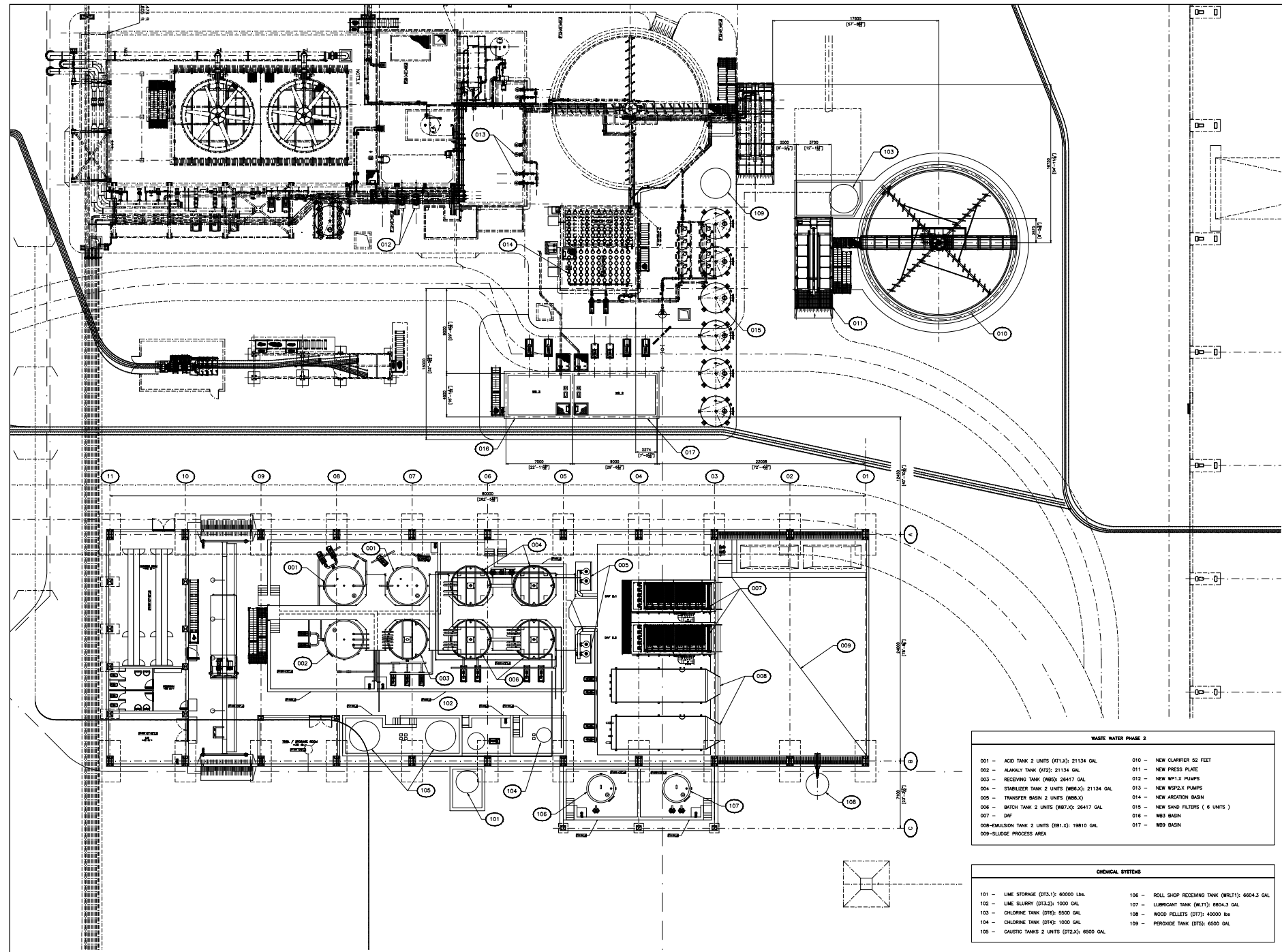
PROJECT LOCATION
SCALE: 1" = 1,000'

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Drawn By:	Date:
AES	9-20-19
Checked By:	Scale:
AHR	0125 METRIC
Project Number:	
BHL-P-19236	

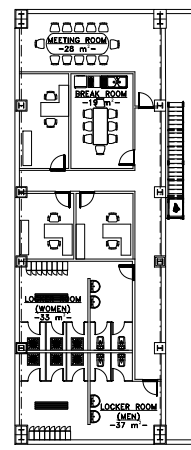
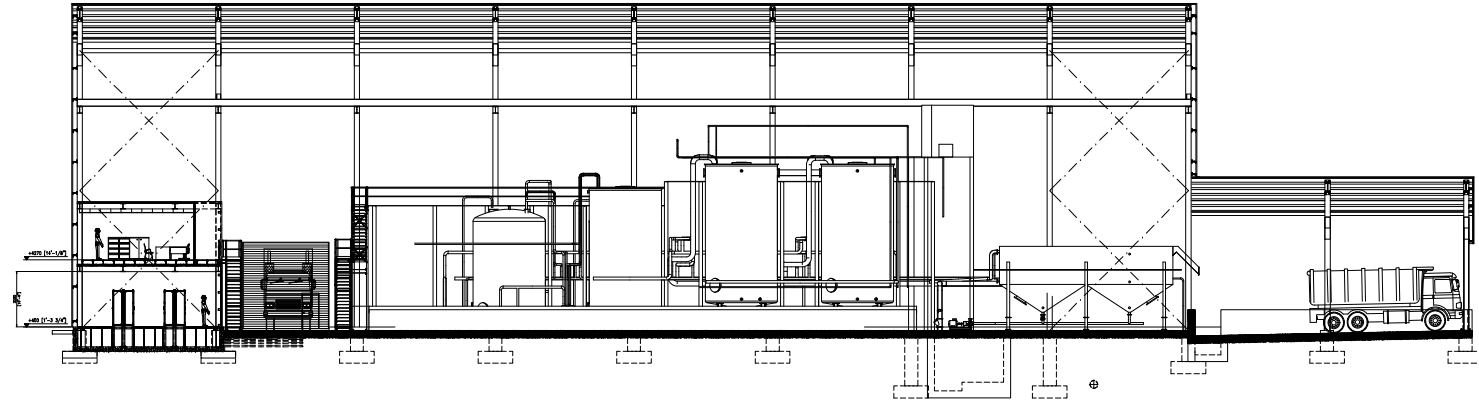
C1



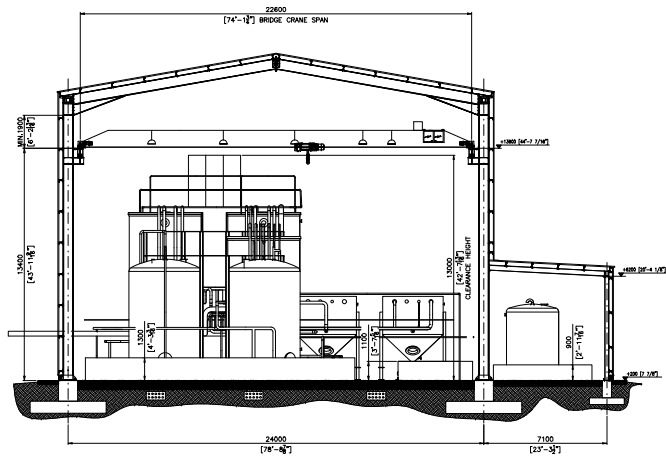
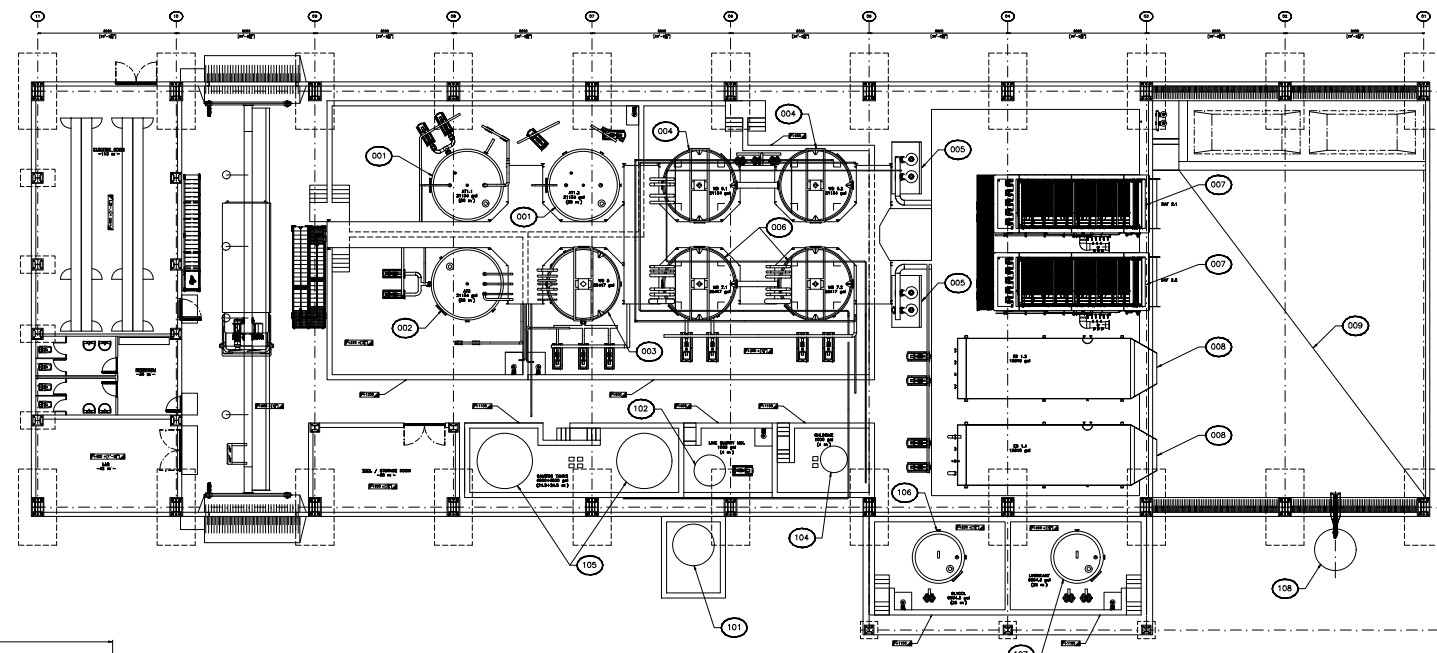
WASTE WATER PHASE 2			
001 -	ACID TANK 2 UNITS (AT1,2): 21134 GAL	010 -	NEW CLARIFIER 52 FEET
002 -	ALUMINUM TANK (AT2): 21134 GAL	011 -	NEW PRESS PLATE
003 -	RECEIVING TANK (WB3): 26417 GAL	012 -	NEW WSP/LX PUMPS
004 -	STABILIZER TANK 2 UNITS (WB1,2): 21134 GAL	013 -	NEW WSP/LX PUMPS
005 -	TRANSFER BASIN 2 UNITS (WB4,5): 26417 GAL	014 -	NEW AERATION BASIN
006 -	BATCH TANK 2 UNITS (WB7,8): 26417 GAL	015 -	NEW SAND FILTERS (6 UNITS)
007 -	DAF	016 -	WB3 BASIN
008 -	EMULSION TANK 2 UNITS (EB1,2): 19810 GAL	017 -	WB3 BASIN
009 -	GLIDE PROCESS AREA		

CHEMICAL SYSTEMS			
101 -	LIME STORAGE (DT3,1): 60000 Lbs.	106 -	ROLL SHOP RECEIVING TANK (WBLT1): 6604.3 GAL
102 -	LIME SLURRY (DT3,2): 1000 GAL	107 -	LUBRICANT TANK (WLT1): 6604.3 GAL
103 -	CHLORINE TANK (DT6): 5500 GAL	108 -	WOOD PELLETS (DT7): 40000 lbs
104 -	CHLORINE TANK (DT4): 1000 GAL	109 -	PEROXIDE TANK (DT5): 6500 GAL
105 -	CAUSTIC TANKS 2 UNITS (DT2,3): 8500 GAL		

NOTES:
1. ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS AND BETWEEN BRACKETS IN THE IMPERIAL SYSTEM, UNLESS OTHERWISE SPECIFIED.
2. ALL ELEVATIONS NOTED ON THIS DRAWING ARE BASED ON ±0.00m. LEVEL CORRESPONDING TO ELEVATION +50.00m (CAST).
3. THE NORTH DIRECTION NOTED IN THIS DRAWING IS THE NORTH OF THE PROJECT.



2ND FLOOR



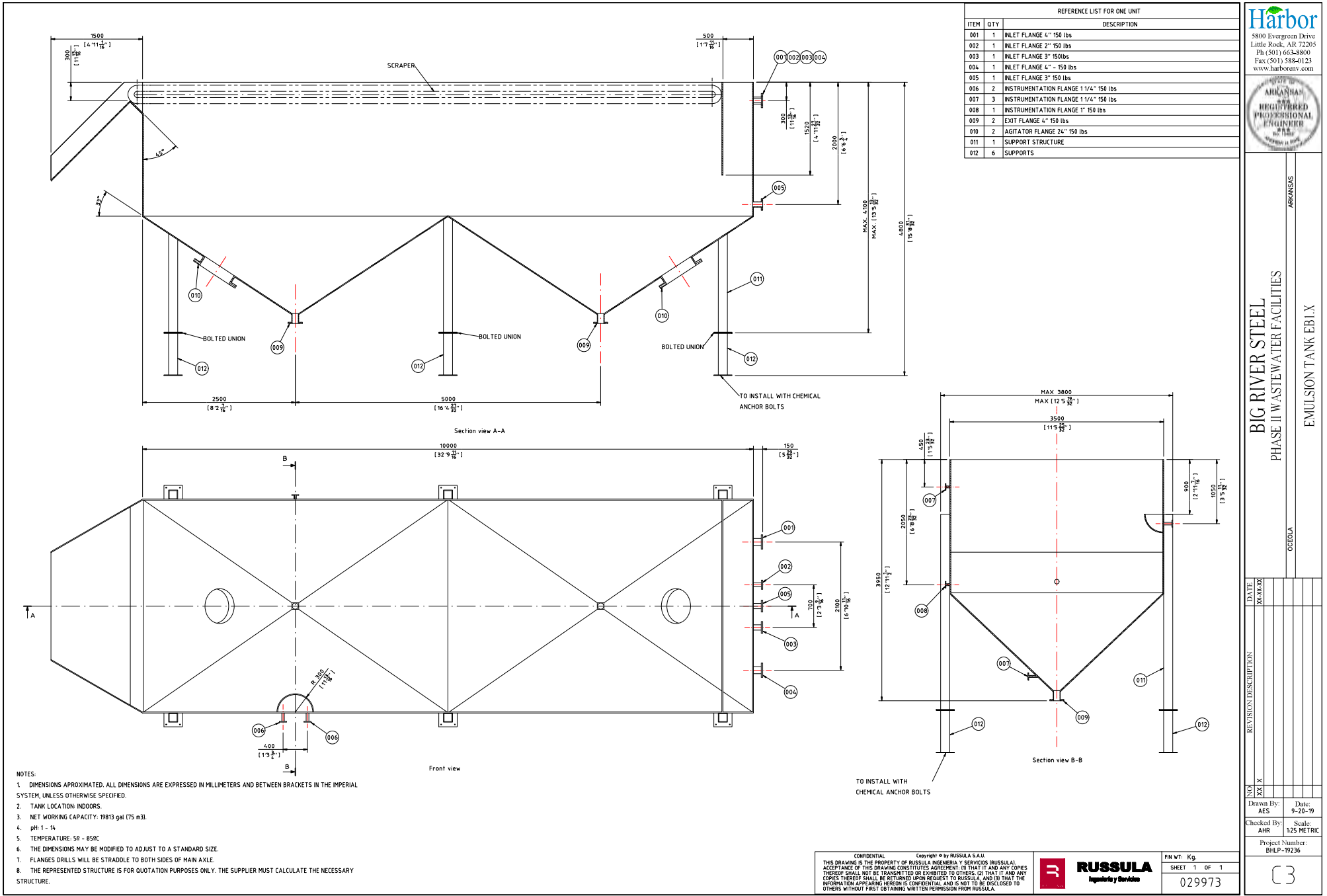
WASTE WATER PHASE 2	
001 - ACID TANK 2 UNITS (AT1-X): 21134 GAL	010 - NEW CLARIFIER 52 FEET
002 - ALKALY TANK (AT2): 21134 GAL	011 - NEW PRESS PLATE
003 - RECEIVING TANK (WB5): 26417 GAL	012 - NEW WP/LX PUMPS
004 - STABILIZER TANK 2 UNITS (WB1-X): 21134 GAL	013 - NEW WSP/LX PUMPS
005 - TRANSFER BASIN 2 UNITS (WB1-X)	014 - NEW AERATION BASIN
006 - BATCH TANK 2 UNITS (WB7-X): 26417 GAL	015 - NEW SAND FILTERS (6 UNITS)
007 - DAF	016 - WB3 BASIN
008-EMULSION TANK 2 UNITS (EB1-X): 19810 GAL	017 - WB9 BASIN
009-SLUDGE PROCESS AREA	

CHEMICAL SYSTEMS	
101 - LIME STORAGE (DT3.1): 60000 Lbs.	106 - ROLL SHOP RECEIVING TANK (WB1T1): 6604.3 GAL
102 - LIME SLURRY (DT3.2): 1000 GAL	107 - LUBRICANT TANK (WB1T): 6604.3 GAL
103 - CHLORINE TANK (DT6): 5500 GAL	108 - WOOD PELLETS (DT7): 40000 lbs
104 - CHLORINE TANK (DT4): 1000 GAL	109 - PEROXIDE TANK (DT5): 6500 GAL
105 - CAUSTIC TANKS 2 UNITS (DT2-X): 6500 GAL	

NOTES:
1. ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS AND BETWEEN BRACKETS IN THE IMPERIAL SYSTEM, UNLESS OTHERWISE SPECIFIED.
2. ALL ELEVATIONS NOTED ON THIS DRAWING ARE BASED ON ±0.00m. LEVEL CORRESPONDING TO ELEVATION +50.000m (243').
3. THE NORTH DIRECTION NOTED IN THIS DRAWING IS THE NORTH OF THE PROJECT.

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Ingeniería y Servicios
FIN. W1:
SHEET 2 OF 2
030417



REFERENCE LIST FOR ONE UNIT		
ITEM	QTY	DESCRIPTION
001	1	INLET FLANGE 4" 150 lbs
002	1	INLET FLANGE 2" 150 lbs
003	1	INLET FLANGE 3" 150lbs
004	1	INLET FLANGE 4" - 150 lbs
005	1	INLET FLANGE 3" 150 lbs
006	2	INSTRUMENTATION FLANGE 1 1/4" 150 lbs
007	3	INSTRUMENTATION FLANGE 1 1/4" 150 lbs
008	1	INSTRUMENTATION FLANGE 1" 150 lbs
009	2	EXIT FLANGE 4" 150 lbs
010	2	AGITATOR FLANGE 24" 150 lbs
011	1	SUPPORT STRUCTURE
012	6	SUPPORTS

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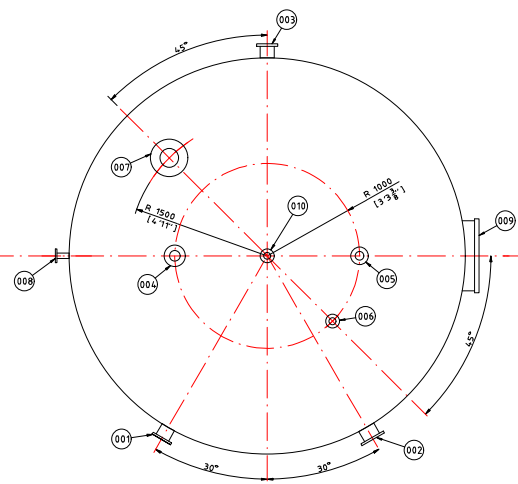
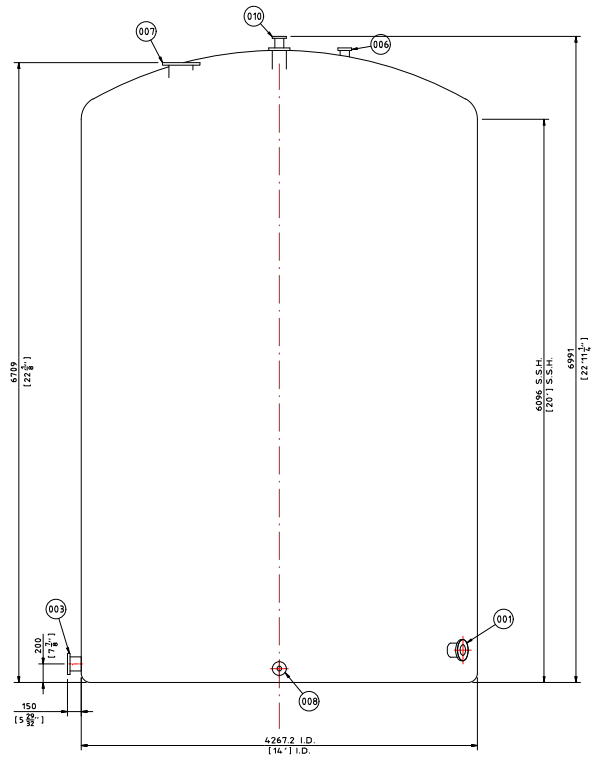
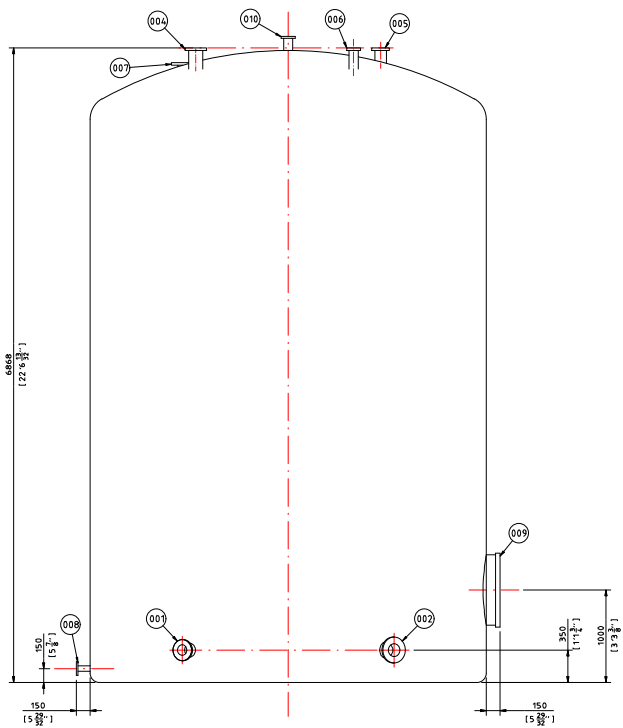
BIG RIVER STEEL
PHASE II WASTEWATER FACILITIES
EMULSION TANK EBI-X

DATE	REVISION DESCRIPTION
XX-XX-XX	
XX-XX-XX	
XX-XX-XX	
XX-XX-XX	
XX-XX-XX	

Drawn By: AES	Date: 9-20-19
Checked By: AHR	Scale: 1:25 METRIC

Project Number:
BHL-P-19236

C3



REFERENCE LIST FOR ONE UNIT		
ITEM	QTY	DESCRIPTION
001	1	PUMP FLANGE ARP11X - 4" - 150 lbs
002	1	PUMP FLANGE AP11X - 6" - 150 lbs
003	1	DRAIN FLANGE - 4" - 150 lbs
004	1	INLET FLANGE - 4" - 150 lbs
005	1	INLET FLANGE - 2" - 150 lbs
006	1	INSTRUMENTATION FLANGE - 10" - 150 lbs
007	1	LEVEL FLANGE - 2" - 150 lbs
008	1	MANHOLE
009	1	AIR RELIEF VALVE FLANGE - 2" - 150 lbs

- NOTES:
1. DIMENSIONS APPROXIMATED. ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS AND BETWEEN BRACKETS IN THE IMPERIAL SYSTEM, UNLESS OTHERWISE SPECIFIED.
 2. TANK LOCATION: INDOORS.
 3. NET WORKING CAPACITY: 21134 gal (80 m3).
 4. pH = 1
 5. TEMPERATURE: 50 - 90°C
 6. THE DIMENSIONS MAY BE MODIFIED TO ADJUST TO A STANDARD SIZE.
 7. FLANGES DRILLS WILL BE STRADDLE TO BOTH SIDES OF MAIN AXLE.

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RUSSULA

Ingeniería y Servicios

FIN WT.

SHEET 1 OF 1

029779

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ARKANSAS

REGISTERED PROFESSIONAL ENGINEER

BIG RIVER STEEL

PHASE II WASTEWATER FACILITIES

TANK AT-1X

DATE: 08-XX-XX

REVISION DESCRIPTION:

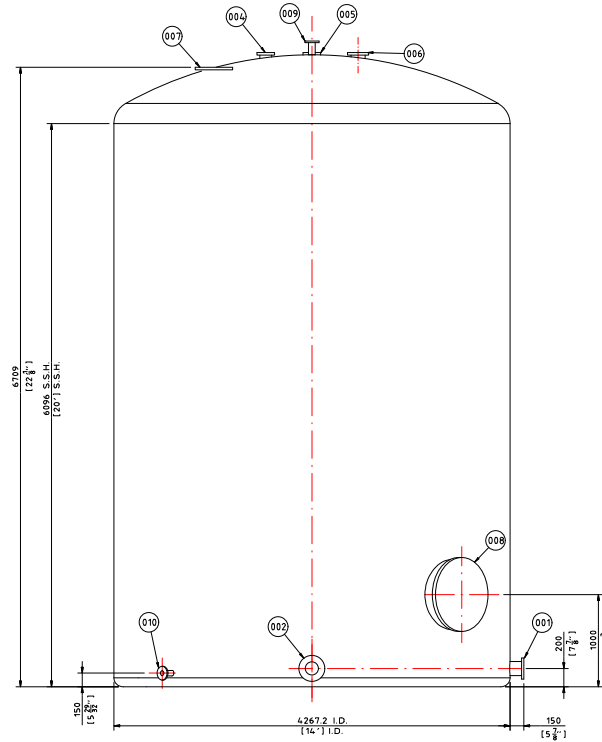
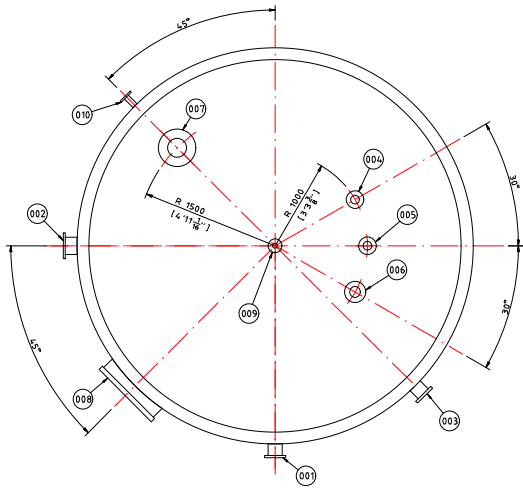
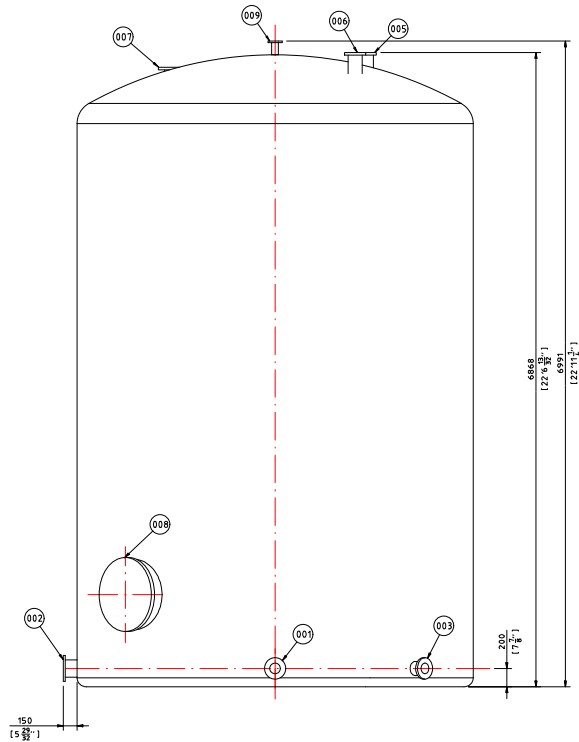
NO. 1

Drawn By: AES Date: 9-20-19

Checked By: AHR Scale: 1/25 METRIC

Project Number: BHL-P-19236

C4



REFERENCE LIST FOR ONE UNIT		
ITEM	QTY	DESCRIPTION
001	1	PUMP FLANGE ARP 2 X - 4" 150 lbs
002	1	PUMP FLANGE AP2X - 6" 150 lbs
003	1	DRAIN FLANGE - 4" 150 lbs
004	1	INLET FLANGE - 3" 150 lbs
005	1	INLET FLANGE - 3" 150 lbs
006	1	INLET FLANGE - 4" 150 lbs
007	1	INSTRUMENTATION FLANGE - 10" 150 lbs
008	1	MANHOLE
009	1	AIR RELIEF VALVE FLANGE - 2" - 150 lbs
010	1	LEVEL FLANGE - 2" - 150 lbs

- NOTES:
1. DIMENSIONS APPROXIMATED. ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS AND BETWEEN BRACKETS IN THE IMPERIAL SYSTEM, UNLESS OTHERWISE SPECIFIED.
 2. TANK LOCATION: INDOORS.
 3. NET WORKING CAPACITY: 2134 gal (80 m³).
 4. pH 1 - 14.
 5. TEMPERATURE: 50 - 85°C.
 6. THE DIMENSIONS MAY BE MODIFIED TO ADJUST TO A STANDARD SIZE.
 7. FLANGES DRILLS WILL BE STRADDLE TO BOTH SIDES OF MAIN AXLE.

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FIN WT:
SHEET 1 OF 1
029780

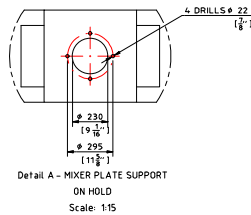
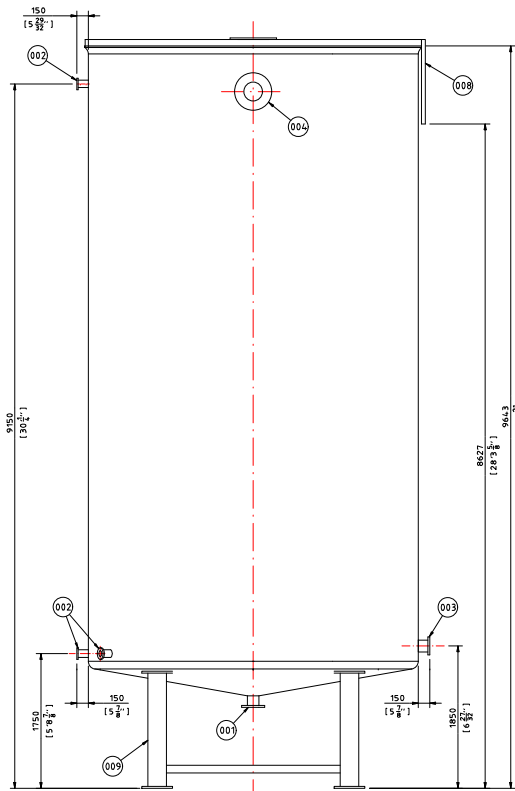
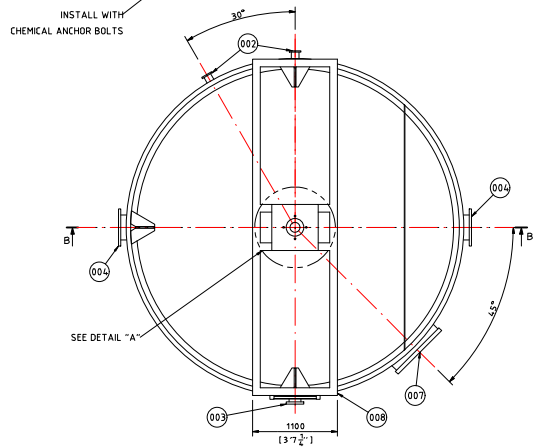
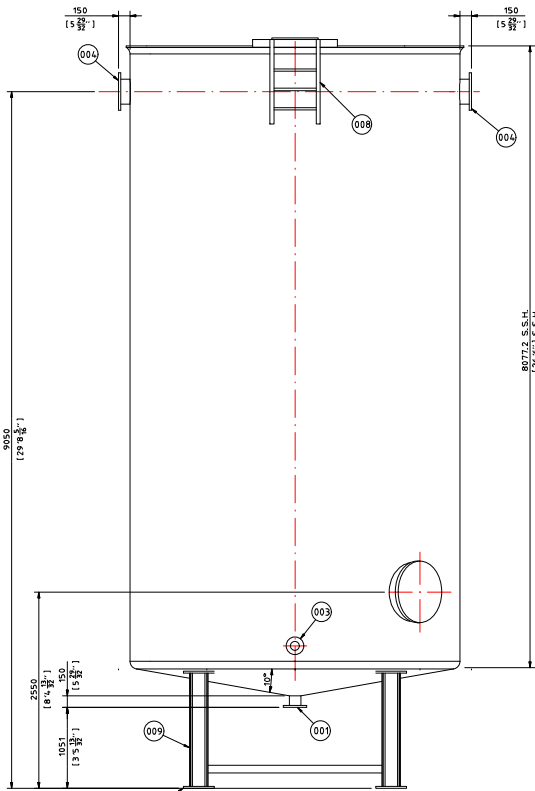
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BIG RIVER STEEL
PHASE II WASTEWATER FACILITIES
TANK AT2
ARIZONA
OCEOLA

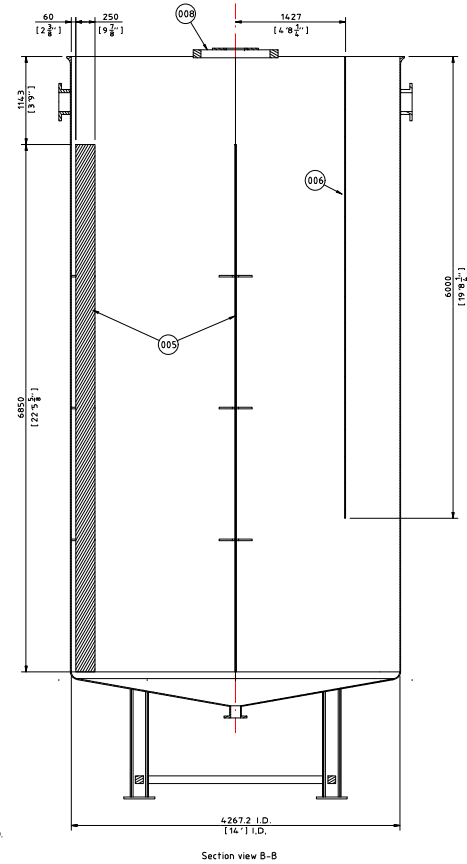
REVISION DESCRIPTION		DATE
NO	XX	XX
Drawn By:	AES	Date:
Checked By:	AHR	Scale:
Project Number:		BHLP-19236

C5



- NOTES:
- DIMENSIONS APPROXIMATED. ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS AND BETWEEN BRACKETS IN THE IMPERIAL SYSTEM, UNLESS OTHERWISE SPECIFIED.
 - TANK LOCATION: INDOORS.
 - NET WORKING CAPACITY: 26417 gal (100 m³).
 - pH: 1 - 14.
 - TEMPERATURE: 50 - 85°C.
 - THE DIMENSIONS MAY BE MODIFIED TO ADJUST TO A STANDARD SIZE.
 - LADDER AND PLATFORM INCLUDED. THE PLATFORM WILL BE PASSABLE TO ACCESS THE MIXER.
 - SEE BELOW MIXER LOAD DATA: USE AT LEAST THREE TIMES THIS VALUES FOR THE DIMENSIONING OF THE TANK AND AGITATOR SUPPORT.
- AXIAL FORCE: 2128 N
 TORQUE: 1475 Nm
 BENDING MOMENT: 3697 Nm
 MIN. ALLOWED STIFFNESS OF MOUNTING: 3415074 Nm/radian
 TOTAL WEIGHT: 1254 kg

REFERENCE LIST FOR ONE UNIT		
ITEM	QTY	DESCRIPTION
001	1	PUMP FLANGE W/7.1X - 6" - 150 lbs
002	3	INSTRUMENTATION FLANGE - 2" - 150 lbs
003	1	INLET FLANGE - 4" - 150 lbs
004	2	OVERFLOW FLANGE - 12" - 150 lbs
005	3	BAFFLE WITH GUSSETS
006	1	BAFFLE
007	1	MANHOLE
008	1	PLATFORM AND LADDER
009	1	SUPPORT STRUCTURE



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FIN WT:
 SHEET 1 OF 1
 029783

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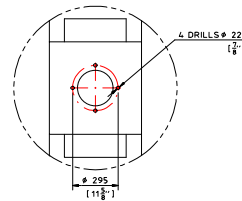
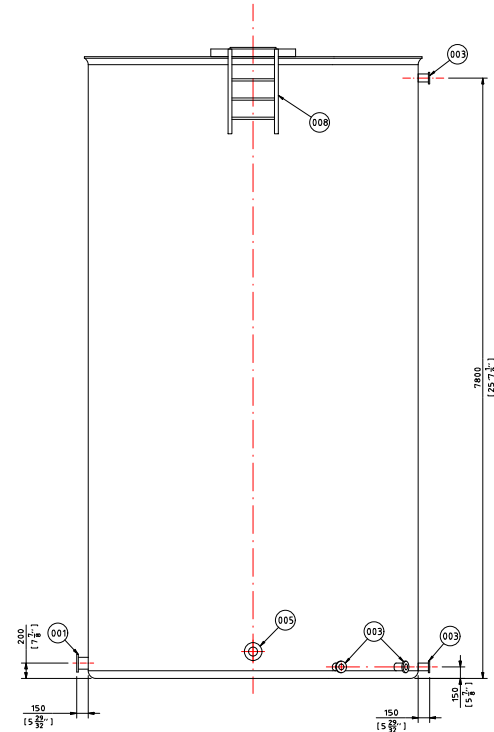
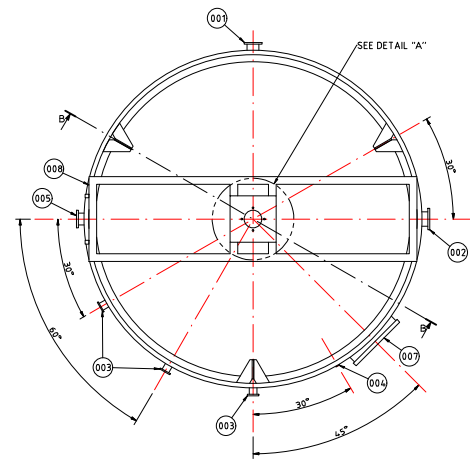
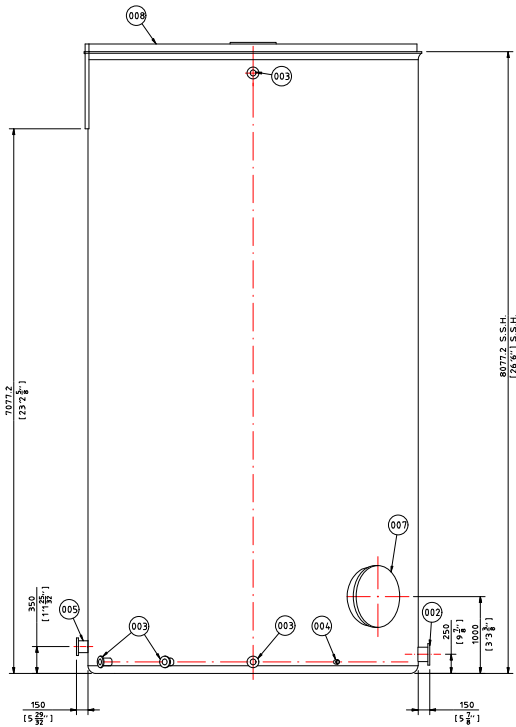
STATE OF ARKANSAS
 REGISTERED
 PROFESSIONAL
 ENGINEER
 No. 11111
 EXPIRATION 11/2016

