



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



a **U.S. Steel** company

AFIN: 47-01073

NOVEMBER 2022

Prepared for:

EXPLORATORY VENTURES, LLC

1000 East County Road 860

P.O. Box 707

Osceola, Arkansas 72370

Phone: (870) 819-3031

Prepared by:

Harbor

5800 Evergreen Drive

Little Rock, Arkansas 72205

Phone: (501) 663.8800

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www.harborenv.com

Engineering | Compliance | Sustainability

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November 9, 2022

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 Wastewater Permit and State Construction Permit
Exploratory Ventures, LLC, Osceola, Mississippi County, Arkansas
AFIN: 47-01073
Expedited Review is Requested

Dear Mr. Liu:

Harbor Environmental and Safety (Harbor) is pleased to submit the enclosed application for an individual National Pollutant Discharge Elimination System (NPDES) wastewater discharge permit on behalf of Exploratory Ventures, LLC (EV) in Osceola, Arkansas. Issuance of a State Construction Permit for the installation of a new wastewater treatment system is also requested.

EV is constructing a new scrap steel-to-steel products manufacturing complex in Osceola (the "Facility"). It is designed to produce a full range of high-strength steel products for key niche markets, primarily through the recycling of scrap metal. The process wastewater generated during the steel mill operations will be treated on-site in the Facility's wastewater treatment system. The treated wastewater effluent will subsequently be continuously discharged to the Mississippi River at Outfall EV201.

The Facility will include a 34-acre slag yard for storing the residue generated during the steel manufacturing operations. The slag will subsequently be recovered for reuse as a road-building material. A 2.4-acre pond will be used to store the stormwater runoff from the slag yard. Water may be sprayed onto the slag to quench the hot material. The quench water will also flow to the pond. The commingled stormwater and quench water will be periodically discharged to the Mississippi River at Outfall EV202.

Installation of the wastewater treatment system is a key component of the overall construction project for the Facility. The treatment equipment must be installed as soon as possible so that various wastewater streams can be processed when the new production units become operational in September 2023. Construction of the new wastewater treatment system is scheduled to begin in March 2023 for completion in September 2023.

EV requests that the DEQ issue the State Construction Permit and NPDES Permit separately. The company plans to initiate construction of the new wastewater treatment system as soon the Construction Permit is issued.

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

- Section A Summary of NPDES Permit Application
- Section B DEQ Application Form 1 (General Information)
- Section C EPA Application Form 2D (New Manufacturing Operations)
- Section D DEQ Construction Permit Application Forms
- Section E Financial Reports (Submitted in lieu of Disclosure Statement)
- Section F Process Description and Design Calculations for Wastewater Treatment System and Slag Yard Pond
- Section G Projected Technology-based and Water Quality-based Mass Permit Limitations for Outfall EV201
- Section H Water Flow and Water Balance Diagram
- Section I Vicinity Map, Site Map, and Topographic Maps
- Section J Maps and Diagrams of Wastewater Treatment System and Slag Yard Pond
- Section K Federal Emergency Management Agency (FEMA) Flood Plain Maps
- Section L Construction Plans and Specifications for Wastewater Treatment System and Slag Yard Pond

EV respectfully requests that the 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 the DEQ for additional information.

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

Mr. Terry Liu, P.E. – DEQ Office of Water Quality
Wastewater Permit Application – NPDES Permit and State Construction Permit
EV – Osceola, Arkansas
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Sincerely,

HARBOR ENVIRONMENTAL AND SAFETY



David Carstens
Sr. Project Manager
dcarstens@harborenv.com



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

Encl.: NPDES Permit Application (Electronic Document)

cc: Jessica Sears, P.E., DEQ
Lenore Trammell, EV
Dean Caldwell, EV
Joe Hall, EV
Michele Vachon, EV
Chrissie Gray, EV
Martin Booher, Esq., BakerHostetler
Lisa Rotenberry, Harbor

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REVIEW PAGE

Prepared By: *David Carstens*

David Carstens
Senior Project Manager
Harbor Environmental and Safety

Reviewed By: *Andrew Rike*

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

Section A – Summary of NPDES Permit Application

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SECTION A SUMMARY OF NPDES PERMIT APPLICATION

Exploratory Ventures, LLC (EV), a subsidiary of U.S. Steel Corporation, is constructing a new scrap steel-to-steel products manufacturing complex near the City of Osceola in Mississippi County, Arkansas (the "Facility" or "Site"). 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. The Site is scheduled to begin operation in September 2023.

The Facility will have five (5) key process areas. The production and support units are summarized below:

- The Direct Reduced Iron (DRI) unit will be used to process pelletized iron oxide into a raw material (in liquid or briquette form) for use in steel production.
- The Melt Shop will be used to process scrap steel, DRI, and other raw materials to produce liquid steel. This production area will include two electric arc furnaces, two ladle metallurgy furnaces, and two vacuum degasser units.
- The Casting Area will be used to process the liquid steel into raw steel coils. Two continuous casting units will be operated.
- The Cold Mill will contain multiple production units which will be used to pickle, galvanize, anneal, and finish the steel. Several types and grades of steel coils will be manufactured.
- The Ancillary Support Operations will include a wide range of process units which will support the production activities. These items will include scrap and slag processing areas, material handling and storage units, natural gas-fired combustion equipment, cooling towers, water treatment and recycling units, and emergency generators and pumps.

The process wastewater generated during the steel mill operations will be treated on-site in the Facility's wastewater treatment system. The wastewater effluent will subsequently be continuously discharged to the Mississippi River at Outfall EV021. Approximately 1.250 million gallons per day (MGD) of wastewater will be generated.

The wastewater treatment plant will have seven (7) general stages of operation. These stages are summarized below:

- Stage 1 – Oil Removal: The emulsified oily discharges from the Facility operations will be treated to break the emulsion and separate it into two liquid phases (oil and water) for further treatment.
- 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.

- Stage 3 – Metals Removal: The combined wastewater stream will contain various dissolved metals (nickel, zinc, etc.) which will be removed via chemical treatment followed by floatation and precipitation. Two dissolved air floatation (DAF) units will be operated. The treated wastewater, floating solids, and heavy sludge will be subjected to further processing.
- Stage 4 – Clarification: The wastewater from the DAF units will be transferred to two clarifier units. The suspended solids will be removed via gravity settling. The sludge will then be dewatered in filter presses. The sludge cake will subsequently be shipped off-site for disposal.
- Stage 5 – Aeration for Iron Oxidization: The treated wastewater from the clarifiers will be aerated to convert dissolved iron in ferrous form (Fe^{+2}) to insoluble iron in ferric form (Fe^{+3}). The aerated wastewater will then be routed to sand filters for solids removal.
- Stage 6 – Filtration: The wastewater will be processed through sand filters to remove the suspended solids, primarily the insoluble iron particles generated in the aeration basins. The filtered effluent will subsequently be discharged at Outfall EV201.
- Stage 7 – Sludge Processing Area: The sludge generated during the oil removal operation (Stage 1) and the metals removal operation (Stage 3) will be transferred to a sludge processing area for drying. The dewatered sludge will then be shipped off-site for disposal.

The Facility will include a 34-acre slag yard for storing the residue generated during the steel manufacturing operations. The slag will subsequently be recovered for reuse as a road-building material. A 2.4-acre pond will be used to store the stormwater runoff from the slag yard. Water may be sprayed onto the slag to quench the hot material. The quench water will also flow to the pond. The surface impoundment will function as a sedimentation basin. The commingled stormwater and quench water will be periodically discharged to the Mississippi River at Outfall EV202. Approximately 0.137 MGD of slag yard runoff and quench water will be generated.

Installation of the wastewater treatment system is a key component of the overall construction project for the Facility. The treatment equipment must be installed as soon as possible so that various wastewater streams can be processed when the new production units become operational in September 2023. Construction of the new wastewater treatment system is scheduled to begin in March 2023 for completion in September 2023.

The process wastewater effluent discharged at Outfall EV021 will be subject to the Effluent Limitations Guidelines for the Iron and Steel Manufacturing Point Source Category (40 Code of Federal Regulations, Part 420). Nine (9) industrial subcategories will be applicable. 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 process wastewater effluent must also comply with the requirements of the Arkansas water quality standards (Arkansas Pollution Control and Ecology Commission Regulation No. 2).

EV requests that the Arkansas Department of Energy and Environment's Division of Environmental Quality (DEQ) issue an individual National Pollutant Discharge Elimination System (NPDES) wastewater discharge permit and a State Construction Permit to EV. The two permits should be issued separately. The company plans to initiate construction of the new wastewater treatment system as soon as the Construction Permit is issued.

EV respectfully requests that the 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 the DEQ for additional information.

The combined application for an NPDES Permit and a State Construction Permit is presented in the remaining sections of this document.

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Section B – DEQ Application Form 1 (General Information)

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ARKANSAS ENERGY & ENVIRONMENT

NPDES Individual Permit Application **Form 1**

5301 Northshore Drive
North Little Rock, AR 72118-5317

PURPOSE OF THIS APPLICATION (check all that apply)

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

SECTION A - GENERAL INFORMATION

A.1. Legal Applicant Name: Exploratory Ventures, LLC

A.2. Operator Type: Corporation

A.3. Corporation? Yes No → Skip to A.4

State of Incorporation, if not Arkansas: Delaware

Attach a Proof/Status of Good Standing from Arkansas Secretary of State and from the state of incorporation, if applicable. (Attached)

A.4. Facility Name: Exploratory Ventures, LLC

A.5. Is the applicant identified in A.1, the owner of the facility? Yes → Skip to A.6 No

Owner of the facility: _____

A.6. Is there an outstanding state construction permit for this facility that needs to be terminated?