BIG RIVER STEEL
 PHASE II WASTEWATER FACILITIES

TANK WB7.X

REVISION DESCRIPTION		DATE
NO.	XX	XX-XX-XX
Drawn By:	AES	Date: 9-20-19
Checked By:	AHR	Scale: 125 METRIC U.N.D.
Project Number: BRLP-19236		

C6

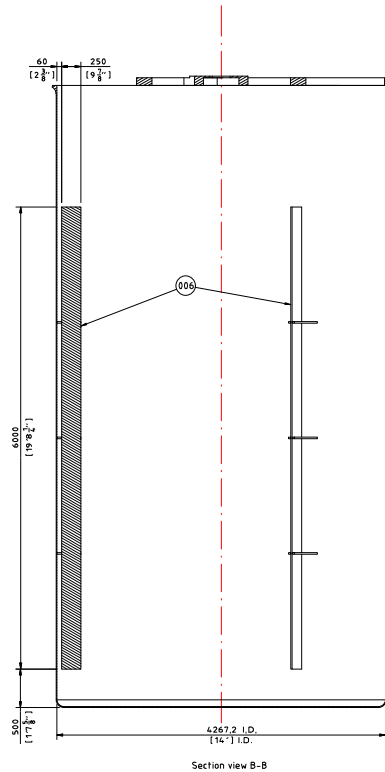


Detail A - MIXER PLATE SUPPORT
ON HOLD
Scale: 1:15

NOTES:

1. DIMENSIONS APPROXIMATED. ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS AND BETWEEN BRACKETS IN THE IMPERIAL SYSTEM, UNLESS OTHERWISE SPECIFIED.
 2. TANK LOCATION: INDOORS.
 3. NET WORKING CAPACITY: 26417 gal (100 m³).
 4. pH: 1 - 14.
 5. TEMPERATURE: 59 - 85°C.
 6. THE DIMENSIONS MAY BE MODIFIED TO ADJUST TO A STANDARD SIZE.
 7. LADDER AND PLATFORM INCLUDED. THE PLATFORM WILL BE PASSABLE TO ACCESS THE MIXER.
 8. FLANGES DRILLS WILL BE STRADDLE TO BOTH SIDES OF MAIN AXLE.
 9. SEE BELOW MIXER LOAD DATA: USE AT LEAST THREE TIMES THIS VALUES FOR THE DIMENSIONING OF THE TANK AND AGITATOR SUPPORT.
- AXIAL FORCE: 584 N
TORQUE: 625 Nm
BENDING MOMENT: 904 Nm
MIN. ALLOWED STIFFNESS OF MOUNTING: 731662 Nm/radian
TOTAL WEIGHT: 545 kg

REFERENCE LIST FOR ONE UNIT		
ITEM	QTY	DESCRIPTION
001	1	DRAIN FLANGE - 4" - 150 lbs
002	1	PUMP FLANGE W/PSX - 6" - 150 lbs
003	4	INSTRUMENTATION FLANGE - 2" - 150 lbs
004	1	INSTRUMENTATION COUPLING NPT 3000# 1 1/4" ANSI B16.11
005	1	INLET FLANGE - 4" - 150 lbs
006	3	BAFFLE WITH GUSSETS
007	1	MANHOLE
008	1	PLATFORM AND LADDER

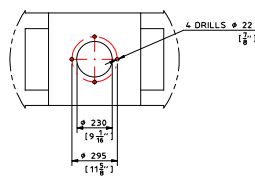
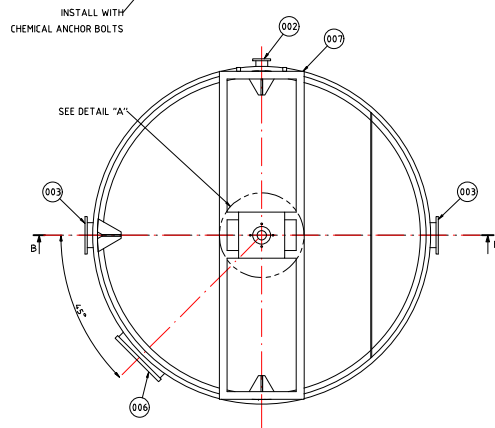


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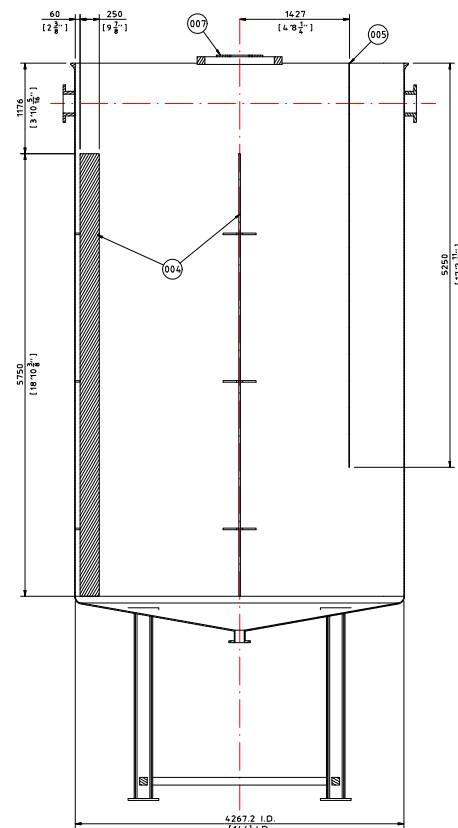


ARKANSAS
BIG RIVER STEEL
PHASE II WASTEWATER FACILITIES
TANK WB5

NO.		XX	X
REVISION DESCRIPTION			
Drawn By:		Date:	
AES		9-20-19	
Checked By:		Scale:	
AHR		125 METRIC U.N.O.	
Project Number: 8HLP-19236			



Scale: 1:15



Section view B-B

REFERENCE LIST FOR ONE UNIT		
ITEM	QTY	DESCRIPTION
001	1	PUMP FLANGE W/SPCL - 6" - 150 lbs
002	1	INLET FLANGE - 4" - 150 lbs
003	2	OVERFLOW FLANGE - 12" - 150 lbs
004	3	BAFFLE WITH GUSSETS
005	1	BAFFLE
006	1	MANHOLE
007	1	PLATFORM AND LADDER
008	1	SUPPORT STRUCTURE

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BIG RIVER STEEL PHASE II WASTEWATER FACILITIES

TANK WB6.X

NO	DATE	REVISION DESCRIPTION	Drawn By:	Date:
			Checked By:	Scale:
XX X	XX-XX-XX		AES	9-20-15
			AHR	1:25 METR U.N.O.
Project Number: BHLP-19236				

Project Number
BHLP-19236

(8)

1. DIMENSIONS APPROXIMATED. ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS AND BETWEEN BRACKETS IN THE IMPERIAL SYSTEM, UNLESS OTHERWISE SPECIFIED.
2. TANK LOCATION: INDOORS.
3. NET WORKING CAPACITY: 2134 gal (80 m3).
4. pH 1-14.
5. TEMPERATURE: 59C - 859C
6. THE DIMENSIONS MAY BE MODIFIED TO ADJUST TO A STANDARD SIZE.
7. LOADER, PLATFORM AND HANDRAIL INCLUDED. THE PLATFORM WILL BE PASSABLE TO ACCESS THE MIXER.
8. SEE BELOW MIXER LOAD DATA. USE AT LEAST THREE TIMES THIS VALUES FOR THE DIMENSIONING OF THE TANK AND AGITATOR SUPPORT.

AXIAL FORCE: 1266 N
TORQUE: 1061 Nm
BENDING MOMENT: 1368 Nm
MIN. ALLOWED STIFFNESS OF MOUNTING: 1118401 Nm/radian
TOTAL WEIGHT: 548 kg

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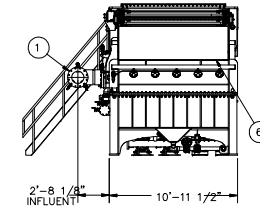


FIN WT:
SHEET 1 OF 1
029782

1. ALL IS TO BE CONSTRUCTED GREY FROM HIGH IMPACT NATURAL STRESS RELIEVED, VIRGIN COPOLYMER POLYPROPYLENE. U.O.W.S
2. 3. WASTE WATER @ 40" & 150"
4. ALL FLANGES TO BE 304 STAINLESS STEEL
5. ALL STEEL REINFORCEMENTS TO BE 304 STAINLESS STEEL
6. ALL DIMENSIONS SHOWN APPLY TO AMBIENT TEMPERATURE (NON-SPR)
7. A SPREADER BEAM REQUIRED TO BE DESIGNED ENSURE VERTICAL OR MINIMUM OUTWARD LIFT
8. SOME HIDDEN LINES AND COMPONENTS OMITTED FOR CLARITY
9. ALL DIMENSIONS TO BE 3/16" THK. EPDM
10. ALL FASTENERS TO BE 304 SS
11. HYDRA TEST TO BE ADMINISTERED BEFORE SHIPMENT
12. ALL FLANGE FACES TO BE PROTECTED WITH WOOD BLANKS FOR SHIPPING

PMP-25SW DAF PROPOSAL

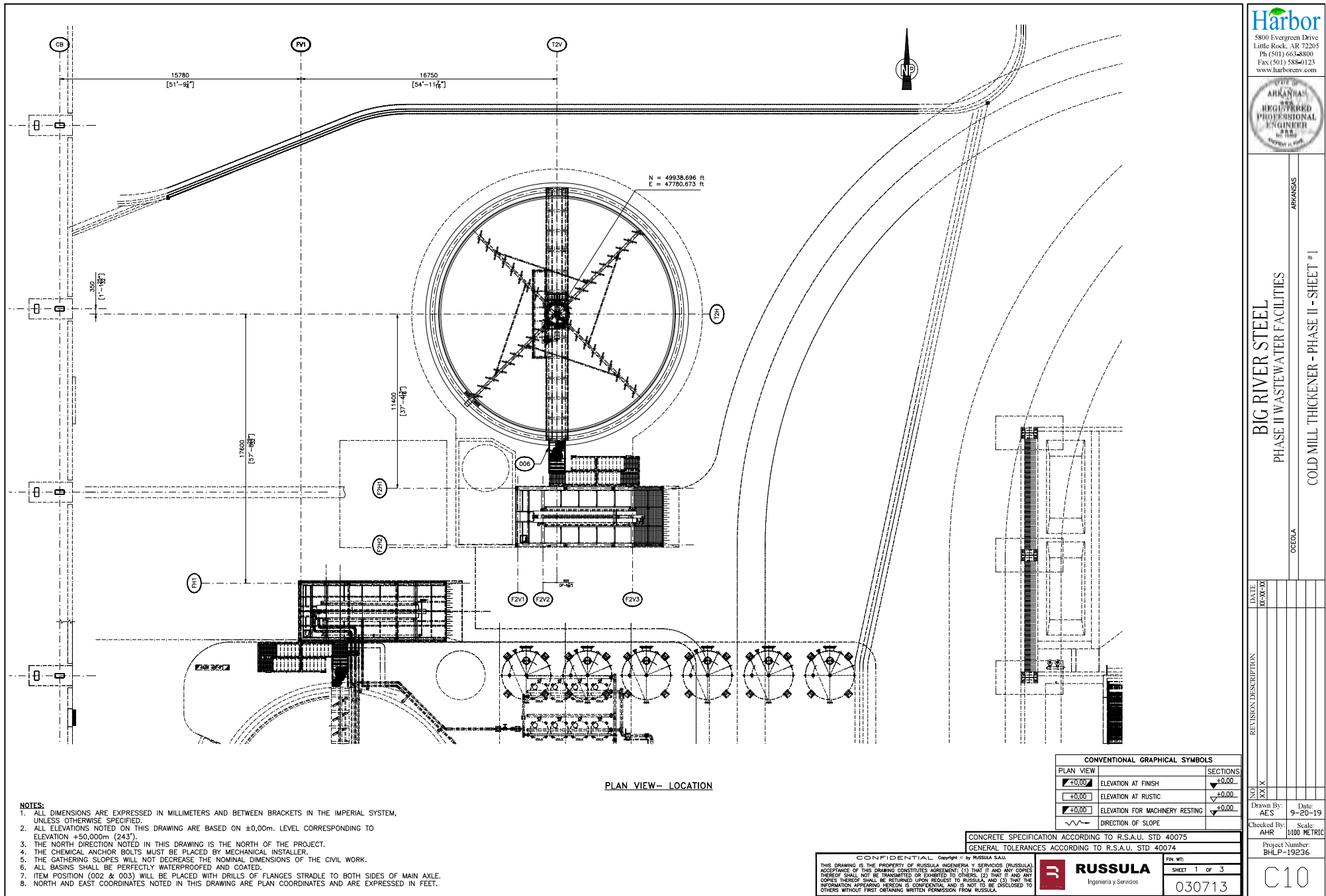
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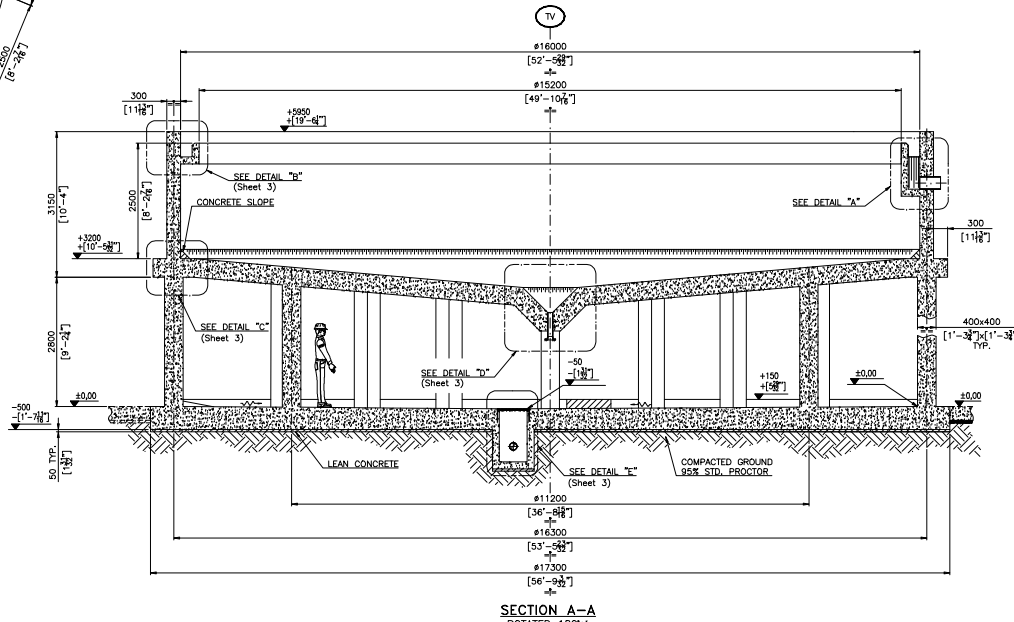
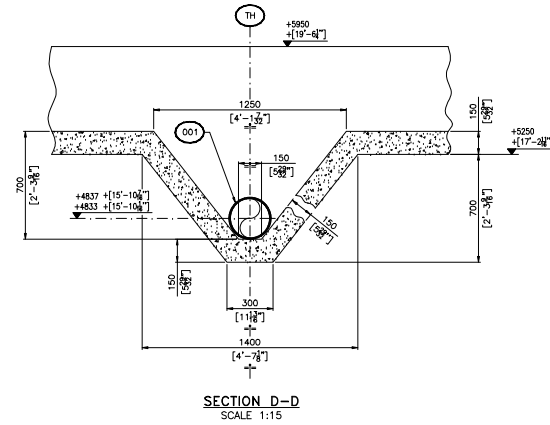
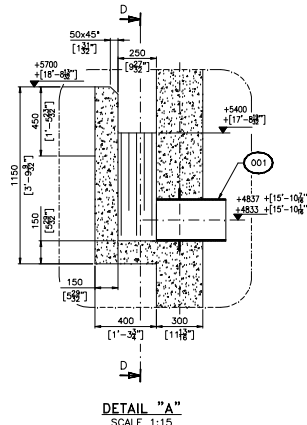
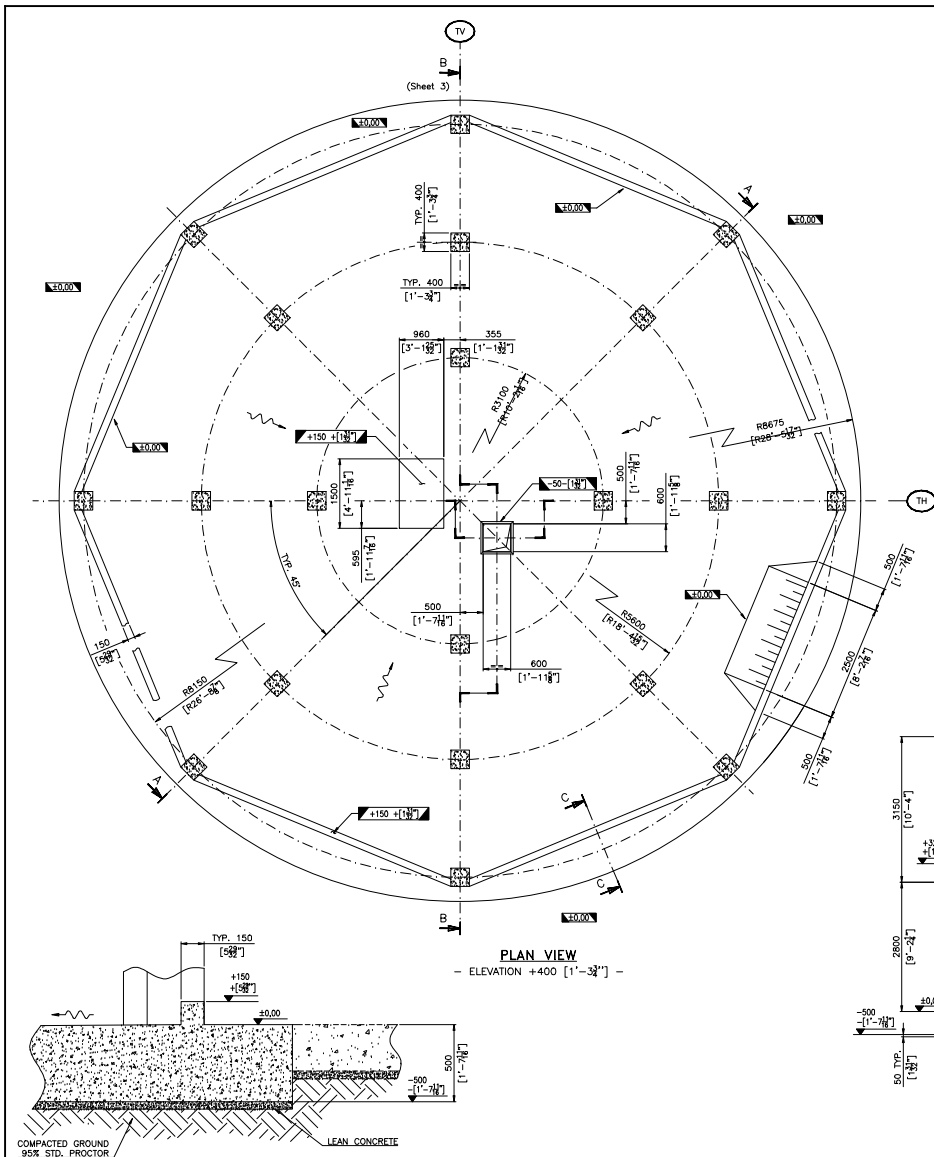


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[illegible]

C9





- NOTES:**
1. ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS AND BETWEEN BRACKETS IN THE IMPERIAL SYSTEM, UNLESS OTHERWISE SPECIFIED.
 2. ALL ELEVATIONS NOTED ON THIS DRAWING ARE BASED ON ± 0.00 m. LEVEL CORRESPONDING TO ELEVATION +50,000m (243').
 3. THE NORTH DIRECTION NOTED IN THIS DRAWING IS THE NORTH OF THE PROJECT.
 4. THE CHEMICAL ANCHOR BOLTS MUST BE PLACED BY MECHANICAL INSTALLER.
 5. THE GATHERING SLOPES WILL NOT DECREASE THE NOMINAL DIMENSIONS OF THE CIVIL WORK.
 6. ALL BASINS SHALL BE PERFECTLY WATERPROOFED AND COATED.
 7. ITEM POSITION (002 & 003) WILL BE PLACED WITH DRILLS OF FLANGES STRADLE TO BOTH SIDES OF MAIN AXLE.
 8. NORTH AND EAST COORDINATES NOTED IN THIS DRAWING ARE PLAN COORDINATES AND ARE EXPRESSED IN FEET.

CONVENTIONAL GRAPHICAL SYMBOLS		
PLAN VIEW		SECTIONS
	ELEVATION AT FINISH	
	ELEVATION AT RUSTIC	
	ELEVATION FOR MACHINERY RESTING	
	DIRECTION OF SLOPE	

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CONCRETE SPECIFICATION ACCORDING TO R.S.A.U. STD 40075	
GENERAL TOLERANCES ACCORDING TO R.S.A.U. STD 40074	
RUSSULA Ingeniería y Servicios	
FIN. NÚM. SHEET 2 OF 3	030713

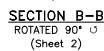
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STATE OF ARKANSAS
 REGISTERED PROFESSIONAL ENGINEER
 No. 12345
 EXPIRATION DATE 12/31/2019

BIG RIVER STEEL
 PHASE II WASTEWATER FACILITIES
 COLD MILL THICKENER - PHASE II - SHEET #2

DATE: 08-20-19
 DESIGNED BY: AES
 CHECKED BY: AHR
 REVISION DESCRIPTION:
 NO. 1: 08-20-19
 NO. 2: 08-20-19
 NO. 3: 08-20-19
 NO. 4: 08-20-19
 NO. 5: 08-20-19
 NO. 6: 08-20-19
 NO. 7: 08-20-19
 NO. 8: 08-20-19
 NO. 9: 08-20-19
 NO. 10: 08-20-19

Drawn By: AES
 Date: 9-20-19
 Checked By: AHR
 Scale: 1:50 METRIC
 UNITS
 Project Number: BHL-P-19236
C11



CONVENTIONAL GRAPHICAL SYMBOLS		
PLAN VIEW		SECTION
	ELEVATION AT FINISH	
	ELEVATION AT RUSTIC	
	ELEVATION FOR MACHINERY RESTING	
	DIRECTION OF SLOPE	

CONCRETE SPECIFICATION ACCORDING TO R.S.A.U. STD 40075
GENERAL TOLERANCES ACCORDING TO R.S.A.U. STD 40074

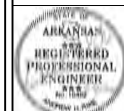
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FIN WT:
SHEET 3 OF 3
030713

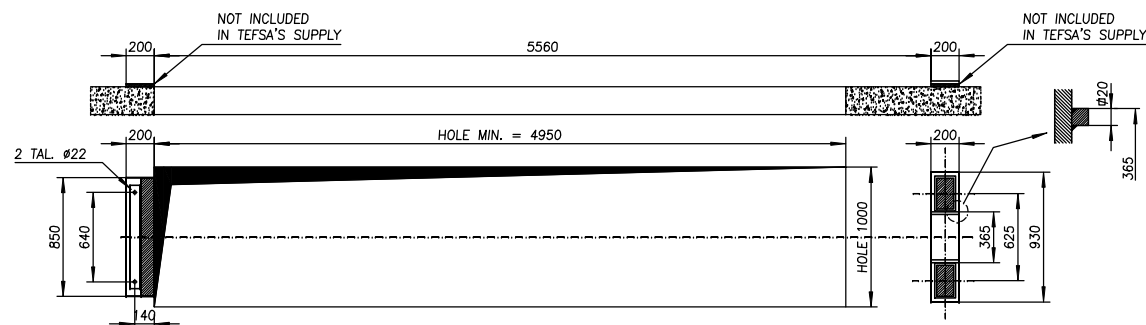
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BIG RIVER STEEL
PHASE II WASTEWATER FACILITIES
COLD MILL THICKENER - PHASE II - SHEET #3

NO.	REVISION DESCRIPTION	DATE
		XX-XX-XX
Drawn By: AES	Date: 9-20-19	
Checked By: AHR	Scale: 1:100 METRIC	
Project Number: BHL P-19236		

C12



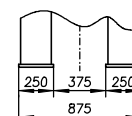
FUNDATION DETAIL
SECTION A-A'

CONEXION AIRE COMPRIMIDO
"COMPRESSED AIR CONNECTION"
R-1" MALE NPT

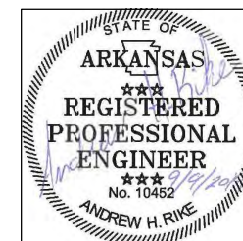
ENTRADA PRODUCTO
PRODUCT INLET
ANSI 3" 300 Lbs.

SALIDA FILTRADO
FILTRATE OUTLET
ANSI 4" 150 Lbs.

ESPOSOR TORTA CAKE THICKNESS	30 mm.
CAPACIDAD TOTAL PLACAS TOTAL PLATES	70
CILINDRO CYLINDER	Ø200-140 mm
CARRERA STROKE	800 mm.
POTENCIA MOTOR CEN. HIDRAULICA HYDRAULIC GROUP POWER	4 kW.
POTENCIA MOTOR TRANS. PLACAS PLATE TRANSPORT MOTOR POWER	0.37 kW.
PRESION DE TRABAJO WORKING PRESSURE	12 bar
PRESION DE CIERRE CLOSING PRESSURE	270 bar



VIEW BY "Y"



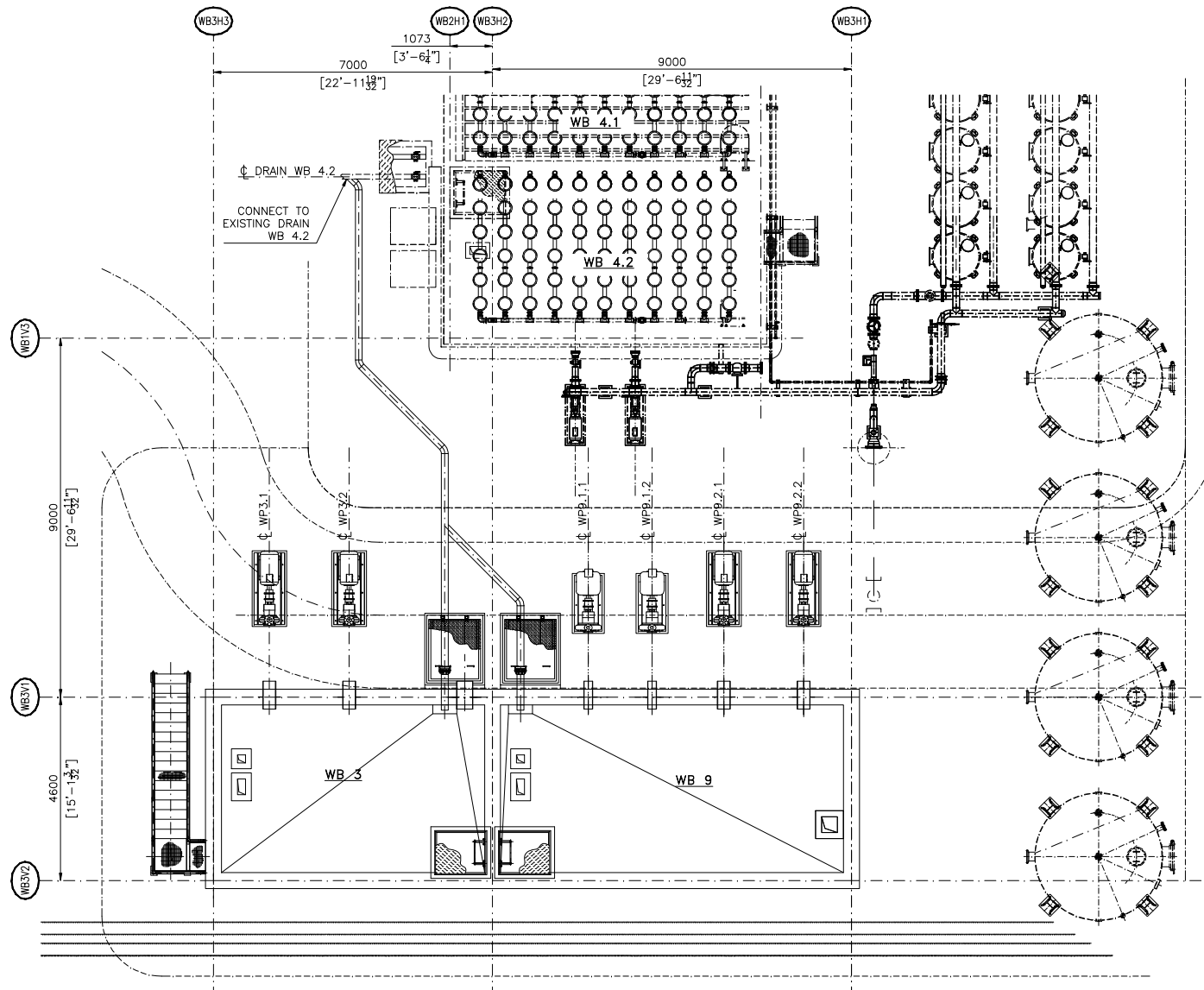
DENOMINACION PLANO:

CONJUNTO GENERAL FILTRO PRENSA

N° PLANO:

PSEH800SL.12A30-70.00

Este plano es propiedad de TECNICAS DE FILTRACION, queda prohibida la reproducción y la comunicación sin previo aviso a otros terceros.



NOTES:

1. ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS AND BETWEEN BRACKETS IN THE IMPERIAL SYSTEM, UNLESS OTHERWISE SPECIFIED.
2. ALL ELEVATIONS NOTED ON THIS DRAWING ARE BASED ON $\pm 0.00m$. LEVEL CORRESPONDING TO ELEVATION +50,000m (243').
3. THE NORTH DIRECTION NOTED IN THIS DRAWING IS THE NORTH OF THE PROJECT.
4. THE CHEMICAL ANCHOR BOLTS MUST BE PLACED BY MECHANICAL INSTALLER.
5. THE GATHERING SLOPES WILL NOT DECREASE THE NOMINAL DIMENSIONS OF THE CIVIL WORK.
6. ALL BASINS SHALL BE PERFECTLY WATERPROOFED AND COATED.
7. COVER PVC PIPE WALL EMBEDDINGS WITH STICK WATERSTOP JOINT, OR SIMILAR, AVOIDING WATER INFILTRATION.

SUPPLEMENTARY DRAWINGS:

- 030729 - WASTE WATER BASINS WB3 & WB9 ELECTRICAL CONDUITS
- 030730 - WASTE WATER BASINS WB3 & WB9 SIDEWALKS
- 030731 - WASTE WATER BASINS WB3 & WB9 CIVIL REINFORCING

CONCRETE SPECIFICATION ACCORDING TO R.S.A.U. STD 40075

GENERAL TOLERANCES ACCORDING TO R.S.A.U. STD 40074

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RUSSULA S.A.
Ingeniería y Servicios

FIN WT:

SHEET 1 OF 5

030728

Harbor

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www.harborenv.com



BIG RIVER STEEL PHASE II WASTEWATER FACILITIES

ARKANSAS

OCEOLA

WASTE WATER BASINS WB3 & WB9 SHEET #1

NO	REVISION DESCRIPTION	DATE
XX X		XX-XX-XX

Drawn By: AES Date: 9-20-19

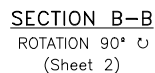
Checked By: AHR Scale: 1/75 METRIC

Project Number: BHL P-19236

C15

ARKANSAS

WASTE WATER BASINS WB3 & WB9 SHEET #3

[illegible]

1. ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS AND BETWEEN BRACKETS IN THE IMPERIAL SYSTEM, UNLESS OTHERWISE SPECIFIED.
2. ALL ELEVATIONS NOTED ON THIS DRAWING ARE BASED ON $\pm 0,00m$. LEVEL CORRESPONDING TO ELEVATION $+50,000m$ (243').
3. THE NORTH DIRECTION NOTED IN THIS DRAWING IS THE NORTH OF THE PROJECT.
4. THE CHEMICAL ANCHOR BOLTS MUST BE PLACED BY MECHANICAL INSTALLER.
5. THE GATHERING SLOPES WILL NOT DECREASE THE NOMINAL DIMENSIONS OF THE CIVIL WORK.
6. ALL BASINS SHALL BE PERFECTLY WATERPROOFED AND COATED.
7. COVER PVC PIPE WALL EMBEDDINGS WITH STICK WATERSTOP JOINT, OR SIMILAR, AVOIDING WATER INFILTRATION.

SUPPLEMENTARY DRAWINGS:

030729	-	WASTE	WATER	BASINS	WB3	&	WB9	ELECTRICAL CONDUITS
030730	-	WASTE	WATER	BASINS	WB3	&	WB9	SIDEWALKS
030731	-	WASTE	WATER	BASINS	WB3	&	WB9	CIVIL REINFORCING

GENERAL TOLERANCES ACCORDING TO R.S.A.U. STD 40074

SHEET 3 OF 5

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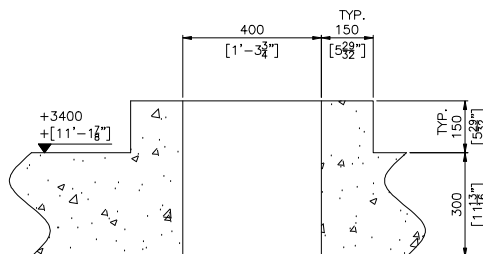
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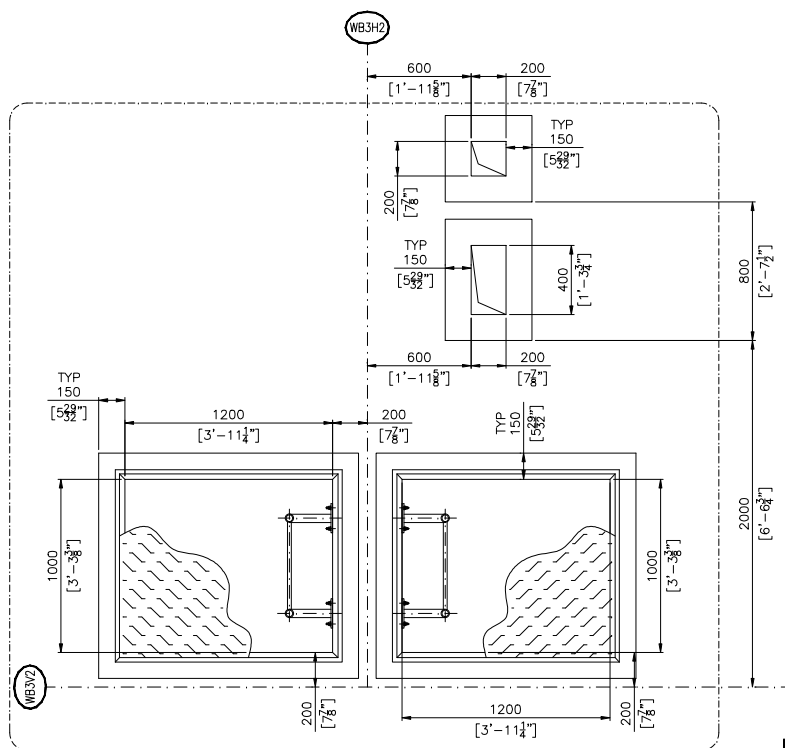
030728

C17



SECTION D-D

SCALE 1:10
ROTATION 90°
(Sheet 2)



DETAIL B-B

(Sheet 2)

ON HOLD

SUPPLIER	ITEM.	DRAWING	QTY.	UM	DESCRIPTION
BIG RIVER	001	010657	1	U	EMBEDDED PIPE 16" x 700
BIG RIVER	002	009191	4	U	EMBEDDED PIPE 12" x 700
BIG RIVER	003	020477	2	U	EMBEDDED PIPE 8" x 700
BIG RIVER	010	030549	2	U	EMBEDDED DRAIN PIPE 6"
BIG RIVER	011		22	m	PVC DRAIN PIPE 6" PN6 & ACCESSORIES
BIG RIVER	012		2	U	FLANGE ADAPTER 6" ANSI 150 Lbs
					"ULTRA QUICK" (SAINT GOBAIN) OR SIMILAR
BIG RIVER	020	030345	2	U	FRAME 1000 X 1200
BIG RIVER	021	030347	2	U	FRAME 1200 X 1200
RUSSULA	030	030349	2	U	COVER 1000 X 1200
RUSSULA	031	030351	2	U	COVER 1200 X 1500
BIG RIVER	040	029813	43	m	EMBEDDED ANGLE 2-1/2" X 2-1/2 X 1/4"
RUSSULA	041	008169	43	m	WELDED HANDRAIL
RUSSULA	050	030541	2	U	LADDER 550 X 3400
RUSSULA	051	020038	1	U	STAIRS 800 x 3400

NOTES:

1. ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS AND BETWEEN BRACKETS IN THE IMPERIAL SYSTEM, UNLESS OTHERWISE SPECIFIED.
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6. ALL BASINS SHALL BE PERFECTLY WATERPROOFED AND COATED.
7. COVER PVC PIPE WALL EMBEDDINGS WITH STICK WATERSTOP JOINT, OR SIMILAR, AVOIDING WATER INFILTRATION.

SUPPLEMENTARY DRAWINGS:

030729 - WASTE WATER BASINS WB3 & WB9 ELECTRICAL CONDUITS
030730 - WASTE WATER BASINS WB3 & WB9 SIDEWALKS
030731 - WASTE WATER BASINS WB3 & WB9 CIVIL REINFORCING

CONCRETE SPECIFICATION ACCORDING TO R.S.A.U. STD 40075

GENERAL TOLERANCES ACCORDING TO R.S.A.U. STD 40074

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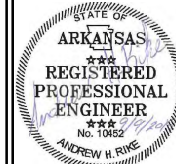
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FIN WT:

SHEET 5 OF 5

030728

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BIG RIVER STEEL
PHASE II WASTEWATER FACILITIES

ARKANSAS

OCEOLA

WASTE WATER BASINS WB3 & WB9 SHEET #5

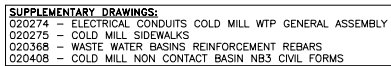
NO	REVISION DESCRIPTION	DATE
XX X		XX-XX-XX

Drawn By: AES Date: 9-20-19

Checked By: AHR Scale: 1:20 METRIC U.N.D.

Project Number: BHLP-19236

C19



- NOTES:**
1. ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS AND BETWEEN BRACKETS IN THE IMPERIAL SYSTEM, UNLESS OTHERWISE SPECIFIED.
 2. ALL ELEVATIONS NOTED ON THIS DRAWING ARE BASED ON ±0.00m. LEVEL CORRESPONDING TO ELEVATION +50.000m ("43")
 3. THE NORTH DIRECTION NOTED IN THIS DRAWING IS THE NORTH OF THE PROJECT.
 4. THE CHEMICAL ANCHOR BOLTS MUST BE PLACED BY MECHANICAL INSTALLER.
 5. THE GATHERING SLOPES WILL NOT DECREASE THE NOMINAL DIMENSIONS OF THE CIVIL WORK.
 6. ALL BASINS SHALL BE PERFECTLY WATERPROOFED AND COATED.
 7. COVER PVC PIPE WALL EMBEDDINGS WITH STICK WATERSTOP JOINT, OR SIMILAR, AVOIDING WATER INFILTRATION.
 8. NORTH AND EAST COORDINATES NOTED IN THIS DRAWING ARE PLAN COORDINATES AND ARE EXPRESSED IN FEET.
 9. EMBEDDED PIPES (ITEM POSITIONS 005, 006 & 007) WILL BE PLACED WITH DRILLS OF FLANGES STRAIDE TO BOTH SIDES OF MAIN AXLE.
 10. ALL SURFACE MUST BE COVERED WITH A COATING SYSTEM RESISTANT TO PH4 LIKE A TWO-COMPONENT EPOXY RESIN: SIKAFLOOR-381 OR SIMILAR.