Yes No → Skip to A.7

A state construction permit can be terminated by submitting Notice of Completion of Construction for State Construction Permits found through the link below:

<https://www.adeq.state.ar.us/water/permits/npdes/individual/pdfs/state-construction-permit-completion-of-construction.pdf>

NPDES Permit Number	AFIN	Facility Name	County
AR00	47-01073	Exploratory Ventures	<u>Mississippi - 47</u>

A.7. Indicate below any NPDES permits issued by DEQ to this facility, if applicable. (Check all that apply and list the corresponding permit number for each.)

NPDES permits issued by DEQ		
<input type="checkbox"/> NPDES Individual Discharge Permit AR00_____	<input type="checkbox"/> NPDES Non-Stormwater General Permit ARG_____	<input type="checkbox"/> NPDES Industrial Stormwater General Permit ARR00_____

A.8. List permit numbers and/or names of any permits issued by DEQ 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:

Permit Name	Permit Number	Held by
Title V Operating Permit	2445-AOP-R0	Exploratory Ventures
Construction Stormwater Permit	ARR157275	Exploratory Ventures

A.9. Is the facility required to file a disclosure statement?

Yes, one has been attached Exempt

The disclosure statement form may be obtained from the DEQ web site at:

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

A.10. Facility Physical Location. Attach a location map.

Street address 1000 East County Road 860			
City or town Osceola	State AR	ZIP code 72370	County Mississippi - 47

Front Door (gate) location of the facility.

Latitude:	<u>35°</u>	<u>37'</u>	<u>8.43"</u>
Longitude:	<u>90°</u>	<u>0'</u>	<u>0.26"</u>

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

Street Address		P.O. Box <u>707</u>
City or town Osceola	State AR	ZIP code 72370

NPDES Permit Number	AFIN	Facility Name	County
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A.12. Neighboring States Within 20 Miles of the permitted facility (Check all that apply):

- Louisiana Mississippi Missouri
 Oklahoma Tennessee Texas

A.13. Standard Industrial Classification (SIC) code and North America Industrial Classification System (NAICS) code for primary process and secondary process if applicable.

Primary SIC <u>3312</u>	Primary NAICS <u>331110</u>
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Secondary SIC <input type="checkbox"/> N/A	Secondary NAICS <input type="checkbox"/> N/A
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A.14. Responsible Official (as described on the last page of this application):

Name (First and Last) <u>Lenore Trammell</u>	Title <u>Assistant Secretary</u>
E-mail Address <u>ltrammell@bigriversteel.com</u>	Phone Number <u>(870) 819-3031</u>

A.15. Cognizant Official (Duly Authorized Representative as described on the last page of this application):

Name (First and Last) <u>Dean Caldwell</u>	Title <u>Environmental Director</u>
E-mail Address <u>dcaldwell@bigriversteel.com</u>	Phone Number <u>(731) 234-2044</u>

A.16. Did a consulting firm prepare this application?

- Yes No → Skip to A.17

Contact Name (First and Last) <u>Andrew Rike, P.E.</u>	Title <u>Principal</u>
Company Name <u>Harbor Environmental and Safety</u>	
E-mail Address <u>arike@harborenv.com</u>	Phone Number <u>(501) 663-8800</u>
Street Address <u>5800 Evergreen Drive</u>	
City or town <u>Little Rock</u>	State <u>AR</u>
	ZIP Code <u>72205</u>

NPDES Permit Number	AFIN	Facility Name	County
AR00	47-01073	Exploratory Ventures	<u>Mississippi - 47</u>

A.17. Wastewater Operator Information

Name (First and Last)	License Number	Municipal Wastewater Operator	Industrial Wastewater Operator
Joe Hall (Lead Operator)	010267	Class Choose an item.	Advanced
		Class Choose an item.	Choose an item.
		Class Choose an item.	Choose an item.
		Class Choose an item.	Choose an item.

NPDES Permit Number	AFIN	Facility Name	County
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SECTION B - OUTFALL INFORMATION

B.1. Outfall Information (If more than two outfalls, attach additional pages)

Outfall <u>EV201</u>								
Design Flow <u>1.250 MGD</u>				Highest Monthly Average flow over the last two years <u>0 MGD</u>				
End-of-Pipe Location:	Latitude:	<u>35°</u>	<u>39'</u>	<u>4.01'' N</u>	Longitude:	<u>89°</u>	<u>54'</u>	<u>48.40'' W</u>
Monitoring Location (If different from End-of-Pipe Location):	Latitude:	<u>35°</u>	<u>36'</u>	<u>59.35'' N</u>	Longitude:	<u>89°</u>	<u>56'</u>	<u>56.39'' W</u>
Name of Receiving Stream								
<u>Mississippi River</u>								
Treatment system (Include all components of the treatment system and attach a process flow diagram):								
<u>See Process Description (Section F) and Wastewater Process Flow Diagrams (Section J).</u>								
How and where are effluent samples collected? Include a narrative description of where samples are collected relative to the treatment system.								
<input type="checkbox"/> Grab <input type="checkbox"/> Composite <input checked="" type="checkbox"/> Both								
<u>Automated composite sampler: wastewater samples will be collected immediately after sand filters, prior to discharge of effluent to transfer pipeline to river. Grab samples will be collected from grab sampling port adjacent to composite sampler.</u>								
How is flow measured and where (relative to the process flow diagram)?								
<u>Electronic flow meter with totalizer. Flow measured at pumping station for effluent transfer pipeline to river.</u>								
Is the outfall equipped with a diffuser?								
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No								
What is the diameter of the effluent pipe?								
<u>18 inches</u>								

NPDES Permit Number	AFIN	Facility Name	County
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Outfall <u>EV202</u>								
Design Flow <u>0.137 MGD</u>				Highest Monthly Average flow over the last two years <u>0 MGD</u>				
End-of-Pipe Location:	Latitude:	<u>35°</u>	<u>39'</u>	<u>4.01" N</u>	Longitude:	<u>89°</u>	<u>54'</u>	<u>48.38" W</u>
Monitoring Location (If different from End-of-Pipe Location):	Latitude:	<u>35°</u>	<u>36'</u>	<u>36.21" N</u>	Longitude:	<u>89°</u>	<u>56'</u>	<u>33.34" W</u>
Name of Receiving Stream								
<u>Mississippi River</u>								
Treatment system (Include all components of the treatment system and attach a process flow diagram):								
<u>Stormwater holding and settling pond.</u>								
<u>See Process Description (Section F) and Wastewater Process Flow Diagrams (Section J).</u>								
How and where are effluent samples collected? Include a narrative description of where samples are collected relative to the treatment system.								
<input checked="" type="checkbox"/> Grab <input type="checkbox"/> Composite <input type="checkbox"/> Both								
<u>Grab samples will be collected from sampling spigot for wastewater transfer pumps; samples will be collected prior to discharge to effluent transfer pipeline to river.</u>								
How is flow measured and where?								
<u>Electronic flow meter with totalizer. Flow will be measured at pumping station at slag yard pond.</u>								
Is the outfall equipped with a diffuser?								
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No								
What is the diameter of the effluent pipe?								
<u>18 inches</u>								

NPDES Permit Number	AFIN	Facility Name	County
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B.2. Describe how influent is collected and conveyed to the treatment system.

Influent wastewater streams will be pumped from various in-plant collection sumps to wastewater treatment plant.

B.3. Are you a publicly owned treatment works?

Yes No → Skip to B.4

If “Yes”, complete the table below:

Pollutant	Maximum Daily Influent		Average Daily Influent		
	Value	Units	Value	Units	Number of Samples *
CBOD ₅ /BOD ₅					
TSS					
How and where were the influent samples collected? Include a narrative description of where samples are collected relative to the treatment system.					
<input type="checkbox"/> Grab <input type="checkbox"/> Composite <input type="checkbox"/> Both					

* At a minimum, influent testing data must be based on at least three samples taken within 4.5 years prior to the date of the permit application. Existing data may be used, if available, in lieu of sampling done solely for the purpose of this application

Attach the laboratory report for the CBOD₅/BOD₅ and TSS tests.

B.4. Attach a process flow diagram. Attached; see Section J (Wastewater Drawings).

B.5. Attach a topographic map extending at least one mile beyond the property boundary with the discharge location(s) marked with this application. Attached; see Section I (Topographic Maps).

B.6. Is the proposed or existing facility located above the 100-year flood level?

Yes No

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

Has a FEMA map been submitted with a previous application?

Yes No

If “No”, a FEMA map must be submitted with this application as an attachment. Attached; see Section K (FEMA Maps).

NPDES Permit Number	AFIN	Facility Name	County
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B.7. Population served for Municipal or Domestic Sewer Systems: N/A

B.8. Backup Power Generation for Treatment Plants

Are there any permanent backup generators? Yes No

If Yes, how many? 1 Total Horsepower (hp)? 1,600 kW (2,150 hp) [Tentative Capacity]

If No, check all that apply.

- Portable generator is available.
- The WWTP does not require power to operate.
- Operations at the facility will cease if power is not available.
- The WWTP has sufficient capacity to hold influent until power is restored.
- Other, please explain. _____

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SECTION C - WASTE STORAGE AND DISPOSAL INFORMATION

C.1. Are solids/sludge produced at this facility?

Yes No → Skip to Section D

C.2. Do solids/sludge remain in treatment lagoon(s)?

Yes No → Skip to C.3

How many lagoon(s)? 1 (Slag Yard Pond)

How old is the lagoon(s)? New (To Be Installed)

Has sludge depth been measured? Yes No

If yes, when was it measured (MM/YYYY)? _____ Average sludge depth? _____ ft.

If no, when will it be measured? To Be Determined

Has sludge ever been removed? Yes No

If yes, when was it removed (MM/YYYY)? _____

C.3. Are solids/sludge disposed at a landfill?

Yes No → Skip to C.4

Is the Landfill located in Arkansas? Yes No

If Yes, what is the DEQ solid waste permit issued to the landfill? Permit No. 0136-S1-R4; 0294-S4-R1

If No, which state? State: _____

Provide the solid waste permit Permit No. _____

C.4. Are solids/sludge disposed by land application?

Yes No → Skip to C.5

Is the land application site located in Arkansas? Yes No

If Yes, what is the DEQ state permit issued to the land application site? _____

If No, what state and their state permit? State: _____ Permit No. _____

C.5. Are solids/sludge disposed by septic tank?

Yes No → Skip to C.6

Arkansas Department of Health Permit No. _____

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C.6. Are solids/sludge distributed and marketed?

Yes No → Skip to C.7

Company Name receiving solids/sludge		
E-mail Address		Phone Number
Street Address		
City or town	State	ZIP Code
Distributed by (check all that applies)		
<input type="checkbox"/> Pipe		
<input type="checkbox"/> Rail		
<input type="checkbox"/> Truck		
<input type="checkbox"/> Other _____		

C.7. Are solids/sludge disposed by sludge storage lagoon? (Lagoon for which the sole purpose is storing sludge):

Yes No → Skip to C.8

How many lagoon(s)? _____ How old is the lagoon(s)? _____ years

Total surface area of lagoon(s)? _____ acre

Has sludge depth been measured? Yes No

If yes, when was it measured (MM/YYYY)? _____ Average depth? _____ ft.

If no, when will it be measured? _____

Has sludge ever been removed? Yes No

If yes, when was it removed (MM/YYY)? _____

Does lagoon(s) have a liner? Yes No

C.8. Are solids/sludge disposed by incineration?

Yes No → Skip to C.9

Company Name	
E-mail Address	Phone Number

NPDES Permit Number	AFIN	Facility Name	County
AR00	47-01073	Exploratory Ventures	<u>Mississippi - 47</u>

Street Address		
City or town	State	ZIP Code

C.9. Are solids/sludge disposed by **Other** method? (Provide complete description)

N/A

NPDES Permit Number	AFIN	Facility Name	County
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SECTION D - WATER SUPPLY

D.1. Are there any water supply sources which are downstream of the outfall location, i.e., those which could be affected by the discharge from this facility?

Yes No → Skip to Section E

D.2. Is the water supply source subsurface water?

Yes No → Skip to D.3

Private Well?

Yes No

Distance from discharge point: Within 5 miles Within 50 miles

Municipal Water Utility?

Yes No

City or town _____

Distance from discharge point: Within 5 miles Within 50 miles

D.3. Is the water supply source surface water

Yes No → Skip to D.4

Distance from discharge point: Within 5 miles Within 50 miles

D.4. **Other** (Provide complete description)

N/A

Distance from discharge point: Within 5 miles Within 50 miles

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SECTION E - TRUST FUND REQUIREMENTS

E.1. Is the facility considered a “nonmunicipal domestic sewage treatment works” (NDSTW) as defined in [Ark. Code Ann. 8-4-203\(b\)](#)?

Yes No

If “yes”, a completed NDSTW trust fund form must be submitted. The trust fund form may be obtained from the DEQ web site at:

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

NPDES Permit Number	AFIN	Facility Name	County
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SECTION F - INDUSTRIAL ACTIVITY

F.1. Is this facility subject to an effluent limit guideline?

Yes No → Skip to Section G

F.2. 40 CFR reference for applicable effluent limit guidelines Part 420 (ELG for Iron and Steel Mfg.)

List all applicable Subpart(s) D, E, F, G, I, J, K, L, M

F.3. Description of all operations at this facility including primary products or services (attach additional sheets if necessary):

Exploratory Ventures will operate a scrap steel-to-steel products manufacturing complex. The mill will produce a variety of high-strength, lightweight steel products, primarily through the recycling of scrap metal. See Section G (Anticipated Permit Limits).

NPDES Permit Number	AFIN	Facility Name	County
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SECTION G - MODIFICATION AND CONSTRUCTION INFORMATION

G.1. Was “Modification of existing permit” or “Construction permit” checked off on **Purpose of this Application?** (Above Section A - General Information)

Yes No → Skip to Section H

G.2. List proposed changes at the facility.

<u>Construction of new wastewater treatment plant for new steel mill.</u>

G.3. If this application is for a State Construction permit, please note that, in accordance with Rule 6.202, plans and specifications and design calculations must be stamped and signed by a **Registered Professional Engineer in the State of Arkansas**. The basic design criteria for wastewater treatment plants in the State of Arkansas should be based on the latest edition of the “Recommended Standards for Sewage Works,” published by the Great Lakes-Upper Mississippi Board of State Sanitary Engineers known as 10 States Standards, with few modifications. Exception to the criteria will only be approved by DEQ when fully justified. A comprehensive list of exceptions to 10 State Standards is listed in Rule 6.202(B) and can be viewed here: https://www.adeq.state.ar.us/regs/files/reg06_final_150918.pdf

Checklist	
<input checked="" type="checkbox"/>	Professional Engineer registered in the State of Arkansas
<input checked="" type="checkbox"/>	Design calculations signed and stamped, attached
<input checked="" type="checkbox"/>	Plans and drawing signed and stamped, attached
<input checked="" type="checkbox"/>	Specifications meet the 10 States Standards, except for those that are fully justified attached

G.4. In the case of construction, will the construction disturb one acre or more?

Yes No → Skip to Section H

If the area disturbed is more than one acre up to, but not including, five acres, the facility is automatically covered under the Construction Stormwater General Permit ARR150000 and must comply with the terms and conditions of that permit.

If the area disturbed is five acres or more, a Construction Stormwater General Permit ARR150000 must be obtained by submitting a Notice of Intent and a Stormwater Pollution Prevention Plan to DEQ. The application information can be found here:

<https://www.adeq.state.ar.us/water/permits/npdes/stormwater/>

NPDES Permit Number	AFIN	Facility Name	County
AR00	47-01073	Exploratory Ventures	<u>Mississippi - 47</u>

SECTION H: CHECKLIST AND SIGNATORY REQUIREMENTS

H.1. Mark the sections of Form 1 below that have been completed and are being submitted as part of the application. For each section, specify any attachments that will be enclosed. Note that not all applicants are required to provide all attachments.

Form 1 Section	Attachments
<input checked="" type="checkbox"/> Section A – General Information	<input checked="" type="checkbox"/> w/Proof of Good Standing from Arkansas Secretary of State <input checked="" type="checkbox"/> w/Proof of Good Standing from State of Incorporation <input type="checkbox"/> w/Notice of Completion of Construction for State Construction Permits <input checked="" type="checkbox"/> w/Disclosure Statement <input checked="" type="checkbox"/> w/location map
<input checked="" type="checkbox"/> Section B – Outfall Information	<input checked="" type="checkbox"/> w/additional outfall information <input checked="" type="checkbox"/> w/topographic map extending at least one mile beyond the property boundary with the discharge location marked <input checked="" type="checkbox"/> w/FEMA flood plain map <input checked="" type="checkbox"/> w/process flow diagram
<input checked="" type="checkbox"/> Section C – Waste Storage and Disposal Information	
<input checked="" type="checkbox"/> Section D – Water Supply	
<input checked="" type="checkbox"/> Section E – Trust Fund Requirements (N/A)	<input type="checkbox"/> w/Nonmunicipal Domestic Sewage Treatment Works Trust Fund Certification form
<input checked="" type="checkbox"/> Section F – Industrial Activity	
<input checked="" type="checkbox"/> Section G – Modification and Construction Information	<input checked="" type="checkbox"/> w/design calculations <input checked="" type="checkbox"/> w/design specifications <input checked="" type="checkbox"/> w/plans and drawing

H.2. Is the submittal of this Form 1 for the modification of an existing permit?

- Yes → Skip to H.3, EPA Form Not Required
 No - additional EPA Forms (in addition to this Form 1) are required for processing your application:

Check all boxes that are applicable

- EPA Form 2A – Municipal Dischargers
 EPA Form 2B – Concentrated Animal Feeding Operations
 EPA Form 2C – Existing Manufacturing, Commercial, Mining, and Silvicultural Operations
 EPA Form 2D – New Sources and New Dischargers Application for Permit to Discharge Process Wastewater
 EPA Form 2E – Facilities Which Do Not Discharge Process Wastewater (i.e. domestic, non-contact cooling water, etc)
 EPA Form 2F – Application for Permit to Discharge Stormwater Dischargers Associated with Industrial Activity

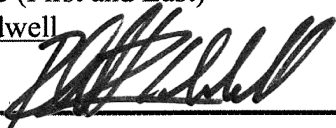
NPDES Permit Number	AFIN	Facility Name	County
AR00	47-01073	Exploratory Ventures	Mississippi - 47

H.3. Cognizant Official (Duly Authorized Representative)

40 C.F.R. 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 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:

Print name (First and Last) <u>Dean Caldwell</u>	Official title <u>Environmental Director</u>	
Signature 	Date signed <u>11/07/2022</u>	Telephone number <u>(731) 234-2044</u>


H.4. Responsible Official

“By my signature below, I certify that I met the requirement to be the signatory as defined in 40 C.F.R. § 122.22.”