CONVENTIONAL GRAPHICAL SYMBOLS		
PLAN VIEW		SECTIONS
	ELEVATION AT FINISH	
	ELEVATION AT RUSTIC	
	ELEVATION FOR MACHINERY RESTING	
	DIRECTION OF SLOPE	

CONCRETE SPECIFICATION ACCORDING TO R.S.A. STD 40075	NIVEL
GENERAL TOLERANCES ACCORDING TO R.S.A. STD 40074	

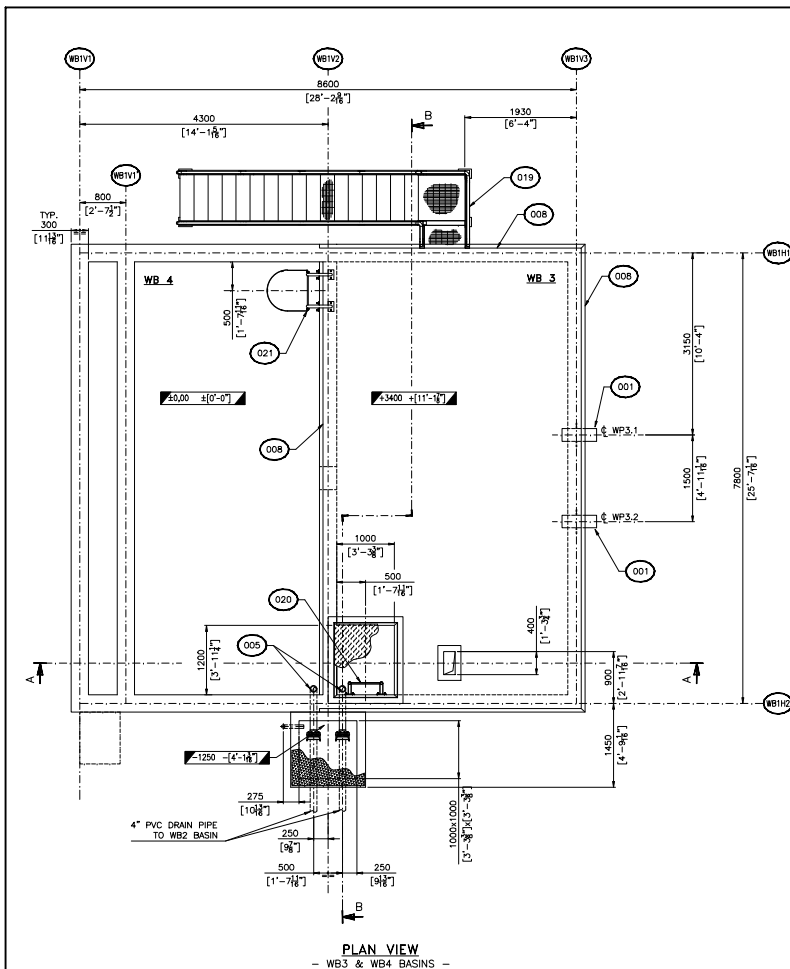
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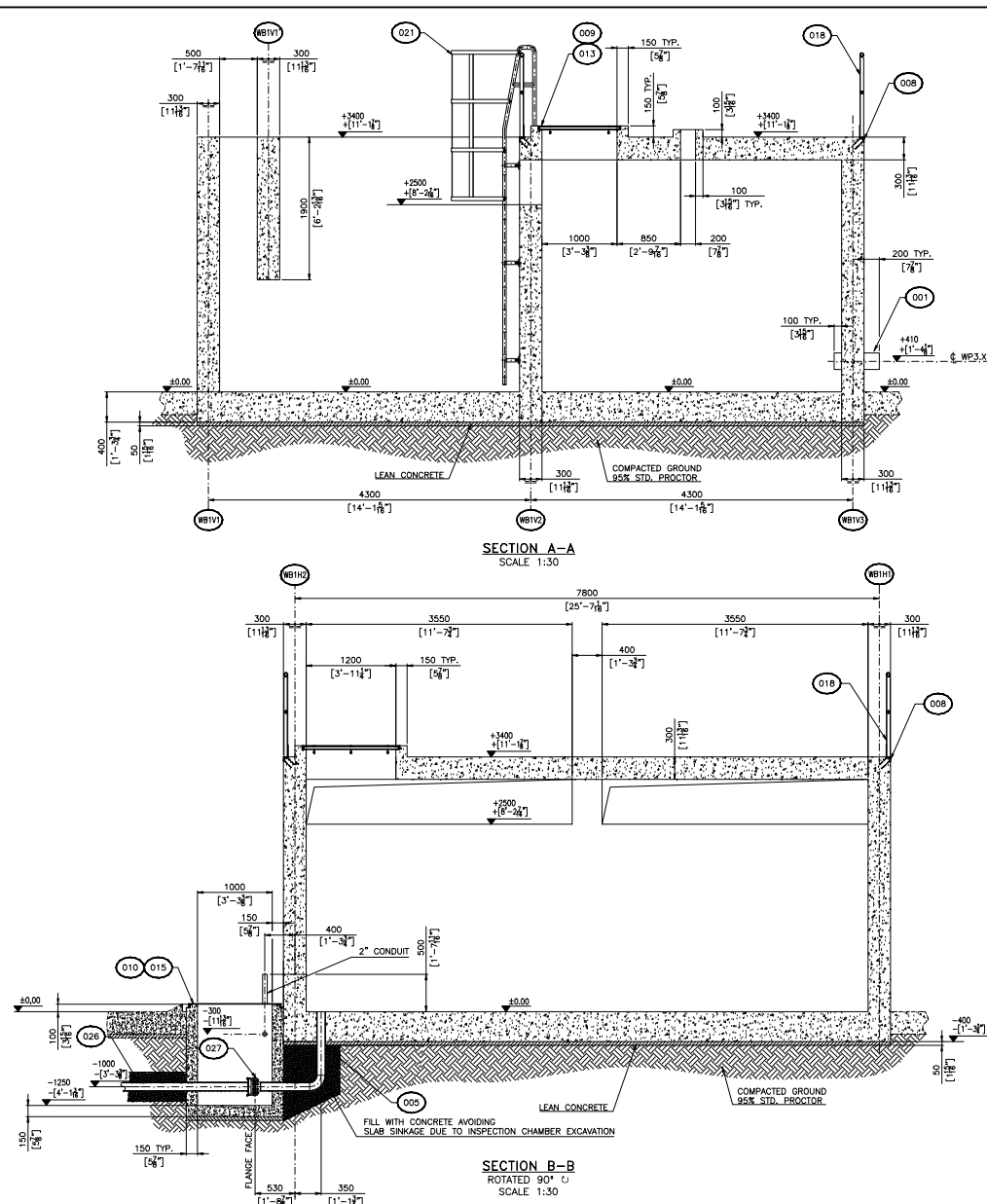
FIN WT:	KG.
SHEET	1 OF 2
020367	



SUPPLEMENTARY DRAWINGS:
 020274 - ELECTRICAL CONDUITS COLD MILL WTP GENERAL ASSEMBLY
 020275 - COLD MILL SIDEWALKS
 020368 - WASTE WATER BASINS REINFORCEMENT REBARS
 020408 - COLD MILL NON CONTACT BASIN NB3 CIVIL FORMS

- NOTES:**
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 - ALL BASINS SHALL BE PERFECTLY WATERPROOFED AND COATED.
 - COVER PVC PIPE WALL EMBEDDINGS WITH STICK WATERSTOP JOINT, OR SIMILAR, AVOIDING WATER INFILTRATION.
 - NORTH AND EAST COORDINATES NOTED IN THIS DRAWING ARE PLAN COORDINATES AND ARE EXPRESSED IN FEET.
 - EMBEDDED PIPES (ITEM POSITIONS 005, 006 & 007) WILL BE PLACED WITH DRILLS OF FLANGES STRADLE TO BOTH SIDES OF MAIN AXLE.
 - INTERNAL SURFACE MUST BE COVERED WITH A COATING SYSTEM RESISTANT TO PH4 LIKE A TWO-COMPONENT EPOXY RESIN: SIKAFLOOR-381 OR SIMILAR.

CONVENTIONAL GRAPHICAL SYMBOLS			
PLAN VIEW		SECTIONS	
	ELEVATION AT FINISH		ELEVATION AT RUSTIC
	ELEVATION FOR MACHINERY RESTING		DIRECTION OF SLOPE



CONCRETE SPECIFICATION ACCORDING TO R.S.A. STD 40075 NIVEL
 GENERAL TOLERANCES ACCORDING TO R.S.A. STD 40074

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Project Number: BHL-P-19236
 SHEET 2 OF 2
 020367

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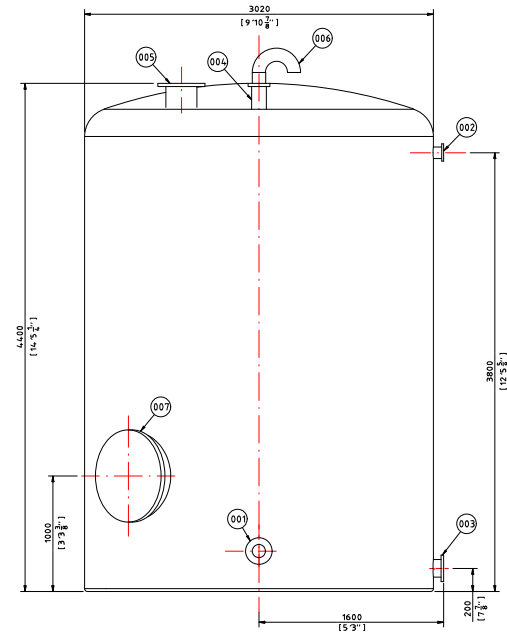
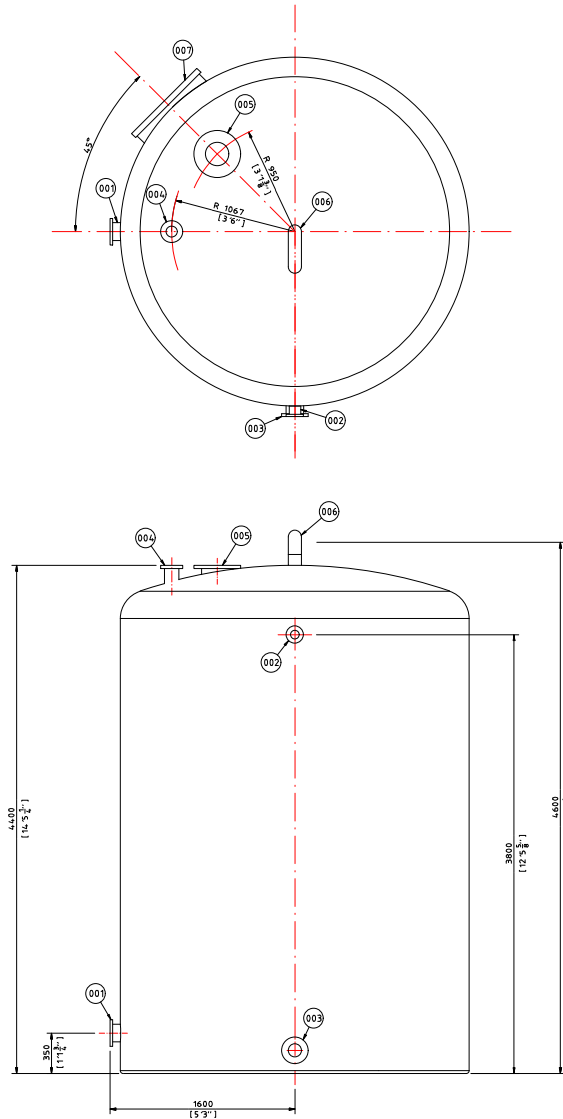
ARKANSAS REGISTERED PROFESSIONAL ENGINEER
 License No. 10000

BIG RIVER STEEL
 PHASE II WASTEWATER FACILITIES
 WASTEWATER BASINS WB 4.1 & WB 4.2 - SHEET #2

OSCEOLA

DATE: 08-20-19
 Drawn By: AES
 Checked By: AHR
 Scale: 1/40 METRIC UNITS

C21



REFERENCE LIST FOR ONE UNIT		
ITEM	QTY	DESCRIPTION
001	1	PUMP FLANGE W/PLX - 4" - 150 lbs
002	1	INLET FLANGE - 2" - 150 lbs
003	1	DRAIN FLANGE - 4" 150 lbs
004	1	INLET FLANGE - 3" - 150 lbs
005	1	INSTRUMENTATION FLANGE - 10" - 150 lbs
006	1	BREATH INLET
007	1	MANHOLE

- NOTES:
1. DIMENSIONS APPROXIMATED. ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS AND BETWEEN BRACKETS IN THE IMPERIAL SYSTEM, UNLESS OTHERWISE SPECIFIED.
 2. TANK LOCATION: INDOORS.
 3. NET WORKING CAPACITY: 6604.3 gal (25 m³).
 4. pH: 9 - 14.
 5. TEMPERATURE: 50 - 85°C.
 6. THE DIMENSIONS MAY BE MODIFIED TO ADJUST TO A STANDARD SIZE.
 7. FLANGES DRILLS WILL BE STRADDLE TO BOTH SIDES OF MAIN AXLE.
 8. THE UPPER FLANGES MUST BE ACCESSIBLE. A LADDER MUST BE INCLUDED.

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Fm WT:
 SHEET 1 OF 1
 029784



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STATE OF ARKANSAS
 REGISTERED PROFESSIONAL ENGINEER
 No. 1486
 EXPIRES 11/2016

BIG RIVER STEEL
 PHASE II WASTEWATER FACILITIES

ARIZONA

OCEOLA

TANK WLT1 & WRLT1

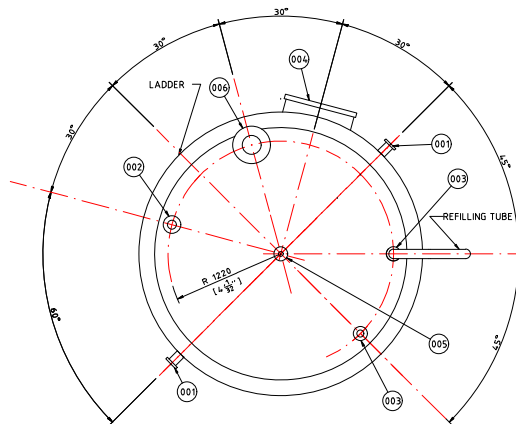
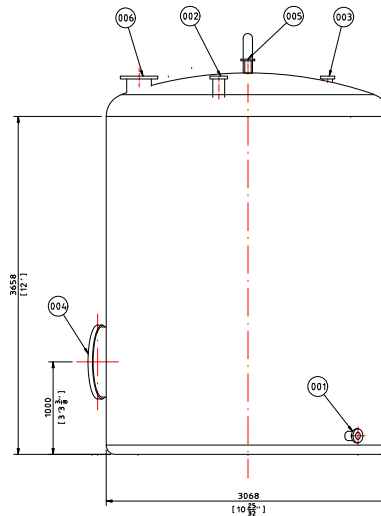
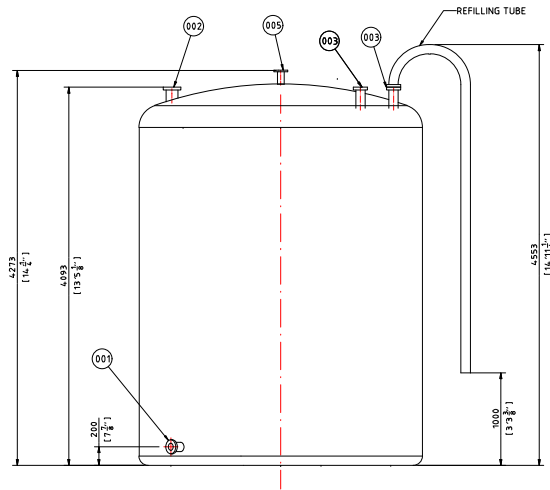
DATE	REVISION DESCRIPTION
04-XX-XX	

Drawn By: AES Date: 9-20-19

Checked By: AHR Scale: 1/25 METRIC

Project Number: BMLP-19236

C22



REFERENCE LIST FOR ONE UNIT		
ITEM	QTY	DESCRIPTION
001	2	PUMP FLANGE DAP 2 1/2-DAP 2 2 / DRAIN FLANGE - 2" 150 lbs
002	1	INSTRUMENTATION FLANGE - 3" 150 lbs
003	2	INLET FLANGE - 2" 150 lbs
004	1	MANHOLE
005	1	AIR RELIEF VALVE FLANGE - 2" - 150 lbs
006	1	INSTRUMENTATION FLANGE - 10" 150 lbs

- NOTES:
- DIMENSIONS APPROXIMATED. ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS AND BETWEEN BRACKETS IN THE IMPERIAL SYSTEM, UNLESS OTHERWISE SPECIFIED.
 - TANK LOCATION: INDOORS.
 - NET WORKING CAPACITY: 6500gal (25 m³).
 - pH 14
 - TEMPERATURE: 50 - 300C
 - THE DIMENSIONS MAY BE MODIFIED TO ADJUST TO A STANDARD SIZE.
 - FLANGES DRILLS WILL BE STRADDLE TO BOTH SIDES OF MAIN AXLE.
 - TANK MUST BE EQUIPPED BY A LADDER WITH ALL THE SUPPORT DETAILS.
 - TANK MUST BE EQUIPPED BY A REFILLING TUBE WITH ALL THE SUPPORT DETAILS AND FITTINGS: BALL VALVE 2", CHECK VALVE 2", CAMLOCK 2" (F).

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FIN WT: 030679
SHEET 1 OF 1

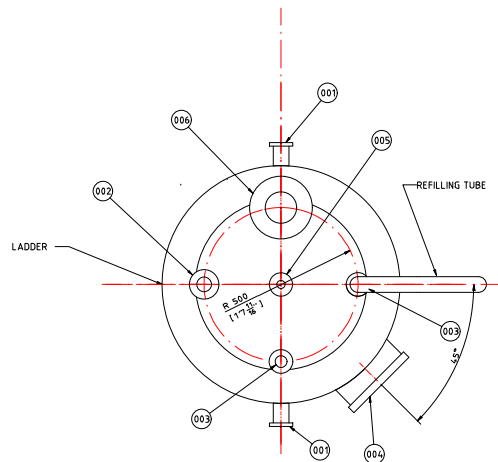
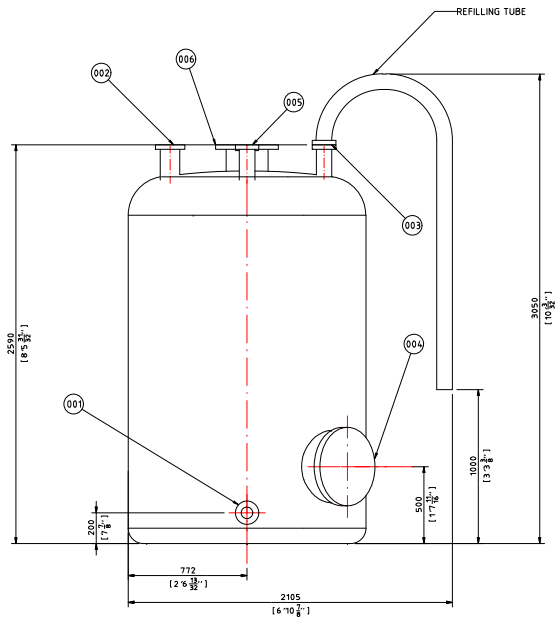
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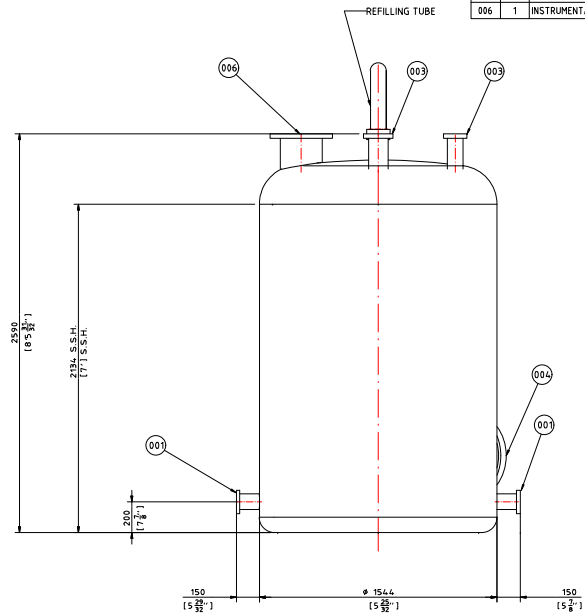
BIG RIVER STEEL
PHASE II WASTEWATER FACILITIES
CAUSTIC TANK DT 2.1 & DT 2.2
ARIZONA
OCEOLA

DATE	REVISION DESCRIPTION	NO	BY	DATE
09-20-19		001	AES	9-20-19
		002	AHR	
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Project Number: BHL-P-19236
C23



REFERENCE LIST FOR ONE UNIT		
ITEM	QTY	DESCRIPTION
001	2	PUMP FLANGE DAP 2.1-DAP2.2 /DRAIN FLANGE - 2" 150 lbs
002	1	INSTRUMENTATION FLANGE - 3" 150 lbs
003	2	INLET FLANGE - 2" 150 lbs
004	1	MANHOLE - 20" 150 lbs
005	1	AIR RELIEF VALVE FLANGE - 2" - 150 lbs
006	1	INSTRUMENTATION FLANGE - 10" 150 lbs



- NOTES:
- DIMENSIONS APPROXIMATED. ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS AND BETWEEN BRACKETS IN THE IMPERIAL SYSTEM, UNLESS OTHERWISE SPECIFIED.
 - TANK LOCATION: INDOORS.
 - NET WORKING CAPACITY: 1000gal (4 m3).
 - pH: 12
 - TEMPERATURE: 50 - 300C
 - THE DIMENSIONS MAY BE MODIFIED TO ADJUST TO A STANDARD SIZE.
 - FLANGES DRILLS WILL BE STRADDLE TO BOTH SIDES OF MAIN AXLE.
 - TANK MUST BE EQUIPPED BY A LADDER WITH ALL THE SUPPORT DETAILS.
 - TANK MUST BE EQUIPPED BY A REFILLING TUBE WITH ALL THE SUPPORT DETAILS AND FITTINGS: BALL VALVE, CHECK VALVE, CAMLOCK 2" IFI.

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FIN. WT.:
SHEET 1 OF 1
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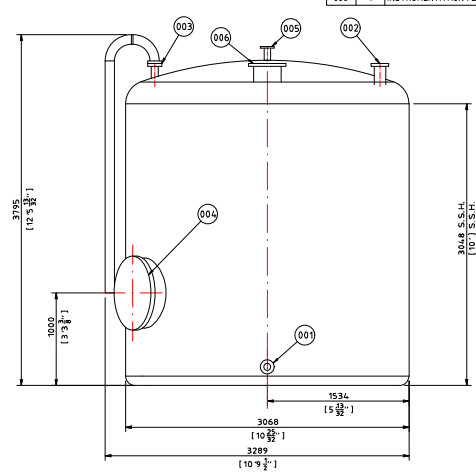
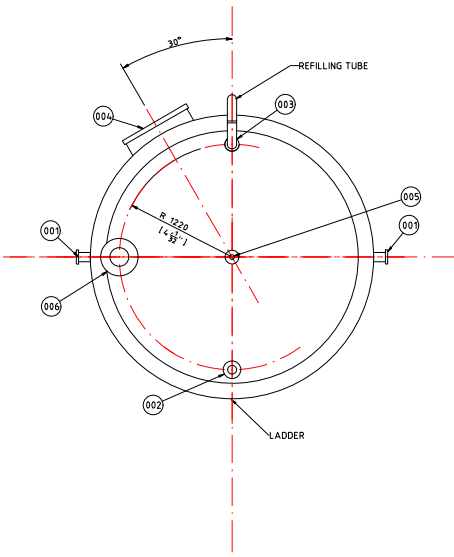
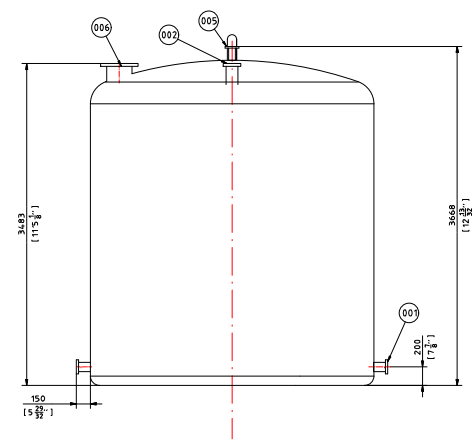
Harbor
5800 Evergreen Drive
Little Rock, AR 72205
Ph (501) 663-8800
Fax (501) 588-0123
www.harborenv.com



BIG RIVER STEEL
PHASE II WASTEWATER FACILITIES
CHLORINE TANK DT4

REVISION DESCRIPTION		DATE
NO.	XX	XX-XX-XX
Drawn By:	AES	Date: 9-20-19
Checked By:	AHR	Scale: 1:15 METRIC
Project Number:		BHLP-19236

C25



- NOTES:
1. DIMENSIONS APPROXIMATED. ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS AND BETWEEN BRACKETS IN THE IMPERIAL SYSTEM, UNLESS OTHERWISE SPECIFIED.
 2. TANK LOCATION: OUTDOORS.
 3. NET WORKING CAPACITY: 5500gal (21 m3).
 4. pH: 12
 5. TEMPERATURE: (-25RC) - (30RC)
 6. THE DIMENSIONS MAY BE MODIFIED TO ADJUST TO A STANDARD SIZE.
 7. FLANGES DRILLS WILL BE STRADDLE TO BOTH SIDES OF MAIN AXLE.
 8. TANK MUST BE EQUIPPED BY A LADDER WITH ALL THE SUPPORT DETAILS.
 9. TANK MUST BE EQUIPPED BY A REFILLING TUBE WITH ALL THE SUPPORT DETAILS AND FITTINGS: BALL VALVE 2", CHECK VALVE 2", CAMLOCK 2" (F).

REFERENCE LIST FOR ONE UNIT		
ITEM	QTY	DESCRIPTION
001	2	PUMP FLANGE DAP 2.1-DAP2.2 /DRAIN FLANGE - 2" 150 lbs
002	1	INSTRUMENTATION FLANGE - 3" 150 lbs
003	1	INLET FLANGE - 2" 150 lbs
004	1	MANHOLE
005	1	AIR RELIEF VALVE FLANGE - 2" - 150 lbs
006	1	INSTRUMENTATION FLANGE - 10" 150 lbs

5800 Evergreen Drive
Little Rock, AR 72205
Ph (501) 663-8800
Fax (501) 588-0123
www.harborenv.com

BIG RIVER STEEL
PHASE II WASTEWATER FACILITIES
CHLORINE TANK DT6

DATE	DC-XC-XC
REVISION DESCRIPTION	
NO	XX
Drawn By:	AES
Checked By:	AHR
Date:	9-20-19
Scale:	1:25 METRIC
Project Number:	BHLP-19236

RUSSULA
Engineering & Services

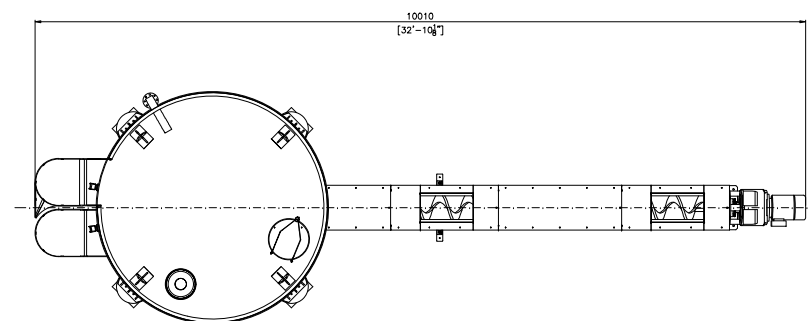
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SHEET 1 OF 1

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C26

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SHEET	1 OF 1
C02740	



PREPARED FOR:

BIG RIVER STEEL LLC

2027 East State Highway 198

Osceola, AR 72370

P: 870.819.3031

www.bigriversteel.com

**CONSTRUCTION
SPECIFICATIONS
FOR
MODIFIED
WASTEWATER
TREATMENT
PLANT**

**PHASE 2
PROJECT**

**NPDES PERMIT
No. AR0052582**

OCTOBER 2019

Prepared by:

Harbor

5800 Evergreen Drive

Little Rock, AR 72205

P: 501.663.8800

F: 501.588.0123

www.harborenv.com

Environmental | Safety | Engineering

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PART 1. - CONTRACT DOCUMENTS

- 1.1 The Contract Documents consist of the documents listed in the table of contents of this specification or in the Owner's invitation to bid the contract, in addition to which may be addenda, change orders, and other documents pertaining to the project.
- 1.2 The intention of the Contract Documents is to describe the labor, materials, equipment, performance standards, schedules, and costs set forward and agreed to by the Contractor and the Owner. In the event of a conflict or ambiguity in the Contract Documents, they shall be interpreted to include all necessary Work needed for a complete, working installation.
- 1.3 The purchase order will take precedence over all other documents, drawings, and changes both verbal and written.

GENERAL CONDITIONS

PART 2. - DEFINITIONS

- 2.1 "Engineer" - A person, firm, or corporation named as such in the CONTRACT DOCUMENTS.
- 2.2 "Contractor" - A person, firm, or corporation who enters into a contractual agreement to assume responsibility for performing and completing all Work as set forth in the Contract Documents.
- 2.3 "Equals/Substitutions" - Means materials, equipment, or methods not specified in the Contract Documents that the Contractor proposes and warrants as suitable for the use intended and conforms to all other physical, functional, and performance requirements. Requests for Equals/Substitutions must be submitted to the Owner's Project Representative and electronic approval received prior to incorporation into the Work.
- 2.4 "Owner" - A public or quasi-public body or authority, corporation, association, partnership, or individual for whom the WORK is to be performed.
- 2.5 "Shop Drawings/Submittals" - Defines drawings, product data, samples, or other information to be submitted by the Contractor to the Engineer for approval before fabrication or installation. Shop Drawings/Submittals that are needed are identified in the Contract Documents or will be identified at the preconstruction meeting. The Contractor is responsible for assuring the drawing/submittals conformance with the requirements of this contract. Review and acceptance by the Engineer does not relieve the Contractor from responsibility for errors or omissions.
- 2.6 "Substantial Completion" - Defines the point in time when the Work is completed to the extent that the Owner can make beneficial use of the Work for the purposes intended and the point in time when warranties and guarantees go into effect. There may be a "Punch List" of minor items of the Work or deficiencies that remain to be completed or corrected following Substantial Completion.
- 2.7 "Work" - Defines all labor, materials, equipment and special project requirements necessary to produce the end result described by the Contract Documents.

GENERAL CONDITIONS

PART 3. - MATERIALS AND WORKMANSHIP

- 3.1 The Contractor shall provide all labor, materials, and equipment in a good workmanlike manner in accordance with the Contract Documents and applicable industry standards, and to furnish upon request, to the Owner, information and test results having to do with the kind and quality of materials.
- 3.2 References to a standard specification of an association or manufacturer or to a State code means the most recent printed edition or catalog in effect on the date the contract is signed.
- 3.3 No material, equipment, or supply shall be purchased by the Contractor that is subject to any conditional agreement where title is retained by the seller. Any material, equipment, or supply will be furnished clear of any lien or claim.
- 3.4 Reference in the documents to a manufacturer's trade name or number establishes a standard, and the Owner may consider any material or item that will perform adequately under the Contract Documents as Equals/Substitutions, subject to prior approval. No compromise in quality level is acceptable.
- 3.5 Use of any material or equipment other than what has been specified or approved by the Owner is not acceptable under the contract and shall be removed and replaced at the Contractor's expense.

PART 4. - PERMITS, REGULATIONS, AND TAXES

- 4.1 The Contractor shall obtain all permits, licenses, and approvals needed for the performance of the Work and will give all notices and comply with all laws, codes, rules and regulations that pertain to the performance of the Work.
- 4.2 The Contractor will pay all taxes required by law.
- 4.3 The Contractor shall notify the Owner of any variance in the Contract Documents needed to comply with codes, rules, and regulation upon which the Owner will

GENERAL CONDITIONS

correct the documents at no additional cost to the Contractor.

- 4.4 The Contractor shall include all charges in its bid and pay for water, sewer, and other utility connections made by municipalities.
- 4.5 All employees, agents, and representatives of the Contractor shall be subject to the reasonable rules and regulations at any time promulgated by the Owner for the safe, orderly, and efficient conduct of operations on the Owner's property. The Contractor shall enforce observance of such rules and regulations and shall maintain discipline and good order among its employees, agents, and representatives. The Contractor's employees, agents, and representatives, during such time as they are on the Owner's premises, shall abide by the same rules and regulations with respect to fire protection, security regulations, and safety that govern the Owner's employees.

PART 5. - CONTRACTOR'S LICENSE

Attention of bidders is directed to Act 124 of the Acts of Arkansas, approved February 24, 1939, being an "Act to Regulate the Practice of General Contracting in the State of Arkansas" as amended by Act 127 of the Acts of the General Assembly of Arkansas, for the year 1945, and further amended by Act 153 of the Acts of the General Assembly of Arkansas for the year 1951, approved February 23, 1951.

The Bidder must assume full responsibility for compliance with applicable Federal and State laws.

PART 6. - CONTRACTOR'S OBLIGATIONS AND SUPERINTENDENCE

- 6.1 The Contractor shall provide and pay for all equipment, materials, supplies, and labor necessary for the completion of the Work within the time agreed, including transportation, storing, superintending, and installing. The Contractor shall be responsible for insuring that all Work strictly conforms to the requirements of this contract and shall maintain adequate inspection and quality control procedures to assure the same. The presence and observation of the

GENERAL CONDITIONS

Work by the Owner shall not relieve the Contractor of any obligations.

- 6.2 The Contractor shall attend a preconstruction meeting and any subsequent construction related meetings that are scheduled by the Owner's Project Representative. The Contractor shall make a timely submittal of all shop drawing/submittals that are required to describe how it will fulfill its responsibility under this contract. While the Contract Documents may identify minimum performance characteristics and brand names to establish the required level of quality, Equals/Substitutions may be considered. However, the Contractor shall be responsible to document the qualifications of a proposed Equal/Substitution, and any additional costs for achieving required performance shall be borne by the Contractor.
- 6.3 The Contractor shall give personal superintendence to the Work through a designated superintendent or foreperson knowledgeable and experienced with the Work and able to act for the Contractor in all matters. The Contractor shall schedule Work and coordinate the activities of any subcontractors to assure timely completion, and shall coordinate site access, storage, and construction activities with the Owner to minimize impacts on program operations.
- 6.4 The Contractor certifies that it is familiar with the site conditions that may affect the Work or its costs and shall perform the Work without additional expense to the State, except for Changes in the Work or unforeseen conditions that may arise.
- 6.5 The Contractor shall maintain a clean and safe work environment. Barricades and other appropriate safety measures required by Federal, State, or other governmental authority having jurisdiction shall be provided. Unused, discarded, or hazardous materials generated by the Work shall be properly managed and recycled or disposed in accordance with applicable rules or regulations. Disposal of hazardous materials shall be coordinated through the Owner's Project Representative.
- 6.6 The Contractor shall safely guard the Owner's and any adjacent property from injury or loss in connection with the Work and shall make good any loss from damage

GENERAL CONDITIONS

due to the Contractor's actions or lack of actions. Stormwater runoff from excavations shall be properly managed to prevent soil erosion off site or into lakes, streams, or other surface waters.

- 6.7 The Contractor shall grant access to the Owner's Project Representative, Engineer, and other authorized persons. Should it be necessary in order to examine the Work to tear out or remove portions, the Contractor shall immediately furnish all facilities necessary. If the Work is found defective, the Contractor shall assume all expenses for tearing out, inspecting, and satisfactory reconstruction. If the defective Work is found to be in compliance with the Contract Documents, the Contractor will be reimbursed for the direct costs involved.
- 6.8 The Contractor may use existing water and electrical sources available at the Work site at no cost. The Contractor shall provide, maintain, and pay for adequate toilet facilities for the Work. The Contractor shall make its own arrangements and pay for telecommunications services as needed.
- 6.9 No piping, manholes, conduit, or similar items are to be buried before having been inspected by the Engineer or the Engineer's field inspector.
- 6.10 All Work must be complete, tested, and ready for use by the Owner prior to Substantial Completion. The Contractor shall also provide operating and maintenance instructions for each item of equipment or device installed, including parts lists, description of control cycles, and wiring diagrams. Any of these items developed by the contractor shall be provided to the Owner in the electronic format of either Word, AutoCad, or Adobe Acrobat.
- 6.11 The Contractor shall maintain a set of record drawings on which changes and deviations from Contract Documents shall be recorded. All buried or concealed piping, conduit, or similar items shall be located by dimensions and elevations on the record drawings. At the completion of the project, the Contractor shall submit the marked-up record drawings to the Owner's Project Representative prior to final payment.

GENERAL CONDITIONS

- 6.12 By accepting this contract the Contractor agrees that any and all payments to their subcontractors, their agents, or employees will not be in any way the liability of the Owner, and that the Contractor agrees that they will hold harmless and indemnify the Owner, their agents or officials against any claims or disputes, to include legal fees resulting from the Contractor's non payment of subcontractors, their agents or employees.

PART 7. - ACCIDENT PREVENTION

- 7.1 The Contractor shall exercise proper precaution at all times for the protection of persons and property and shall be responsible for all damages to persons or property, either on or off the site, which occur as a result of his prosecution of the work. The safety provisions of applicable laws and buildings and construction codes, in addition to specific safety and health regulations described by all applicable provisions of 29 CFR 1926, shall be observed and the Contractor shall take or cause to be taken, such additional safety and health measures as the Owner may determine to be reasonably necessary.
- 7.2 The Contractor shall maintain an accurate record of all cases of death, occupational disease, or injury requiring medical attention or causing loss of time from work, arising out of and in the course of employment on work under the contract. The Contractor shall promptly furnish the Owner with reports concerning these matters.
- 7.3 The Contractor shall indemnify and save harmless the Owner and Engineer from any claims for damages resulting from property damage, personal injury and/or death suffered or alleged to have been suffered, by any person as a result of any work conducted under this contract.
- 7.4 Lockout/Tagout: All employees, agents, and representatives of the Contractor involved in servicing and maintenance of machinery, equipment, utilities, and/or facilities that have hazardous energy (i.e., electricity, hydraulic, pneumatic, steam, stored or residual energy, etc..) in which unexpected start-up or release of stored energy could

GENERAL CONDITIONS

cause injury to employees, must comply with OSHA regulation 29CFR1910.147, "the control of hazardous energy (lockout/tagout)". The Contractor is required to comply with the Owner's Lockout/Tagout Program when working at the Owner's facility (or the Contractor must inform the Owner's Safety Department of differences between the Contractor's and the Owner's Lockout/Tagout Programs). The Contractor will be responsible for providing its employees, agents, and representatives with Lockout/Tagout related hardware (i.e., locks, tags, lockout devices, hasps, etc.). A copy of the Owner's written Lockout/Tagout Program can be obtained from the Owner's Safety Department.

7.5 Confined Space: All employees, agents, and representatives of the Contractor performing work involving permit-required confined space entry must comply with OSHA regulation 29CFR1910.146. The Contractor is responsible for providing the required monitoring, protective, and rescue equipment necessary to perform permit-required confined space entry. A copy of the Owner's written Confined Space Entry Procedure can be obtained from the Owner's Safety Department.