“By my signature below, 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 Division considers the applicant to be the responsible official for the facility and only reports, etc., signed by the applicant will be accepted by the Division.

“By my signature below, I certify that, if this facility is a corporation, it is registered with the Secretary of State in Arkansas.”

“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.”

Print name (First and Last) <u>Lenore Trammell</u>	Official title <u>Assistant Secretary</u>	
Signature 	Date signed <u>10-21-22</u>	Telephone number <u>(870) 819-3031</u>

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DEQ Form 1
Notes and Comments

- (1). Item A.9, Disclosure Statement: Recent financial reports for U.S. Steel are being submitted in lieu of filing a Disclosure Statement. This information is provided in Section E.
- (2). Item A.17, Wastewater Operators: The lead operator is listed. Additional licensed operators will be hired and trained prior to start-up of new wastewater treatment system.
- (3). Item B.4, Process Flow Diagram: Process flow diagrams for the wastewater treatment system are provided in Section J.
- (4). Item B.5, Topographic Maps: Topographic maps for the facility are provided in Section I.
- (5). Item B.6, FEMA Maps: Flood plain maps for the facility are provided in Section K.
- (6). Item C.2, Sludge Management in Lagoons: The slag yard will include a surface impoundment for storing stormwater runoff and quench water prior to discharge. The slag yard pond will function as a sedimentation basin. The solids in the stormwater runoff and quench water will settle out within the basin. The accumulated sediment will be removed when necessary for off-site disposal.
- (7). Items F.2, Effluent Limit Guidelines: Information on the applicable provisions of the ELG for Steel Manufacturing (40 CFR Part 420) is provided in Section G.

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**Arkansas Secretary of State
John Thurston**

State Capitol Building ♦ Little Rock, Arkansas 72201-1094 ♦ 501-682-3409

Certificate of Good Standing

I, John Thurston, Secretary of State of the State of Arkansas, and as such, keeper of the records of domestic and foreign corporations, do hereby certify that the records of this office show

EXPLORATORY VENTURES, LLC

formed under the laws of the state of Delaware, and authorized to transact business in the State of Arkansas as a Foreign Limited Liability Company, was granted a Registration of Foreign Limited Liability Company by this office June 13, 2022.

Our records reflect that said entity, having complied with all statutory requirements in the State of Arkansas, is qualified to transact business in this State.



In Testimony Whereof, I have hereunto set my hand and affixed my official Seal. Done at my office in the City of Little Rock, this 15th day of June 2022.



John Thurston

John Thurston
Secretary of State

Online Certificate Authorization Code: 9b7613b80bb5a5a

To verify the Authorization Code, visit sos.arkansas.gov

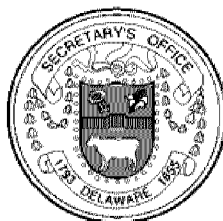
Delaware

The First State

I, JEFFREY W. BULLOCK, SECRETARY OF STATE OF THE STATE OF DELAWARE, DO HEREBY CERTIFY "EXPLORATORY VENTURES, LLC" IS DULY FORMED UNDER THE LAWS OF THE STATE OF DELAWARE AND IS IN GOOD STANDING AND HAS A LEGAL EXISTENCE SO FAR AS THE RECORDS OF THIS OFFICE SHOW, AS OF THE NINTH DAY OF JUNE, A.D. 2022.

AND I DO HEREBY FURTHER CERTIFY THAT THE SAID "EXPLORATORY VENTURES, LLC" WAS FORMED ON THE FOURTH DAY OF AUGUST, A.D. 2021.

AND I DO HEREBY FURTHER CERTIFY THAT THE ANNUAL TAXES HAVE BEEN PAID TO DATE.




Jeffrey W. Bullock, Secretary of State

6141674 8300

SR# 20222678140


You may verify this certificate online at corp.delaware.gov/authver.shtml

Authentication: 203641317

Date: 06-09-22

Section C – EPA Application Form 2D (New Manufacturing Operations)

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Form 2D NPDES		U.S. Environmental Protection Agency Application for NPDES Permit to Discharge Wastewater NEW MANUFACTURING, COMMERCIAL, MINING, AND SILVICULTURAL OPERATIONS THAT HAVE NOT YET COMMENCED DISCHARGE OF PROCESS WASTEWATER
---------------------	---	--

SECTION 1. EXPECTED OUTFALL LOCATION (40 CFR 122.21(k)(1))

Outfall Location	1.1	Provide information on each of the facility's outfalls in the table below.			
		Outfall Number	Receiving Water Name	Latitude	Longitude
		EV201	Mississippi River	35° 39' 4.01"	89° 54' 48.40"
		EV202	Mississippi River	35° 39' 4.01"	89° 54' 48.38"
			° ' "	° ' "	

SECTION 2. EXPECTED DISCHARGE DATE (40 CFR 122.21(k)(2))

Expected Discharge Date	2.1	Month	Day	Year
		September	1	2023

SECTION 3. AVERAGE FLOWS AND TREATMENT (40 CFR 122.21(k)(3)(i))

Average Flows and Treatment	3.1	For each outfall identified under Item 1.1, provide average flow and treatment information. Add additional sheets as necessary.		
		Outfall Number EV201		
		Operations Contributing to Flow		
		Operation	Average Flow	
		Steel Manufacturing Operations	1.250 mgd	
		(Process Wastewater, Contact Cooling Water, and	mgd	
		Non-Contact Cooling Water)	mgd	
			mgd	
			mgd	
		Treatment Units		
		Description (include size, flow rate through each treatment unit, retention time, etc.)	Code from Exhibit 2D-1	Final Disposal of Solid or Liquid Wastes Other Than by Discharge
		See Attached Table 2D-2	---	---

3.1
Cont.

****Outfall Number**** EV202

Operations Contributing to Flow

Operation	Average Flow
Slag Yard (Quench Water and Stormwater Runoff)	0.137 mgd
	mgd
	mgd
	mgd
	mgd

Treatment Units

Description (include size, flow rate through each treatment unit, retention time, etc.)	Code from Exhibit 2D-1	Final Disposal of Solid or Liquid Wastes Other Than by Discharge
See Attached Table 2D-2	---	---

****Outfall Number**** N/A

Operations Contributing to Flow

Operation	Average Flow
N/A	mgd
	mgd
	mgd
	mgd
	mgd

Treatment Units

Description (include size, flow rate through each treatment unit, retention time, etc.)	Code from Exhibit 2D-1	Final Disposal of Solid or Liquid Wastes Other Than by Discharge
N/A		

Average Flows and Treatment Continued

SECTION 4. LINE DRAWING (40 CFR 122.21(k)(3)(ii))

Line Drawing	4.1	Have you attached a line drawing to this application that shows the water flow through your facility with a water balance? (See instructions for drawing requirements. See Exhibit 2D-2 at end of instructions for example.)
	<input checked="" type="checkbox"/>	Yes <input type="checkbox"/> No

SECTION 5. INTERMITTENT OR SEASONAL FLOWS (40 CFR 122.21(k)(3)(iii))

Intermittent or Seasonal Flows	5.1	Except for stormwater runoff, leaks, or spills, are any expected discharges described in Sections 1 and 3 intermittent or seasonal?						
		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No → SKIP to Section 6.						
	5.2	Provide information on intermittent or seasonal flows for each applicable outfall. Attach additional pages, if necessary.						
		Outfall Number	Operations (list)	Frequency		Rate and Volume		Duration
				Average Days/Week	Average Months/Year	Maximum Daily Discharge	Maximum Total Volume	
		EV201	See	days/week	months/year	mgd	gallons	days
			Table 2D-1	days/week	months/year	mgd	gallons	days
				days/week	months/year	mgd	gallons	days
		Outfall Number	Operations (list)	Frequency		Rate and Volume		Duration
				Average Days/Week	Average Months/Year	Maximum Daily Discharge	Maximum Total Volume	
		EV202	Quench	7 days/week	12 months/year	0.01 mgd	10,000 gallons	365 days
			Water	days/week	months/year	mgd	gallons	days
				days/week	months/year	mgd	gallons	days
		Outfall Number	Operations (list)	Frequency		Rate and Volume		Duration
				Average Days/Week	Average Months/Year	Maximum Daily Discharge	Maximum Total Volume	
	N/A		days/week	months/year	mgd	gallons	days	
			days/week	months/year	mgd	gallons	days	
			days/week	months/year	mgd	gallons	days	

SECTION 6. PRODUCTION (40 CFR 122.21(k)(4))

Production	6.1	Do any effluent limitation guidelines (ELGs) promulgated by EPA under CWA Section 304 apply to your facility?		
		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No → SKIP to Section 7.		
	6.2	Provide the following information on applicable ELGs.		
		ELG Category	ELG Subcategory	Regulatory Citation
		Iron and Steel Manufacturing	D, E, F, G, I, J, K, L, M	40 CFR Part 420
	(See Section G)			

Production Continued	6.3	Are the limitations in the applicable ELGs expressed in terms of production (or other measure of operation)? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No → SKIP to Section 7.				
	6.4	Provide an expected measure of average daily production expressed in terms and units of applicable ELGs.				
		Expected Actual Average Daily Production for First Three Years				
		Outfall Number	Year	Operation, Product, or Material	Quantity per Day <small>(note basis if applicable)</small>	Unit of Measure
		EV201	Year 1	See Attachment (Table 2D-3)	---	---
			Year 2			
			Year 3			
			Year 1			
			Year 2			
			Year 3			
		Year 1				
	Year 2					
	Year 3					

SECTION 7. EFFLUENT CHARACTERISTICS (40 CFR 122.21(k)(5))

Effluent Characteristics	See the instructions to determine the parameters and pollutants you are required to monitor and, in turn, the tables you must complete. Note that not all applicants need to complete each table.				
	Table A. Conventional and Non-Conventional Parameters				
	7.1	Are you requesting a waiver from your NPDES permitting authority for one or more of the Table A parameters for any of your outfalls? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No → SKIP to Item 7.3.			
	7.2	If yes, indicate the applicable outfalls below. Attach waiver request and other required information to the application. Outfall number _____ Outfall number _____ Outfall number _____			
	7.3	Have you have provided estimates or actual data for all Table A parameters for each of your outfalls for which a waiver has not been requested and attached the results to this application package? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No; a waiver has been requested from my NPDES permitting authority for all parameters at all outfalls.			
	Table B. Certain Conventional and Non-Conventional Pollutants				
	7.4	Have you checked "Believed Present" for all pollutants listed in Table B that are limited directly or indirectly by an applicable ELG? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
	7.5	Have you checked "Believed Present" or "Believed Absent" for all remaining pollutants listed in Table B? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
	7.6	Have you provided estimated data for those Table B pollutants for which you have indicated are "Believed Present" in your discharge? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			

Effluent Characteristics Continued	Table C. Toxic Metals, Total Cyanide, and Total Phenols		
	7.7	Have you indicated whether pollutants are "Believed Present" or "Believed Absent" for all pollutants listed on Table C for all outfalls? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
	7.8	Have you completed Table C by providing estimated data for pollutants you indicated are "Believed Present," including the source of the information, for each applicable outfall? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
	Table D. Organic Toxic Pollutants (GC/MS Fractions)		
	7.9	Do you qualify for a small business exemption under the criteria specified in the Instructions? <input type="checkbox"/> Yes → Note that you qualify at the top of Table D, then SKIP to Item 7.12. <input checked="" type="checkbox"/> No	
	7.10	Have you indicated whether pollutants are "Believed Present" or "Believed Absent" for all pollutants listed on Table D for all outfalls? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
	7.11	Have you completed Table D by providing estimated data for pollutants you indicated are "Believed Present," including the source of the information, for each applicable outfall? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
	2,3,7,8-Tetrachlorodibenzo-p-Dioxin (TCDD)		
	7.12	Does the facility use or manufacture one or more of the 2,3,7,8-TCDD congeners listed in the Instructions, or do you know or have reason to believe that TCDD is or may be present in effluent from any of your outfalls? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
	Table E. Certain Hazardous Substances and Asbestos		
	7.13	Have you indicated whether pollutants are "Believed Present" or "Believed Absent" for all pollutants listed in Table E for all outfalls? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
	7.14	Have you completed Table E by reporting the reason the pollutants are expected to be present and available quantitative data for pollutants you indicated are "Believed Present" for each applicable outfall? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
	Intake Credits, Tables A through E		
	7.15	Are you applying for net credits for the presence of any of the pollutants on Tables A through E for any of your outfalls? <input type="checkbox"/> Yes → Consult with your NPDES permitting authority. <input checked="" type="checkbox"/> No	
	SECTION 8. ENGINEERING REPORT (40 CFR 122.21(k)(6))		
Engineering Report	8.1	Do you have any technical evaluations of your wastewater treatment, including engineering reports or pilot plant studies? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No → SKIP to Item 8.3.	
	8.2	Have you provided the technical evaluation and all related documents to this application package? <input type="checkbox"/> Yes <input type="checkbox"/> No	
	8.3	Are you aware of any existing plant(s) that resemble production processes, wastewater constituents, or wastewater treatment at your facility? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No → SKIP to Section 9.	

Engineering Report Continued	8.4	Provide the name and location of the similar plants.	
		Name of Similar Plants	Location of Similar Plants
		Big River Steel LLC	Osceola, Arkansas

SECTION 9. OTHER INFORMATION (40 CFR 122.21(k)(7))


Other Information	9.1	Have you attached any optional information that you would like considered as part of the application review process (i.e., material beyond that which you have already noted in the application as being attached)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No → SKIP to Section 10.
	9.2	List the additional items and briefly note why you have included them.
		1.
		2.
		3.
		4.
	5.	

SECTION 10. CHECKLIST AND CERTIFICATION STATEMENT (40 CFR 122.22(a) and (d))

Checklist and Certification Statement	10.1	In Column 1 below, mark the sections of Form 2D that you have completed and are submitting with your application. For each section, specify in Column 2 any attachments that you are enclosing to alert the permitting authority. Note that not all applicants are required to complete all sections or tables, or provide attachments.	
		Column 1	Column 2
		<input checked="" type="checkbox"/> Section 1: Expected Outfall Location	<input checked="" type="checkbox"/> w/ attachments (e.g., responses for additional outfalls)
		<input checked="" type="checkbox"/> Section 2: Expected Discharge Date	<input type="checkbox"/> w/ attachments
		<input checked="" type="checkbox"/> Section 3: Average Flows and Treatment	<input checked="" type="checkbox"/> w/ attachments
		<input checked="" type="checkbox"/> Section 4: Line Drawing	<input checked="" type="checkbox"/> w/ line drawing <input checked="" type="checkbox"/> w/ additional attachments
		<input checked="" type="checkbox"/> Section 5: Intermittent or Seasonal Flows	<input checked="" type="checkbox"/> w/ attachments
		<input checked="" type="checkbox"/> Section 6: Production	<input checked="" type="checkbox"/> w/ attachments
		<input checked="" type="checkbox"/> Section 7: Effluent Characteristics	<input type="checkbox"/> w/ Table A waiver request or approval <input checked="" type="checkbox"/> Table A <input checked="" type="checkbox"/> Table B <input checked="" type="checkbox"/> Table C <input checked="" type="checkbox"/> Table D <input checked="" type="checkbox"/> Table E <input type="checkbox"/> w/ other attachments
		<input type="checkbox"/> Section 8: Engineering Report	<input type="checkbox"/> w/ technical evaluations and related attachments
		<input checked="" type="checkbox"/> Section 9: Other Information	<input checked="" type="checkbox"/> w/ optional information
	<input checked="" type="checkbox"/> Section 10: Checklist and Certification Statement	<input checked="" type="checkbox"/> w/ attachments	

EPA Identification Number	NPDES Permit Number	Facility Name Exploratory Ventures, LLC
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Form Approved 03/05/19
OMB No. 2040-0004

Checklist and Certification Statement Continued	10.2	Certification Statement <i>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>	
		Name (print or type first and last name) Lenore Trammell	Official title Assistant Secretary
		Signature 	Date signed 10.21.22

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EPA Identification Number	Facility Name Exploratory Ventures, LLC	Outfall Number EV201
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Form Approved 03/05/19
OMB No. 2040-0004

TABLE A. CONVENTIONAL AND NON CONVENTIONAL PARAMETER ESTIMATES (40 CFR 122.21(k)(5)(i)) ¹									
Pollutant	Waiver Requested (if applicable)	Units	Effluent Data				Intake Water		
			Maximum Daily Discharge (required)	Average Daily Discharge (if available)	Source of Information (use codes in instructions)	Believed Present? (check only one response per parameter)			
<input type="checkbox"/> Check here if you have applied to your NPDES authority for a waiver for <i>all</i> of the pollutants listed on this table for the noted outfall.									
1.	Biochemical oxygen demand (BOD ₅)	<input type="checkbox"/>	Concentration	mg/L	<67	---	3 (NPDES Appl. for BRS)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
			Mass	lb/d	<698	---	(Same)		
2.	Chemical oxygen demand (COD)	<input type="checkbox"/>	Concentration	mg/L	<530	---	3 (NPDES Appl. for BRS)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
			Mass	lb/d	<5,525	---	(Same)		
3.	Total organic carbon (TOC)	<input type="checkbox"/>	Concentration	mg/L	<13	---	3 (NPDES Appl. for BRS)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
			Mass	lb/d	<136	---	(Same)		
4.	Total suspended solids (TSS)	<input type="checkbox"/>	Concentration	mg/L	<124	---	3 (NPDES Info for BRS)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
			Mass	lb/d	<1,293	---	(Same)		
5.	Ammonia (as N)	<input type="checkbox"/>	Concentration	mg/L	<0.3	---	3 (NPDES Appl. for BRS)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
			Mass	lb/d	<3.1	---	(Same)		
6.	Flow	<input type="checkbox"/>	Rate	MGD	1.250	---	4 (Best Professional Estimate)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
7.	Temperature (winter)	<input type="checkbox"/>	°C	°C	20	---	3 (NPDES Appl. for BRS)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
	Temperature (summer)	<input type="checkbox"/>	°C	°C	20	---	(Same)		
8.	pH (minimum)	<input type="checkbox"/>	Standard units	s.u.	7.0	---	3 (NPDES Info for BRS)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
	pH (maximum)	<input type="checkbox"/>	Standard units	s.u.	8.8	---	(Same)		

¹ Sampling shall be conducted according to sufficiently sensitive test procedures (i.e., methods) approved under 40 CFR 136 for the analysis of pollutants or pollutant parameters or required under 40 CFR chapter I, subchapter N or O. See instructions and 40 CFR 122.21(e)(3).