7.6 Safety of Controlled or Hazardous Materials: The Contractor must take full responsibility for the following:

- A. Should the Contractor, during the course of this project, encounter any type of hazardous material, chemicals, or any component thereof, the Contractor is to cease all efforts and remove all employees from the work area. The Contractor will contact the Owner's Facilities Engineer and the Owner's Safety Department within two (2) hours, and, in writing, define the concern and location of same.
- B. Should the Contractor leave the work site due to any suspected or known hazardous materials, they will not return to the work site without authorization from the Owner's Procurement Department.
- C. Exiting from the work site, as stated above, will be considered a safety issue and will not be subject to remobilization or stand down costs.

GENERAL CONDITIONS

PART 8. - CHANGES IN THE WORK

- 8.1 All changes shall be documented by a Change Order to adjust the contract amount. Changes may be either an add or a deduct. Changes may be initiated either by a Field Order from the Owner's Project Representative prior to determination of the final cost, or by a Change Order that is based upon the final agreed upon total cost. No change in the Work shall be made without the prior approval of the Owner.
- 8.2 Field Orders or other proposed changes in the Work can only be authorized by the Owner's Project Representative. When a change is initiated, the Contractor shall provide the Owner's Project Representative with a proposal within 10 working days, unless both parties agree upon a different time period. The Contractor's proposal shall state the proposed cost of the change, with appropriate cost breakdown, any effect on the contract completion date, and pertinent information concerning the circumstances and scope of the change.
- 8.3 The cost of the change to be added or subtracted from the contract amount shall be calculated using one of the following methods:
- A. By Unit Prices that are part of the approved contract or as agreed upon by the Owner's Project Representative.
 - B. A Lump Sum that is based upon the anticipated cost of labor, materials, equipment or large tool rental, and overhead and profit.
 - C. By Actual costs that are based upon documented labor and materials costs expended.
- 8.4 The overhead and profit markup on changes shall not exceed 15%. The markup for that portion of Work performed by a subcontractor shall be limited to 7.5%. A reasonable credit for overhead and profit shall be included in the amount of a deduct change. Overhead and profit includes expenses for estimating, change order processing, supervision, installation layout, small tools and supplies, job related general expenses, record drawings, and all other costs

GENERAL CONDITIONS

relative to change order proposals and field and office supervision.

PART 9. - TIME FOR COMPLETION AND SUBSTANTIAL COMPLETION

- 9.1 The date of beginning the Work and the time of completion are essential conditions to the contract. All Work shall be prosecuted regularly and diligently and the Contractor agrees that the time for completion is reasonable.
- 9.2 The Contractor shall keep the Owner informed about Work activities, progress, delays, and anticipated completion date. Should delays be caused by reasons beyond the control of the Contractor, an extension of the contract completion date may be requested. Permitting the change shall not serve as a waiver on the part of the Owner of any right under the contract. The Contractor shall be responsible for damages resulting from delays that were not beyond the Contractor's control.
- 9.3 When the Contractor considers that the Work is Substantially Complete, the Owner's Project Representative will conduct an inspection to verify completion of the Work and provide a list of any incomplete or defective Work. When in the judgment of the Owner's Project Representative the Work is Substantially Complete, notice will be provided to the Contractor and the Agency, a time will be fixed for completion of any remaining minor Punch List items, and responsibility will be established for operation, maintenance, and security.

PART 10. - CORRECTION OF THE WORK

- 10.1 Labor, materials, and equipment involved in the Work are subject to inspection at any time by the Owner. Labor, materials, and equipment that do not comply with contract requirements shall be replaced at the Contractor's expense. Rejected items shall be immediately removed from the site.
- 10.2 If the Contractor neglects to perform the Work in accordance with the Contract Documents, the Owner may, after ten days written notice to the Contractor, repair the deficiency. The Owner will then issue a

GENERAL CONDITIONS

change order to deduct from the amount owed the Contractor the cost of correcting the deficiency.

PART 11. - OWNER'S RIGHT TO TERMINATE CONTRACT

- 11.1 Should any provision of the contract be violated by the Contractor or any subcontractor, the Owner may serve written notice on the Contractor of its intention to terminate the contract and, unless the violation ceases and satisfactory corrections are made within ten days, the contract shall then terminate. The Owner will notify the contractor of the termination. The Owner may then take over and complete the Work by contract or otherwise and may take and use all materials on site necessary to complete the Work. The Contractor shall be liable for all excess costs involved in the completion.
- 11.2 The Owner shall also have the right to terminate this contract at any time without cause following the expiration of thirty days written notice to the Contractor. The Contractor shall be paid for all Work performed or expenses incurred prior to the date of termination. Expenses must be documented and shall not include lost profits. Materials not incorporated into the Work shall be turned over to the Owner.

PART 12. - CONTRACT SURETY AND PAYMENTS BY THE CONTRACTOR

- 12.1 A Payment and Performance Bond will not be required for the project unless such a requirement is included in the project documents. However, the following provisions for assurance of payment and performance do apply.
- A. All contracts involving \$30,000 or more require that the Contractor maintain a list of all subcontractors and suppliers performing labor or furnishing materials under the contract.
 - B. For contracts between \$10,000 and \$100,000, payments will generally be limited to a single payment for all Work upon completion of the project. Exceptions may be made for seasonal Work or Work delayed by the Owner. The Contractor shall provide a waiver of lien for

GENERAL CONDITIONS

labor and materials provided for any partial payments authorized.

- 12.2 The Contractor shall within seven calendar days following receipt of payment from the Owner, make payment to each and every person or entity who furnished goods or services for the progress of the Work on the project, the value of which were included in the Contractors invoice or "Request and Certification for Payment". Upon request of the Owner, the Contractor shall furnish satisfactory evidence of payment under this article.
- 12.3 Prior to final payment, the Contractor shall furnish to the Owner a certification that all debts and claims have been paid or otherwise satisfied.

PART 13. - PAYMENTS TO THE CONTRACTOR

- 13.1 Requests for payment shall be in the form of an invoice from the Contractor, or in the form of a "Request and Certification for Payment", as determined in the notice to proceed. Any partial payments may have 10% of the amount retained until final payment is made.
- 13.2 All requests for payment shall be submitted to the Owner's Project Representative. The Contractor shall furnish any records or other satisfactory evidence requested by the Owner to establish the sum requested in the request for payment represents the value of Work completed.
- 13.3 Payments will not be made for incomplete or deficient Work. The Contractor shall certify that its invoice or request for payment is true and accurate and that all sums are earned and payable.
- 13.4 Final Payment will not be made until:
- A. Project is substantially complete and all equipment tests and punch list items have been satisfactorily completed.
 - B. A certification has been submitted that all debts and claims have been paid or otherwise have been satisfied.

GENERAL CONDITIONS

- C. An affidavit of compliance with wage rates has been submitted, if applicable.
 - D. All record drawings, written warranties and special guarantees required for the project have been submitted.
 - E. All maintenance and operating instructions, part lists, description of control cycles and wiring diagrams, on-site training, keys or special tools have been completed or submitted as required.
- 13.5 Final payment to the Contractor constitutes a waiver of all claims by the Owner except those arising from unsettled liens, faulty or defective Work appearing after Substantial Completion, failure of the Work to comply with the Contract Documents, or terms of any special guarantees required by the contract.
- 13.6 Acceptance of final payment constitutes a waiver of all claims by the Contractor.
- 13.7 The Contractor may not assign any part of this contract or any money due under this contract without the written consent of the Owner.
- 13.8 The Contractor may receive progress payments upon furnishing a performance-payment bond equal to 100% of the contract amount.
- 13.9 The Contractor may be assessed liquidated damages if the Work is not completed within the allotted time per the Bid. The right of the contractor to proceed shall not be terminated or the contractor charged with liquidated damages because of any delays in the completion of the work due to unforeseeable causes beyond the control and without the fault or negligence of the contractor, including, but not restricted to, acts of God, or of the public enemy, acts of the Government, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and unusually severe weather or delays of subcontractors due to such causes.

PART 14. - NONDISCRIMINATION/AFFIRMATIVE ACTION

- 14.1 In connection with the Work under this contract, the Contractor shall not discriminate against any employee

GENERAL CONDITIONS

or applicant for employment because of age, race, religion, color, handicap, sex, physical condition, developmental disability, sexual orientation or national origin. This provision includes but is not limited to employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training including apprenticeship. Except with respect to sexual orientation, the Contractor shall take affirmative action to ensure equal employment opportunities.

PART 15. - SUBCONTRACTORS

- 15.1 Subject to approval by the Owner, the Contractor may subcontract portions of the Work to be performed under this contract. However, this does not relieve the Contractor from responsibility or liability for execution of the Work.
- 15.2 Requests for approval of subcontractors shall be submitted and approved in writing before their employment on the project. The Owner may request that the Contractor provide information to substantiate the proposed subcontractor's qualifications or ability to perform the Work.

PART 16. - WARRANTIES

- 16.1 The Contractor warrants to the Owner that all materials, equipment, and supply used in the Work are free from liens, claims or encumbrances, of good quality, and new unless otherwise permitted by the Contract Documents. The Contractor also warrants that the Work will be free from defects and strictly conform to the requirements of the Contract Documents.
- 16.2 The Contractor shall remedy and repair all defective Work and materials and pay for any damage to other Work resulting therefrom, which may appear within the warranty period, providing such defects and damages are not due to abuse or misuse by the Owner. The Owner will give notice of defects or damages with promptness.
- 16.3 The warranty period shall be one year from the date of Substantial Completion, or where warranties are

GENERAL CONDITIONS

required in sections of the specification that are in excess of one year, the longer terms shall apply. The contractor will supply copies of manufactures' warranties for all equipment and other items deemed by the Owner as needed.

PART 17. - CLAIMS

- 17.1 In the event a dispute arises, the Contractor shall present its written claim to the Owner's Project Representative.
- 17.2 The Owner and the Contractor shall act in good faith to efficiently and fairly resolve claims and disputes arising under the contract. The Contractor shall proceed with the performance of the Work as directed by the Owner's Representative during the period of any claim or dispute.

PART 18. - INSURANCE

- 18.1 Insurance to be carried by the Contractor:
The Contractor shall not commence Work until the Contractor has obtained all the insurance required under this section and the Owner has approved such insurance. The Contractor shall not allow any subcontractor to commence Work until the insurance required of the subcontractor has been obtained and approved. The Contractor shall provide an insurance certificate showing coverage provided from a company licensed to do business in Arkansas. The Contractor may either require each subcontractor to maintain insurance equal to the following requirements or insure them under the Contractor's policy.
- A. Workmen's Compensation Insurance: The Contractor shall maintain worker's compensation insurance as required by the laws of the state or the states in which the work is to be performed.
 - B. Employer's Liability Insurance: The Contractor shall maintain employer's liability insurance of not less than \$100,000 per person/\$300,000 for any one accident.
 - C. Public Liability Insurance: The Contractor shall maintain public liability insurance of not less

GENERAL CONDITIONS

than \$1,000,000 combined single limit per occurrence and annual aggregate. (Copy of certificate to be provided to the Owner).

- D. If any part of the work hereunder is sublet, the Contractor shall provide Owner's and Contractor's Protective Liability Insurance having limits of not less than \$1,000,000 combined single limit per occurrence and annual aggregate, plus name the Owner as an additional named insured. (Copy of certificate to be provided to the Owner).
- E. Comprehensive Automobile Liability Insurance: The Contractor shall provide comprehensive automobile liability insurance limits of not less than \$500,000 combined single limit per occurrence and annual aggregate.
- F. Other Insurance: Such other insurance coverage may, from time to time, be required by the Owner with respect to performance hereunder.
- G. Scope of Insurance and Special Hazards: The Contractor's commercial general liability insurance shall provide adequate protection against damage claims which may arise from operations under this contract, whether such operations be by the insured or by anyone directly or indirectly employed by the insured, and also against any of the special hazards which may be encountered in the performance of this contract. The Contractor is responsible for determining the special hazards that must be insured for on this project. Special hazards may include loading and unloading, excavating, filling, drilling, blasting, explosions, demolition, underpinning, elevator, or hoist. Insurer must also document on the insurance certificate that they have been notified, when applicable, of the Contractor's involvement in asbestos abatement and that insurance coverage provided specifically covers that activity.

GENERAL CONDITIONS

PART 19. - CONSIDERATION OF BIDS

19.1 OPENING OF BIDS

Unless stated otherwise in the Advertisement or Invitation to Bid, the properly identified Bids received on time will be opened and evaluated by Aerojet management. An abstract of the Base Bids and Alternate Bids, if any, will be made available to Bidders. When it has been stated that Bids will be opened privately, an abstract of the same information may, at the discretion of the Owner, be made available to the Bidders within a reasonable time.

19.2 REJECTION OF BIDS

- A. The Owner shall have the right to reject any or all Bids and to reject a Bid not accompanied by any required bid security or by other data required by the Bidding Documents, or to reject a Bid which is in any way incomplete or irregular.
- B. Whenever it is obvious from examination of the Bid Documents that it was the intent to submit a responsive bid and such bid (because of scrivener error), if accepted, would create a serious loss to the bidder, the Owner reserves the right to relieve the bidder and to reject his bid.

19.3 ACCEPTANCE OF BID (AWARD)

It is the intent of the Owner to award a Contract to the lowest responsible Bidder provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and does not exceed the funds available. The Owner shall have the right to waive any informality or irregularity in any Bid or Bids received and to accept the Bid or Bids which, in his judgment, is in his own best interests.

The Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided herein, and to determine the low Bidder on the basis of the sum of the Base Bid and the Alternates accepted.

GENERAL CONDITIONS

PART 20. - RECORD DRAWINGS

20.1 The Contractor shall keep a clean set of drawings at the jobsite at all times during the construction period upon which shall be marked neatly and accurately any and all deviations from the plans. Measurements as necessary shall be made by the Contractor to accurately portray and locate the "as constructed" work. These drawings shall be turned over to the Engineer at the end of the construction period for use in preparing the record drawings.

PART 21. - ACCESS TO RECORDS/MAINTENANCE OR RECORDS

21.1 The Contractor shall maintain accounts and records, including personnel, property, and financial records, adequate to identify other records as may be deemed necessary by the locality to assure proper accounting for all funds. These records will be available for audit purposes to the locality or the State or any other authorized representative, and will be retained for three years after contract completion unless permission to destroy them is granted by locality. Moreover, the locality, State, or any authorized representative shall have access to any books, documents, papers, and records of the Contractor which are directly pertinent to this contract for the purpose of making audit, examination, excerpts, and transcriptions.

PART 22. - INDEMNIFICATION

22.1 The Subcontractor or Contractor, as noted on the purchase order, by accepting the contract for this work, agrees to indemnify and hold harmless the Owner and the Engineer, their officers, employees, agents, and representatives from any and all claims, liabilities, losses and damages, costs or expenses, including reasonable attorney's fees by reason of: a property damage or personal injury, including death or dismemberment, of whatever nature arising out of or as a result of or in connection with Subcontractor or Contractor, its employees, agents or lower tier subcontractors' performance, expenses, or other charges incurred or anticipated to be incurred hereunder.

SECTION 01300
SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

Work Included: The CONTRACTOR shall provide submittals for the ENGINEER's approval to show compliance with the specifications. Unacceptable submittals shall be revised and resubmitted as necessary until compliance with the specifications is achieved.

1.2 QUALITY ASSURANCE

- A. Coordination of Submittals: The CONTRACTOR shall be responsible for reviewing the Specifications to ensure that the items being submitted conform in all respects with the requirements. All submittals shall be provided to the ENGINEER at least 1 week prior to commencing work on the items being submitted.
- B. Substitutions:
 - (1) The CONTRACTOR is bound to the standards of quality established in the Contract Documents. Refer to Section 6.2 of the General Conditions regarding "Equal/Substitution".
 - (2) The substitution of materials, equipment or methods shall not be permitted unless prior approval for the substitution has been given in writing by the ENGINEER.
 - (3) The CONTRACTOR shall certify that the proposed substitution has been determined to be equal or superior to the product and/or construction method specified. The proposed substitution shall be in complete compliance with the provisions in the Contract Documents.

SUBMITTAL PROCEDURES

PART 2 - PRODUCTS

2.1 SUBMITTALS

- A. General: The CONTRACTOR shall comply with Section 6.2 of the General Conditions regarding "Shop Drawings and Submittals".
- B. Submissions: Submittals will be stamped by the ENGINEER in one of the following ways:
 - (1) "No Exceptions Taken" - No exceptions are taken, subject to compliance with the Contract Documents.
 - (2) "Furnish as Corrected" - Minor corrections are noted and a resubmittal is not required, subject to compliance with the corrections and the Contract Documents.
 - (3) "Rejected - See Remarks" - The submittal material, method or system is totally rejected and does not meet the intent of the Specifications.
 - (4) "Revise and Resubmit" - Revise prior to resubmittal is required.
- C. Submission Procedures: The CONTRACTOR shall provide a minimum of 6 copies of each submittal to the ENGINEER for review. The ENGINEER will retain 2 copies, the OWNER'S representative receives 1 copy, the OWNER receives 2 copies, and the CONTRACTOR receives the remaining copy.

2.2 SHOP PLANS

- A. Scale and Measurements: Shop plans shall be to a scale sufficiently large to show all pertinent aspects of the item.
- B. Review Comments: The ENGINEER will show all review comments on each copy of the submittal to be distributed as stated in Section 2.1.

01300 - SUBMITTAL PROCEDURES

2.3 MANUFACTURER'S LITERATURE

General: The CONTRACTOR shall provide all manufacturer's data pertinent to the submittal, clearly showing which portions of the contents are being provided for review.

2.4 OPERATION AND MAINTENANCE MANUALS

General: The CONTRACTOR shall provide the ENGINEER, prior to submitting the 50 percent pay request, 4 copies of complete operation and maintenance manuals and other written recommendations for operation, as provided by the manufacturer.

2.5 RECORD PLANS

General: The CONTRACTOR shall submit to the ENGINEER certified record plans of the project in accordance with the requirements of the General Conditions.

PART 3 - EXECUTION

3.1 IDENTIFICATION OF SUBMITTALS

- A. Numbering: All submittals shall be consecutively numbered. Resubmittals shall cite the original submittal number for reference.
- B. Transmittal: Each submittal shall be accompanied by a transmittal letter showing all the information required for identification and checking, including the appropriate Specification sections.
- C. Submittal Log: The CONTRACTOR shall maintain a submittal log for the duration of the Work that indicates current status of all submittals. The submittal log shall be available to the ENGINEER at all times for their review.

3.2 ENGINEER'S REVIEW

- A. General: Review by the ENGINEER does not relieve the CONTRACTOR from responsibility for errors which may result from the submitted data.

SUBMITTAL PROCEDURES

01300 - SUBMITTAL PROCEDURES

- B. Revisions: All revisions requested by the ENGINEER will be required. If the CONTRACTOR is considering any required revision to be changed, he shall notify the ENGINEER as provided in the General Conditions.

SECTION 02110
CLEARING AND GRUBBING

PART 1 - GENERAL

1.1 WORK INCLUDED IN THIS SECTION

- A. Clearing - The removal of fences, trees, logs, brush, vegetation, rubbish and other objectionable material found above ground level.
- B. Grubbing - The removal of roots, stumps and other objectionable material found below ground level.

1.2 RELATED WORK SPECIFIED ELSEWHERE

Not Applicable.

PART 2 - PRODUCTS

Not Applicable.

PART 3 - EXECUTION

3.1 CLEARING

- A. WATER AND SEWER LINES - The contractor shall clear the construction easement as required for the operation of his equipment. The entire width of the easement need not be cleared; only trees, brush, etc., inside the working easement shall be cut. Trees, logs, and other construction debris may be temporarily stored on the construction easement on the initial work.
- B. BUILDINGS, ROADWAYS AND LEVEES - The contractor shall clear the area designated for clearing on the drawings.

3.2 GRUBBING

- A. Limits of grubbing shall be designated on the plans.
- B. Stumps, roots and other material shall be removed to a depth of 12 inches.
- C. Footings shall be grubbed to the footing depth shown on the plans.

CLEARING AND GRUBBING

3.3 UTILITIES

The removal of existing utilities required to permit an orderly progression of the work will be done by local agencies, unless otherwise shown on the plans. Whenever power, telephone or telegraph poles, conduit, pipeline, sewer or other utilities encountered must be removed or relocated to complete the project, the contractor shall notify the Engineer who will notify the local owner and attempt to get prompt action. The contractor will cooperate with the local utility owners in maintaining service to include areas within the project limits and contiguous to the project.

3.4 DISPOSAL

- A. Spoiled material shall be burned or removed to approved disposal areas. Ashes shall be spread or removed.
- B. The contractor shall be responsible for controlling fires in compliance with all Federal, State and Local laws or regulations.

3.5 PRESERVATION OF TREES, ETC.

All trees designated for preservation that become damaged resulting from the contractor's operation shall be repaired by dressing, cutting and painting as directed by the Engineer.

3.6 CLEANUP

Upon completion of the work, the entire site within the project area shall be cleaned up, graded and left in a neat manner, free of the above mentioned items of debris. All cleanup shall be performed to the satisfaction of the Owner and the Engineer

3.7 BASIS OF PAYMENT

There shall be no special pay item for clearing and grubbing, unless otherwise noted in the bid. The cost for this item of work shall be included in the contract price for the several items and will not be paid for separately, unless otherwise noted in the bid.

SECTION - 02220
SITE & STRUCTURAL EXCAVATION, BACKFILLING AND GRADING

PART 1 - SCOPE

1.1 WORK INCLUDED IN THIS SECTION

- A. Site Excavation - The removal of soil accurately to the line and grade shown on the plans and as established by the Engineer. Includes water and sewer line trenches, foundation excavation, etc. This work is conducted after all clearing and grubbing.
- B. Site Grading - All work required to bring the soil elevation to the proper elevation below foundations, in trenches, around buildings, around foundations, etc. Includes finished grade work with topsoil and seeding.

1.2 RELATED WORK SPECIFIED ELSEWHERE

Clearing and Grubbing - Section 02110.

PART 2 - PRODUCTS

Not Applicable.

PART 3 - EXECUTION

3.1 EXCAVATION OF TRENCH FOR WATER AND SEWER LINES

Trenches for water and sewer lines shall be of the width and depth necessary for the proper installation of the pipe. All pipe lines shall be laid in trenches of such depth as to provide a minimum cover of thirty inches (30) over the top of the pipe barrel unless otherwise shown on the plans. Contractor shall increase depth as necessary for crossing other pipe lines and to provide required cover for valves and valve boxes. Trench will be deepened to the extent necessary so as not to exceed the maximum permissible deflection of the pipe being installed, with maximum permissible deflection being as recommended by the pipe manufacturer.

Width of pipe trench for all water lines shall be adequate for the installation of the pipe and make-up joints, but in no case shall the width of the trench at the top of the pipe be wider than the outside diameter of the pipe plus two (2) feet.

The bottom of the trench shall be accurately graded so that the pipe will be in continuous and uniform contact with and have a longitudinal bearing on undisturbed soil for the full length of the pipe, except for such distance as necessary for adequate bell holes and proper sealing of the pipe joints. If water is encountered in the trench, appropriate dewatering shall be performed by the Contractor.

If the soil at the bottom of the trench is mucky or if the subgrade is too soft to properly support the pipe, the Contractor shall excavate below the lower extremity of the pipe as shown on the plans and place a cushion of sand, gravel or crushed stone in the trench to receive the pipe. Gravel or crushed stone used for this purpose shall not exceed 3/4" in size.

Refer to the water and sewer line sections of these specifications for other requirements regarding water and sewer lines.

3.2 STRUCTURAL EXCAVATION

The Contractor shall perform all structural excavation required by the plans. Excavation shall extend a sufficient distance from walls and footings to allow for forms and for proper inspection, except where the plans indicate that concrete may be deposited directly against excavated surfaces.

3.3 CLASSIFICATION AND FINISHED GRADE

All excavation, both in trench and for structure, shall be unclassified.

The Contractor shall perform all finish grading as indicated by the plans. Any backfill required for finish grading shall be placed in approximately six (6) inch lifts and shall be compacted until the material is of the same density as the undisturbed earth in the sides of the excavation.

Upon completion of this work, the work area shall have a clean, neat appearance and be free of all objectionable debris or material. Sodding and/or seeding as called for on the plans or specifications shall be placed immediately after completion of the finish grading in accordance with the plans and as called for by these specifications.

3.4 FILL UNDER CONCRETE FLOORS

02220 - SITE & STRUCTURAL EXCAVATION, BACKFILLING AND GRADING

- A. Cut or fill areas as required to produce construction elevations shown on the drawings.
- B. Fill material for underfloor area shall be inorganic, non-expansive clay, or clay gravel meeting Public Roads Administration Classification A-1, A-2, A-3, or A-4. The proposed fill material shall be tested in an established soil mechanics laboratory using modified proctor test ASTM D-1557-78. Necessary testing shall be paid for by the Contractor. Laboratory, test reports and fill material shall be approved by the Engineer before any fill material is delivered to the site.
- C. Fill shall be placed in horizontal layers not over six inches deep. Each layer shall be compacted with machine or hand tampers to a density of 95% of maximum density obtained in the laboratory by the proctor test mentioned above. Contractor shall furnish and pay for two such tests, if required, during the filling operation, plus any other retesting that might be necessary to verify compliance with compaction requirements.
- D. Under slabs place six-inch (6") thickness of drainage fill. This shall be either crushed rock or stone, washed bank gravel, or clean creek gravel mixed with sand. Submit sample of proposed fill for approval of Engineer before hauling begins. Largest size shall not exceed 1-1/2". Fill shall be tamped or vibrated to uniform compaction and grade.

3.5 BACKFILLING

After the Engineer has inspected the foundations and the work has taken its final set, the Contractor shall backfill with material originally excavated, in layers of 6" thickness; each layer to be thoroughly tamped before succeeding layer is placed. The backfill shall be high enough to drain water away from all walls.

3.6 WATER

Should water be encountered or caused by rainfall, the Contractor shall keep same pumped out of excavations until concrete is poured.

3.7 SITE GRADING AND FILL

- A. Finish grade at wall lines shall be as shown on drawings. Fill or cut to this grade as required. Top 4" of outside grading

shall be top soil.

B. Finish site grading shall be extended out from building as shown on the drawings.

3.8 BENCH MARK

The elevations shown on the drawings relative to construction heights and grade line levels shall be determined from an established bench mark.

3.9 DISPOSITION OF UTILITIES

Rules and regulations governing the respective utilities shall be observed in the execution of all excavations, fills and site work. Inactive or abandoned utilities encountered shall be removed, plugged or capped.

3.10 CLEANING

Complete the grading operations after the building is finished, utilities installed, etc., removing from the site all materials, rubbish and debris. Leave finish grading clean.

3.11 SEEDING

When seeding is required the Contractor shall spread topsoil over the area disturbed by construction operations. The Contractor may utilize topsoil stockpiled on the site to give the seeding area at least a 4" covering of topsoil. The Contractor shall furnish all additional topsoil necessary to complete the aforementioned requirement.

The area shall then be seeded with a mixture of one-half fescue and one-half bermuda seed at a rate of not less than 50 lbs. per acre. The seeded area shall be watered by the Contractor until there is a sufficient stand of grass to prevent erosion. The Contractor shall repair all eroded areas and reseed as above all areas where grass does not grow. The Contractor shall mow the grass at least twice before final job acceptance.

3.12 MEASUREMENT AND PAYMENT

The cost of all excavation of water line trenches for the installation of pipe and appurtenances, will be considered

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subsidiary to the cost of pipe or appurtenances, and no trench excavation will be measured or paid for separately. Sewer line trenches will be paid for as described in that portion of the specifications.

All structural excavation will be considered subsidiary to the cost of the appropriate unit contract price as given in the proposal. The volume of structural excavation, without regard to any changes which may occur during the prosecution of the work, will not be measured or paid for separately.

Contract unit price for the appropriate item shall include all shoring, dewatering, backfilling, maintenance of backfill, disposal of waste, and all other work incidental thereto.

All finish grading will be considered subsidiary to the cost of the appropriate unit contract price as given in the proposal and none will be measured or paid for separately.

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SECTION 02221
TRENCHING AND BACKFILLING

PART 1 - GENERAL

1.1 WORK INCLUDED IN THIS SECTION

This section shall consist of excavation of trench, bedding of pipe and backfilling of trench.

1.2 RELATED WORK SPECIFIED ELSEWHERE

Not applicable.

1.3 QUALITY ASSURANCE

- A. Materials which have been rejected shall be removed from the job site.
- B. Bedding or backfill that do not conform to the specifications shall be removed or reworked until the specifications are met.

1.4 PROTECTION

- A. Existing Property -
 - (1) The contractor shall exercise reasonable care in excavating trenches for water lines or sewer force mains in order not to interfere with or damage existing improvements on public or private property.
Any property damaged shall be replaced or repaired by the contractor at his own expense.
 - (2) Shrubs and ornamental trees along the centerline of trench shall be removed before and replaced after the pipe laying operation.
 - (3) The contractor shall restore the disturbed surfaces to as nearly original grade and conditions immediately after pipe laying and shall completely fill any areas where trench settlement has occurred and shall dress-up the construction area before the final inspection. The contractor shall also maintain the roadway and driveway trenches

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throughout the period of construction and specified maintenance period so as to permit traffic to cross these trenches without hazard at all times. This work shall be considered a part of the pipe laying cost (except asphalt and concrete surfaces cut and replaced), and will not be paid for separately.

- (4) The contractor shall conform to any requirements and regulations of the Arkansas State Highway and Transportation Department, relative to the crossing of highways, and to the trenching inside the highway rights-of-way, and also in compliance with the regulations of the railroad company relative to all railroad crossings.
- (5) Brush and slash may be disposed of in the woods (with Owners permission). Stumps and rock too large for placement in the trench must be removed from the jobsite.
- (6) Retainage in addition to normally retained amounts may be withheld by the Owner (max \$0.25/LF) for not keeping up with clean-up.

B. Existing Utilities -

- (1) The contractor shall be responsible for determining the exact location of existing utilities.
- (2) Any utility line that is cut must be reported to the Owner and repaired immediately in order to maintain service to the customers. These repairs are considered part of the pipe laying cost and will not be paid for separately.
- (3) The contractor shall coordinate with the utility company and the Owner in the event that utilities must be shut off.

1.5 SITE CONDITIONS

A. Excavations -

TRENCHING AND BACKFILLING

02221 - TRENCHING AND BACKFILLING

- (1) Trenches and other excavations more than five feet deep (or less when hazardous ground movement is expected) shall be shored, laid back to a stable slope or some other means of protection provided (such as trench boxes) where employees may be exposed to moving ground or cave-ins.
 - (2) Additional precaution (shoring or bracing) shall be installed when trenches are exposed to vibrations (railroad, highway or machinery) or adjacent to backfill. Cross braces or trench jacks shall be placed in true horizontal position, be spaced vertically and be secured.
 - (3) Trenches over five feet deep shall have ladders or stairs every 50 feet.
 - (4) In all events all excavations and trenches shall be in compliance with all codes and ordinances especially the OSHA "Construction Standards for Excavations" 29CFR Part 1926.650 through 1926.652 Subpart P.
- B. Dewatering - If dewatering is required, the contractor shall exercise care not to allow water to damage existing property or damage bedding.
- C. Explosives -
- (1) If explosives are used by the contractor to loosen rock, the contractor shall be responsible for obtaining any necessary permits and to carry insurance to hold the Owner and hold the Engineer harmless against any claim for injury or damage to persons and property resulting from the use of explosives.
 - (2) Explosives and caps shall be stored in accordance with applicable laws and regulations.
 - (3) Blasting mats or other approved devices shall be used at all times.

TRENCHING AND BACKFILLING

PART 2 - PRODUCTS

2.1 BEDDING

- A. Water Main Bedding - Shall consist of naturally occurring soil or sand having a maximum particle size of 3/4 inch.
- B. Sewer Main Bedding -
 - (1) CLASS I: Angular, 1/4" to 1 1/2" graded stone, including a number of fill materials that have regional significance such as coral, slag, cinders, crushed stone or crushed shells.
 - (2) CLASS II: Coarse sands and gravels with maximum particle size of 1 1/2", including variously graded sands and gravels containing small percentages of fines, generally granular and non-cohesive, either wet or dry. Soil types included in this class are: GW, GP, SW & SP.
 - (3) All sewer pipe must be bedded with one of the above materials. A tolerance of 3 percent will be allowed on particle size.

2.2 BORING OF HIGHWAY AND RAILROADS

- A. Boring of highway and railroads for encasement pipe shall be constructed in accordance with the specifications of the Arkansas Highway and Transportation Department or the Railroad Company.
- B. Pipe for encasement will be standard weight new steel pipe for Railroad crossings. For highway crossings, new steel pipe shall be used in thicknesses allowed by the Arkansas Highway Department, otherwise standard weight steel pipe will be used.
- C. Spacers similar and equal to PSI Model PE and encasement seals similar to PSI Model W shall be used with all encasement pipe. No used pipe or fabricated seals will be allowed.

02221 - TRENCHING AND BACKFILLING

2.3 BACKFILL

- A. WATER LINES - Initial backfill material shall consist of select soil (maximum particle size of 3/4 inch for angular rock or 1 1/2 inch for rounded rock) in accordance with A.W.W.A. C605-94. The initial backfill shall be carefully with rock fragments placed over the pipe until 12 inches of cover has been obtained over and around pipe.
- B. SEWER LINES - Initial backfill material shall consist of select soil placed from the springline or top of pipe to a point above the top of the pipe and tamped in place. Select soil shall be good earth, sand, or gravel (maximum particle size 1-1/2") free of larger rock; hard, lumpy material; or spongy, wet, organic or otherwise unsuitable material.
- C. Remaining backfill (called general backfill) shall be select material free of stones (maximum particle size of 6 inches). Stones or rock larger than 6 inches shall be removed from the work site.
- D. The backfill shall be well rounded over the trench and as settlement occurs, the trench shall be refilled and maintained by the addition of material, if required.
- E. Gravel surfaces (both driveways and county roads) cut shall be repaired by backfilling the entire depth of the trench with SB-2 or GB-2 as defined by the Arkansas Highway and Transportation Department.

PART 3 - EXECUTION

3.1 TRENCH EXCAVATION

- A. Trenches shall be excavated to the depth specified.
In the event rock is encountered in the excavation, the trench must be excavated to a depth not less than six (6) inches below grade and then filled back to grade with bedding material. There shall be no additional payment for the excavation of rock or the placing of the bedding in the bottom of the trench.
- B. Rock or other unsuitable material excavated which

02221 - TRENCHING AND BACKFILLING

is not suitable for backfill shall be removed from the job site.

- C. Trench Width - Water mains shall be of sufficient width for the proper installation of the pipe. Maximum widths are as follows:

<u>PIPE SIZE</u>	<u>TRENCH WIDTH (Maximum)</u>
1" - 3"	18"
4" - 8"	30"
10" - 12"	36"

The bottom of the trench shall be graded to a line so that the pipe as nearly as possible will have a bearing for its full length except at the couplings and fittings.

3.2 SEPARATION OF WATER AND SEWER LINES

A minimum 18-inch vertical separation (water over sewer) must be maintained whenever lines cross, otherwise a 10-foot horizontal separation must be maintained between water and sewer lines.

3.3 DEPTH OF TRENCH

Except when otherwise shown on the drawings, or herein specified, all water main trenches shall be constructed to a minimum depth of 36 inches; however, extra depth allowing a minimum cover of 30 inches is required on large diameter pipe. Pipe shall be laid deeper whenever necessary in order to maintain the required grade or in order to avoid obstructing other lines, water ways, etc. At creek, ditch, or box culverts, the excavation shall be carried down sufficiently to give the proper cover. The descent shall be on a gradual grade so as not to exceed the allowable designed deflection of the pipe being used.

Where culverts or other pipe lines may be encountered, the water line shall be placed at such depth as to be under the culvert of pipe line. The construction of water lines exposed through culverts and bridges will not be permitted. Where creek crossings are encountered, the water line shall be placed so that there is not less than 36" from the top of the bell or coupling to the natural bottom of the creek. Concrete encasements may be required wherever deemed necessary by the

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Engineer.

3.4 METHOD OF PAYMENT AND MEASUREMENT

- A. The trenching for the gravity sewers shall be paid for at the unit price per lineal foot for the various depths as set out in the proposal. Such payment shall constitute full compensation for labor, equipment, trench gravel, clean-up, and tools necessary for common excavation as specified.
- B. Trenching for water and force main piping shall be subsidiary to the pipe laying and shall be included in the various sizes of pipe . Trenching will not be measured or paid for separately.
- C. Permanent type pavement to be removed and replaced at street and driveway crossings shall be measured and paid for by the square yard based on the width actually cut to a maximum width of 36 inches, except in the case of highway crossings, which shall be measured in place.
- D. Gravel surfaces cut and repaired shall be subsidiary to the trenching and will not be measured or paid for separately.
- E. Rock excavation shall be subsidiary to the trenching and shall be included in the unit price for laying the various sizes of pipe and will not be paid for separately.
- F. Encasement pipe shall be measured and paid for by the lineal foot in place, which shall include all cost of material, labor, and boring.
- G. All items of work in this section shown on the plans or called for in the specifications which are not given in the list of variable quantities shall be included in the various unit contract prices of work.

TRENCHING AND BACKFILLING

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SECTION 02270
SLOPE PROTECTION AND EROSION CONTROL

PART 1 - GENERAL

1.1 Furnish and install all materials and labor necessary for revegetation (seeding) of those areas disturbed by construction operations which are inside the boundaries of the National Forest or called for on the plans.

1.2 Measurement and Basis of Payment:

All items of work called for under this section of the specifications shall be paid for under the appropriate lump sum item or items as listed in the proposal and none shall be measured or paid for separately.

PART 2 - PRODUCTS

2.1 Seed:

Seed for revegetation shall consist of K-31 Fescue, Orchard Grass, and White Dutch Clover.

2.2 Fertilizer:

Fertilizer shall be 12-24-12 commercial grade fertilizer.

PART 3 - EXECUTION

3.1 Soil Preparation:

All areas to be seeded shall have the top 1/2 inch of surface soil in loose condition. Scarification shall be done with a springtooth harrow or equivalent. Fertilizer shall be applied uniformly either prior or after soil preparation. Seed shall be applied uniformly after soil preparation.

3.2 Application Methods:

Application Methods for Seed and Fertilizer - Mechanical seeders, seed drills, cultipacker seeders, fertilizer spreaders or other approved mechanical seeding equipment shall be used to apply seed or seed and fertilizer. Hand operated seeding devices may be used to apply seed and fertilizer.

02270 - SLOPE PROTECTION AND EROSION CONTROL

3.3 Application Rates:

A. Seeding Rates:

<u>Seed</u>	<u>Lbs./Acre</u>
K-31 Fescue	15
Orchard grass	20
White Dutch Clover	4

B. Fertilizer - Fertilizer shall be spread at a rate of 400 lbs. per acre.

SECTION 02300
EARTHWORK

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. Work Included: Excavate and grade in the areas designated in the Contract Documents as shown on the grading plan and specified herein, which shall include but not be limited to, the following:
- (1) Excavation and site preparation.
 - (2) Grading to establish subgrades for slabs, walks, pavements, gravel surfaces, and grassed areas.
 - (3) Excavation, filling and backfilling and compaction.
 - (4) Dewatering or addition of water as required.
 - (5) Placing of topsoil and finish grading.
- B. Related Sections: Additional Sections of the Documents which are referenced in this Section include:
- (1) Section 01330 - Submittal Procedures

1.2 REFERENCES

- A. General: The work shall comply with the most recent standards or tentative standards as published at the date of the contract and as listed in this specification using the abbreviation shown.
- B. American Society for Testing and Materials (ASTM):
- (1) D 698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³))
 - (2) D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

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- (3) D 1557 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))
- (4) D 2167 - Standard Test Method for Density and Unit Weight of Soil In Place by the Rubber Balloon Method
- (5) D 2216 - Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- (6) D 2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)
- (7) D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
- (8) D 2937 - Standard Test Method for Density of Soil in Place by the Drive-Cylinder Method
- (9) D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
- (10) D 4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

1.3 DEFINITIONS

- A. Controlled Fill: Controlled fill is fill required in all areas on which final grade is not placed on original excavated soil.
- B. Unclassified Excavation: For the purposes of payment, material shall not be classified regardless of the type of material encountered.
- C. Satisfactory Materials: Materials classified by ASTM D 2487 as GW, GP, GM, GC, SW, SP, SM, SC, ML, and CL are satisfactory as fill for overlot grading and are satisfactory in-situ. Materials shall have a minimum compacted density of 95 pounds per cubic foot and a plasticity index in excess of 15.
- D. Unsatisfactory Materials: Materials classified by ASTM D 2487 as OL, OH, MH, CH, and PT are unsatisfactory in-

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situ and as fill. Unsatisfactory materials also include those materials containing roots and other organic matter, trash, debris, frozen materials, and stones larger than 4 inches. Fill materials containing stones larger than 4 inches shall not be used in the uppermost 2 feet.