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TABLE B. CERTAIN CONVENTIONAL AND NON CONVENTIONAL POLLUTANTS (40 CFR 122.21(k)(5)(ii))¹

Pollutant	Presence or Absence (check one)		Estimated Data for Pollutants Expected to be Present or Limited by an ELG (Provide both concentration and mass estimates for each pollutant.)					
	Believed Present	Believed Absent	Effluent			Intake Water		
			Units	Maximum Daily Discharge (required)	Average Daily Discharge (if available)	Source of Information (use codes in instructions)	Believed Present? (check only one response per item)	
<input type="checkbox"/>	Check (✓) here if you believe all pollutants listed to be absent from the discharge. You need not complete Table B for the noted outfall <i>unless</i> you have quantitative data available.							
1. Bromide (24959-67-9)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No	
			Mass					
2. Chlorine, total residual	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No	
			Mass					
3. Color	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No	
			Mass					
4. Fecal coliform	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No	
			Mass					
5. Fluoride (16984-48-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No	
			Mass					
6. Nitrate-nitrite	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No	
			Mass					
7. Nitrogen, total organic (as N)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No	
			Mass					
8. Oil and grease	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Concentration	mg/L	<12 <input checked="" type="checkbox"/>	--- <input checked="" type="checkbox"/>	3 (NPDES Info for BRS)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
			Mass	lb/d	<125 <input checked="" type="checkbox"/>	--- <input checked="" type="checkbox"/>		
9. Phosphorus (as P), total (7723-14-0)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No	
			Mass					
10. Sulfate (as SO ₄) (14808-79-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No	
			Mass					
11. Sulfide (as S)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No	
			Mass					

TABLE B. CERTAIN CONVENTIONAL AND NON CONVENTIONAL POLLUTANTS (40 CFR 122.21(k)(5)(ii))¹

Pollutant		Presence or Absence (check one)		Estimated Data for Pollutants Expected to be Present or Limited by an ELG (Provide both concentration and mass estimates for each pollutant.)					Intake Water Believed Present? (check only one response per item)	
		Believed Present	Believed Absent	Effluent			Source of Information (use codes in instructions)			
				Units	Maximum Daily Discharge (required)	Average Daily Discharge (if available)				
12.	Sulfite (as SO ₃) (14265-45-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No	
				Mass						
13.	Surfactants	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No	
				Mass						
14.	Aluminum, total (7429-90-5)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Concentration	ug/L <input checked="" type="checkbox"/>	<190 <input checked="" type="checkbox"/>	--- <input checked="" type="checkbox"/>	3 (NPDES Appl. for BRS)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
				Mass	lb/d <input checked="" type="checkbox"/>	<2 <input checked="" type="checkbox"/>	--- <input checked="" type="checkbox"/>			
15.	Barium, total (7440-39-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No	
				Mass						
16.	Boron, total (7440-42-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No	
				Mass						
17.	Cobalt, total (7440-48-4)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No	
				Mass						
18.	Iron, total (7439-89-6)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Concentration	ug/L <input checked="" type="checkbox"/>	<1,500 <input checked="" type="checkbox"/>	--- <input checked="" type="checkbox"/>	3 (NPDES Appl. for BRS)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
				Mass	lb/d <input checked="" type="checkbox"/>	<15.6 <input checked="" type="checkbox"/>	--- <input checked="" type="checkbox"/>			
19.	Magnesium, total (7439-95-4)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No	
				Mass						
20.	Molybdenum, total (7439-98-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No	
				Mass						
21.	Manganese, total (7439-96-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No	
				Mass						
22.	Tin, total (7440-31-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No	
				Mass						

EPA Identification Number	Facility Name Exploratory Ventures, LLC	Outfall Number EV201
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Form Approved 03/05/19
OMB No. 2040-0004

TABLE B. CERTAIN CONVENTIONAL AND NON CONVENTIONAL POLLUTANTS (40 CFR 122.21(k)(5)(ii)) ¹										
Pollutant		Presence or Absence (check one)		Estimated Data for Pollutants Expected to be Present or Limited by an ELG (Provide both concentration and mass estimates for each pollutant.)						
		Believed Present	Believed Absent	Effluent				Intake Water		
				Units	Maximum Daily Discharge (required)	Average Daily Discharge (if available)	Source of Information (use codes in instructions)	Believed Present? (check only one response per item)		
23.	Titanium, total (7440-32-6)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
24.	Radioactivity									
24.1	Alpha, total	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
24.2	Beta, total	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
24.3.	Radium, total	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
24.4	Radium 226, total	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						

¹ Sampling shall be conducted according to sufficiently sensitive test procedures (i.e., methods) approved under 40 CFR 136 for the analysis of pollutants or pollutant parameters or required under 40 CFR chapter I, subchapter N or O. See instructions and 40 CFR 122.21(e)(3).

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TABLE C. TOXIC METALS, TOTAL CYANIDE, AND TOTAL PHENOLS (40 CFR 122.21(k)(5)(iii)(A))¹

Pollutant (CAS Number, if available)	Presence or Absence (check one)		Estimated Data for Pollutants Expected to be Present in Discharge (Provide both concentration and mass estimates for each pollutant.)							
	Believed Present	Believed Absent	Effluent				Intake Water			
			Units	Maximum Daily Discharge (required)	Average Daily Discharge (if available)	Source of Information (Use codes in Instructions.)	Believed Present? (Check only one response per pollutant.)			
<input type="checkbox"/>	Check (✓) here if you believe all pollutants listed to be absent from the discharge. You need not complete Table C for the noted outfall <i>unless</i> you have quantitative data available.									
1. Antimony, Total (7440-36-0)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration						<input type="checkbox"/> Yes	<input type="checkbox"/> No
			Mass							
2. Arsenic, Total (7440-38-2)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Concentration	ug/L	<17	---	3 (NPDES Appl. for BRS)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/>	No
			Mass	lb/d	<0.2	---				
3. Beryllium, Total (7440-41-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/>	No
			Mass							
4. Cadmium, Total (7440-43-9)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/>	No
			Mass							
5. Chromium, Total (7440-47-3)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Concentration	ug/L	<10	---	3 (NPDES Info for BRS)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/>	No
			Mass	lb/d	<0.10	---				
6. Copper, Total (7440-50-8)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Concentration	ug/L	<2	---	3 (NPDES Appl. for BRS)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/>	No
			Mass	lb/d	<0.02	---				
7. Lead, Total (7439-92-1)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Concentration	ug/L	<6	---	3 (NPDES Info for BRS)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/>	No
			Mass	lb/d	<0.06	---				
8. Mercury, Total (7439-97-6)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/>	No
			Mass							
9. Nickel, Total (7440-02-0)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Concentration	ug/L	<30	---	3 (NPDES Info for BRS)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/>	No
			Mass	lb/d	<0.31	---				
10. Selenium, Total (7782-49-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/>	No
			Mass							
11. Silver, Total (7440-22-4)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/>	No
			Mass							
12. Thallium, Total (7440-28-0)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/>	No
			Mass							
13. Zinc, Total (7440-66-6)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Concentration	ug/L	<250	---	3 (NPDES Info for BRS)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/>	No
			Mass	lb/d	<2.6	---				
14. Cyanide, Total (57-12-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/>	No
			Mass							
15. Phenols, Total	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/>	No
			Mass							

¹ Sampling shall be conducted according to sufficiently sensitive test procedures (i.e., methods) approved under 40 CFR 136 for the analysis of pollutants or pollutant parameters or required under 40 CFR chapter I, subchapter N or O. See Instructions and 40 CFR 122.21(e)(3).

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TABLE D. ORGANIC TOXIC POLLUTANTS (Gas Chromatography/Mass Spectrometry or GC/MS Fractions) (40 CFR 122.21(k)(5)(iii)(B))¹

Pollutant (CAS Number, if available)	Presence or Absence (check one)		Estimated Data for Pollutants Expected to Be Present in Discharge (provide both concentration and mass estimates for each pollutant)					
	Believed Present	Believed Absent	Units	Effluent			Intake Water	
				Maximum Daily Discharge	Average Daily Discharge	Source of Information (use codes in instructions)	Believed Present? (check only one response per pollutant)	
<input type="checkbox"/>	Check here if all pollutants listed in Table D are expected to be absent from your facility's discharge.							
<input type="checkbox"/>	Check here if the facility believes it is exempt from Table D reporting requirements because it is a qualified small business. See the instructions for exemption criteria and for a list of materials you must attach to the application.							
Note: If you check either of the above boxes, you do not need to complete Table D for the noted outfall <i>unless</i> you have quantitative data available.								
1. Organic Toxic Pollutants (GC/MS Fraction—Volatile Compounds)								
1.1	Acrolein (107-02-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass				
1.2	Acrylonitrile (107-13-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass				
1.3	Benzene (71-43-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass				
1.4	Bromoform (75-25-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass				
1.5	Carbon tetrachloride (56-23-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass				
1.6	Chlorobenzene (108-90-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass				
1.7	Chlorodibromomethane (124-48-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass				
1.8	Chloroethane (75-00-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass				
1.9	2-chloroethylvinyl ether (110-75-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass				
1.10	Chloroform (67-66-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass				
1.11	Dichlorobromomethane (75-27-4)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass				

TABLE D. ORGANIC TOXIC POLLUTANTS (Gas Chromatography/Mass Spectrometry or GC/MS Fractions) (40 CFR 122.21(k)(5)(iii)(B))¹

Pollutant (CAS Number, if available)		Presence or Absence (check one)		Estimated Data for Pollutants Expected to Be Present in Discharge (provide both concentration and mass estimates for each pollutant)						
		Believed Present	Believed Absent	Units	Effluent			Intake Water		
					Maximum Daily Discharge	Average Daily Discharge	Source of Information (use codes in instructions)	Believed Present? (check only one response per pollutant)		
1.12	1,1-dichloroethane (75-34-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
1.13	1,2-dichloroethane (107-06-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
1.14	1,1-dichloroethylene (75-35-4)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
1.15	1,2-dichloropropane (78-87-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
1.16	1,3-dichloropropylene (542-75-6)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
1.17	Ethylbenzene (100-41-4)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
1.18	Methyl bromide (74-83-9)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
1.19	Methyl chloride (74-87-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
1.20	Methylene chloride (75-09-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
1.21	1,1,2,2-tetrachloroethane (79-34-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
1.22	Tetrachloroethylene (127-18-4)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Concentration	ug/L	<10	---	3 (Appl. for BRS)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
				Mass	lb/d	<0.10				
1.23	Toluene (108-88-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
1.24	1,2-trans-dichloroethylene (156-60-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						

TABLE D. ORGANIC TOXIC POLLUTANTS (Gas Chromatography/Mass Spectrometry or GC/MS Fractions) (40 CFR 122.21(k)(5)(iii)(B))¹

Pollutant (CAS Number, if available)	Presence or Absence (check one)		Estimated Data for Pollutants Expected to Be Present in Discharge (provide both concentration and mass estimates for each pollutant)					
	Believed Present	Believed Absent	Units	Effluent			Intake Water	
				Maximum Daily Discharge	Average Daily Discharge	Source of Information (use codes in instructions)	Believed Present? (check only one response per pollutant)	
1.25 1,1,1-trichloroethane (71-55-6)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
1.26 1,1,2-trichloroethane (79-00-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
1.27 Trichloroethylene (79-01-6)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
1.28 Vinyl chloride (75-01-4)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
2. Organic Toxic Pollutants (GC/MS Fraction—Acid Compounds)								
2.1 2-chlorophenol (95-57-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
2.2 2,4-dichlorophenol (120-83-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
2.3 2,4-dimethylphenol (105-67-9)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
2.4 4,6-dinitro-o-cresol (534-52-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
2.5 2,4-dinitrophenol (51-28-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
2.6 2-nitrophenol (88-75-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
2.7 4-nitrophenol (100-02-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
2.8 p-chloro-m-cresol (59-50-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
2.9 Pentachlorophenol (87-86-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					

TABLE D. ORGANIC TOXIC POLLUTANTS (Gas Chromatography/Mass Spectrometry or GC/MS Fractions) (40 CFR 122.21(k)(5)(iii)(B))¹

Pollutant (CAS Number, if available)	Presence or Absence (check one)		Estimated Data for Pollutants Expected to Be Present in Discharge (provide both concentration and mass estimates for each pollutant)				
	Believed Present	Believed Absent	Units	Effluent			Intake Water
				Maximum Daily Discharge	Average Daily Discharge	Source of Information (use codes in instructions)	Believed Present? (check only one response per pollutant)
2.10 Phenol (108-95-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
2.11 2,4,6-trichlorophenol (88-05-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3. Organic Toxic Pollutants (GC/MS Fraction—Base /Neutral Compounds)							
3.1 Acenaphthene (83-32-9)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.2 Acenaphthylene (208-96-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.3 Anthracene (120-12-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.4 Benzidine (92-87-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.5 Benzo (a) anthracene (56-55-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.6 Benzo (a) pyrene (50-32-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.7 3,4-benzofluoranthene (205-99-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.8 Benzo (ghi) perylene (191-24-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.9 Benzo (k) fluoranthene (207-08-9)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.10 Bis (2-chloroethoxy) methane (111-91-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.11 Bis (2-chloroethyl) ether (111-44-4)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				

TABLE D. ORGANIC TOXIC POLLUTANTS (Gas Chromatography/Mass Spectrometry or GC/MS Fractions) (40 CFR 122.21(k)(5)(iii)(B))¹

Pollutant (CAS Number, if available)	Presence or Absence (check one)		Estimated Data for Pollutants Expected to Be Present in Discharge (provide both concentration and mass estimates for each pollutant)				
	Believed Present	Believed Absent	Units	Effluent			Intake Water
				Maximum Daily Discharge	Average Daily Discharge	Source of Information (use codes in instructions)	Believed Present? (check only one response per pollutant)
3.12 Bis (2-chloroisopropyl) ether (102-80-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.13 Bis (2-ethylhexyl) phthalate (117-81-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.14 4-bromophenyl phenyl ether (101-55-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.15 Butyl benzyl phthalate (85-68-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.16 2-chloronaphthalene (91-58-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.17 4-chlorophenyl phenyl ether (7005-72-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.18 Chrysene (218-01-9)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.19 Dibenzo (a,h) anthracene (53-70-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.20 1,2-dichlorobenzene (95-50-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.21 1,3-dichlorobenzene (541-73-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.22 1,4-dichlorobenzene (106-46-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.23 3,3-dichlorobenzidine (91-94-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.24 Diethyl phthalate (84-66-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.25 Dimethyl phthalate (131-11-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				

TABLE D. ORGANIC TOXIC POLLUTANTS (Gas Chromatography/Mass Spectrometry or GC/MS Fractions) (40 CFR 122.21(k)(5)(iii)(B))¹

Pollutant (CAS Number, if available)	Presence or Absence (check one)		Estimated Data for Pollutants Expected to Be Present in Discharge (provide both concentration and mass estimates for each pollutant)					
	Believed Present	Believed Absent	Units	Effluent			Intake Water	
				Maximum Daily Discharge	Average Daily Discharge	Source of Information (use codes in instructions)	Believed Present? (check only one response per pollutant)	
3.26 Di-n-butyl phthalate (84-74-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No	
			Mass					
3.27 2,4-dinitrotoluene (121-14-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No	
			Mass					
3.28 2,6-dinitrotoluene (606-20-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No	
			Mass					
3.29 Di-n-octyl phthalate (117-84-0)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No	
			Mass					
3.30 1,2-diphenylhydrazine (as azobenzene) (122-66-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No	
			Mass					
3.31 Fluoranthene (206-44-0)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No	
			Mass					
3.32 Fluorene (86-73-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No	
			Mass					
3.33 Hexachlorobenzene (118-74-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No	
			Mass					
3.34 Hexachlorobutadiene (87-68-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No	
			Mass					
3.35 Hexachlorocyclopentadiene (77-47-4)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No	
			Mass					
3.36 Hexachloroethane (67-72-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No	
			Mass					
3.37 Indeno (1,2,3-cd) pyrene (193-39-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No	
			Mass					
3.38 Isophorone (78-59-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No	
			Mass					
3.39 Naphthalene (91-20-3)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Concentration	ug/L	<10	---	3 (Appl. for BRS)	
			Mass	lb/d	<0.10	---		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

TABLE D. ORGANIC TOXIC POLLUTANTS (Gas Chromatography/Mass Spectrometry or GC/MS Fractions) (40 CFR 122.21(k)(5)(iii)(B))¹

Pollutant (CAS Number, if available)	Presence or Absence (check one)		Estimated Data for Pollutants Expected to Be Present in Discharge (provide both concentration and mass estimates for each pollutant)				
	Believed Present	Believed Absent	Units	Effluent			Intake Water
				Maximum Daily Discharge	Average Daily Discharge	Source of Information (use codes in instructions)	Believed Present? (check only one response per pollutant)
3.40 Nitrobenzene (98-95-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.41 N-nitrosodimethylamine (62-75-9)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.42 N-nitrosodi-n-propylamine (621-64-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.43 N-nitrosodiphenylamine (86-30-6)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.44 Phenanthrene (85-01-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.45 Pyrene (129-00-0)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.46 1,2,4-trichlorobenzene (120-82-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
4. Organic Toxic Pollutants (GC/MS Fraction—Pesticides)							
4.1. Aldrin (309-00-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
4.2 α-BHC (319-84-6)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
4.3 β-BHC (319-85-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
4.4 γ-BHC (58-89-9)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
4.5 δ-BHC (319-86-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
4.6 Chlordane (57-74-9)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				

EPA Identification Number

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Exploratory Ventures, LLCOutfall Number
EV201Form Approved 03/05/19
OMB No. 2040-0004**TABLE D. ORGANIC TOXIC POLLUTANTS (Gas Chromatography/Mass Spectrometry or GC/MS Fractions) (40 CFR 122.21(k)(5)(iii)(B))¹**

Pollutant (CAS Number, if available)		Presence or Absence (check one)		Estimated Data for Pollutants Expected to Be Present in Discharge (provide both concentration and mass estimates for each pollutant)					
		Believed Present	Believed Absent	Units	Effluent			Intake Water	
					Maximum Daily Discharge	Average Daily Discharge	Source of Information (use codes in instructions)	Believed Present? (check only one response per pollutant)	
4.7	4,4'-DDT (50-29-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass					
4.8	4,4'-DDE (72-55-9)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass					
4.9	4,4'-DDD (72-54-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass					
4.10	Dieldrin (60-57-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass					
4.11	α -endosulfan (115-29-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass					
4.12	β -endosulfan (115-29-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass					
4.13	Endosulfan sulfate (1031-07-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass					
4.14	Endrin (72-20-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass					
4.15	Endrin aldehyde (7421-93-4)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass					

TABLE D. ORGANIC TOXIC POLLUTANTS (Gas Chromatography/Mass Spectrometry or GC/MS Fractions) (40 CFR 122.21(k)(5)(iii)(B))¹

Pollutant (CAS Number, if available)	Presence or Absence (check one)		Estimated Data for Pollutants Expected to Be Present in Discharge (provide both concentration and mass estimates for each pollutant)				
	Believed Present	Believed Absent	Units	Effluent			Intake Water
				Maximum Daily Discharge	Average Daily Discharge	Source of Information (use codes in instructions)	Believed Present? (check only one response per pollutant)
4.16 Heptachlor (76-44-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
4.17 Heptachlor epoxide (1024-57-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
4.18 PCB-1242 (53469-21-9)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
4.19 PCB-1254 (11097-69-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
4.20 PCB-1221 (11104-28-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
4.21 PCB-1232 (11141-16-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
4.22 PCB-1248 (12672-29-6)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
4.23 PCB-1260 (11096-82-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
4.24 PCB-1016 (12674-11-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
4.25 Toxaphene (8001-35-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				

¹ Sampling shall be conducted according to sufficiently sensitive test procedures (i.e., methods) approved under 40 CFR 136 for the analysis of pollutants or pollutant parameters or required under 40 CFR chapter I, subchapter N or O. See instructions and 40 CFR 122.21(e)(3).