- E. Cohesionless and Cohesive Materials: Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Cohesionless materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Materials classified as GM and SM will be identified as cohesionless only when the minus #40 fraction has a plasticity index of zero as classified by ASTM D 4318.
- F. Degree of Compaction: Degree of compaction is a percentage of the maximum density obtained by the test procedure presented in ASTM D 698 or ASTM D 1557 as specified, abbreviated below as a percent of laboratory maximum density.
- G. Topsoil: Material obtained from excavations, suitable for topsoils shall consist of friable clay loam, free from roots, stones, other undesirable material and shall be capable of supporting a good growth of grass.
- H. Geotechnical Engineer: A representative of a commercial geotechnical testing laboratory which will be used by the CONTRACTOR to provide the required quality assurance testing.

1.4 SYSTEM DESCRIPTION

Soil Bearing Capacity: Soil underneath all footings and structures not supported by piles shall have a minimum bearing capacity of 2000 pounds per square foot.

1.5 SUBMITTALS

- A. General: Submittals shall be in accordance with Section 01330 - Submittal Procedures. Copies of all test results and field and office worksheets shall be furnished to the ENGINEER within 72 hours after the tests are complete.
- B. Test Reports: The testing agency shall submit following

reports, in duplicate, directly to ENGINEER from the testing services, with copy to the OWNER and CONTRACTOR.

- (1) Test report on borrow material for soil classification.
- (2) Field density reports and map of test location.
- (3) One optimum moisture-maximum density curve for each type of soil used for controlled fill.
- (4) Other reports of any testing hereinafter specified deemed necessary by Soils Engineer or requested by the OWNER and/or ENGINEER.
- (5) A test location plan shall be included with each submittal.

1.6 QUALITY ASSURANCE

- A. Geotechnical Engineer: The CONTRACTOR shall retain a licensed independent Geotechnical Engineer and Test Laboratory approved by the ENGINEER to insure that earthwork meets the requirements of the specifications for density and moisture content. The Geotechnical Engineer shall attend the Pre-Construction Conference.
- B. Inclement Weather: When fill operations are ceased due to weather (rain, freezing, snow, etc.), construction shall not be resumed until the Geotechnical Engineer has verified soil strength has not been adversely affected. If soil strength has been decreased, the affected portion of fill shall be rescarified, moistened, or dried as required and recompact to the specified density.
- C. Inspection: The CONTRACTOR shall conduct daily inspections and more often if necessary to verify that the specifications are being met for the installation of materials.
- D. Coordination: The CONTRACTOR shall coordinate the work with the OWNER's Project Representative (PR) by notifying the PR of scheduled work in advance. The CONTRACTOR shall coordinate work with other trades whose work will be affected on the site.
- E. Utilities: Prior to any excavation the CONTRACTOR shall

verify the locations of all utilities which may be in the area.

- F. Drainage: The CONTRACTOR shall be responsible for the proper drainage of the site during construction of the project. Water shall not be allowed to accumulate in any of the excavated areas. Storm or ground water collecting on site during construction shall be removed by pumping, ditching, or other suitable means.

1.7 PROJECT CONDITIONS

- A. Test Borings: A subsurface investigation has been made at the site of the project in order to ascertain character of materials to be excavated. This information is available upon request for general information only. Attention is directed to the fact that these logs indicate materials encountered at boring locations only. Nothing in plans or specifications shall be taken as a guarantee that materials other than those disclosed by borings will be encountered or that proportions of various materials will not vary from those indicated. If the CONTRACTOR has any questions or desires additional information it is his responsibility to acquire this information at his own expense. All excavation for project is to be considered and bid as "unclassified" and no allowances will be made for rock encountered or removal and replacement of unsuitable material.

- B. Existing Utilities: Locate existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.

Should uncharted, incorrectly charted, unmarked in field, or incorrectly marked in the field, piping or other utilities be encountered during excavation, CONTRACTOR shall consult utility Owner immediately for directions. CONTRACTOR shall cooperate with OWNER and utility companies in keeping respective services and facilities in operation, and shall repair or arrange for repair, damaged utilities to satisfaction of utility owner.

- C. Protection of Persons and Property: Barricade open excavations occurring as part of this work as required by

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state and federal regulations. The CONTRACTOR shall protect structures and adjacent equipment from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials: All fill materials shall be free from mud, refuse, construction debris, organic material, rock or gravel greater than 4 inches in any dimension, frozen or otherwise unsuitable material. Materials for fills shall be secured from excavation after rejection of any unsuitable materials. Materials from other sources may be used upon approval by the Geotechnical Engineer.
- B. Borrow: Material for use in replacing undercut areas or in construction of embankments shall be approved by the Geotechnical Engineer and obtained from approved sources.
- C. Rock: Rock shall be removed to a minimum depth of 12 inches below the subgrade elevation. The excavated area shall be brought up to subgrade with approved material placed and compacted as described herein.
- D. Porous Fill:
 - (1) For areas under on grade slabs, use clean, washed gravel or crushed stone which is free of clay, vegetable matter, loam or other deleterious matter.
 - (2) Material shall be ASTM D 448 #68 stone, unless shown otherwise on the plans.
- E. Unsuitable Materials: Areas that exhibit excessive pumping or that do not meet density requirements due to unsuitable material as determined by Geotechnical Engineer shall be undercut and replaced with approved material in accordance with Part 3, Execution.

PART 3 - EXECUTION

3.1 TOPSOIL

- A. Conservation of Topsoil: Topsoil shall be removed as

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required without contamination with subsoil and stockpiled convenient to areas for later application or at locations specified. Any surplus of topsoil from excavations and grading shall be stockpiled in location approved by the OWNER. A silt fence shall be installed on the downslope side and the stockpiles seeded.

- B. Placing Topsoil: On areas to receive topsoil, the compacted subgrade shall be scarified to a 2 inch depth for bonding of topsoil with subsoil. Topsoil then shall be spread evenly and graded to the elevations and slopes shown. Topsoil shall not be spread when frozen or excessively wet or dry.

3.2 EXCAVATION

- A. Excavation: Excavation shall be unclassified. After topsoil removal has been completed, excavation of every description, regardless of material encountered, within the grading limits of the project shall be performed to the lines and grades indicated. Satisfactory excavation material shall be transported to and placed in fill areas within the limits of the work. All unsuitable material including any soil which is disturbed by the CONTRACTOR's operations and surplus material shall be disposed of at locations off site secured by CONTRACTOR and approved by the OWNER. Excavations carried below the depths indicated, shall, except as otherwise specified, be refilled to the proper grade with satisfactory material as directed. All additional work of this nature shall be at the CONTRACTOR's expense. Excavation and filling shall be performed in a manner and sequence that will provide drainage at all times. Excavations shall be kept free from water while construction therein is in progress. If the CONTRACTOR fails to provide adequate drainage and any material becomes soft or otherwise unsuitable as a result, such material shall be removed and replaced with satisfactory on-site material or borrow material from approved sources, or shall be dried and recompacted as directed by the Geotechnical Engineer at no additional cost to the OWNER. Fill areas and slopes may be adjusted to balance earthwork quantities as approved by the ENGINEER. Material required for fills in excess of that produced by excavation within the grading limit shall be obtained from borrow areas at the CONTRACTOR's expense.

B. Unauthorized Excavation:

- (1) Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific instruction from the ENGINEER or the Geotechnical Engineer.
- (2) Under footings or foundations, fill unauthorized excavations by extending the indicated bottom elevation of the footing or base to the unauthorized excavation bottom, but in no way altering the required top elevation.
- (3) Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations, unless otherwise directed by the Geotechnical Engineer.

C. Stability of Excavations: Maintain sides and slopes of excavations in a manner such that the excavation provides safety of personnel, protection of work, and compliance with requirements of governmental agencies having jurisdiction.

3.3 FILL

- A. Preparation of Ground Surface for Fill: All vegetation such as roots, brush, heavy sods, heavy growth of grass, and all decayed vegetative matter, rubbish, and other unsatisfactory material within the area upon which fill is to be placed, shall be stripped or otherwise removed before the fill is started. In no case will unsatisfactory material remain in or under the fill area. The areas shall then be scarified to a depth of at least 6 inches, moistened or aerated as required and compacted with vibratory rollers, pneumatic rollers, sheepsfoot rollers or other mechanical means acceptable to the Geotechnical Engineer. Sloped ground surfaces steeper than one vertical to four horizontal on which fill is to be placed shall be plowed, stepped, benched, or broken up, as directed, in such manner that the fill material will bond with the existing surface. Prepared surfaces

on which compacted fill is to be placed shall be wetted or dried as may be required to obtain the specified moisture content and density.

- B. Fills and Embankments: Fills and embankments shall be constructed at the locations and to lines and grades indicated. The completed fill shall conform to the grading plan indicated. Approved material obtained during excavation may be used in forming required fill. Fill shall be satisfactory material and shall be free from roots, other organic material. No frozen material will be permitted in the fill. Stones having a dimension greater than 4 inches shall not be permitted in the upper 2 feet of fill or horizontal embankment. The material shall be placed in successive horizontal layers of 6 inches in loose depth for the full width of the cross section and shall be compacted as specified. Each layer shall be compacted before the overlaying lift is placed. Moisture content of the fill or backfill material shall be adjusted by wetting or aerating as necessary to provide the moisture content specified.
- C. Stone Aggregate: A layer of ASTM D 448 #68 stone shall be placed underneath concrete slabs and footings at the locations shown on the plans. Stone depth shall be 6 inches where not shown otherwise on the plans.

3.4 COMPACTION

- A. Subgrade Compaction: The cut sub-grade material shall be compacted to 95 percent of its maximum dry density as determined by ASTM D 698. The moisture content should be within +/-3 percentage points of the material's optimum as determined by ASTM D 2216.
- B. Compaction: Each layer of the fill shall be compacted to at least 95 percent of the maximum theoretical density as determined by ASTM D 698. Moisture content shall be within +/-3 percent of optimum as determined by ASTM D 2216.

3.5 PROTECTION

Site Preservation: The CONTRACTOR shall protect newly graded areas from traffic and from erosion, and any

settlement or washing away that may occur from any cause, prior to acceptance, shall be repaired and grades reestablished to the required elevations and slopes. All work shall be conducted in accordance with the Erosion Control provisions of these specifications.

3.6 FIELD QUALITY CONTROL

- A. Testing: Testing shall be the responsibility of the CONTRACTOR and shall be performed by an approved commercial testing laboratory qualified to perform such tests and approved by ENGINEER. Standard Proctor tests conforming to ASTM D 698, shall be made by the Geotechnical Engineer or his representative on each soil type found in the areas prepared to receive fill and in the soil to be used for fill. Field Density tests shall be made by the Geotechnical Engineer or his representative in accordance with ASTM D 1556 or ASTM D 2922 and ASTM D 3017 on the areas prepared to receive fill and on each layer of compacted fill. Testing shall be the responsibility of the CONTRACTOR and shall be performed at no additional cost to the OWNER. When ASTM D 2922 is used, the calibration curves shall be checked and adjusted if necessary by the procedure described in ASTM D 2922, paragraph "ADJUSTING CALIBRATION CURVE". ASTM D 2922 results in a wet unit weight of soil and when using this method, ASTM D 3017 shall be used to determine the moisture gauges along with density calibration checks as described in ASTM D 3017. ASTM D 2937 shall be used only for soft, fine-grained, cohesive soils. At least one test shall be performed on the compacted backfill. More tests shall be performed if in the judgment of the PR or ENGINEER the compactive effort of the CONTRACTOR will not result in the specified density.
- B. Testing Frequency: The following submittals are required.
- 1) A minimum of one moisture-density test shall be performed for each classification of fill material, and existing subgrade material.
 - 2) One Atterberg limits test and one gradation analysis is required for every six field density tests.

- 3) Field density tests shall be performed as follows:
a minimum of two tests per lift are required for
fill material and a minimum of two tests per lift
are required for subgrades prior to filling.
- C. Visual Inspection: Upon completion of all excavation of
unsuitable material, and for all footings, the
Geotechnical Engineer shall visually inspect the subgrade
and excavations. The visual inspection shall be conducted
to assure that the data obtained from the test borings
and used as a basis of design was representative of the
site conditions. Upon completion of the inspection, the
Geotechnical Engineer shall provide written notification
to the OWNER and ENGINEER.
- D. Proof Rolling: Following visual inspection, CONTRACTOR
shall demonstrate to the Geotechnical Engineer that the
exposed subgrade does not contain previously unidentified
soft areas by proof rolling. Proof rolling shall consist
of rolling the entire surface with approved mechanical
equipment while observing the subgrade for displacement
or deformation.

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SECTION 02530
WASTEWATER TREATMENT SYSTEM

PART 1 – SCOPE

This section pertains to the design of the wastewater treatment system for the steel mill process water.

PART 2 – TECHNICAL CHARACTERISTICS OF WASTEWATER SYSTEM COMPONENTS

See Design Calculations for determination of component sizing.

2.1 EMULSION TANKS EB1.1 AND EB1.2.

Table 1. Dimensions of EB1.X tanks

Volume (m ³)	75
Length (mm)	10,000
Width (mm)	3,500
Height (mm)	2,050

Table 2. Transfer pump groups EP1.1.X (1+1) and EP1.2.X (1+1)

Flowrate (m ³ /h)	80
Pressure (bar)	2.0

2.2 BATCH TANKS WB7.1 AND WB7.2.

Table 3. Dimensions of WB7.X tanks

Volume (m ³)	100
Diameter (mm)	4,267
Height (mm)	8,077

Table 4. Recirculation pump groups WP7.1.X (1+1) & WP7.2.X (1+1)

Flowrate (m ³ /h)	80
Pressure (bar)	2.0

2.3 ACID TANKS AT1.1 AND AT1.2.

Table 5. Dimensions of AT1.X tanks

Volume (m ³)	80
Diameter (mm)	4,267
Height (mm)	6,096

Table 6. Recirculation pumps ARP1.1.X (1+1) & ARP1.2.X (1+1)

Flowrate (m ³ /h)	40
Pressure (bar)	1.5

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Table 7. Transfer pump groups AP1.1.X (1+1) & AP1.2.X (1+1)

Flowrate (m ³ /h)	80
Pressure (bar)	2.0

Table 8. Drain pump ADP1.1

Flowrate (m ³ /h)	10
Pressure (bar)	2.0

2.4 ALKALI TANK AT2.

Table 9. Dimensions of AT2 tank

Volume (m ³)	80
Diameter (mm)	4,267
Height (mm)	6,096

Table 10. Recirculation pump group ARP2.X (1+1)

Flowrate (m ³ /h)	40
Pressure (bar)	1.5

Table 11. Transfer pump group AP2.X (1+1)

Flowrate (m ³ /h)	80
Pressure (bar)	2.0

Table 12. Drain pump ADP2.1

Flowrate (m ³ /h)	10
Pressure (bar)	2.0

2.5 RECEIVING BASIN WB5.

Table 13. Dimensions of WB5 basin.

Volume (m ³)	100
Diameter (mm)	4,267
Height (mm)	8,077

Table 14. Transfer pump group WP5.X (2+1)

Flowrate (m ³ /h)	50
Pressure (bar)	2.0

Table 15. Drain pump WDP5.1

Flowrate (m ³ /h)	10
Pressure (bar)	2.0

Table 16. Drain pump ADP5.1

Flowrate (m ³ /h)	10
Pressure (bar)	2.0

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2.6 STABILIZER TANKS WB6.1 AND WB6.2.

Table 17. Dimensions of WB6.X tanks

Volume (m ³)	80
Diameter (mm)	4,267
Height (mm)	7,101

Table 18. Transfer pump group WSP6.X (2+1)

Flowrate (m ³ /h)	40
Pressure (bar)	2.0

Table 19. Drain pump WDP6.1

Flowrate (m ³ /h)	10
Pressure (bar)	2.0

2.7 DAF Units DAF1 (and DAF2, Contingency).

Table 20. WSP1.X (1+1)

Flowrate (m ³ /h)	15
Pressure (bar)	2.0

2.8 TRANSFER TANKS WB8.1 AND WB8.2.

Table 21. Dimensions of WB8.X tanks

Volume (m ³)	TBD
Diameter (mm)	TBD
Height (mm)	TBD
Water surface height (mm)	TBD

Table 22. Transfer pump groups WP8.1.X (1+1) and WP8.2.X (1+1)

Flowrate (m ³ /h)	450
Pressure (bar)	2

2.9 CLARIFIER (THICKENER) WST2.

Table 23. Design parameters for thickener WST2.

Parameter	Value	Units
Hydraulic residence time	> 2.45	h
Settling velocity	< 1.1	m/h

Table 24. Dimensions of thickener WST2

Parameter	Value	Units
Diameter	16000	mm

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Parameter	Value	Units
Water surface height above top of sludge cone	2500	mm
Volume	552	m ³
Surface	201	m ²

Table 25. Sludge pumps WSP4.1 and WSP4.2

Flowrate (m ³ /h)	90
Pressure (bar)	12

Table 26. Drain pumps WDP4.1 and WDP4.2

Flowrate (m ³ /h)	2
Pressure (bar)	1.0

2.10 FILTER PRESS WSPF2

See Section 3.6.

2.11 AERATION BASIN WB4

Table 27. Design parameters of WB4.X aeration tanks.

Parameter	Value	Units
Hydraulic residence time	> 20	min
Minimum height of water surface	2000	mm

Table 28. Dimensions of aeration tanks WB 4.1 and WB 4.2

Volume (m ³)	84
Height (mm)	3400
Water surface height (mm)	2500
Length (mm)	7800
Width (mm)	4300

Table 29. Blower groups WBP4.1.X (1+1) and WBP4.2.X (1+1)

Flowrate (Nm ³ /h)	400
Pressure (bar)	0.7

2.12 OVERFLOW BASIN WB3.

Table 30. Dimensions of WB3 tank

Volume (m ³)	80
Length(mm)	7600
Width (mm)	4600
Height (mm)	3000
Water surface height (mm)	2590

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Table 31. WP3.X pump group

Flowrate (m ³ /h)	450
Pressure (bar)	2.5

2.13 SAND FILTERS WSF1.1 TO WSF1.6.

Table 32. Design parameters of WSF 1 sand filtration.

Parameter	Value	Units
Filtration velocity	≤ 19	m/h
Backwash velocity	25	m/h
Air backwash velocity	≤ 55.8	m/h

Table 33. Technical characteristics of filters WSF 1.X

Parameter	Value	Units
Number of filters	6	-
Diameter of each filter	3200	mm
Total surface	7.92	m ²
Maximum backwash flow	200	m ³ /h

Table 34. Backwash pump group WP9.1.X (1+1)

Flowrate (m ³ /h)	200
Pressure (bar)	2.5

Table 35. Drain pump group WP9.2.X (1+1)

Flowrate (m ³ /h)	450
Pressure (bar)	2.5

2.14 FILTERED WATER BASIN WB9.

Table 36. Dimensions of WB9 tank

Volume (m ³)	105
Length	9000
Width (mm)	4600
Height (mm)	3000
Water surface height (mm)	2590

2.15 SLUDGE PROCESSING AREA.

Table 37. Sludge pump group WSP10.X (1+1)

Flowrate (m ³ /h)	25
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Pressure (bar)	2.0
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2.16 ROLL SHOP RECEIVING TANK WRLT1.

Table 38. Dimensions of WRLT1 tank

Volume (m ³)	25
Diameter (mm)	3,200
Height (mm)	3,800

Table 39. Transfer pump group WRLP1.X

Flowrate (m ³ /h)	35
Pressure (bar)	1.0

Table 40. Drain pump WDRLP1

Flowrate (m ³ /h)	10
Pressure (bar)	1.1

2.17 LUBRICANT TANK WLT1.

Table 41. Dimensions of WLT1 tank

Volume (m ³)	25
Diameter (mm)	3,200
Height (mm)	3,800

Table 42. Transfer pump WLP1.1

Flowrate (m ³ /h)	35
Pressure (bar)	1.0

Table 43. Drain pump WDLP1

Flowrate (m ³ /h)	10
Pressure (bar)	1.1

2.18 DRY LIME AREA.

Table 44. Lime slurry installation

Minimum flowrate (m ³ /h)	0.55
Pressure (bar)	2.0
Slurry concentration, %	10
Preparation tank, m ³	3.78

Table 45. Drain pump WDP12.1

Flowrate (m ³ /h)	10
Pressure (bar)	1.1

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PART 3 - EQUIPMENT SPECIFICATIONS

3.1 CENTRIFUGAL PUMPS.

Table 1. AP1.1.X pumps

Parameter	Unit	Value
Quantity	-	2 ; (1+1)
Type	-	Centrifugal. Horizontal in a bench. Magnetic drive.
Work fluid	-	Acid Effluents
Guaranteed Nominal Flow	gpm - m ³ /h	352 - 80
Peak Flow	gpm - m ³ /h	-
Guaranteed Nominal Pressure	psi - bar	29 - 2
Maximum NPSH required	m	<7
Volute material	-	Plastic
Impeller material	-	Plastic
Elastomers material	-	Plastic
Impeller	-	Open Impeller
Motor enclosure	-	IEC - IP55
Motor insulation class	-	F according IEC 34-1
Motor cooling method	-	IC 411
Motor driving	-	Variable Frequency Drive
Operation	-	Continuous
Installation	-	Indoors

Table 2. AP1.2.X pumps

Parameter	Unit	Value
Quantity	-	2 ; (1+1)
Type	-	Centrifugal. Horizontal in a bench. Magnetic drive.
Work fluid	-	Acid Effluents
Guaranteed Nominal Flow	gpm - m ³ /h	352 - 80
Peak Flow	gpm - m ³ /h	-
Guaranteed Nominal Pressure	psi - bar	29 - 2
Maximum NPSH required	m	<7
Volute material	-	Plastic
Impeller material	-	Plastic
Elastomers material	-	Plastic
Impeller	-	Open Impeller
Motor enclosure	-	IEC - IP55

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Parameter	Unit	Value
Motor insulation class	-	F according IEC 34-1
Motor cooling method	-	IC 411
Motor driving	-	Variable Frequency Drive
Operation	-	Continuous
Installation	-	Indoors

Table 3. AP2.X pumps

Parameter	Unit	Value
Quantity	-	2 ; (1+1)
Type	-	Centrifugal. Horizontal in a bench.
Work fluid	-	Alkaline Effluents
Guaranteed Nominal Flow	gpm - m ³ /h	352 - 80
Peak Flow	gpm - m ³ /h	-
Guaranteed Nominal Pressure	psi - bar	29 - 2
Maximum NPSH required	m	<7
Volute material	-	Plastic
Impeller material	-	Plastic
Elastomers material	-	Plastic
Impeller	-	Open Impeller
Motor enclosure	-	IEC - IP55
Motor insulation class	-	F according IEC 34-1
Motor cooling method	-	IC 411
Motor driving	-	Variable Frequency Drive
Operation	-	Continuous
Installation	-	Indoors

Table 4. WP1.X pumps

Parameter	Unit	Value
Quantity	-	2 ; (1+1)
Type	-	Centrifugal. Horizontal in a bench.
Work fluid	-	Clean Cooling Water
Guaranteed Nominal Flow	gpm - m ³ /h	1100 - 250
Peak Flow	gpm - m ³ /h	-
Guaranteed Nominal Pressure	psi - bar	29 - 2
Maximum NPSH required	m	<7
Volute material	-	Cast steel A216-WCB or similar
Impeller material	-	Ductile Iron
Elastomers material	-	NBR

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Parameter	Unit	Value
Motor enclosure	-	IEC - IP55
Motor insulation class	-	F according IEC 34-1
Motor cooling method	-	IC 411
Motor driving	-	Variable Frequency Drive
Operation	-	Continuous
Installation	-	Outdoors

Table 5. WP3.X pumps

Parameter	Unit	Value
Quantity	-	2 ; (1+1)
Type	-	Centrifugal. Horizontal in a bench.
Work fluid	-	Clean Cooling Water
Guaranteed Nominal Flow	gpm - m ³ /h	1981 - 450
Peak Flow	gpm - m ³ /h	-
Guaranteed Nominal Pressure	psi - bar	36 - 2.5
Maximum NPSH required	m	<7
Volute material	-	Cast steel A216-WCB or similar
Impeller material	-	Ductile Iron
Elastomers material	-	NBR
Motor enclosure	-	IEC - IP55
Motor insulation class	-	F according IEC 34-1
Motor cooling method	-	IC 411
Motor driving	-	Variable Frequency Drive
Operation	-	Continuous
Installation	-	Outdoors

Table 6. WP5.X pumps

Parameter	Unit	Value
Quantity	-	3 ; (2+1)
Type	-	Centrifugal. Horizontal in a bench.
Work fluid	-	Waste water
Guaranteed Nominal Flow	gpm - m ³ /h	220 - 50
Peak Flow	gpm - m ³ /h	-
Guaranteed Nominal Pressure	psi - bar	29 - 2
Maximum NPSH required	m	<7
Volute material	-	Plastic
Impeller material	-	Plastic
Elastomers material	-	Plastic

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Parameter	Unit	Value
Impeller	-	Open Impeller
Motor enclosure	-	IEC - IP55
Motor insulation class	-	F according IEC 34-1
Motor cooling method	-	IC 411
Motor driving	-	Variable Frequency Drive
Operation	-	Continuous
Installation	-	Indoors

Table 7. WP7.1.X pumps

Parameter	Unit	Value
Quantity	-	2 ; (1+1)
Type	-	Centrifugal. Horizontal in a bench.
Work fluid	-	Waste Water
Guaranteed Nominal Flow	gpm - m ³ /h	352 - 80
Peak Flow	gpm - m ³ /h	-
Guaranteed Nominal Pressure	psi - bar	29 - 2
Maximum NPSH required	m	<7
Volute material	-	Plastic
Impeller material	-	Plastic
Elastomers material	-	Plastic
Impeller	-	Open Impeller
Motor enclosure	-	IEC - IP55
Motor insulation class	-	F according IEC 34-1
Motor cooling method	-	IC 411
Motor driving	-	Variable Frequency Drive
Operation	-	Continuous
Installation	-	Indoors

Table 8. WP7.2.X pumps

Parameter	Unit	Value
Quantity	-	2 ; (1+1)
Type	-	Centrifugal. Horizontal in a bench.
Work fluid	-	Waste Water
Guaranteed Nominal Flow	gpm - m ³ /h	352 - 80
Peak Flow	gpm - m ³ /h	-
Guaranteed Nominal Pressure	psi - bar	29 - 2
Maximum NPSH required	m	<7
Volute material	-	Plastic
Impeller material	-	Plastic

WASTEWATER TREATMENT SYSTEM

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Parameter	Unit	Value
Elastomers material	-	Plastic
Impeller	-	Open Impeller
Motor enclosure	-	IEC - IP55
Motor insulation class	-	F according IEC 34-1
Motor cooling method	-	IC 411
Motor driving	-	Variable Frequency Drive
Operation	-	Continuous
Installation	-	Indoors

Table 9. WP9.1.X pumps

Parameter	Unit	Value
Quantity	-	2 ; (1+1)
Type	-	Centrifugal. Horizontal in a bench.
Work fluid	-	Clean Cooling Water
Guaranteed Nominal Flow	gpm - m ³ /h	880 - 200
Peak Flow	gpm - m ³ /h	-
Guaranteed Nominal Pressure	psi - bar	36 - 2.5
Maximum NPSH required	m	<7
Volute material	-	Cast steel A216-WCB or similar
Impeller material	-	Ductile Iron
Elastomers material	-	NBR
Motor enclosure	-	IEC - IP55
Motor insulation class	-	F according IEC 34-1
Motor cooling method	-	IC 411
Motor driving	-	Variable Frequency Drive
Operation	-	Continuous
Installation	-	Outdoors

Table 10. WP9.2.X pumps

Parameter	Unit	Value
Quantity	-	2 ; (1+1)
Type	-	Centrifugal. Horizontal in a bench.
Work fluid	-	Clean Cooling Water
Guaranteed Nominal Flow	gpm - m ³ /h	1981 - 450
Peak Flow	gpm - m ³ /h	-
Guaranteed Nominal Pressure	psi - bar	36 - 2.5
Maximum NPSH required	m	<7

WASTEWATER TREATMENT SYSTEM

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Parameter	Unit	Value
Volute material	-	Cast steel A216-WCB or similar
Impeller material	-	Ductile Iron
Elastomers material	-	NBR
Motor enclosure	-	IEC - IP55
Motor insulation class	-	F according IEC 34-1
Motor cooling method	-	IC 411
Motor driving	-	Variable Frequency Drive
Operation	-	Continuous
Installation	-	Outdoors

Table 11. EP1.1.X pumps

Parameter	Unit	Value
Quantity	-	2 ; (1+1)
Type	-	Centrifugal. Horizontal in a bench.
Work fluid	-	Oil Emulsions
Guaranteed Nominal Flow	gpm - m ³ /h	352 - 80
Peak Flow	gpm - m ³ /h	-
Guaranteed Nominal Pressure	psi - bar	29 - 2
Maximum NPSH required	m	<7
Volute material	-	Plastic
Impeller material	-	Plastic
Elastomers material	-	Plastic
Impeller	-	Open Impeller
Motor enclosure	-	IEC - IP55
Motor insulation class	-	F according IEC 34-1
Motor cooling method	-	IC 411
Motor driving	-	Variable Frequency Drive
Operation	-	Continuous
Installation	-	Indoors

Table 12. EP1.2.X pumps

Parameter	Unit	Value
Quantity	-	2 ; (1+1)
Type	-	Centrifugal. Horizontal in a bench.
Work fluid	-	Oil Emulsions
Guaranteed Nominal Flow	gpm - m ³ /h	352 - 80
Peak Flow	gpm - m ³ /h	-
Guaranteed Nominal Pressure	psi - bar	29 - 2

WASTEWATER TREATMENT SYSTEM

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Parameter	Unit	Value
Maximum NPSH required	m	<7
Volute material	-	Plastic
Impeller material	-	Plastic
Elastomers material	-	Plastic
Impeller	-	Open Impeller
Motor enclosure	-	IEC - IP55
Motor insulation class	-	F according IEC 34-1
Motor cooling method	-	IC 411
Motor driving	-	Variable Frequency Drive
Operation	-	Continuous
Installation	-	Indoors

Table 13. WSP4.2 sludge pump

Sludge pump to the press plate filter	Data
Item	WSP 4.2
Units	1
Type	Centrifugal
Construction	Horizontal with baseplate
Technical data:	
Type of fluid	Water + Sludge
Unit flow rate	90 m ³ /h
Total flow rate	90 m ³ /h
Head	12 bar
Seal	Mechanical
Feeding	480 V/3 ph./60 Hz
Motor power	37 kW
Type of starter	Frequency converter

Table 14. ARP1.1.X (1+1) pump group

Parameter	Unit	Value
Quantity	-	2 ; (1+1)
Type	-	Centrifugal. Horizontal in a bench.
Work fluid	-	Acid effluents
Guaranteed Flow	Nominal gpm - m ³ /h	176 - 40
Peak Flow	gpm - m ³ /h	-
Guaranteed Pressure	Nominal psi - bar	1.5
Maximum NPSH required	m	2.6
Volute material	-	Plastic
Impeller material	-	Plastic
Elastomers material	-	Plastic

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Parameter	Unit	Value
Impeller	-	Open Impeller
Motor enclosure	-	IEC - IP55
Motor insulation class	-	F according IEC 34-1
Motor cooling method	-	IC 411
Motor driving	-	Contactor
Operation	-	Continuous
Installation	-	Indoors

Table 15. ARP1.2.X (1+1) pump group

Parameter	Unit	Value
Quantity	-	2 ; (1+1)
Type	-	Centrifugal. Horizontal in a bench.
Work fluid	-	Acid effluents
Guaranteed Flow	Nominal gpm - m ³ /h	176 - 40
Peak Flow	gpm - m ³ /h	-
Guaranteed Pressure	Nominal psi - bar	1.5
Maximum NPSH required	m	2.6
Volute material	-	Plastic
Impeller material	-	Plastic
Elastomers material	-	Plastic
Impeller	-	Open Impeller
Motor enclosure	-	IEC - IP55
Motor insulation class	-	F according IEC 34-1
Motor cooling method	-	IC 411
Motor driving	-	Contactor
Operation	-	Continuous
Installation	-	Indoors

Table 16. ARP2.X (1+1) pump group

Parameter	Unit	Value
Quantity	-	2 ; (1+1)
Type	-	Centrifugal. Horizontal in a bench.
Work fluid	-	Alkali effluents
Guaranteed Flow	Nominal gpm - m ³ /h	176 - 40
Peak Flow	gpm - m ³ /h	-
Guaranteed Pressure	Nominal psi - bar	1.5
Maximum NPSH required	m	2.6

WASTEWATER TREATMENT SYSTEM

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Parameter	Unit	Value
Volute material	-	Plastic
Impeller material	-	Plastic
Elastomers material	-	Plastic
Impeller	-	Open Impeller
Motor enclosure	-	IEC - IP55
Motor insulation class	-	F according IEC 34-1
Motor cooling method	-	IC 411
Motor driving	-	Contactor
Operation	-	Continuous
Installation	-	Indoors

Table 17. WDP 4.2 pump

Bailing pump	Data
Item	WDP 4.1
Units	1
Type	Centrifugal
Construction	Submersible with autocoupling
Technical data:	
Type of fluid	Water + sludge
Unit flow rate	2 m ³ /h
Total flow rate	2 m ³ /h
Head	1 bar
Seal	Mechanical
Motors:	
Feeding	480 V/3 ph./60 Hz
Motor power	1.5 kW
Type of starter	Direct starter

Table 18. WDP11 pump

Parameter	Unit	Value
Quantity	-	1
Type	-	Centrifugal. Submersible with autocoupling
Work fluid	-	Alkaline Effluents
Guaranteed Nominal Flow	gpm - m ³ /h	44 - 10
Peak Flow	gpm - m ³ /h	-
Guaranteed Nominal Pressure	psi - bar	29 - 2
Installation depth	m	15
Volute material	-	Defined by manufacturer
Impeller material	-	Defined by manufacturer
Elastomers material	-	Defined by manufacturer

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Parameter	Unit	Value
Impeller	-	Free flow vortex impeller
Motor enclosure	-	IEC - IP68
Motor insulation class	-	F according IEC 34-1
Motor cooling method	-	Surface cooling
Motor driving	-	Contactor
Operation	-	Occasionally
Installation	-	Indoors / submerged

Table 19. WSP10.X pumps

Parameter	Unit	Value
Quantity	-	2 ; (1+1)
Type	-	Centrifugal. Submersible with autocoupling
Work fluid	-	Waste water
Guaranteed Nominal Flow	gpm - m ³ /h	110 - 25
Peak Flow	gpm - m ³ /h	-
Guaranteed Nominal Pressure	psi - bar	29 - 2
Installation depth	m	15
Volute material	-	Defined by manufacturer
Impeller material	-	Defined by manufacturer
Elastomers material	-	Defined by manufacturer
Impeller	-	Free flow vortex impeller with agitator
Motor enclosure	-	IEC - IP68
Motor insulation class	-	F according IEC 34-1
Motor cooling method	-	Surface cooling
Motor driving	-	Contactor
Operation	-	Occasionally
Installation	-	Indoors / submerged

Table 20. WDP12 pump

Parameter	Unit	Value
Quantity	-	1
Type	-	Centrifugal. Submersible with autocoupling
Work fluid	-	Alkaline Effluents
Guaranteed Nominal Flow	gpm - m ³ /h	44 - 10
Peak Flow	gpm - m ³ /h	-
Guaranteed Nominal Pressure	psi - bar	29 - 2
Installation depth	m	15
Volute material	-	Defined by manufacturer

WASTEWATER TREATMENT SYSTEM

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Parameter	Unit	Value
Impeller material	-	Defined by manufacturer
Elastomers material	-	Defined by manufacturer
Impeller	-	Free flow vortex impeller
Motor enclosure	-	IEC - IP68
Motor insulation class	-	F according IEC 34-1
Motor cooling method	-	Surface cooling
Motor driving	-	Contactor
Operation	-	Occasionally
Installation	-	Indoors / submerged

Table 21. WP 8.1.X pumps

Parameter	Unit	Value
Quantity	-	2 ; (1+1)
Type	-	Centrifugal. Submersible with autocoupling
Work fluid	-	Dirty process water with oil
Guaranteed Nominal Flow	gpm - m ³ /h	1981 - 450 (Must work also in 200 and 100 m ³ /h)
Peak Flow	gpm - m ³ /h	-
Guaranteed Nominal Pressure	psi - bar	29 - 2
Installation depth	m	15
Volute material	-	Cast steel A216-WCB or similar
Impeller material	-	Stainless steel Duplex or similar
Elastomers material	-	NBR
Impeller	-	Minimum free passage size: 60mm
Motor enclosure	-	IEC - IP68
Motor insulation class	-	F according IEC 34-1
Motor cooling method	-	Surface cooling
Motor driving	-	Variable Frequency Drive
Operation	-	Continuous
Installation	-	Indoors / submerged

Table 22. WP 8.2.X pumps

Parameter	Unit	Value
Quantity	-	2 ; (1+1)
Type	-	Centrifugal. Submersible with autocoupling
Work fluid	-	Dirty process water with oil

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Parameter	Unit	Value
Guaranteed Nominal Flow	gpm - m ³ /h	1981 - 450 (Must work also in 200 and 100 m ³ /h)
Peak Flow	gpm - m ³ /h	-
Guaranteed Nominal Pressure	psi - bar	29 - 2
Installation depth	m	15
Volute material	-	Cast steel A216-WCB or similar
Impeller material	-	Stainless steel Duplex or similar
Impeller	-	Free flow vortex impeller. Minimum free passage size: 60mm
Elastomers material	-	NBR
Motor enclosure	-	IEC - IP68
Motor insulation class	-	F according IEC 34-1
Motor cooling method	-	Surface cooling
Motor driving	-	Variable Frequency Drive
Operation	-	Continuous
Installation	-	Indoors / submerged

3.2 PNEUMATIC PUMPS.

Table 23. ADP1.1 pump

Flowrate (m ³ /h)	10
Pressure (bar)	2.0
Type	Diaphragm pump, air-operated
Units	1
Connections	Flanged, ANSI 150 Lbs.

Table 24. ADP2.1 pump

Flowrate (m ³ /h)	10
Pressure (bar)	2.0
Type	Diaphragm pump, air-operated
Units	1
Connections	Flanged, ANSI 150 Lbs.

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Table 25. WDP5.1 pump

Flowrate (m ³ /h)	10
Pressure (bar)	2.0
Type	Diaphragm pump, air-operated
Units	1
Connections	Flanged, ANSI 150 Lbs.

Table 26. WDP6.1 pump

Flowrate (m ³ /h)	10
Pressure (bar)	2.0
Type	Diaphragm pump, air-operated
Units	1
Connections	Flanged, ANSI 150 Lbs.

Table 27. WDL1 pump

Flowrate (m ³ /h)	10
Pressure (bar)	1.1
Type	Diaphragm pump, air-operated
Units	1
Connections	Flanged, ANSI 150 Lbs.

Table 28. WRL1.X pumps

Flowrate (m ³ /h)	35
Pressure (bar)	1.0
Type	Diaphragm pump, air-operated
Units	2
Connections	Flanged, ANSI 150 Lbs.

Table 29. WSP6.X pump group (2+1)

Flowrate (m ³ /h)	40
Pressure (bar)	2.0
Type	Diaphragm pump, air-operated
Units	3
Connections	Flanged, ANSI 150 Lbs.

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Table 30. WLP1.1 pump

Flowrate (m ³ /h)	35
Pressure (bar)	1.0
Type	Diaphragm pump, air-operated
Units	2
Connections	Flanged, ANSI 150 Lbs.

Table 31. WDRLP1 pump

Flowrate (m ³ /h)	10
Pressure (bar)	1.1
Type	Diaphragm pump, air-operated
Units	1
Connections	Flanged, ANSI 150 Lbs.

3.3 AGITATORS.

Table 32. Agitator WAG5.1

Agitator of WB5	Data
Item	WAG 5.1
Units	1
Technical data:	
Structure	Stainless Steel
Motors:	
Feeding	480 V/3 ph./60 Hz
Type of starter	VFD

Table 33. Agitator EAG1.1.X

Agitator of EB1.1	Data
Item	EAG1.1.X
Units	2
Technical data:	
Structure	Stainless Steel
Motors:	
Feeding	480 V/3 ph./60 Hz
Type of starter	VFD

Table 34. Agitator EAG1.2.X

Agitator of EB1.2	Data
Item	EAG1.2.X
Units	1
Technical data:	

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Agitator of EB1.2	Data
Structure	Stainless Steel
Motors:	
Feeding	480 V/3 ph./60 Hz
Type of starter	VFD

Table 35. Agitator WAG6.1

Agitator of WB6.1	Data
Item	WAG 6.1
Units	1
Technical data:	
Structure	Stainless Steel
Motors:	
Feeding	480 V/3 ph./60 Hz
Type of starter	VFD

Table 36. Agitator WAG6.2

Agitator of WB6.2	Data
Item	WAG 6.2
Units	1
Technical data:	
Structure	Stainless Steel
Motors:	
Feeding	480 V/3 ph./60 Hz
Type of starter	VFD

Table 37. Agitator WAG7.1

Agitator of WB7.1	Data
Item	WAG 7.1
Units	1
Technical data:	
Structure	Stainless Steel
Motors:	
Feeding	480 V/3 ph./60 Hz
Type of starter	VFD

Table 38. Agitator WAG7.2

Agitator of WB7.2	Data
Item	WAG 7.2
Units	1
Technical data:	
Structure	Stainless Steel
Motors:	
Feeding	480 V/3 ph./60 Hz
Type of starter	VFD

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Table 39. Agitator WAG1.1

Agitator of WB1.1	Data
Item	WAG 1.1
Units	1
Technical data:	
Structure	Stainless Steel
Motors:	
Feeding	480 V/3 ph./60 Hz
Type of starter	Direct starter

Table 40. Agitator WAG5.1

Agitator of WB2	Data
Item	WAG2
Units	1
Technical data:	
Structure	Stainless Steel
Motors:	
Feeding	480 V/3 ph./60 Hz
Type of starter	Direct starter

3.4 BLOWERS.

Table 41. Blower WBP1.X

Blower of WSF1.X	Data
Item	WBP1.X
Type	Side Channel
Units	2 (1+1)
Technical data:	
Flow	442 Nm ³ /h
Structure	Stainless Steel
Motors:	
Feeding	480 V/3 ph./60 Hz
Type of starter	Frequency converter
Installation	Outdoors

Table 42. Blower WBP4.1.X

Blower of WB4.1	Data
Item	WBP4.1.X
Type	Lobular
Units	2 (1+1)
Technical data:	
Flow	400 Nm ³ /h
Pressure	0.7 bar
Structure	Stainless Steel
Motors:	

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Blower of WB4.1	Data
Feeding	480 V/3 ph./60 Hz
Type of starter	Frequency converter
Installation	Outdoors

Table 43. Blower WBP4.2.X

Blower of WB4.2	Data
Item	WBP4.2.X
Type	Lobular
Units	2 (1+1)
Technical data:	
Flow	400 Nm ³ /h
Pressure	0.7 bar
Structure	Stainless Steel
Motors:	
Feeding	480 V/3 ph./60 Hz
Type of starter	Frequency converter
Installation	Outdoors

3.5 THICKENER.

Table 44. Thickener WST2

Thickener	Data
Item	WST 2
Units	1
Type	Scrapers for circular basin in concrete with central traction
Scrapers	Surface scraper for oil removal and sludge scrapers
Service	Sludge thickening and oil removal
Technical data:	
Type of fluid	Water + sludge + oil
Structure	Carbon Steel
Diameter	16 m
Slope	See Drawing 020256
Motors:	
Feeding	480 V/3 ph./60 Hz
Rotation motor power	1.5 kW
Elevation motor power	0.75 kW
Type of starter	Direct starter

3.6 PRESS PLATE FILTER.

Table 45. Press plate filter WSPF 2

Press plate filter for sludge dewatering	Data
Item	WSPF 2
Units	1
Type	Press plate filter
Service	Sludge dewatering
Technical data:	
Structure	Carbon Steel
Capacity	800 l
Hydraulic pressure	12 bar
Motors:	
Feeding	480 V/3 ph./60 Hz
Hydraulic pump motor	5.5 kW
Plates car motor	0.55 kW
Type of starter	Direct starter

3.7 SAND FILTERS.

Table 46. Sand Filters WSF1.1 through WSF1.6

Sand filters	Data
Item	WSF 1.X
Technical data:	
Type of fluid	Water + suspended solids
Type	Vertical filters
Number of filters	6
Type of sand	Silica sand
Diameter	3200 mm
Total flow rate	450 m ³ /h
Filtration velocity	11 m/h
Backwash mode	Counter-washing with water
Backwash velocity	25 m/h
Backwash flowrate	33 m ³ /h
Filter material	Carbon steel
Notes	Pneumatic valves, solenoid valves and interconnecting piping are included

3.8 STRAINERS.

Table 47. Strainers AS1.1

Type	Flanged
Pressure Drop - Clean Filter	0,05 bar

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Type	Flanged
Pressure Drop - Dirty Filter	0,2 bar
Mesh	1,5 mm
Maximum Working Pressure	0,6 bar

Table 48. Strainers AS1.2

Type	Flanged
Pressure Drop - Clean Filter	0,05 bar
Pressure Drop - Dirty Filter	0,2 bar
Mesh	1,5 mm
Maximum Working Pressure	0,6 bar

3.9 CAUSTIC SYSTEM.

Table 49. Caustic tanks

Caustic tank	Data
Item	DT 2.1 & DT 2.2
Units	2
Total volume	25 m ³ (6,500 gallons)
Material	FRP
Low Level switch	Included
Level transducer	Included

Table 50. Recirculation pumps

Recirculation pump	Data
Item	DAP 2.X
Units	1+1 Stand by
Unit flow rate	2,2 m ³ /h
Total flow rate	2,2 m ³ /h
Head	2 bar

3.10 LIME SLURRY SYSTEM.

Table 51. Lime silo

Dry lime silo	Data
Item	DT 3.1
Units	1

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Welded carbon steel leg supported dry lime storage silo	Qty, one (1) 60,000lbs storage capacity
Screw type feeder	Included
Level switch	Included. 3 units.

Table 52. Lime slurry tank

Slurry tank	Data
Item	DT 3.2
Units	1
Total volume	4 m ³ (1000 gallons)
Material	FRP
Lime slurry concentration	10% maximum
Level switch	Included. 2 units

Table 53. Recirculation pumps

Recirculation pump	Data
Item	DAP 3.X
Units	1+1 Stand by
Unit flow rate	10 m ³ /h*
Total flow rate	10 m ³ /h*
Head	2 bar

3.11 CHLORINE SYSTEM, WASTEWATER BUILDING.

Table 54. Chlorine tank

Chlorine tank	Data
Item	DT 4
Units	1
Total volume	4 m ³ (1000 gallons)
Material	FRP
Low Level switch	Included
Level transducer	Included

Table 55. Recirculation pumps

Recirculation pump	Data
Item	DAP 4.X
Units	1+1 Stand by
Construction	Horizontal with baseplate
Unit flow rate	m ³ /h *
Total flow rate	m ³ /h *
Head	2 bar

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3.12 CHLORINE SYSTEM, CLARIFIERS (THICKENERS) AREA.

Table 56. Chlorine tank

Chlorine tank	Data
Item	DT 6
Units	1
Total volume	21 m ³ (5500 gallons)
Material	FRP
Low Level switch	Included
Level transducer	Included

3.13 PEROXIDE SYSTEM.

Table 57. Peroxide tank

Peroxide tank	Data
Item	DT 5
Units	1
Total volume	25 m ³ (6500 gallons)
Material	FRP
Low Level switch	Included
Level transducer	Included

3.14 WOOD PELLETS SYSTEM.

Table 58. Pellets silo

Wood pellets silo	Data
Item	DT 7
Units	1
Welded carbon steel leg supported wood pellets storage silo	Qty, one (1) 40000lbs storage capacity
Screw type feeder	Included
Level switch	Included. 3 units.

PART 4 - CIVIL WORKS SPECIFICATION

4.1 INTRODUCTION

The purpose of this Section is to explain the conditions, calculations and results of wastewater basins structure, thickener and press plate filter located in cold mill area.

All engineering design criteria have a common goal: ensuring a safe structure and ensuring the functionality of the structure.

4.2 GEOTECHNICAL CONDITIONS

The subsurface study prepared for the Phase 1 project by "Professional Service Industries, Inc." about this area determine that the soil beneath the topsoil may be divided into an upper stratum consisted of predominantly fine-grained soils and a second stratum consisted of coarse-grained (sandy) soils.

With the goal of designing the best solution, wastewater basin foundations were designed between -400 mm (1 ft 3.74 in) and -4100 (13 ft 5.41 in) while thickener and press filter foundations were designed shallower. According to field boring data, this area includes inorganic clays of low to medium plasticity (CL soils, USCS classification) on top of inorganic clays of high plasticity (CH soils, USCS classification). Geotechnical study informs that to support the loads applied, the existing soils will need to be removed and replaced with a crushed stone.

All foundations consist in flat plates of uniform thickness, with the exception of wastewater basins where the foundation of the wall between basin 2 and 1.1 must be reinforced. This is because of the loads that a structure is transmitting to another, lateral pressures as well as moments.

Surface run-off water should be drained away from the excavations and not be allowed to pond. Although, in order to guarantee the stability of slabs, Russula has considered hydrostatic forces due to the possibility of the existence of groundwater under sidewalks, elevation -300 mm (11.81 in).

The subsurface study suggests that for subgrade prepared soil and properly compacted fill, a modulus of subgrade reaction of 150 pounds per cubic inch (pci) may be used in the grade slab design based on values typically obtained from 1 ft x 1 ft plate load test. The value must be adjusted for larger areas and depending on cohesion or cohesionless soil.

4.3 LOADING CRITERIA

The loads applied to the structure for designing it were:

- Self-weight of the structure as a dead load.
- Concentrated loads because of the necessary equipment.
- The total lateral pressure which includes the static soil pressure plus the calculated seismic lateral pressure, according to geotechnical report recommendations. The PSI soils report has provided the static lateral pressure

coefficients as 0.61 (at-rest) and 0.44 (active). The distribution of these forces would be taken as linear in relation to the depth.

- Loads due to nearby structures: Walls calculations must take into account the adjacent structures which will transmit extra loads and moments.
- Wind loads: In the calculation of design wind loads, the algebraic sum of the pressures acting on opposite faces of each building surface shall be taken into account.
- Wind loads were calculated for press plate filter and thickener depending on:
 - o Basic wind speed according to location.
 - o Importance factor.
 - o Exposure category based on ground surface roughness.
 - o Topographic effects: wind speed-up at isolated hills, ridges and escarpments.
 - o Gust effect factor depending on conditions of rigid or flexible structure.
 - o Enclosure classification because of number of openings.
 - o Internal pressure coefficient.
 - o External pressure coefficient.
 - o Velocity pressure evaluated at each height.

Wind effects are not applied to water basins walls which are not exposed to it.

- Seismic loads: According to geotechnical engineering information, Osceola, Arkansas is in the general proximity of New Madrid which contains the highest level of seismicity in the central and eastern parts of the United States.

Structures designed are intended to resist earthquake motions through ductile inelastic response.

Furthermore, under seismic conditions, the direction of shear may not be predictable. The full shear force has been assumed in any direction for a safe design.

4.4 REQUIREMENTS FOR MATERIALS AND DESIGN

As to the characteristics of the materials used in the calculation:

- Concrete used shall be at least 4000 psi (280 Kg/cm²) and meet requirements specified in ITM-STD40075.
- Reinforcing steel shall be at least ASTM A-615 Grade 60, yield strength (fyk)= 60000 psi (4200 Kg/cm²). Details and placement shall be in accordance with ACI 315 and ACI 318.

02530 - WASTEWATER TREATMENT SYSTEM

All basins shall be perfectly waterproofed and coated. The walls and slabs shall be poured monolithically; alternatively, water stops may be provided. Contact surface between concrete pouring stages must be rough, and it must be cleaned and moistened just before pouring the next stage. Concrete pouring stages will be defined by the contractor in order to minimize slab and wall retraction when curing, see the suggested location of construction joints in drawings.

Furthermore, for WB 4.1 and WB 4.2, internal surfaces of slabs and walls need to be covered with a coating system resistant to pH4 like a two-component epoxy resin: SIKAFLOOR-381 or similar. The areas to be covered are represented in the drawing 020256 and 020257.

General geometric and dimensional tolerances for civil works are stated in ITM-STD40074.

Required strength (U) as combinations of loads, used in design was:

- $U = 1.4D$
- $U = 1.2D + 1.6L + 0.5(L_r \text{ or } S \text{ or } R)$
- $U = 1.2D + 1.6(L_r \text{ or } S \text{ or } R) + (L \text{ or } 0.5W)$
- $U = 1.2D + W + L + 0.5(L_r \text{ or } S \text{ or } R)$
- $U = 1.2D + E + L + 0.2S$
- $U = 0.9D + W$
- $U = 0.9D + E$

Where terminology used are:

W: wind load

L: service live load

L_r : service roof live load

R: cumulative load effect of service rain load. It has not been used in calculation due to its low value.

D: service dead load

S: effect of service snow load. It has not been used in calculation due to its low value.

E: effect of horizontal and vertical earthquake-induced forces.

Limit state design requires the structure to satisfy two principal criteria: the ultimate limit state (ULS) and the serviceability limit state (SLS).

To satisfy the ultimate limit state (ULS), the structure must not collapse when subjected to the peak design load for which it was designed. A structure is deemed to satisfy the ultimate limit state criteria if all factored bending, shear and tensile or compressive

stresses are below the factored resistance calculated for the section under consideration.

To satisfy the serviceability limit state criteria, a structure must remain functional for its intended use subject to routine loading. A structure is deemed to satisfy the serviceability limit state when the constituent elements do not deflect by more than certain limits laid down in the building codes. Many of these limits depend on the finish materials used and of a correct execution.

In addition, calculating wastewater basins designs, Russula has analyzed two cases according to the water level, always resulting worst case when they are empty. The presence of water helps to compensate lateral pressures towards the interior of the basin. Unlike the thickener, where the worst case shall be filled of water and sludge.

Codes requirements applied for water basins, thickener and press plate filter designs were:

- Building Code Requirements for Structural Concrete (ACI 318-14) which refers to the proper design and construction of buildings of structural concrete. Among the subjects covered are: design and construction for strength, serviceability, and durability; deflection limits; development and splicing of reinforcement and construction document information.

The Code also gives load factors for specific combinations of loads. In assigning factors to combinations of loading, some consideration is given to the probability of simultaneous occurrence.

- Minimum Design Loads for Buildings and Other Structures (ASCE/SEI 7-10) which provides requirements for general structural design and includes means for determining dead, live, soil, flood, snow, rain, earthquake and wind loads.

Design requirements for earthquake-resistant structures are determined by the SDC (Seismic Design Categories) to which the structure is assigned. In general, the SDC relates to seismic hazard level, soil type, occupancy, and building use.

4.5 ANALYSIS OF RESULTS

A. WASTEWATER BASINS

In conformity with the results obtained about wastewater basins, WB 3 and WB 9 were designed with concrete walls of 400 mm (15.7 in) thick and upper slab of 800 mm (31.5 in) thick. Reinforcement rebars will be #5 separated each 200 mm (7.87 in) to resist stress around 360 KN/m (24669.36 lb/ft).

B. THICKENER

In relation to the thickener, concrete pillars designed were 400 x 400 mm (15.74 x 15.74 in) because they will support structure, water and sludge weight. Upper concrete walls will be 300 mm (11.81 in) thick. Pillars are reinforced with eight #7 rebars and perimeter walls with #6 separated each 200 mm (7.87 in) to resist stress around 520 KN/m (35633.52 lb/ft).

For civil work forms and reinforcement rebars see drawings 020256 and 020257.

C. GENERAL REQUIREMENTS

To ensure a correct behavior of the structures, rebars should be placed carefully trying to avoid any interference with anchor bolts for pumps or mechanical equipment. If rebars interfere with anchor bolts or any other embedded elements, rebars may be bent but never cut.

SECTION 02610
INDUSTRIAL SEWER LINES AND FORCE MAINS

PART I - GENERAL

1.1 DESCRIPTION OF WORK

The work to be performed under this section of the specifications shall consist of furnishing and installing sewer pipe and force mains; including all clearing, grubbing, excavation, sheeting and shoring, dewatering, pipe laying, jointing, testing, backfilling and any other work that is required or necessary to complete the work as shown in the plans and as specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

Clearing and Grubbing:	Section 02110
Trenching and Backfilling:	Section 02221

1.3 QUALITY ASSURANCE

- A. The pipe manufacturer shall be a member of the Plastic Pipe Institute of the American Water Works Association or the National Clay Pipe Institute and shall have manufactured the pipe and joint proposed for use for not less than five (5) years.
- B. The pipe shall be permanently marked by the manufacturer as set forth in ASTM and P.S. Standard Specifications.
- C. The supplier shall furnish to the contractor a warranty governing both workmanship and material and shall be for a period of not less than one (1) year from date of acceptance by the Owner or his agents. The warranty of the material by the supplier shall be in writing to the contractor. Any material failure shall be replaced at no cost to the Owner.

1.4 GOVERNING STANDARDS

All work performed under this contract shall be in compliance with the "Specifications and Policy for Sanitary Sewers" as established by the manufacturer of the pipe except as modified

herein and the following standards:

- 1) "Recommended Practice for the Installation of PVC Sewer Pipe" - Uni-Bell Uni-B-5.
- 2) "Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe" - ASTM D2321.
- 3) Uni-Bell Handbook of PVC Pipe, 2nd Edition, 1982.
- 4) "Recommended Practice for Installing Vitrified Clay Sewer Pipe" - ASTM C12.

PART 2 - PRODUCTS

2.1 MATERIALS FOR INDUSTRIAL SEWER

The pipe for the gravity sewer may be Vitrified Clay, ABS 'Truss', PVC (Smooth, Corrugated or Ribbed), Ductile Iron, or high density polyethylene (HDPE). Ductile iron pipe shall be required for certain runs of pipe or other applications as shown on the plans. All wyes, tees, and bends shall be manufactured of the same material as the sewer pipe used and all wyes or ends of service shall be equipped with a watertight plug. All sewer pipe shall be installed using either Class I or II embedment materials except that ductile iron pipe may be embedded as specified for 'Type I' laying conditions in ANSI A21.50 latest revision.

2.2 VITRIFIED CLAY PIPE

- A. All vitrified clay pipe shall be extra strength pipe. All clay pipe shall be in conformance to ASTM Specification C-700 latest revision and shall be laid in conformance to ASTM C12 latest revision.
- B. Unless otherwise approved by the Engineer, all clay pipe six inches (6") in diameter and larger shall be furnished in joints having a nominal laying length of not less than five (5) feet.
- C. On all vitrified clay sewer pipe the joints shall

conform to current ASTM Designation C-425
"Compression Joints for Vitrified Clay Bell and
Spigot Pipe."

- D. Pipe bedding shall be crushed stone or rounded gravel material. The material shall have 95% passing a 3/4" sieve and 95% retained on a No. 4 sieve. This bedding shall have a minimum thickness of 4" beneath the pipe throughout its entire length.

2.3 PVC PIPE (SMOOTH, CORRUGATED OR RIBBED)

- A. PVC pipe to be used in gravity sewers shall meet and/or exceed all of the requirements of ASTM Specification D-3034 (SDR 26 min) or ASTM D789, Type PS-115, and shall be made of plastic having a cell classification of 12454-B or 12164-A as defined in ASTM D-1784. Provisions must be made for contraction and expansion at each joint with a rubber ring. The bell shall consist of an integral wall section with solid cross section rubber ring factory assembled and securely locked in place to prevent displacement. The length of pipe sections shall not exceed twenty (20) feet.
- B. All fittings and accessories shall be as manufactured from PVC having a minimum cell class of 12454-B, 12454-C, or 13343-C, and furnished by the pipe supplier or approved equal and have bell and/or spigot configurations identical to that of the pipe. The pipe and fittings shall be tested in accordance with ASTM designations D-2412, D-2152, and D-2444 and shall be rated the same as the pipe.
- C. Minimum "pipe stiffness" at 5% deflection shall be 115 psi for all sizes when tested in accordance with ASTM Designation D-2412, "External Loading Properties of Plastic Pipe by Parallel-Plate Loading." All PVC sewer pipe shall have a minimum impact resistance of 210 ft-lbs.

- D. Pipe and fittings shall be installed in accordance with ASTM D2321 with the following restrictions.
- (1) Only Class I and Class II embedment materials will be considered suitable for use with PVC pipe. This requires that a granular material be used as embedment for the entire length of the sewer lines. Embedment material shall be brought to the top of the pipe in 14 feet or deeper trench cuts.
 - (2) Allowable deflection shall not exceed 5%.
 - (3) Measurements shall be made by pulling a mandrell through all sections of pipe within the system. All tests shall be performed by the contractor in the presence of the Engineer or his representative.
 - (4) Gasket materials shall meet the requirements of ASTM F477.
 - (5) Joint tightness shall meet the requirements of ASTM D-3212 and extrusion quality must meet the requirements of ASTM D-2152.

2.4 ABS and PVC 'TRUSS' PIPE

- A. All 'Truss' pipe shall meet or exceed all requirements of ASTM Specification D-2680 or D-2751 latest revision. All solid wall pipe and fittings shall be SDR 26 or better and shall meet or exceed all requirements of ASTM Specification D-2750 or D-3034 latest revision. The pipe shall be furnished in standard 12.5 feet lengths and shall be free from visible cracks, holes, foreign inclusions or other injurious defects. Fittings shall include couplings, 'O'-rings, backup rings, laterals, tees, elbows, caps, plugs, adaptors, manhole water stops and clamps.
- B. Pipe and fittings shall be installed in accordance 321. Only Class I, Class II, or Class

III embedment materials will be allowed. Class III bedding material must be compacted by hand or mechanical methods to achieve a minimum Standard Proctor Density of 90%. This requires a granular material to be used as embedment for the entire length of the sewer line. In addition, measurements shall be made by pulling a 5% mandrell through random sections within the system as selected by the Engineer.

2.5 DUCTILE IRON PIPE

- A. Ductile iron pipe to be used for gravity sewer shall be ductile iron pipe of the rubber gasket type joint unless otherwise specifically shown on the plans or approved by the Engineer. All pipe shall be furnished in 20' nominal laying lengths and shall bear a mark denoting approval by the Underwriters' Laboratories of Chicago, Illinois.
- B. Pipe of the rubber gasket type joint shall be manufactured in accordance with AWWA Specification C-151, latest revision. All joints shall be of the type which provides a recession in the bell for the employment of a single rubber gasket to be placed before the insertion of the succeeding spigot.
- C. Ductile iron gravity sewer pipe shall be manufactured in accordance with ANSI/ASTM A746 Standards. The pipe thickness shall be based on the depth of bury as shown on the plans but in no case shall pipe lighter than Class 51 be supplied. The pipe shall have an asphaltic coating approximately 1 mil thick as specified in AWWA C-151 on the outside of the pipe. The inside coating shall consist of the standard cement lining as specified in AWWA C-104.

2.6 HDPE PIPE

- A. HDPE pipe to be used for gravity sewer shall be high density polyethylene PE 3408 unless otherwise specifically shown on the plans or approved by the

Engineer. The pipe shall be furnished in standard 40/50 feet lengths and shall be free from visible cracks, holes, foreign inclusions or other injurious defects. Fittings shall include couplings, 'O'-rings, backup rings, laterals, tees, elbows, caps, plugs, adaptors, manhole water stops and clamps.

- B. Only Class I, Class II, or Class III embedment materials will be allowed. Class III bedding material must be compacted by hand or mechanical methods to achieve a minimum Standard Proctor Density of 90%. This requires a granular material to be used as embedment for the entire length of the sewer line. In addition, measurements shall be made by pulling a 5% mandrell through random sections within the system as selected by the Engineer.
- C. Segments may be joined by fusion welding or standard push-on couplings or mechanical coupling devices. Couplings or coupling devices must be made from HDPE or steel and be pressure rated compatible with the pipe.

2.7 MATERIALS FOR FORCE MAINS

- A. The pipe for force mains may be either ductile iron, PVC, or HDPE as herein specified.
 - (1) Ductile iron pipe for force mains shall be the same as that previously specified for gravity sewer pipe. Fittings may be either cast or ductile iron and shall be coated and lined the same as the pipe.
 - (2) PVC Pipe - for force mains shall be Class 160 SDR-26 for 6-inch and smaller force mains, and Class 200 SDR-21 for 8-inch and larger force mains. The pipe shall meet all requirements of ASTM D-2241 and D-1784. All pipe must also meet the requirements as set forth in Commercial Standard PS-22-70 with standard dimension ratio (SDR), and bearing the National Sanitation Foundation seal.

- a. Provisions must be made for contraction and expansion at each joint with a rubber ring, and integral bell as part of each joint. Nominal laying lengths shall be 20 feet.
 - b. All fittings for 3" and smaller PVC pipe shall be made from clean, virgin, NSF approved Type I, Grade 1 PVC conforming to ASTM Resin Specification D-1784. Joints shall be push-on type with rubber gaskets. Fittings for 4" and larger PVC pipe shall be of either cast or ductile iron as above.
- (3) HDPE pipe to be used for force mains shall be high density polyethylene PE 3408 unless otherwise specifically shown on the plans or approved by the Engineer.
- a. Pipe shall meet standard ASTM D3350, ASTM F714 DR 26, 21, 17 or 11.
 - b. Fusion welded joints should meet ASTM D3261. Segments may be joined by fusion welding or equivalent practice. Couplings or coupling devices must be made from HDPE or steel and be pressure rated compatible with the pipe.
- (4) Concrete for Blocking - All fittings and bends shall be blocked. Concrete for this purpose shall be 2000 psi minimum strength either hand or batch mixed and shall conform to all other requirements of the 'Concrete' specification.

2.8 ENCASEMENT PIPE

Pipe for encasement across highways and railroads shall be new standard weight steel pipe of sizes as shown on the plans and shall be constructed in accordance with the specifications and requirements of the Arkansas Highway and Transportation Department.

PART 3 - EXECUTION

3.1 GENERAL

- A. All equipment necessary and required for the proper construction of the sewers shall be on the project in first class working condition. The contractor shall provide the necessary hand tampers and pneumatic tampers to obtain the compaction of the pipe bed and backfill as specified. In order to comply with the requirements of the Arkansas State Health Department, the contractor shall maintain a minimum of ten (10) feet of horizontal separation between water and sewer lines when they are installed parallel and a vertical separation of 18" (minimum) when these lines cross.
- B. Backfilling operations shall not lag more than 500 feet behind laying operations unless written authorization to do otherwise is given by the Engineer. The contractor shall mark all trenches left open at the end of each working day with appropriate barriers, lights, and signs as required by the various safety codes.

No consideration shall be given for reduction of retainage as per Section 3.2 of the General Conditions until such time as fifty percent (50%) of the final cleanup has been successfully completed.

3.2 EXCAVATION

- A. The contractor shall do all excavation to the depth shown on the plans. Common excavation shall include all excavation including such rock as may be encountered in the trench. If the soil at the bottom of the trench is mucky, or in such condition that it cannot be properly shaped and graded, or if this material is too soft to properly support the bedding material, the contractor shall excavate below the normal subgrade elevation as directed by the Engineer.

Whenever excavation is carried below the subgrade, at the direction of the Engineer, the contractor shall provide and install a foundation material of gravel or crushed stone meeting ASTM D2774, ASTM D448 size 67, or AHTD Class 8, thoroughly tamped into place up to an elevation sufficient to prepare the bedding as specified. A minimum of 6 inches of such foundation material will be required.

- B. Where rock excavation is encountered in trench, the contractor shall excavate to the depth shown on the plans plus at least six inches (6"). A bedding material of at least six inches (6") shall be placed between the rock and the bottom of the pipe. This bedding shall consist of ballast, concrete aggregate or other acceptable graded or crushed stone material as shown on the plans. The depth of cut shown on the plans is from the surface of the ground to the invert of the pipe. The width of the trench at the top of the pipe shall be the outside diameter of the pipe bells plus twelve inches, minimum, and plus sixteen inches maximum. The bed for the pipe shall be so shaped that at least the lower quarter of the pipe shall be in continuous contact with the top of the bedding. The contractor shall do all bracing, sheathing, and shoring necessary to perform and protect all excavations required to prepare trenches for laying and installing pipe, and other structures incidental to the construction of this sewer system.

3.3 LAYING AND INSTALLING PIPE

The contractor shall provide a laser beam type grade light to insure the pipe is laid to the lines and grade shown on the plans. The Engineer shall inspect all pipe before it is laid and reject any pipe damaged or defective. Laying of pipe shall be started at the lowest point and be laid up grade. The pipe shall be protected from water during placing and until joints are made.

3.4 BACKFILLING

All trenches and excavations shall be backfilled in a reasonable time after the pipe is installed and bedded. (See Paragraph 3.1(b). Backfill material shall be as shown on the standard detail drawings. Select backfill material containing stones or rock exceeding three inches (3") in diameter shall not be used adjacent to the pipe or until the fill over the pipe exceeds one foot (1') in common excavation and two feet (2') in rock excavation. No haunching or initial backfill material may be dropped from a height exceeding two feet (2') over the top of the pipe. Compaction of the bedding, haunching, and initial backfill material shall be obtained by hand tamping method until cover exists over the pipe as shown on the standard trench detail drawings. General backfill material containing large clods or stones larger than six inches (6") in diameter shall not be placed in trenches. In trenches located in paved streets, the general backfill shall be made in layers not to exceed six inches (6") and shall be compacted to a density of 95% Modified Proctor by pneumatic tampers or other equipment approved by the Engineer in such manner that minimal settling of the trench will occur. The contractor will top the backfill by placing the stone or gravel base material level with the existing surface. The crossing shall then be opened to traffic for a period of at least three weeks before the finished surface is placed. Where sufficient backfill material is not available for any of the above operations, it shall be hauled to the work site by the contractor.

3.5 CONNECTIONS

Where the plans call for connections to existing structures, these connections shall be watertight and so made that a smooth uniform flow will be obtained. Where sewer pipe penetrates a new or existing manhole wall, the connection shall be made watertight using either a manhole coupling or a rubber ring water stop.

3.6 MANHOLES

Manholes shall be constructed at the locations and of the materials and to the dimensions shown on the drawings.

Manholes in streets shall be adjusted to the finished street grade. When rigid sewer pipe is used, the contractor shall install a pipe bell within one foot (1') of the manhole wall for each pipe penetrating the manhole wall. When PVC sewer pipe is installed, the contractor shall install a mechanical pipe plug in the end of each pipe penetrating the manhole wall until the manhole has been constructed. The top of manholes constructed outside of streets, driveways, and ditches shall extend approximately 6" above natural ground unless otherwise noted on the plans.

3.7 SERVICE WYES

Shall be placed in locations to best serve the structure or as designated by field location. In shallow trenches wyes shall be laid horizontal, but in all trenches four feet (4') deep and deeper, wyes shall be inclined at 45 degrees from the horizontal unless otherwise specified. All wyes where service connections are not to be immediately installed shall be plugged with a pressure cap or other suitable means before being placed in the trench. Care shall be taken in backfilling to support the branch so that wyes will not be disturbed by backfilling. No wyes shall be covered until they have been inspected and located by the Engineer.

3.8 SERVICE CONNECTIONS

Service connections shall be installed from the main to the property line of structure to be served. Connection to the wye shall be made with a bend of the proper degree to make the house connection run perpendicular to the main, and pipe shall be laid to a uniform line and grade. No service connections shall be covered until they have been inspected and located by the Engineer. All service connections shall be plugged with a pressure cap before the terminal pipe is placed in the trench. The end of each service connection shall be clearly marked with 1" x 4" painted wooden marker twenty-four inches (24") long driven to within 6 inches of flush. A length of yellow nylon rope shall be attached to this marker and extend to a 1/2" x 1-1/2" x 18" stake buried immediately in front of the end of the service. Where a service connection is laid from an inclined wye in

a trench eight feet (8') or more deep, a block of concrete shall be placed as shown on the plans. This concrete shall be allowed to set before backfilling to a depth of more than one foot (1'). Wyes that are placed in trenches eight feet (8') and deeper and that do not serve existing buildings shall have sufficient pipe connected to them to provide for a future connection at a distance below natural grade of approximately six feet (6') unless otherwise directed by the Engineer. Such pipe shall be considered as pipe for service connections and shall be plugged the same as a service connection. Service connections shall include pipe, bends, plugs, jointing materials, markers, trench excavation, backfill, and all other work incidental to the construction.

3.9 CUTTING AND REPLACING SPECIAL SURFACES

- A. Whenever it becomes necessary in excavating to disturb special surfaces, such as paved or gravel roadways, drives, walks, or parking areas, the original surface shall be restored to original condition or better after completion of the backfill. In these instances, care shall be used in making the backfill to eliminate future settlement and the surface shall be restored using the same type of materials that were used in the original surface.
- B. In gravel-surfaced streets and other areas, the gravel will be disturbed in excavating for trenches. After the backfill has been so placed that no further appreciable settlement will occur, gravel over the trench shall be replaced to the same compacted thickness as the original surfacing. During construction, also, the gravel on the remainder of the street not occupied by the trench may be covered with dirt from the excavation. After completion of the backfill, such dirt shall be removed as completely as possible and additional gravel shall be placed on the street, until the surfacing is as weather resistant and traffic resistant as the original surfacing.

- C. All sewer lines and force mains crossing under state highways will be bored and encasement pipe installed. All other street crossings including service crossings will be open cut. The contractor shall be aware and conform to any requirements and regulations of the Arkansas State Highway and Transportation Department relative to construction on their rights-of-way. The repair of highway surface shall conform to the requirements of the Arkansas State Highway and Transportation Department.

3.10 CUTTING AND REPLACING FENCES AND LAWN SOD

- A. Wherever it becomes necessary in excavating to cut fences or disturb lawns, the fences and lawns shall be restored after completion of the backfill. Fences shall be restored to their original conditions using the same type of materials that were used in their original construction.
- B. Trenches where lawn sod has been disturbed shall be backfilled in accordance with applicable provisions of Paragraph 3.4, and backfilled by hand, if necessary. After replacing the sod, it shall be covered loosely with earth, tamped lightly to protect the roots, and sprinkled with water. Shrubbery shall be taken up ahead of construction, stored, and reset in such manner as to damage it as little as possible.

3.11 INSPECTION

Prior to final approval of the sewer system, the Engineer, accompanied by the contractor's representative, shall make a thorough visual inspection by appropriate method, of the entire installation. Any indication of defects in material or workmanship, or obstructions to flow in the pipe system, shall be corrected. Defects due to contractor's negligence shall be corrected by the contractor and as directed by the Engineer.

3.12 TESTING OF GRAVITY SEWERS

- A. Tests for water tightness shall be made on each section of sewer line by the contractor in the presence of the Engineer by one of the following methods:
- (1) Exterior Saturated Ground Water
Pressure - Infiltration due to exterior ground water pressure shall not exceed 50 gallons per mile per inch diameter per day. The contractor shall furnish all equipment necessary for the completion of this test. If dependable results cannot be achieved due to a low ground water table, the low pressure air loss method shall be used. This method (the E.S.G.W.P.) shall be used only when the ground water table is over the top of the sewer pipe.
 - (2) Low Pressure Air Loss - for testing the water tightness of sewer lines. The contractor shall furnish all equipment necessary for this test. The test shall be conducted following procedures outlined in the installation and testing handbook as published by the Johns-Manville Company. Air pressure in the lines shall not exceed 5.0 psig. An internal pressure of 3.5 psig minimum shall be maintained for at least 5 minutes. After the stabilization period, the time required for a pressure loss of 0.5 psig (3.5 psig to 3.0 psig) will be recorded. If the time for this pressure loss is greater than that shown in the table below, the section undergoing the test shall have passed.

Any section of sewer line failing the above tests shall be repaired and if necessary relaid until that section shall satisfactorily pass one of the above tests. Where high ground water tables are encountered, the air pressure will be increased by the height of water above the

top of the pipe. The costs of any corrective work and retesting shall be borne by the contractor.

TIME REQUIRED FOR AIR TESTING

<u>Pipe Size</u>	<u>Time</u>
4"	2.5 Minutes
6"	4.0 Minutes
8"	5.0 Minutes
10"	6.5 Minutes
12"	7.5 Minutes
15"	9.5 Minutes

- B. Test of Force Mains - after the force main has been laid as specified, the entire line shall be given a hydrostatic pressure test. These tests shall be performed by the contractor in the presence of the Engineer. The contractor shall furnish all necessary pressure gauges, meters, and pumps, and make all taps and connections.

Hydrostatic Test - The section to be tested shall be slowly filled with water and all air expelled. Pressure shall be applied by means of a pressure pump and maintained for at least two hours or until the whole section can be examined. The test shall be at 50% above normal operating pressure for the line, however, in no case shall the testing pressure be lower than 50 psi or higher than the class rating of the pipe, on any portion of the line being tested. All leaks and defects found during the test shall be satisfactorily repaired and corrected by the contractor.

Leakage Test shall be in accordance with AWWA C605-94, "Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water" Section 7.3 (Equation 1).

- C. Manhole Tests - All manholes shall be vacuum tested in accordance with Section 02601 Paragraph 3.4 (C.)

PART 4 - MEASUREMENT & PAYMENT

4.1 METHOD OF MEASUREMENT

- A. The footage of pipe to be paid for shall be in the number of linear feet of pipe in place, measured along the centerline of the pipe. The several sizes shall be measured separately. All fittings and/or wyes shall be included in the footage.
- B. The depth of trench as measured from the ground surface to the invert of the pipe, as determined from the construction drawings furnished the contractor by the Engineer, or measurements made or verified in the field by the Engineer, shall determine the depth.
- C. Concrete for encasement shall be measured along the length of pipe encased for a maximum thickness (height) of twelve inches (12") and a width of twenty-four inches (24"). Concrete for blocking shall not be measured or paid for separately.
- D. Service connections will be measured along the top centerline of the pipe as laid, including the 45 degree bend.
- E. Pavement cut and replaced, both concrete and bituminous, will be measured by the square yard as determined by the horizontal length of pavement actually cut and replaced measured along the centerline of the trench multiplied by the actual width of trench cut to a maximum width of thirty-six (36) inches. Where a width greater than thirty-six (36) inches is required and authorized by the Engineer, the actual width of pavement so authorized to be cut shall be used in determining the quantity of pavement cut and replaced.
- F. Gravel surfacing cut and replaced will not be measured or paid for separately.

- G. Trench gravel used as pipe cushion in rock areas and in wet trench will not be measured or paid for separately.
- H. Encasement pipe shall be measured by the lineal foot in place.
- I. Manholes shall be measured from the bottom of the manhole ring to the invert of the gravity sewer line leaving the manhole.

4.2 BASIS OF PAYMENT

- A. The footage of gravity sewer pipe shall be paid for at the unit price per lineal foot for the several sizes set out in the proposal, which price and payment shall constitute full compensation for all materials, equipment, hauling, installing, labor, tools, filling, compacting, testing, and incidentals necessary to install the pipe complete in place.
- B. The trench for the gravity sewers shall be paid for at the unit price per lineal foot for the various depths as set out in the proposal. Such payment shall constitute full compensation for labor, equipment trench gravel, clean-up, and tools necessary for common excavation as specified.
- C. The footage of force main pipe shall be paid for at the unit price per lineal foot as set out in the proposal, which price and payment shall constitute full compensation for all materials, fittings, blocking, equipment, hauling and installing, rock excavation, backfilling, compacting, testing, clean-up, and incidentals necessary to install the force main pipe complete in place.

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- D. Manholes shall be paid for at the unit price per each as set out in the proposal, which price and payment shall be full compensation for excavating and backfilling, all material, equipment, tools, labor, adjustment to the finished grade, testing, and incidentals necessary to install the manhole complete in place.
- E. Gravel surfacing cut and replaced shall be paid for at the lump sum price for this item of work as set out in the proposal, which price shall include gravel, placing, spreading, compacting and all other work incidental thereto. Gravel for maintenance shall not be measured or paid for separately as such cost shall be incidental to the item as listed in the proposal.
- F. Bituminous and concrete pavement cut and replaced shall be paid for at the unit price per square yard as set out in the proposal, which price shall include materials and all work incidental thereto.
- G. Sewer wyes shall be paid for at the unit price per each as set out in the proposal, which price shall include all material and installation costs.
- H. Sewer service connections shall be paid for at the unit price per lineal foot of pipe, which price shall include all labor, pipe, fittings, trench, and all incidentals necessary to complete installation except cutting of special surfacing which shall be paid for at the bid unit price as set out in the proposal.
- I. Trench gravel shall not be paid for separately, but shall be included in the cost of pipe and trenching.
- J. Encasement pipe under highway or railroad shall be paid for per lineal foot bored in place as set out in the proposal, which price shall include all material, and incidentals necessary to

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install the encasement pipe. Carrier pipe shall be included in the footage of gravity sewer pipe and shall be paid for as outlined in Paragraph 6.a.

- K. Concrete for encasement shall be paid for at the unit price per cubic yard in place. Such payment shall constitute full compensation for all work, materials and incidentals as associated with this work.

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SECTION 02831
CHAIN LINK FENCES, GATES AND BARBED WIRE

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Fence framework, fabric, barbed tape and accessories.
- B. Excavation for post footings.
- C. Concrete for post footings.
- D. Gates and related hardware.

1.2 RELATED WORK

- A. Clearing and grading.
- B. Fence line layout and staking.

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM) Standards.
 - A 90 - Test Method for Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.
 - A 120 - Specification for Pipe, Steel, Black and Hot Dipped Zinc-Coated (Galvanized) Welded and Seamless, for ordinary uses.
 - A 121 - Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.
 - A 392 - Specification for Zinc-Coated Steel Chain-Link Fence Fabric.
 - A 428 - Test Method for Weight of Coating on Aluminum-Coated Iron or Steel Articles.
 - A 446 - Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
 - A 478 - Chromium-Nickel Stainless and Heat Resisting

CHAIN LINK FENCES, GATES & BARBED WIRE

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Steel Weaving Wire.

A 491 - Specification for Aluminum-Coated Steel Chain Link Fence Fabric.

A 569 - Specification for Steel, Sheet and Strip, Carbon (0.15 Maximum Percent), Hot-Rolled, Commercial Quality.

A 585 - Specification for Aluminum-Coated Steel Barbed Wire.

A 817 - Specification for Metallic-Coated for Chain Link Fence Fabric.

A 824 - Specification for Metallic-Coated Steel Marcellled Tension Wire for Use with Chain Link Fence.

B 117 - Method of Salt Spray (Fog) Testing.

C 94 - Ready-Mixed Concrete.

F 567 - Standard Practice for Installation of Chain Link Fence.

F 626 - Specification for Fence Fittings.

1.4 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in commercial quality fence products with at least five years' experience.
- B. Fence framework, fabric, barbed wire and related accessories to be a complete system as specified herein.

1.5 SUBMITTALS

- A. Shop Drawings: Include complete details of fence and gate construction, fence height, post spacing, dimensions and unit weights of framework and concrete footing details.
- B. Product Data: Manufacturer's catalog cuts with printed specifications.

CHAIN LINK FENCES, GATES & BARBED WIRE

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Allied Tube & Conduit Corp.
- B. Anchor Fence, Inc.
- C. Cyclone Fence/United States Steel Corp.
- D. Substitutions: Products of other manufacturers equal to those specified can be used subject to prior approval.

2.2 MATERIALS

- A. Framework: Type I or Type II Steel Pipe.

Type I - Schedule 40 steel pipe with 1.8 ounces of zinc coating per square foot of surface area confirming to Standard Specification ASTM A 120; or

Type II - Pipe manufactured from steel conforming to ASTM a 569, cold-formed, high frequency welded and having a minimum yield strength of 50,000 psi. External surface triple coated with 1.0 ounce +/- 0.1 ounce of zinc per square foot, 30 +/- 15 micrograms of chromate per square inch and 0.5 +/- 0.2 mils of clear, cross linked polyurethane. Internal surface coated, after welding, with a zinc-rich based organic coating having an 87% zinc powder loading capable of providing galvanic protection. Internal surface of 4" O.D. pipe only to be zinc-coated in accordance with ASTM A 446.

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Pipe shall be straight, true to section and conform to the following weights:

Pipe Size Outside Diameter	Type I Weight Lbs./Ft.	Type II Weight lbs./Ft.
1-5/8"	2.27	1.84
2"	2.72	2.28
2-1/2"	3.65	3.12
3"	5.79	4.64
3-1/2"	7.58	5.71
4"	9.11	6.56
6-5/8"	18.97	--

B. Fabric: Zinc-Coated or Aluminum-Coated steel.

Zinc-coated fabric shall be galvanized after weaving with a minimum 2.0 ounces of zinc per square foot of surface area and conform to ASTM A 392, Class 2.

Aluminum-coated fabric shall be manufactured in accordance with ASTM A 491 and coated before weaving with a minimum of 0.4 ounces of aluminum per square foot of surface area. The steel wire and coating shall conform to ASTM A 817.

C. Fittings: Pressed steel or cast iron, galvanized with a minimum of 1.2 ounces of zinc per square foot of surface area, or cast aluminum alloy, all conforming to ASTM F 626.

2.3 CONCRETE MIX

A. ASTM C 94 Portland Cement concrete with maximum 3/4" aggregate having a minimum compressive strength of 3,000 psi at 28 days.

2.4 COMPONENTS

A. Corner Posts, End Posts, and Pull Posts:

1. Size - 3-1/2" O.D. Type I or Type II pipe.
2. All posts shall be plumb within 5 degree (+/- 1 degree) in two planes.
3. Deflection - When a force of 70 pounds is applied perpendicular to the fence at the top of the post, it shall not deflect more than 1" at that location.
4. Pull posts shall be used at all abrupt changes in grade, direction, and at intervals no greater than 300 feet.
5. Posts shall be horizontally braced at mid-point with 1-5/8" O.D. brace rails and diagonally trussed with 3/8" O.D. truss rods and turnbuckles to adjacent post.

B. Line Posts:

1. Size - 2" O.D. Type I or Type II pipe.
2. Space posts equidistant in the fence-line, with a maximum of 10' on centers.
3. All posts to be plumb within 5 degrees (+/- 1 degree) in two planes.
4. Deflection - When a force of 38 pounds is applied perpendicular to the fence at the top of the post, it shall not deflect more than 1" at that location.

C. Top Rail:

1. Install top rails continuously through post caps or extension arms.
2. Size - 1-5/8" O.D. Type I or Type II pipe.
3. Each joint where a rail meets a post shall be secured so that no perceivable movement between

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the two pieces takes place when the fence fabric is flexed.

- D. Fabric: Galvanized or aluminum-coated steel wire, 9 gauge, woven in a 2" diamond mesh with top selvage twisted and barbed and bottom selvage knuckled. Furnish one piece fabric widths.
- E. Gate Posts: Furnish posts for supporting gates of a size shown on the drawings.
- F. Gates: Fabricate swing gate perimeter frames of 2" O.D. pipe, Type I or Type II. Metal and finish to match framework. Provide horizontal and vertical members to ensure proper gate operation and for attachment of fabric, hardware and accessories. Space so that frame members are not more than 8' apart. Barbed wire shall be installed at top of gates.

Assemble gate frames by welding and repair weld areas with zinc-rich coating applied per manufacturer's direction. Install fabric with tension bars at vertical edges. Bars may also be used at top and bottom edges. Attach tension bars to gate frame at not more than 15" on centers. Attach hardware to provide security against removal or breakage. Install diagonal cross-bracing consisting of 3/8" diameter adjustable length truss rods on gates to ensure frame rigidity without sag or twist.

- 1. Hinges: Size and material to suit gate size, non-lift-off type, offset to permit 180 degree gate opening. Provide 1-1/2 pair of hinges for each leaf. Hinges to be heavy duty ball and socket, malleable iron, hot-dip galvanized.
 - 2. Locks: Gates shall be furnished and installed with forked type or plunger bar type latch for installation of owner-furnished padlocks.
- G. Vehicular Slide Gates: (If required) Vehicular slide gate perimeter frames of 3" O.D. are Type I or Type II. Provide additional horizontal and vertical members to insure proper gate operation and for attachment of fabric, hardware and accessories. Assemble gate frames by welding for rigid connections. Use same fabric as for fence. Install fabric with tension bars

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at vertical edges and tie at top and bottom edges. Attach tension bars to gate frame at not more than 15" on centers. Attach hardware with rivets or by other means which will provide security against removal or breakage. Gates shall be equipped with "J" vehicular chain link fence gate operators with remote electric locking and unlocking operation with chain drive. Contractor shall furnish, coordinate, and install vehicular slide gates and appurtenances as required to accept electric locks and gate operators as specified. Contractor to perform all required excavation, backfill and concrete work to allow security hardware contractor to install gate operators. posts and bottom rails.

H. Fittings:

Post Caps - Pressed steel, cast iron or cast aluminum alloy designed to fit snugly over posts to exclude moisture. Supply cone type caps for terminal posts and loop type for line posts. All caps to be equipped with set screws.

Rail and Brace Ends - Pressed steel, cast iron or cast aluminum alloy, cup-shaped to receive rail and brace ends.

Top Rail Sleeves - Tubular steel, 0.051 thickness x 7" long, expansion type.

Tension Bars - Steel strip 5/8" wide x 3/16" thick.

Tension Bands - Pressed steel, 14 gauge thickness x 3/4" wide.

Brace Bands - Pressed steel, 12 gauge thickness x 3/4" wide.

Truss Rods - Steel rod, 3/8" diameter merchant quality with turnbuckle.

Barbed Wire Arms - Pressed steel, cast iron or cast aluminum alloy fitted with clips or slots for attaching three strands of barbed wire. Arms shall be set outward on a 45 degree angle and be capable of supporting a 250 pound load at outer barbed wire connecting point without causing permanent deflection.

CHAIN LINK FENCES, GATES & BARBED WIRE

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- I. Tension Wire: Marcellled 7 gauge steel wire with minimum coating of 0.80 ounces of zinc or 0.40 ounces of aluminum per square foot of wire surface and conforming to ASTM A 824.
- J. Barbed Wire: Commercial quality steel, 12-1/2 gauge, two strand twisted line wire with 4 point barbs at 5" spacing. Coating shall consist of a minimum of 0.80 ounces of zinc per square foot of wire surface conforming to ASTM A 121 or a minimum of 0.30 ounces of aluminum per square foot of wire surface conforming to ASTM A 585.
- K. Tie Wires: Steel, 9 gauge, hot-dip galvanized.

PART 3 EXECUTION

3.1 INSPECTION

Installer shall examine site and report in writing to Engineer/Owner any conditions detrimental to the proper and timely completion of the work. Clearing, grading and fence line layout and staking of terminals to be completed by others before start of fence installation.

3.2 INSTALLATION

- A. General: Fence installation to conform to requirements of ASTM F 567.
- B. Height: Provide fence height as indicated on contract drawings.
- C. Post Spacing: Space line posts at intervals not exceeding 10'.
- D. Post Setting: Set terminal, gate and line posts plumb in concrete footings as indicated on contract drawings. Top of footing to be 2" above grade and sloped to direct water away from posts.
- E. Bracing: Brace gate and terminal posts back to adjacent line posts with horizontal brace rails and diagonal truss rods.
- F. Top Rail: Install through line post loop caps connecting sections with sleeves to form a continuous

CHAIN LINK FENCES, GATES & BARBED WIRE

02831 - CHAIN LINK FENCES, GATES & BARBED WIRE

- rail between terminal posts. Fasten to terminal posts.
- G. Bottom Tension Wire: Stretch between terminal posts 6" above grade and fasten to outside of line posts with tie wires.
 - H. Fabric: Pull fabric taut to provide a smooth uniform appearance, free from sag, with bottom selvage 2" above grade. Fasten to terminal posts with tension bars threaded through mesh and secured with tension bands at maximum 15" intervals. Tie to line posts and top rails with tie wires spaced at maximum 12" on posts and rails. Attach to bottom tension wire with hog rings at maximum 12" intervals.
 - I. Barbed Wire: Anchor to terminal extension arms, pull taut to remove all sag and firmly install in slots of line post extension arms.
 - J. Install gates plumb, level and secure for full opening without interference. Adjust hardware for smooth operation. Gates shall be erected in strict accordance with the manufacturer's recommendations. All gates must be adjusted for smooth unimpeded operations. Construct gate supporting structure according to details of the drawings.
 - K. Fasteners: Install nuts for fittings, bands and hardware bolts on inside of fence. Peen ends of bolts or score threads to prevent removal.

3.3 COMPLETION

The area of installation shall be left neat and free of any debris caused by the erection of the fence.

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SECTION 02932
HYDROMULCHING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Seeding and fertilizing by the hydromulching method finish-graded slopes and areas disturbed by construction Work.

1.2 RELATED SECTIONS

- A. Section 02220 - Site Excavation, Backfilling and Grading

1.3 QUALITY ASSURANCE

- A. Furnish seed labeled in accordance with current rules and regulations of Arkansas Plant board.

1.4 SUBMITTALS

- A. Submit results of soil analysis of samples taken from seeding area and imported topsoils.
- B. Submit labels from seed bags, lime and fertilizers.
- C. Submit sample of mulching material.
- D. Submit soil stabilizer information.

1.5 REFERENCES

- A. Federal Specifications (FS):
 - 1. FS O-F-241 Fertilizers, Mixed, Commercial.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver grass seed in original containers showing analysis of seed mixture, percentage or pure seed, year of production, net weight, date of packaging, and location of packaging. Damaged packages are not acceptable.
- B. Deliver fertilizer and lime in waterproof bags showing weight, chemical analysis, and name of manufacturer.

HYDROMULCHING

1.7 PRICES

- A. Hydromulching: Hydromulch seeding in place as specified in this section and shown on the drawings. All items of work called for under this section of the specifications shall be paid for under the appropriate lump sum item or items as listed in the proposal and none shall be measured or paid for separately.
- B. Topsoil: Imported topsoil incorporated into the work as specified in this section and shown on the drawings. All items of work called for under this section of the specifications shall be paid for under the appropriate lump sum item or items as listed in the proposal and none shall be measured or paid for separately.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Topsoil: Use topsoil excavated from the site only if conforming to the specified requirements.
 - 1. Existing Topsoil: Natural, fertile agricultural soil capable of sustaining vigorous plant growth, not in frozen or muddy condition, containing not less than 3% organic matter, and corrected to pH value of 5.9 to 7.0. Free from subsoil, slag, clay, stones, lumps, live plants, roots, sticks, crabgrass, coughgrass, noxious weeds, and foreign matter.
 - 2. Imported Topsoil: Natural, fertile, agricultural soil typical of locality, capable of sustaining vigorous plant growth, from well-drained site free of flooding, not in frozen or muddy condition, not less than 3% organic matter, and pH value of 5.9 to 7.0. Free from subsoil, slag, clay, stones, lumps, live plants, roots, sticks, crabgrass, coughgrass, noxious weeds and foreign matter.
 - 3. Very fine sandy loams and silt loams are not allowed.
 - 4. Have topsoil analyzed and submit written analysis stating the nitrogen, phosphorus, and potassium requirements, organic matter content, and pH value of the soil.
- B. Fertilizer: Commercial type conforming to FS O-F- 241, proportions 10N-20P-10K.

HYDROMULCHING

- C. Lime: Lime, if required, shall be agricultural grade ground limestone ground to pass an 8-mesh sieve with 25 percent passing a 100-mesh sieve. Calcareous lime-stone shall contain not less than 50 percent calcium oxide, and dolomitic lime-stone shall contain not less than 40 percent magnesium oxide. Coarser materials will be acceptable provided the specified rates of application are increased proportionately, on the basis of quantities passing the 8 and 100 mesh sieves, but no additional payment will be made for the increase quantity.
- D. Seed, General:
1. Labeled in accordance with current rules and regulations of Arkansas State Plant Board.
 2. Minimum 98% pure seed and 85% germination by weight.
 3. Allowable noxious weed seeds: 50 per pound of seed with no Johnson grass, wild onion, wild garlic, field bindweed, or nut grass seed allowed in any amount whatsoever.
 4. Furnish seed in sealed, standard containers.
- E. Seed varieties: Refer to seed mix control schedule in subsection 2.2 - A of this section.
- F. Mulching material/soil stabilizer:
1. Virgin wood cellulose fiber combined with COHEREX, as manufactured by Witco Chemical, Golden Bear Division, Bakersfield, CA; or
 2. CONWED 2000, as manufactured by Conwed Corporation, Environmental Products Division, St. Paul, MN
- G. Water: Irrigation quality, free of impurities that would be detrimental to plant growth.

2.2 MIXING

- A. Seed Mix: Seed shall be composed of the varieties and amount by weight as shown below, based on time of application.

Variety	Period	Rate
1. Turf Type Seeding Mix	Turf	
Common Bermuda Grass	4-1 to 8-15	100lbs/Acre
Perennial Ryegrass	8-16 to 12-30	200lbs/Acre

B. Hydromulching Mixture:

1. 2000 lbs. of virgin wood cellulose fiber per acre; COHEREX in proportion as recommended by manufacturer for mixing with cellulose fiber.
2. Fertilizer: Minimum 600 lbs. per acre or maximum 800 lbs. per 1500 gallons of water.
3. CONWED 2000 in proportion to rest of mixture as recommended by manufacturer.
4. Seed: As specified for type of seed or seed mixture and time of application.
5. Water.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Furnish and install all materials and labor necessary for revegetation (seeding) of those areas disturbed by construction operations.
- B. Have the seeding areas tested for lime and fertilizer requirements by the County Extension Agent, other public service agency, or private testing service at Contractor's expense. At least three soil samples shall be taken from each area. Submit a report of the soil analysis recommendation to the Architect/Engineer.
- C. Verify that seeding area has been cleaned up and dressed to final shape.

3.2 INSTALLATION

A. Subgrade Preparation:

1. Fine grade sub-grade, eliminating uneven areas and low spots. Maintain lines, levels, profiles, and contours. Make changes in grade gradual. Blend slopes into level areas and rake until smooth.
2. Remove foreign materials, undesirable plants and their roots, stones and debris. Do not bury foreign material beneath areas to be hydromulched.
3. Remove sub-soil which has been contaminated with petroleum products.
4. Scarify and pulverize sub-soil to a depth of 3 inches where topsoil is to be placed. Repeat pulverizing in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

HYDROMULCHING

5. If lime is required, apply at rate determined by soil analysis, uniformly spreading on areas prior to their being scarified. Thoroughly mix lime with sub-soil to the scarified depth.

B. Placing Topsoil:

1. Spread topsoil to a minimum layer depth of 3 inches over entire area to be seeded.
2. Place topsoil during dry weather and on dry, unfrozen sub-grade.
3. Remove stones, roots, grass, weeds, debris, and other foreign non-organic matter while spreading.
4. If lime is required, apply at rate determined by soil analysis, uniformly spreading on topsoiled areas. Thoroughly mix lime with topsoil layer.

C. Hydromulching:

1. Prior to hydromulching, lightly firm seeding area with a cultipacker.
2. Verify that seeding area is ready to receive hydromulching and notify architect/engineer of schedule for application.
3. Apply mixture of mulch, seed, fertilizer, soil stabilizer, and water with the proper equipment to achieve complete coverage at the specified rate.

3.3 MAINTENANCE

- A. Maintain hydromulched areas by watering, fertilizing, reseeding, and repairing as for a period of 90 days after germination, to provide a healthy, growing stand of grass. Water seeded areas to maintain adequate moisture levels for vigorous germination and growth. Apply additional granular or liquid fertilizer every 30 days following germination.
- B. Mow turf type grass areas to a height of 3 to 4 inches when height of grass reaches 6 inches. Mowing is not required in areas hydromulched for slope protection.
- C. Repair and reseed damaged ground surfaces outside of normal Work areas due to negligence of the Contractor.

- D. It is intended that an established live and growing stand of grass be provided with no bare spots larger than one 3 square foot in area. The Contractor shall re-seed areas as necessary to obtain this result.
- E. The time required for maintenance after the Contract Time ends will not be assessed as liquidated damages provided all other Work under the Contract has been completed.

End of Section

SECTION 03100
CONCRETE FORMWORK

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

This section shall consist of the requirements for the furnishing of all necessary materials and erection of concrete formwork.

1.2 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Submittal Procedures - Section 01330
- B. Concrete Formwork - Section 03100
- C. Concrete Reinforcement - Section 03200

1.3 QUALITY ASSURANCE

Comply with Standard ACI 347 "Recommended Practice for Concrete Formwork".

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Form material may be plywood or metal sufficiently substantial and tight to prevent leakage of concrete.
- B. Cylindrical forms of paper or fiber may be used provided the forms can resist the loading of wet concrete without deflection.

2.2 DESIGN

The forms shall be designed and constructed so as to safely support loads that may be applied and maintain their position and shape.

PART 3 - EXECUTION

3.1 GENERAL

- A. Forms shall conform to the shape, lines and

CONCRETE FORMWORK

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dimensions of numbers called for on plans. They shall be properly braced or tied together to maintain their position and shape when concrete is tamped or vibrated.

B. Provide 3/4" chamfer on all exposed edges unless otherwise shown on the plans.

C. Forms for footings may be omitted when the soil and workmanship permit accurate excavation to size; and the omission is approved by the Engineer.

D. Removal of forms shall be done in a manner which will assure complete safety of the structures. When the structures as a whole are supported on shores, the removable forms, beams and sides and similar vertical forms may be removed after twenty-four (24) hours, provided the concrete is sufficiently hard and will not be injured. In no case shall the supporting forms or shoring be removed until the members have acquired sufficient strength to support their weight and the loads safely.

E. Forms for permanently exposed surfaces shall produce a smooth, even level finish without fins or board marks.

CONCRETE FORMWORK

SECTION 03200
CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

This section shall consist of the requirements for the furnishing and installation of concrete reinforcement work.

1.2 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Submittal Procedures - Section 01330
- B. Concrete Formwork - Section 03100
- C. Concrete Reinforcement - Section 03200

1.3 QUALITY ASSURANCE

A. Codes and Standards: Comply with requirements of the latest edition of the following codes and standards, except as herein modified:

(1) Concrete Reinforcing Steel Institute,
"Manual of Standard Practice for Placing
Reinforced Concrete Construction."

(2) American Concrete Institute, ACI 318
"Building Code Requirements for Reinforced
Concrete."

(3) American Concrete Institute, ACI 315:
"Manual of Standard Practice for Detailing
Reinforced Concrete Structures."

(4) ASTM A615: Specifications for Deformed
and Plain Billet-Steel Bars for Concrete
Reinforcement.

1.4 SHOP DRAWINGS

Shop Drawings shall be submitted to the Engineer for approval.

CONCRETE REINFORCEMENT

03200 - CONCRETE REINFORCEMENT

PART 2 - PRODUCTS

2.1 MATERIALS

A. Metal reinforcement shall be deformed bars, conforming to the latest revision of one of the following requirements:

(1) ASTM "Standard Specifications for Deformed Billet-Steel Bars for Concrete Reinforcement," A-615.

(2) ASTM "Standard Specifications for Rail-Steel Deformed Bars for Concrete Reinforcement," A-616.

(3) ASTM "Standard Specifications for Cold-Drawn Steel Wire for Concrete Reinforcement," A-82.

(4) ASTM "Standard Specifications for Welded Steel Wire Fabric for Concrete Reinforcement," A-185.

B. Metal accessories including spacers, chairs, ties and other devices necessary for properly assembling, placing, spacing, and supporting all reinforcement in place, shall be provided.

C. All reinforcing steel shall be Grade 60 unless otherwise indicated on the plans.

2.2 FABRICATION

Bars shall be accurately bent as indicated on the drawing and shall conform to the standards of CRSI "Manual of Standard Practice."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Contractor shall comply with the standards as specified.

CONCRETE REINFORCEMENT

03200 - CONCRETE REINFORCEMENT

B. Reinforcement shall be free from scale, rust, or coatings which will reduce the bond to the concrete.

C. Bars shall be placed as indicated on the shop drawings and securely supported and fastened to prevent movement during the placement of concrete.

D. Protection for reinforcement shall be as follows:

(1) Concrete deposited against ground without use of forms - three inches (3").

(2) Concrete exposed to ground but poured in forms - two inches (2").

(3) Concrete exposed to weather - One and one-half inches (1-1/2").

CONCRETE REINFORCEMENT

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SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

This section consists of furnishing all required material and labor necessary completion of all cast-in-place concrete work, as indicated on the drawings or as specified.

1.2 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Concrete Formwork - Section 03100
- B. Concrete Reinforcement - Section 03200

1.3 QUALITY ASSURANCE

- A. Codes and Standards - 1) Comply with the following codes:
 - a. ACI 301 "Specifications for Structural Concrete for Buildings."
 - b. ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete".
 - c. ACI 311 "Recommended Practice for Concrete Inspection".
 - d. ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures".
 - e. ACI 318 "Building Code Requirements for Reinforced Concrete".
 - f. Concrete Reinforcing Steel Institute, "Manual of Standard Practice".

1.4 TESTING

- A. Testing and inspection of concrete and materials shall be made under the direction of the Engineer, who shall have access to all places where concrete materials are stored, proportioned, mixed or placed.
- B. Tests shall be made by a recognized testing laboratory approved by the Engineer. The contractor will pay for all testing direct, as a part of the Contract. The contractor under the direction of the Engineer shall arrange for the proper sampling, molding of the test cylinders, job storage and transportation to the testing laboratory, all in accordance with ASTM C-94, C-172, C-143, C-138, C-1064, C-31

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and ACI 301. This means that the concrete must be sampled by and the test specimens made by a Certified Concrete Field Testing Technician.

C. Material to be tested:

Cement
Fine Aggregate
Coarse Aggregate
Concrete as poured on the job

D. Testing shall be as follows:

(1) Cement - Test at mill source of supply. Test for each car or fraction of a car shipment.

(2) Fine and Coarse Aggregate - Complete preliminary tests before source is approved; then gradation tests on each car of aggregate shipped.

(3) Concrete as Poured on the Job - Test cylinders as per ASTM C-31, sets of three (3) each made at such time as directed by the Engineer; test one cylinder seven (7) days and two (2) at twenty-eight (28) days. Cylinders to be cured under conditions approaching that of concrete poured on the job as nearly as possible. Three cylinders for each 75 CY or fraction thereof, of concrete shall be taken.

1.5 STORAGE OF MATERIALS

A. Cement and aggregate shall be stored in a manner that prevents deterioration or intrusion of foreign matter. Any material which has deteriorated or has been damaged shall not be used for concrete.

B. Store admixtures so as to prevent contamination and protect from extreme temperatures.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

A. Cement shall conform to ASTM "Standard Specifications for Portland Cement," C-150, Type I, latest revision. Type III High-Early strength may be used when approved.

CAST-IN-PLACE CONCRETE

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B. Aggregates for concrete shall conform to ASTM "Standard Specifications for Concrete Aggregates," C-33, latest revision.

Fine aggregate shall be natural sand or sand prepared from stone, blast furnace slag, or gravel or other inert materials having similar characteristics when given approval by the Engineer.

Coarse aggregate shall be crushed stone, gravel, blast furnace slag, or other approved inert materials of similar characteristics, or combinations thereof having hard, strong, durable pieces, free from adherent coatings. Maximum size of pieces shall be one (1) inch, except for pavements.

C. Water shall be clean, and free from injurious amounts of oil, acid, alkali, organic materials, or other deleterious substances.

D. Vapor Barrier:

(1) Polyethylene sheeting conforming to Product Standard PS17, not less than 6 mil nominal thickness.

(2) Other similar material having a vapor permeance rating not exceeding 0.5 perm as determined under ASTM E96, Procedure E.

2.2 CONCRETE ADMIXTURES

A. Admixtures shall be used only if approved by the Engineer and in accordance with the manufacturer's recommendations.

B. Air-Entraining Admixture in accordance with ASTM C 260.

C. Calcium chloride will not be permitted in concrete, unless approved by the Engineer.

D. Fly-Ash may be used in the concrete mix as long as properly prepared mix designs have been submitted to the Engineer.

2.3 CONCRETE CURING MATERIALS

A. Burlap Cover - Keep the slab wet by light sprinkling for the first twelve (12) hours and then cover with two (2) layers of burlap kept continually wet for the balance of the curing period.

B. Liquid Membrane - Forming curing compounds for curing concrete shall conform to ASTM "Standard Specifications for Liquid

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Membrane-Forming Compound for Curing Concrete," Designation C309. The Type Z, white pigmented compound shall be used.

2.4 CONCRETE DESIGN

All structural concrete shall have a minimum twenty-eight (28) day compressive strength of 4,000 pounds per square inch, unless otherwise noted on the plans, or called for in these specifications. All other concrete for sidewalks, headwalls, etc., shall have a minimum twenty-eight (28) day compressive strength of 3,000 pound per square inch (psi) unless otherwise noted on the plans.

PART 3 - EXECUTION

3.1 CONCRETE MIXING

A. Mix all concrete ingredients in power batch mixers, for not less than One (1) minute after all ingredients are in a mixer having a capacity of one (1) cubic yard or less. Increase mixing period fifteen (15) seconds for each one-half (1/2) cubic yard additional capacity of the mixer.

B. Concrete Proportions and Consistency - Proportion aggregates to cement so as to produce a mixture which will work readily into corners and angles of forms and around reinforcement, without permitting the materials to separate or excess free water to collect on surface.

Combined aggregates to be of such composition that when separated on the No. 4 sieve the weight passing the sieve shall not be less than thirty percent (30%) nor greater than fifty percent (50%) of the total. Proportion concrete materials by weight, provide accurate scales for this purpose. This requirement must be complied with. There shall be added to all concrete a cement dispersion agent which will reduce the amount of water required for a given consistency by not less than ten percent (10%) and which complies fully with the water cement ratio law. It shall be added in such amounts as recommended by the manufacturer to achieve the above results.

C. Ready-Mix Concrete - Ready-mix concrete, if used, shall conform to ASTM C-94 "Standard Specifications for Ready-Mix Concrete".

D. One brand of cement only shall be used unless written permission is given by the Engineer.

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3.2 CONCRETE PLACEMENT

- A. The footings and soil bottoms for slabs shall be approved before placement of concrete.
- B. Remove water and all foreign matter from forms and excavations. Unless otherwise directed, wood forms and subgrades shall be thoroughly wetted just prior to placing concrete.
- C. Deposit concrete as closely as practicable in its final position to avoid segregation due to rehandling or flowing. Place no concrete until all reinforcing steel, pipes, conduits, sleeves, hangers, and other work required to be built into concrete has been inspected and approved by the Engineer.
- D. Retempering - No concrete that has partially hardened, become contaminated by foreign materials, or been retempered, shall be used.
- E. Continuity of placing concrete shall generally be carried on as a continuous operation until the placing of an individual section is completed. When construction joints are necessary they shall be made and located with the approval of the Engineer. Concrete shall be carefully worked around reinforcement and embedded fixtures, along surfaces and into corners of forms. Vibrators may be used, provided they are operated under experienced supervision, and forms constructed to withstand their action.
- F. Construction Joints - Before placing new concrete, the surface of the concrete already in place shall be picked, brushed clean, and given a coat of neat cement grout for a proper bond.
- G. Cold Weather Requirements - Unless the temperature is at least 40 degrees F and rising water and/or aggregates shall be heated so that the temperature of the concrete, when placed, is not less than 55 degrees F. Provisions shall be made for maintaining the concrete at a minimum temperature of not less than 50 degrees F for a period of 5 days. Thereafter, until curing is complete, the concrete shall be maintained at a temperature which will prevent freezing. Other methods may be used as recommended in ACI 306-66 or latest revision.
- H. Hot Weather Requirements - When the ambient temperature is 90 degrees F or above, special precautions shall be taken during mixing, placing, and curing. The use of a set retarding admixture

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may be used upon the approval of the Engineer. In any event, the temperature of the mixing water with crushed or shaved ice is an acceptable practice. Curing shall be started as soon as finishing has been completed and/or the water sheen has disappeared.

Detailed recommendations for hot-weather concrete as given in ACI 605-59 or latest revision shall be followed.

3.3 CURING

Protect all concrete work and cement finished against injury from the elements and defacement of any nature during construction operation. All concrete made with normal Portland Cement shall be maintained in a moist condition for at least the first seven (7) days after placing; a high early strength concrete for at least the first three (3) days.

3.4 REPAIR OF TIEHOLES AND MINOR DEFECTS

Imperfect surfaces where concrete strength is not impaired may be patched in accordance with Chapter 9 of ACI 301-66 or latest revision.

Fins and projections shall be removed and the concrete surface affected thereby shall be rubbed smooth with carborundum brick.

Small voids and cavities caused by form ties shall be filled with a non-shrink, non-staining grout pressed into holes and floated smooth. Exposed surfaces of headwalls and structure walls shall be rubbed smooth with carborundum brick until all form prints are removed. Pressure grouting shall be used for sealing cracks and crevices in hydraulic structures to maintain water tightness.

3.5 REPAIR OF HONEYCOMBED AREAS

Where concrete strength or structural integrity is not compromised, the area shall be cut out to a depth at which sound concrete is exposed, and filled with a non-shrink, non-staining grout matching the color of the concrete. The edges shall be undercut to insure a good mechanical bond.

3.6 BACKFILLING

No backfilling shall be allowed against a concrete structure or wall within 14 days of the placement of concrete. An additional time period may be required at the discretion of the Engineer.

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3.7 MEASUREMENT AND BASIS OF PAYMENT

There shall be no measurement or separate pay item for the work covered under this section. The cost for this work shall be included in the contract unit price for the items as listed in the proposal.

CAST-IN-PLACE CONCRETE

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SECTION 06650

LUMBER

PART 1 - SCOPE

This division shall relate all wood construction in accordance with the details of the drawings and in conformity with the lines and dimensions as shown on the drawings or required by the Engineer.

PART 2 - PRODUCTS

- 2.1 Lumber, unless otherwise designated on the plans, shall be No. 2 Common, Southern Pine or Cypress of the rough stock sizes shown on the plans. All lumber shall be dressed to Yard Size Standards given in American Lumber Standards and shall be dried to a moisture content not to exceed fifteen (15) percent. All lumber shall bear the "Grade Mark" of the Association under whose rules it is graded, or each shipment shall be accompanied by a "Certificate of Inspection" issued by the said Association.
- 2.2 All work adjacent to concrete on grade or masonry at grade will be Wolmanized.
- 2.3 Miscellaneous building materials such as nails, spikes, screws, etc., shall be of suitable types and sizes to draw and securely hold the members in place. Bolts, washers, and nuts shall be of standard manufacture approved by the Engineer.
- 2.4 All plywood shall be of the exterior type. Plywood used for the ceiling or eave trim shall be one side Grade B or better veneer finish. Roof deck shall be 1/2" thick Yellow Pine sheathing grade plywood.

PART 3 - EXECUTION

3.1 PROTECTION

- A. All lumber shall be protected and kept under cover both in transit and at the job site.
- B. Materials shall not be delivered unduly long before it is required for proper conduct of the work.
- C. Lumber shall not be stored within the structure during the process of drying out of masonry or concrete work.

LUMBER

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3.2 MEASUREMENT AND PAYMENT

A cost involved in the cost of wood and lumber construction shall be considered as subsidiary to other items and will not be measured or paid for separately.

LUMBER

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SECTION 15010
GENERAL MECHANICAL PROVISIONS

PART 1 - GENERAL AND SPECIAL CONDITIONS

- a. Note that the General and Special Conditions of the specifications are applicable to this division of the specifications. In the event of any conflict between the general and special conditions and this division, the requirements of this division shall take precedence.

PART 2 - MEANS AND METHODS

- a. Unless otherwise expressly provided in the contract drawings, specifications, and addenda, the means and methods of construction shall be such as the contractor may choose; subject, however, to the Engineer's right to reject means and methods proposed which: (1) will constitute or create a hazard to the work, or to persons or property; or (2) will not produce finished work in accordance with the terms of the contract.
- b. The Engineer's approval of means and methods of construction or his failure to exercise his right to reject such means or methods, shall not relieve the contractor of his obligation to accomplish the result intended by the contract; nor shall the exercise of such right to reject create a cause of action for damages.

PART 3 - SITE AND JOB CONDITION INSPECTION

- a. Before submitting a bid, thoroughly inspect the job site and existing facilities to insure complete understanding of conditions to be met in carrying out the requirements of this contract. Verify at the job site all measurements necessary for the proper installation of the work.
- b. Where work consists of modification of or addition to an existing facility, the contract documents do not indicate all of the existing mechanical installations. Inspect the existing installation to determine full extent of effect of existing conditions on work under this contract.

PART 4 - RELATIONSHIP BETWEEN DRAWINGS AND SPECIFICATIONS

- a. The drawings and specifications are complementary documents. In the event of conflict between them, the drawings shall take precedence.

GENERAL MECHANICAL PROVISIONS

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- b. Generally, the specifications provide general instructions for completion of work and fix the quality of equipment supplied and of workmanship in performance of work.
- c. Generally, the drawings show quantities, capacities and indicate diagrammatically the location of the various components of the mechanical systems and the method of connecting, circuiting and controlling them. Exact location of components must be determined from detail drawings, rough-in drawings, shop drawings, and by measurements on the job and are subject to approval of the Architect/Engineer.

PART 5 - SUBSTITUTIONS

- a. Where manufacturer's names appear, other manufacturers may be substituted upon obtaining written approval of Engineer at least seven (7) days prior to opening of bids.
- b. Assume any additional charges, including engineering charges and any charges for changes in the work resulting from substitutions.
- c. If substitutions in materials, equipment, or designs are made, with or without the Engineer's approval, other than those authorized herein, assume full responsibility for the effects of such substitutions on the entire project.
- d. Should a substitute item prove unsatisfactory for the service intended within the guaranty period, replace it at no additional cost.

PART 6 - SUBMITTAL DATA

- a. Provide submittal data for all mechanical equipment, air distribution equipment, automatic controls, piping specialties, insulation and vibration isolators, or other items as required by the Engineer.
- b. Provide 5 copies of all submittals derived from manufacturer's literature to the Engineer within 30 days of the date the contract is approved. Indicate positively the exact items offered with capacities and dimensions clearly marked and options to be provided. Submittals shall be permanent copies and not copies which age rapidly. Include the name, address

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and telephone number of the supplier or manufacturer's representative through whom the equipment is to be procured.

PART 7 - SHOP DRAWINGS

- a. Generally, shop drawings shall be required only to show departures from the plans as prepared by the Engineer, shall consist of working scale drawings showing clearly each such departure, and shall be approved by the Engineer before the work is started. Detailed installation drawings need not be submitted for approval unless specifically required.
- b. Wherever shop drawings are called for, furnish 5 copies after receiving approval on materials and equipment and in sufficient time that no delay or changes will result. Shop drawings shall be permanent copies and not copies which age rapidly.

PART 8 - AS-BUILT DRAWINGS

- a. During progress of construction, record on one set of prints any deviation from original design with respect to size and location of all mechanical system components. Record final location of all underground lines by depth from finished grade and by distance from buildings, curbs, or walks.
- b. On completion of the contract, submit these drawings to the Architect/Engineer for approval and record.

PART 9 - CODES, ORDINANCES AND REGULATIONS

- a. Install all components of the mechanical system in accordance with the current editions of local, state and national codes, ordinances, or regulations pertaining to the class of work. If any conflict between these codes and the plans and specifications occurs, notify the Engineer and request a resolution of the conflict.
- b. Arrange for inspection and testing of systems by constituted authorities as required by local codes and ordinances. Obtain and deliver to the Architect/Engineer final certificates of acceptance from authorities.
- c. Applicable portions of the following ordinances, codes and regulations in effect on the bid opening date shall be used:

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- (1) National Electrical Code
- (2) American Gas Association Recommended Practices
 - (3) National Fire Protection Association Recommended Practices
- (4) American Society of Mechanical Engineers Piping and Boiler Codes
- (5) National Safety Code
- (6) Arkansas State Plumbing and Gas Code
- (7) Arkansas Fire Prevention Code
- (8) Arkansas State Mechanical Code
- (9) Other Applicable State or Local Ordinances or Codes

PART 10 - PERMITS AND FEES

- a. Obtain all permits required for installation of work and pay any fees required for these permits.

PART 11 - UTILITIES LOCATIONS, METERS AND CONNECTIONS

- a. Locations and elevations of utilities given on plans are from utility maps or other reliable sources but are offered as a general guide only with no guarantee as to accuracy. Verify the location and elevation of all utilities affecting work, prior to installation of any piping.
- b. Arrange with proper authorities and utility companies for service connections, verifying locations and arrangements and paying all charges pertaining thereto.
- c. Furnish meters and pressure regulators as indicated on plans when not furnished by the utility company. Furnish meter loops and bypasses and set meters furnished by utilities companies. All piping shall conform to Utility Company specifications.
- d. When connections to existing lines, rerouting of utility lines, modifications to services, etc., would interrupt service or interfere with normal use of the buildings, arrange work such that outages are minimized and schedule outages to occur at times satisfactory to the Owner.

PART 12 - SKILLED LABOR AND SUPERVISION

- a. Accomplish all work with workmen skilled in their trade or under continuous supervision of skilled craftsmen. Provide a superintendent on the job with experience in the type of work

GENERAL MECHANICAL PROVISIONS

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involved and capable of coordinating and directing the installation of the mechanical system.

PART 13 - OPERATING AND MAINTENANCE INSTRUCTIONS

- a. Prior to final inspection, submit to the Engineer, in draft form, three sets of instructions for operating and maintaining systems and equipment. After approval of draft, provide finished copies, framed with glass cover, and mount in suitable locations on the job.
- b. Provide three copies of a bound manual containing repair operating instructions for each component of the mechanical system.

PART 14 - GUARANTEE

- a. Furnish a written certificate of guarantee of materials, equipment and labor to be free of defects for one year from date of final acceptance and agree thereby to replace, repair or in other manner make good any defects appearing in that period without additional cost to the Owner.
- b. This guarantee shall specifically include the replacement of drive belts, bearings, seals, and other similar items whose improper installation or lack of attention could be cause for failure within the one-year period, but does not include the replacement of air filters, or similar expendable items.

PART 15 - EXISTING FACILITY

- a. Coordinate all work with the Owner in such a way that interference with the operation of the existing facility will be minimized. Refer to special scheduling requirements specified in Architectural divisions of the specifications.
- b. Schedule utilities outages as required by provisions of paragraph "Utilities Locations, Meters and Connections."
- c. Adhere strictly to requirements pertaining to the protection of existing facility from construction dust or damage resulting from construction.

PART 16 - EXISTING AND OWNER SUPPLIED EQUIPMENT

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- a. Relocate and reconnect existing equipment where noted on the plans. Install equipment in accordance with all requirements of this contract and perform any cleaning and adjusting of relocated equipment required to place equipment in operation. Any major repairs requiring parts will constitute an extra to the contract.

PART 17 - CONDITIONS OF WORK-IN-PLACE

- a. Examine work-in-place on which specified work is in any way dependent. Report, in writing, to the Engineer any defects which may influence satisfactory completion and performance of specified work. The absence of such notification shall be construed as acceptance of work-in-place.
- b. Should incorrectly charted piping or other utilities be encountered during demolition, consult the Engineer immediately for directions as to procedure. Cooperate with Owner in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of Owner.
- c. Data on indicated conditions are not intended as representations or warrants of continuity of such conditions. It is expressly understood that the Owner will not be responsible for interpretations or conclusions drawn therefrom by Contractor. Data are made available for the convenience of Contractor.
- d. Additional exploratory operations may be made by Contractor at no additional cost to the Owner, provided such operations are acceptable to Engineer.

PART 18 - SALVAGE ITEMS

- a. All salvage items are considered as property of the Owner and are to be transported to a storage area by the Contractor, as directed by Owner or Owner's representative. Any items rejected by the Owner or Owner's representative are to be removed from the job site by the Contractor.
- b. Notify the Engineer or Owner's representative of any items removed that may be of value to the Owner before disposing of it.
- c. All salvage items removed are to be removed with the greatest

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of care not to damage their finish or shape. Store in a manner that will protect each item from damage.

PART 19 - DISPOSAL OF WASTE MATERIALS

Remove all waste materials and rubbish from the site. Do not stockpile on site.

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SECTION 15050
BASIC MATERIALS AND METHODS

PART 1 - APPEARANCE OF WORK

- a. Arrange and install all exposed portions of work specified under this division such as access doors, grilles, escutcheons, thermostats, etc., to fit in and harmonize with the work specified in other divisions to the satisfaction of the Architect/Engineer.
- b. Run piping and ductwork exposed in mechanical rooms and concealed in chases, attic and crawl spaces, or in enclosures or furring unless indicated otherwise. Traps, supplies and stops to plumbing fixtures may be exposed unless otherwise noted.

PART 2 - PAINTING

- a. Mechanical equipment, unless otherwise specified, shall have standard factory finish or at least a prime coat finish. Restore marred surfaces of mechanical equipment to original condition.
- b. Paint all exposed gas piping within building, exposed outside building, in boiler rooms and in furnace rooms. Apply one coat of inhibiting primer coat and two finish coats.
- c. Paint all refrigerant piping insulation outdoors with two coats of exterior enamel.
- d. Other painting and finishes are specified elsewhere.

PART 3 - EQUIPMENT IDENTIFICATION

- a. Provide nameplates or identification labels for all mechanical equipment and main or riser shut off valves. Nameplates shall be laminated bakelite with letters at least 3/8" high. Attach permanently to the equipment in a conspicuous location. Do not attach to removable parts of equipment such as starter covers.

PART 4 - PROTECTION OF APPARATUS

- a. Protect equipment stored on the job site or installed on the job from damage. This shall include construction of temporary

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shelters to protect equipment stored in the open, cribbing of equipment above the floor, and the covering of equipment in the uncompleted buildings.

- b. Keep ends of pipe and conduits, including those extending through roofs, drains, openings in equipment, and fixture branches, closed with caps or plugs to prevent foreign material from entering them during construction.
- c. Do not operate equipment furnished under this contract during construction, except as required for testing, without written permission of the Engineer.

PART 5 - FIXTURE AND EQUIPMENT SUPPORTS AND FASTENINGS

- a. Support fixtures and equipment so they can function properly without damage to structure or equipment or hazard to occupants. Support from structural components such as joists or studs, or proper blocking, etc., and not from suspended ceilings or wall panels or plaster.
- b. Use expansion sleeves, wood screws, through bolts, Phillips "Red Head" self-drilling anchors or Ramset fasteners where applicable and as recommended by the manufacturers.
- c. Install floor mounted equipment on concrete bases, not less than 4" high unless otherwise noted. Corners of the foundations shall be neatly chamfered. Place foundation bolts in the forms when the concrete is poured, correctly located by means of templates. Allow 1" below equipment bases for alignment and grouting. After grouting remove the forms and hand rub the surface of foundations with carborundum.
- d. Furnish special piping and equipment supports as specified under other sections of this division.

PART 6 - VIBRATION ISOLATION

- a. Provide resilient motor bases, vibration isolators on equipment, flexible connectors in piping and ductwork and vibration isolating hangers for piping as required or specified to prevent transmission of objectionable vibrations to occupied spaces. All vibration isolators shall be by a single manufacturer unless provided as an integral part of an item of

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equipment.

PART 7 - ROOF CURBS AND ROOF AND WALL PENETRATIONS

- a. Provide curbs for relief vents, rooftop exhaust fans, H.V.A.C. equipment, etc., where required. Equipment on sloping roofs shall have sloped curbs to match roof slope. Coordinate location and size of all roof openings with other trades affected.
- b. Provide proper sheet metal flashing and counterflashing for all places where piping, ducts, etc., specified in this division penetrate the roof. Provide sheet lead plumbing vent flashing as specified.
- c. Install fire dampers with access doors, at all duct penetrations of fire rated walls and floors.
- d. Provide 22 gage galvanized iron sleeves where pipes penetrate interior walls and galvanized wrought iron sleeves where pipes penetrate exterior masonry walls, concrete beams, walls or floors. Size sleeves to permit insertion of pipes, continuation of insulation through walls and proper waterproofing and sealing where required. Finish wall sleeves flush with the walls and floor sleeves 1" above finished floor.
- e. Provide "fire-stop" caulk or sealant around all pipe penetrations of fire rated walls or floors.
- f. Install chromium-plated sectional plates around pipes at all wall, ceiling and floor penetrations except in attics and crawl spaces.

PART 8 - ACCESSIBILITY OF EQUIPMENT

- a. Install valves, unions, junction boxes, expansion joints, flexible connections, instruments, air vents, bearings, filters, cleanouts, strainers, and other items requiring servicing or repairs in accessible location where possible.
- b. Furnish and install Milcor metal access panels, style and type as required for access to equipment above ceilings, in chases, etc., to which access will be required for servicing, testing, balancing, etc., and which are not otherwise accessible.

PART 9 - EXCAVATION AND TRENCHING

- a. Excavate and trench as required to install portions of the mechanical systems required to be located below grade. Arrange cutting of streets and walks with cognizant authorities and patch cuts to conform to their requirements.
- b. Exercise care to protect the roots of trees to remain. Perform all the trenching within the branch spread by hand. When trench is opened, install the utility immediately, prune injured roots cleanly and backfill as soon as possible.
- c. Keep trenches free from water while construction therein is in progress. Pump or bail water from bell holes to permit proper joining of pipes. Conduct discharge from dewatering to drains or natural drainage channels.
- d. Unless otherwise shown or approved by the Engineer, provide separate trenches for sewers, water lines, and gas lines. Provide a minimum of 10' of undisturbed earth between water and sewer trenches.
- e. Grade bottom of trenches to provide uniform bearing support for each sections of pipe on undisturbed soil. Dig bell holes with only sufficient room for making up joints. Where trench is in rock, excavate at least 4" over depth and backfill with loose moist earth thoroughly tamped to desired depth. Where unstable soil in trench is incapable of supporting pipe, remove it and backfill to trench bottom grade with coarse sand or fine gravel. Round bottom of trench so that at least 1/3 of the circumference of the pipe will rest on undisturbed or tamped soil.
- f. Backfill trenches only after required tests have been completed. Backfill and tamp in 6" layers with materials free of large stones or clods or earth to cover of 1' for water lines and 2' for sewer and gas lines. Backfill the remainder of trenches in 1' layers. Do not use blasted rock, broken concrete or large boulders for backfill. Backfill entire depth of trenches to be covered with roads, walks, or concrete slabs in 6" layers with each layer moistened and compacted to at least 95% compaction as specified by Modified Compaction Procedures (ASTM D-1557).

- g. All buried lines shall have a minimum of 18" cover unless noted otherwise. Utilities lines beyond 2' from building shall not be installed until all rough grading is completed. Allowances shall be made for finished grading operations to insure adequate final cover over lines.

PART 10 - CUTTING AND PATCHING

- a. Hold all cutting of walls, floors, ceilings, roofs, etc., to a minimum by providing sleeves or arranging to have proper openings left. Perform cutting required to install the mechanical systems. Openings shall be only as large as required and provided with structural supports where necessary. Do not cut structural members or load bearing masonry walls without permission from the Engineer. Provide for patching of openings by the trade whose work is disturbed.

PART 11 - BELT DRIVES

- a. Equip each belt driven machine with a v-belt drive with endless belts of reinforced cord and rubber construction. Cords shall be long staple cotton, rayon, nylon, or other suitable fiber. Belts shall be correct cross section to fit properly in sheave grooves and carefully matched for each drive.
- b. Provide sheaves of cast iron or steel, bored to fit shafts and secured with keys of proper size. The use of set screws alone will not be permitted. Pitch diameters of sheaves shall be not less than 2" for 1/4 HP, 2.5" for 1/2 HP, and 3" for "A" section and 5.4" for "B" section belts above 1/2 HP. Select variable pitch sheaves so the required RPM will be obtained with sheave set in mid-position, and pitch diameter in that position shall be as specified above. Driving and driven shafts shall be parallel and sheaves so located that corresponding grooves will be in the same place. The driven sheave shall have the same groove spacing as motor sheave.
- c. Drive rating shall be as recommended by the equipment manufacturer but at least 1.5 times the nameplate rating of the motor, with proper allowance for sheave diameters, center distance and arc of contact less than 180 degrees.

PART 12 - GUARDS

- a. Equip each exposed drive assembly with a guard constructed of 12 gauge diamond mesh wire screen, or equivalent, welded to 1" steel angle frames enclosing all belts and sheaves. Construct tops and bottoms of guards of not less than 18 gage galvanized sheet metal. Secure guards to the driven machines or to the foundations by heavy angle supports and angle bolts. Do not secure to motors and do not "bridge" the sound and vibration isolators. Guards shall permit movement of the motor to adjust belt tension, oiling, use of speed counters, and other maintenance and testing operations with guard in place.
- b. Equip each fan which has blades or wheels exposed with a guard consisting of diamond mesh or welded wire screen. Openings in screen shall be no larger than 1/2". Guards shall be removable as required for access to fan parts which require adjustment and maintenance and shall be easily replaced.

PART 13 - ELECTRICAL MOTORS

- a. All motors shall be of recognized American manufacturer wound for the voltage specified, and conform to latest standards of manufacture and performance of the National Electrical Manufacturers Association and the American Institute of Electrical Engineers. Motors shall be rated for continuous duty at 100% of rated capacity, with temperature rise of 40 degrees centigrade for open type; 50 degrees centigrade for drip and splash proof; and 55 degrees centigrade for explosion proof and totally enclosed, above an ambient of 40 degrees centigrade.
- b. Unless otherwise required, integral horsepower polyphase motors shall be Class B, general purpose, squirrel cage, open type induction motors. Single phase fractional horsepower motors shall be of the open capacitor type. Generally, motors 1/3 horsepower and less shall be split capacitor type unless otherwise specified. Motors rated 1/3 horsepower or less shall have integral overcurrent protection. The insulation resistance between stator conductors and frames of motors shall be not less than 1/2 megohm.
- c. Motors inside building shall be open type drip-proof. Motors outside building exposed to weather to be totally enclosed,

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fan-cooled. Motors in hazardous locations or duty shall be explosion proof of the type required for the service.

PART 14 - MOTOR AND EQUIPMENT CONTROL

- a. Each motor or piece of electrical equipment will be provided with controllers or pilot devices as specified. Thermostats, humidistats, etc., which may control motors directly or indirectly are specified under "Automatic Controls System." Motors furnished with packaged equipment shall be furnished with contactors or starters and motor protective devices as specified under that equipment.
- b. Furnish a complete typewritten list of motors or electrical equipment furnished under this division, showing for each one complete nameplate data including voltage, number of phases, full load amps, locked rotor amps and other applicable data. This list shall be turned over to the Owner with operating manuals specified elsewhere in this specification division.

PART 15 - WIRING

- a. Unless specifically stated otherwise in the plans or specifications, provide all wiring and conduit for equipment and automatic controls specified in this division except wiring which is part of the electrical distribution system. Wiring of automatic temperature control devices, internal wiring of equipment, interlock and remote control wiring are included. Wiring of safety disconnects, motor starters, circuit protective devices and power connections to equipment are to be accomplished as part of wiring specified under Electrical Division of the specifications.
- b. All automatic temperature control wiring shall be installed in conduit, and shall conform to requirements of the Electrical Division of these specifications. One-half inch conduit may be used and #18 AWG wiring may be used for low voltage control wiring.

PART 16 - WELDING

- a. Welding of pipe joints shall conform to the applicable requirements of the American Standard Code for Pressure Piping (ASA B31.1-1951), and any later supplements that are in force.

BASIC MATERIALS & METHODS

- b. Welders shall show proof satisfactory to the Engineer that they have passed qualification tests prescribed by and that they have been certified by the National Certified Pipe Welding Bureau or by other reputable agency, acceptable to the Engineer, using welding procedures as set forth in the ASME Boiler Construction Code, Section IX, "Welding Qualifications." No welder shall be employed who does not meet the above requirements.

PART 17 - TEST AND ACCEPTANCE

- a. Arrange for or conduct all tests and balancing operations necessary to put system into proper operating condition. These shall include testing of mechanical system components to assure proper operation and balancing of air and water flows to provided rated quantities at each outlet or system component. Furnish a written tabulation indicating the results of these tests including specified and achieved quantities at each point in system where measurements were made.
- b. Prior to balancing of system, flush out piping systems, clean strainers, replace filters in air systems and clean or replace other components as required or specified elsewhere in this division to assure proper results from balancing procedure.
- c. Perform any other tests during construction or before final acceptance as specified elsewhere in this division.

PART 18 - STANDARD PRODUCTS

- a. Each item of equipment furnished under these specifications, is to be essentially the standard product of the manufacturer.
- b. All material and equipment shall be of the best quality normally used in good commercial practice, being products of reputable manufacture. Each major component shall bear a nameplate stating name and address of the manufacturer and catalog number or designation. All materials shall be of the manufacturer's latest design standard.

SECTION 16000
GENERAL ELECTRICAL REQUIREMENTS

PART 1 - SCOPE

- A. General Conditions apply to this Division.
- B. Provide labor, materials, appurtenances and equipment necessary for completion of the work of this Division as described in Drawings.

PART 2 - CODES

NEC and local ordinances and regulations shall govern.

PART 3 - STANDARDS

Material and equipment provided shall be new, meet standards of NEMA or UL, and bear their label wherever standards have been established and label service is available.

PART 4 - MEANS AND METHODS

- A. Unless otherwise expressly provided in the contract drawings, specifications, and addenda, the means and methods of construction shall be such as the Contractor may choose; subject, however, to the Engineer's right to reject means and methods proposed which: (1) will constitute or create a hazard to the work, or to persons or property; or (2) will not produce finished work in accordance with the terms of the contract.
- B. The Engineer's approval of means and methods of construction or his failure to exercise his right to reject such means or methods, shall not relieve the contractor of his obligation to accomplish the result intended by the contract; nor shall the exercise of such right to reject create a cause of action for damages.

PART 5 - SITE AND JOB CONDITION INSPECTION

- A. Before submitting a bid, thoroughly inspect the job site and existing facilities to insure complete understanding of conditions to be met in carrying out the requirements of this contract. Verify at the job site all measurements necessary for the proper installation of the work.

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- B. Where work consists of modification of or addition to an existing facility, the contract documents do not indicate all of the existing electrical installations. Inspect the existing installation to determine full extent of effect of existing conditions on work under this contract.

PART 6 - RELATIONSHIP BETWEEN DRAWINGS AND SPECIFICATIONS

- A. The drawings and specifications are complementary documents. In the event of conflict between them the drawings shall take precedence.
- B. Generally, the specifications provide general instructions for completion of work and fix the quality of equipment supplied and of workmanship in performance of work.
- C. Generally, the drawings show quantities, capacities and indicate diagrammatically the location of the various components of the electrical systems and the method of connecting, circuiting and controlling them. Exact location of components must be determined from detail drawings, rough-in drawings, shop drawings, and by measurements on the job and are subject to approval of the Architect/Engineer.

PART 7 - SUBSTITUTES

- A. Where Manufacturer's names appear, other Manufacturers may be substituted upon obtaining written approval of Engineer at least ten (10) days prior to opening of bids.
- B. Assume any additional charges, including engineering charges and any charges for changes in the work resulting from substitutions.
- C. If substitutions in materials, equipment, or designs are made, with or without the Engineer's approval, other than those authorized herein, assume full responsibility for the effects of such substitutions on the entire project.
- D. Should a substitute item prove unsatisfactory for the service intended within the guaranty period, replace it at no additional cost.

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PART 8 - SUBMITTAL DATA

- A. Provide submittal data for all electrical distribution, equipment, starters, safety switches, devices and plates, light fixtures, kitchen equipment, and other items as required by the Engineer.
- B. Provide six (6) copies of all submittals to the Engineer within thirty (30) days of the date the contract is approved. Indicate positively the exact items offered with capacities and dimensions clearly marked and options to be provided. Submittals shall be permanent copies and not copies which age rapidly. Include the name, address, and telephone number of the supplier or manufacturer's representative through whom the equipment is to be procured.

PART 9 - AS BUILT DRAWINGS

- A. During progress of construction, record on one set of prints any deviation from original design with respect to size and location of all electrical system components. Record final location of all underground lines by depth from finished grade and by distance from buildings, curbs, or walks.
- B. On completion of the contract, submit these drawings to the Architect/Engineer for approval and record.

PART 10 - PERMITS AND FEES

- A. Obtain all permits required for installation of work and pay any fees required for these permits.
- B. Arrange utilities connections with proper authorities and utilities companies and pay charges for connections.

PART 11 - UTILITIES LOCATIONS, METERS AND CONNECTIONS

- A. Locations and elevations of utilities given on plans are from utility maps or other reliable sources but are offered as a general guide only with no guarantee as to accuracy. Verify the location and elevation of all utilities affecting work.
- B. Arrange with proper authorities and utility companies for service connections, verifying locations and arrangements.

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- C. Furnish meters as indicated on plans when not furnished by the utility company.
- D. When connections to existing lines, rerouting of utility lines, modifications to services, etc., would interrupt service or interfere with normal use of the buildings, arrange work such that outages are minimized and schedule outages to occur at times satisfactory to the owner.
- E. Voltage that appears on the drawings and elsewhere in these specifications has been obtained from the serving utility company. Before ordering equipment and starting the job, this contractor shall verify the voltage with the utility company. If voltage differs from that noted on the drawings and in the specifications, the Architect/Engineer shall be notified at once. If the Engineer is not notified before the equipment is ordered or construction is started, this contractor shall provide an acceptable and operable system at no additional cost to the owner.

PART 12 - SKILLED LABOR AND SUPERVISION

Accomplish all work with workmen skilled in their trade or under continuous supervision of skilled craftsmen. Provide a superintendent on the job with experience in the type of work involved and capable of coordinating and directing the installation of the electrical systems.

PART 13 - OPERATING AND MAINTENANCE INSTRUCTIONS

Provide three (3) copies of a bound manual containing repair parts list, detailed maintenance instructions and detailed operating instructions for each component of the electrical system.

PART 14 - GUARANTEE

Furnish a written certificate of guarantee of materials, equipment, and labor to be free of defects for one year from date of final acceptance and agree thereby to replace, repair or in other manner make good any defects appearing in that period without additional cost to the owner.

GENERAL ELECTRICAL REQUIREMENTS

SECTION 16050
BASIC MATERIALS & METHODS

PART 1 - GENERAL

General Conditions apply to this Section.

PART 2- APPEARANCE OF WORK

- a. Arrange and install all exposed portions of work specified under this division such as devices, fixtures, panels, safety switches, etc., to fit in and harmonize with work specified in other divisions to the satisfaction of the Engineer.
- b. Run conduits, etc., concealed or exposed in mechanical rooms and electrical equipment rooms and concealed in chases, attics, or cable trenches unless indicated otherwise.
- c. Arrange and support all exposed conduit in a neat workmanlike manner acceptable to the Engineer.

PART 3 - PAINTING

- a. Furnish all electrical equipment unless otherwise specified, with standard factory finish. Restore marred or damaged finish of equipment to original condition. All equipment shall be protected from corrosion.

PART 4 - EQUIPMENT IDENTIFICATION

- a. Provide nameplates or identification labels for all electrical equipment, panels and safety switches. Nameplates shall be laminated bakelite with letters at least 3/8" high. Attach permanently to the equipment in a conspicuous location. Do not attach to removable parts of equipment such as starter covers.
- b. Provide typewritten panel schedules fixed inside panel doors describing load served by each circuit.

PART 5 - PROTECTION OF MATERIALS

- a. Protect equipment stored on the job site or installed on the job from damage. This shall include construction of temporary shelters to protect equipment stored in the open,

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cribbing of equipment above the floor, and the covering of equipment in the buildings.

- b. Keep ends of pipe and conduits, including those extending through roofs and equipment closed with caps or plugs to prevent foreign material from entering the pipe during construction.

PART 6 - FIXTURE AND EQUIPMENT SUPPORTS AND FASTENINGS

- a. Support fixtures and equipment so they can function properly without damage to structure or equipment or hazard to occupants. Support from structural components such as joists or studs, and not from suspended ceilings or wall panels or plaster.
- b. Use expansion sleeves, wood screws, through bolts, Phillip "Red Head" self-drilling anchors or Ramset fasteners where applicable and as recommended by the manufacturers.

PART 7 - ROOF FLASHING

- a. Provide proper sheet metal flashing and counterflashing for all places where conduit, etc., specified under this division penetrates the roof. Flashing, etc., shall be 28 gage 304 stainless steel or 18 gage galvanized steel.

PART 8 - ACCESSIBILITY

- a. Junction boxes, starters, relays, light fixtures, etc., requiring servicing or repairs shall be installed in an accessible location.
- b. Furnish for installation by appropriate trade Milcor metal access panels of style and type required for access to electrical equipment mounted in chases or above ceilings where they would be no ready access otherwise.

PART 9 - EXCAVATION AND TRENCHING

- a. Excavate and trench as required to install portion of the electrical systems required to be located below grade. Arrange cutting of streets and walks with cognizant authorities and patch cuts to conform to their requirements.

- b. Exercise care to protect the roots of trees to remain. Perform all the trenching within the branch spread by hand. When trench is opened, install the utility immediately, prune injured roots cleanly and backfill as soon as possible.
- c. Keep trenches free from water while construction therein is in progress. Conduct discharge from dewatering to drains or natural drainage channels.
- d. Backfill trenches only after required tests have been completed. Backfill and tamp in 6" layers with materials free of large stones or clods of earth to cover of 1'. Backfill the remainder of trenches in 1' layers. Do not use blasted rock, broken concrete or large boulders for backfill. Backfill entire depth of trenches to be covered with roads, walks, or concrete slabs in 6" layers with each layer moistened and compacted such that trench and surrounding earth can be rolled and compacted to required bearing value.
- e. All buried lines shall have a minimum of 18" cover unless noted otherwise. Utilities lines beyond 2' from the building shall not be installed until all rough grading is completed. Allowances shall be made for finished grading operations to insure adequate final cover over lines.

PART 10 - CUTTING AND PATCHING

- a. Hold all cutting of walls, floors, ceilings, roofs, etc., to a minimum by providing sleeves or arranging to have proper openings left. Perform cutting required to install the electrical systems. Openings shall be only as large as required and provided with structural supports where necessary. Do not cut structural members or load bearing masonry walls without permission from the Engineer. Provide for patching of openings by the trade whose work is disturbed. Seal all penetrations with a fire resistant sealant (3M or equal) with equal rating or greater than the fire rating of the penetrated structure.

PART 11 - WIRING RESPONSIBILITY

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- a. Unless specifically stated otherwise in the plans or specifications, all wiring except wiring internal to equipment furnished under some other division of the specifications is a part of wiring specified under this division.
- b. Wiring internal to equipment shall be considered as wiring from a terminal in one enclosure to another terminal in the same enclosure or wiring between two enclosures on a piece of packaged equipment. Wiring from a terminal or connection in an enclosure to a terminal or connection in another enclosure not on the same piece of packaged equipment regardless of the distance, is considered as external to the equipment and is a part of this division.

PART 12 - TESTS

- a. Test all panel feeders, motor circuits, and conductors larger than #8 with a 600 volt Megger to prove insulation resistances.
- b. Record all readings and submit three copies of the tabulated results to the Engineer prior to the final inspection.
- c. Upon completion of the installation of equipment, work with other trades to start all equipment and make necessary tests and adjustments to place all systems in first-class operating condition.
- d. Perform other special tests required elsewhere in these specifications.

PART 13 - CONNECTION OF EQUIPMENT NOT SPECIFIED UNDER THIS DIVISION

- a. Provide all necessary materials and make connections to electrical equipment specified elsewhere or furnished by others and shown on the plans or specified elsewhere in this division to be connected under this contract.
- b. Rough-in for connection of this equipment according to shop drawings furnished with the equipment or by actual measurements taken from equipment on site. Provide junction boxes, disconnect switches, etc., required to properly connect each piece of equipment unless specifically stated

otherwise.

- c. Equipment will be furnished assembled and set in place by the supplier ready for final connection unless otherwise specified.

PART 14 - STANDARD PRODUCTS

- a. Each item of equipment furnished under these specifications, is to be essentially the standard product of the manufacturer.
- b. All material and equipment shall be of the best quality normally used in good commercial practice, being products of reputable manufacture. Each major component shall bear a nameplate stating name and address of the manufacturer and catalog number or designation. All materials shall be of the manufacturer's latest design standard.

PART 15 - CLEARANCES

- a. Maintain clearances in front of electrical equipment as required by Code. Report any discrepancies to Architect/Engineer.

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SECTION 16110
CONDUIT AND RACEWAYS

PART 1 - GENERAL

Scope:

- a. Includes - 1) All conduit and fittings used except as excluded below. See Sections relating to power, lighting, signal, sound, and telephone for additional requirements.

PART 2 - PRODUCTS

2.1 Conduit:

- a. Three-Fourth inch (3/4") minimum unless indicated otherwise and use restricted as indicated by product. Half-inch (1/2") conduit may be used for switch legs. Install size and type as indicated on plans. If not indicated on plans, install as shown below.
- b. Galvanized rigid steel -
 - 1) May be used in all areas above grade.
- c. Galvanized rigid steel (PVC coated)-
 - 1) Used for all underground feeders.
- d. Flexible Steel Conduit - 1/2 inch minimum
 - 1) Use in indoor final connections to:
 - a. Mechanical equipment, not to exceed 36 inches.
 - b. Recessed fluorescent lighting fixtures, not to exceed 72 inches.
- e. Liquid-tight flexible steel conduit -
 - 1) Use in outdoor final connections to mechanical equipment, not to exceed 36 inches.
- f. Install rigid steel conduit for all underground panel feeders; or Schedule 40 PVC encased in 6" minimum concrete all around, with rigid steel 90° bend and rigid steel through floor slab. Concrete encased conduit shall be as

CONDUITS AND RACEWAYS

shown in figure 310-1 of 1987 N.E.C.

- g. Install proper sized wiremold for exposed raceways with proper fittings and devices. Run wiremold in neat workmanlike manner in least conspicuous manner. Run with lines parallel to building lines.

2.2 FITTINGS:

- a. Conduit fittings shall be designed and approved for the specific use intended. Rigid conduits shall have insulated bushings, unless grounding bushings are required by N.E.C. Article 250. Grounding bushings shall have insulated throats.
- b. Rigid metal conduit shall be hot-dipped galvanized. Fittings shall be threaded type. Expansion fittings shall be OZ Type DX.
- c. Liquid-tight flexible conduit and fittings shall consist of single strip, continuous, flexible interlocked, double-wrapped steel, galvanized inside and outside, forming smooth internal wiring channel with liquid-tight covering of flexible polyvinyl chloride (PVC). It shall be furnished with a sealing O-ring where entering an enclosure subject to moisture. Where O-Rings are used, ground type bushings shall be used in the box or enclosure.
- d. PVC-
 - 1) PVC fittings shall be PVC type. Use PVC adapters at all boxes.
 - 2) Brush apply PVC cement.
 - 3) All PVC components, (conduit, fittings, cement) shall be from same Manufacturer.

2.3 USE OF THE FOLLOWING IS PROHIBITED:

- a. Aluminum conduit.
- b. EMT crimp-on, tap-on, indenter type fittings.
- c. EMT malleable iron or cast set-screw fittings.

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- d. Spray (aerosol) PVC cement.

PART 3 - EXECUTION

- 3.1 Conceal raceways within ceilings, walls and floors except where exposed raceways are specifically permitted (such as in mechanical rooms).
- 3.2 Keep raceway runs a minimum distance of six inches from hot water pipes.
- 3.3 Run two 3/4 inch spare conduits from each panel to ceiling access area and cap so no foreign matter will enter conduit while not in use.
- 3.4 Run conduit in concrete slabs at center of slab. Conduits shall have outside diameter less than 1/3 slab thickness.
- 3.5 Support conduit and boxes in an approved manner by:
 - a. Expansion shields in concrete or solid masonry.
 - b. Toggle bolts on hollow masonry units.
 - c. Wood screws on wood.
 - d. Metal screws on metal.
- 3.6 Install conduit parallel or perpendicular to buildings lines, concealed in finished areas of the building and concealed or exposed in unfinished areas. Maintain conduit clearance of 12" heat sources such as from hot water pipes, flues, heating appliances, etc. Provide 12" between telephone and power conduits.
- 3.7 Join conduits with couplings and fittings and bond throughout to form a continuous circuit. Make field bends uniform and symmetrical without flattening and of code radius. Remove burrs and sharp edges from end cuts. Do not use running threads.
- 3.8 Underground and in damp locations install conduits and cast boxes with liquid-tight joints and connectors, so that moisture cannot enter the system. Use liquid-tight connectors on

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Sealtite.

- 3.9 Provide grounding type expansion fittings at building expansion joints and elsewhere as required to allow for conduit and building expansion.
- 3.10 At connections to switchboards, panelboards, and boxes provide plastic insulated bushings T&B 1222 series and 141 locknut outside enclosure on all conduit. Provide T&B 222 series bushings and two locknuts on conduits over 1-1/4". On EMT use T&B raintight 5123 series and 5031. Where holes are required in cabinets, punch with Greenlee type punch.
- 3.11 Cap or plug conduit ends during construction with T&B 1470 Push Penny Plugs.
- 3.12 Clean conduits after installation and prior to pulling conductors.
- 3.13 Install concealed outlet and switch boxes flush with the finished surface and provide with the proper type extension rings or plaster covers where required. Install pull boxes in accessible locations.
- 3.14 Install grounding conductor in PVC conduit.
- 3.15 Bending of PVC shall be by hot box bender and, for PVC two inch in diameter and larger, expanding plugs.
- 3.16 The following are prohibited:
 - a. Use of wooden plugs inserted in concrete or masonry units as base for fastening conduits, tubing, boxes, cabinets, or other equipment.
 - b. Installation of conduit or tubing which has been crushed or deformed.
 - c. Torches for bending PVC conduit.
- 3.17 Schedule 40 PVC conduit may be used for underground branch circuits. Conduits must be 30" minimum below floor slab. Install rigid steel conduit at slab penetration and down to 24" below grade.

CONDUITS AND RACEWAYS

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- 3.18 Use galvanized rigid steel conduit from condensing unit disconnect switches on building, to unit connection; final 12" may be liquid-tight flexible steel conduit. All conduit shall be rigidly clamped to building and to Unistrut supports where crossing concrete pads at grade. All connectors shall be liquid-tight.

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SECTION 16120
WIRE AND CABLE

PART 1 - GENERAL

1.1 Scope:

- a. Includes - 1) All conductors except as excluded below.
- b. Related Work Specified Elsewhere -
 - 1) Conductors for temperature control system specified in Division 15900.

PART 2 - PRODUCTS

2.1 Conductors:

- a. Copper.
- b. Minimum size shall be No. 12 except where specified otherwise. Use #10 for branch circuits over 50 feet to the first outlet on 120 volt circuits or 100 feet at 208 volts.
- c. Conductor size No. 8 and larger shall be stranded.

2.2 Insulation: (Local codes shall apply)

- a. Conductor size No. 10 and smaller -

Type THWN or THHN. Branch circuit conductors which run through ballast compartments of lighting fixtures shall be code approved for such use.
- b. Conductor Size No. 8 and larger - Type THW, THWN, or THHN.
- c. Use THHN for dry location feeders and THWN for damp location feeders.
- d. Use Type 'USE' for underground service feeders, or as per Power Company's specifications.
- e. Conduit sizes on plans are based on THWN.

2.3 Steel spring wire connectors or pressure type terminal lugs as specified.

WIRE AND CABLE

PART 3 - EXECUTION

- 3.1 Install conductors in raceway unless indicated otherwise.
- 3.2 Pulling Conductors:
 - a. Do not pull conductors into conduit until raceway system is complete and cabinets and outlet boxes are free of foreign matter and moisture.
 - b. Do not use heavy mechanical means for pulling conductors.
 - c. Only wire pulling lubricant may be used.
- 3.3 Conductors shall be continuous from outlet to outlet.
- 3.4 Make splices for conductors No. 8 and smaller with steel spring wire connections. Splice larger conductors with pressure type terminal lugs.
- 3.5 Route circuits at own discretion, however, circuit numbers shall be according to Drawings. Home runs may be grouped together in a conduit provided the proper size conduit is used and wire derating factors applied.
- 3.6 On three phase, four wire systems, do not use a common neutral for more than three circuits.
- 3.7 On single phase, three wire systems, do not use a common neutral for more than two circuits.
- 3.8 Where a common neutral is run for two or three home run circuits, connect phase conductors to breakers in panel which are attached to separate phase legs in order that the neutral conductors will carry only the unbalanced current. Neutral conductors shall be of same size as phase conductors unless specifically noted otherwise.
- 3.9 Run conductors of same circuit in same conduit.
- 3.10 Run conductors of different voltage systems in separate conduits.

16120 - WIRE AND CABLE

3.11 Color code conductors as follows:

- a. Black - Phase A
- b. Red - Phase B
- c. Blue - Phase C
- d. Green - Ground
- e. White - Neutral

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SECTION 16450
GROUNDING

PART 1 - GENERAL

1.1 SCOPE:

- a. Includes - Provide grounding for entire electrical installation as shown below and described on Drawings.
 - 1. Electrical service, its equipment and enclosures.
 - 2. Conduits and other conductor enclosures.
 - 3. Neutral conductor of interior wiring system.
 - 4. Main panelboard, power and lighting panelboards.
 - 5. Non-current-carrying metal parts of fixed equipment such as motors, starter and controller cabinets, instrument cases, and lighting fixtures.
 - 6. Communication systems.

PART 2 - PRODUCTS

- 2.1 Size and type of ground conductors and method of securing them to obtain electrical continuity and effective grounding as per NEC, Article 250.

PART 3 - EXECUTION

3.1 EXECUTION

- a. Provide and connect system grounding conductor to a made electrode assembly.
- b. All grounded conductors (neutrals) shall be connected back to the ground at the main distribution panel through the neutral bus in the panels. Safety grounds shall be carried to the ground at the main panel but by separate green insulated wire to each panel ground bus. Do not connect safety grounds to neutral bus of panels, or cross connect grounded conductors and safety ground except at service entrance or main switch. Pull separate green insulated ground in all circuits.

GROUNDING

- c. Ground jumpers shall be installed across all water meters and flanged gasketed pipe joints. Jumpers shall be stranded bare copper cable or copper bus attached by means of approved bolt pressure connectors to the water pipe.
- d. Ground rods shall be installed, with the top of the rods above finished grade. Ground conductors shall be so installed as to permit shortest and most direct path from equipment to ground. All connections to ground conductors shall be accessible for inspection and made with approved bolted connectors. All contact surfaces shall be thoroughly cleaned before connections are made to insure good metal-to-metal contact.
- e. Conduit is not acceptable as a ground.
- f. Extend a #8 ground wire in 1/2" conduit to telephone terminal boards and leave 6' of wire coiled on board.

End of Wastewater Permit Application