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TABLE E. CERTAIN HAZARDOUS SUBSTANCES AND ASBESTOS (40 CFR 122.21(k)(5)(v))¹

Pollutant	Presence or Absence (check one)		Reason Pollutant Believed Present in Discharge	Available Quantitative Data (specify units)
	Believed Present	Believed Absent		
<input checked="" type="checkbox"/>	Check (✓) here if you believe all pollutants listed to be absent from the discharge. You need not complete Table E for the noted outfall <i>unless</i> you have quantitative data available.			
1. Asbestos	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
2. Acetaldehyde	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
3. Allyl alcohol	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
4. Allyl chloride	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
5. Amyl acetate	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
6. Aniline	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
7. Benzonitrile	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
8. Benzyl chloride	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
9. Butyl acetate	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
10. Butylamine	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
11. Captan	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
12. Carbaryl	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
13. Carbofuran	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
14. Carbon disulfide	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
15. Chlorpyrifos	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
16. Coumaphos	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
17. Cresol	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
18. Crotonaldehyde	<input type="checkbox"/>	<input checked="" type="checkbox"/>		

TABLE E. CERTAIN HAZARDOUS SUBSTANCES AND ASBESTOS (40 CFR 122.21(k)(5)(v))¹

Pollutant	Presence or Absence (check one)		Reason Pollutant Believed Present in Discharge	Available Quantitative Data (specify units)
	Believed Present	Believed Absent		
19. Cyclohexane	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
20. 2,4-D (2,4-dichlorophenoxyacetic acid)	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
21. Diazinon	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
22. Dicamba	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
23. Dichlobenil	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
24. Dichlone	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
25. 2,2-dichloropropionic acid	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
26. Dichlorvos	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
27. Diethyl amine	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
28. Dimethyl amine	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
29. Dinitrobenzene	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
30. Diquat	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
31. Disulfoton	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
32. Diuron	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
33. Epichlorohydrin	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
34. Ethion	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
35. Ethylene diamine	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
36. Ethylene dibromide	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
37. Formaldehyde	<input type="checkbox"/>	<input checked="" type="checkbox"/>		

TABLE E. CERTAIN HAZARDOUS SUBSTANCES AND ASBESTOS (40 CFR 122.21(k)(5)(v))¹

Pollutant	Presence or Absence (check one)		Reason Pollutant Believed Present in Discharge	Available Quantitative Data (specify units)
	Believed Present	Believed Absent		
38. Furfural	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
39. Guthion	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
40. Isoprene	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
41. Isopropanolamine	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
42. Kelthane	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
43. Kepone	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
44. Malathion	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
45. Mercaptodimethur	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
46. Methoxychlor	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
47. Methyl mercaptan	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
48. Methyl methacrylate	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
49. Methyl parathion	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
50. Mevinphos	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
51. Mexacarbate	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
52. Monoethyl amine	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
53. Monomethyl amine	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
54. Naled	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
55. Naphthenic acid	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
56. Nitrotoluene	<input type="checkbox"/>	<input checked="" type="checkbox"/>		

TABLE E. CERTAIN HAZARDOUS SUBSTANCES AND ASBESTOS (40 CFR 122.21(k)(5)(v))¹

Pollutant	Presence or Absence (check one)		Reason Pollutant Believed Present in Discharge	Available Quantitative Data (specify units)
	Believed Present	Believed Absent		
57. Parathion	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
58. Phenolsulfonate	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
59. Phosgene	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
60. Propargite	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
61. Propylene oxide	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
62. Pyrethrins	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
63. Quinoline	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
64. Resorcinol	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
65. Strontium	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
66. Strychnine	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
67. Styrene	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
68. 2,4,5-T (2,4,5-trichlorophenoxyacetic acid)	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
69. TDE (tetrachlorodiphenyl ethane)	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
70. 2,4,5-TP [2-(2,4,5-trichlorophenoxy) propanoic acid]	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
71. Trichlorofon	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
72. Triethanolamine	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
73. Triethylamine	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
74. Trimethylamine	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
75. Uranium	<input type="checkbox"/>	<input checked="" type="checkbox"/>		

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TABLE E. CERTAIN HAZARDOUS SUBSTANCES AND ASBESTOS (40 CFR 122.21(k)(5)(v))¹

Pollutant	Presence or Absence (check one)		Reason Pollutant Believed Present in Discharge	Available Quantitative Data (specify units)
	Believed Present	Believed Absent		
76. Vanadium	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
77. Vinyl acetate	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
78. Xylene	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
79. Xylenol	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
80. Zirconium	<input type="checkbox"/>	<input checked="" type="checkbox"/>		

¹ Sampling shall be conducted according to sufficiently sensitive test procedures (i.e., methods) approved under 40 CFR 136 for the analysis of pollutants or pollutant parameters or required under 40 CFR chapter I, subchapter N or O. See instructions and 40 CFR 122.21(e)(3).

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TABLE A. CONVENTIONAL AND NON CONVENTIONAL PARAMETER ESTIMATES (40 CFR 122.21(k)(5)(i)) ¹									
Pollutant	Waiver Requested (if applicable)	Units		Effluent Data			Intake Water		
				Maximum Daily Discharge (required)	Average Daily Discharge (if available)	Source of Information (use codes in instructions)	Believed Present? (check only one response per parameter)		
<input type="checkbox"/> Check here if you have applied to your NPDES authority for a waiver for <i>all</i> of the pollutants listed on this table for the noted outfall.									
1.	Biochemical oxygen demand (BOD ₅)	<input type="checkbox"/>	Concentration	mg/L	<5	---	3 (NPDES Permit Appl. for BRS)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
			Mass	lb/d	<75	---	(Same)		
2.	Chemical oxygen demand (COD)	<input type="checkbox"/>	Concentration	mg/L	<15	---	3 (NPDES Permit Appl. for BRS)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
			Mass	lb/d	<225	---	(Same)		
3.	Total organic carbon (TOC)	<input type="checkbox"/>	Concentration	mg/L	<2.5	---	3 (NPDES Permit Appl. for BRS)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
			Mass	lb/d	<38	---	(Same)		
4.	Total suspended solids (TSS)	<input type="checkbox"/>	Concentration	mg/L	<120	---	3 (NPDES Permit Info for BRS)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
			Mass	lb/d	<1,801	---	(Same)		
5.	Ammonia (as N)	<input type="checkbox"/>	Concentration	mg/L	<0.3	---	3 (NPDES Permit Appl. for BRS)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
			Mass	lb/d	<5	---	(Same)		
6.	Flow	<input type="checkbox"/>	Rate	MGD	<1.800	---	4 (Best Professional Estimate)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
7.	Temperature (winter)	<input type="checkbox"/>	°C	°C	4.4	---	3 (NPDES Permit Appl. for BRS)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
	Temperature (summer)	<input type="checkbox"/>	°C	°C	21.1	---	(Same)		
8.	pH (minimum)	<input type="checkbox"/>	Standard units	s.u.	6.9	---	3 (NPDES Permit Info for BRS)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
	pH (maximum)	<input type="checkbox"/>	Standard units	s.u.	8.9	---	(Same)		

¹ Sampling shall be conducted according to sufficiently sensitive test procedures (i.e., methods) approved under 40 CFR 136 for the analysis of pollutants or pollutant parameters or required under 40 CFR chapter I, subchapter N or O. See instructions and 40 CFR 122.21(e)(3).

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TABLE B. CERTAIN CONVENTIONAL AND NON CONVENTIONAL POLLUTANTS (40 CFR 122.21(k)(5)(ii))¹

Pollutant	Presence or Absence (check one)		Estimated Data for Pollutants Expected to be Present or Limited by an ELG (Provide both concentration and mass estimates for each pollutant.)					
	Believed Present	Believed Absent	Effluent				Intake Water	
			Units	Maximum Daily Discharge (required)	Average Daily Discharge (if available)	Source of Information (use codes in instructions)	Believed Present? (check only one response per item)	
<input type="checkbox"/>	Check (✓) here if you believe all pollutants listed to be absent from the discharge. You need not complete Table B for the noted outfall <i>unless</i> you have quantitative data available.							
1. Bromide (24959-67-9)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
2. Chlorine, total residual	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
3. Color	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
4. Fecal coliform	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
5. Fluoride (16984-48-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
6. Nitrate-nitrite	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
7. Nitrogen, total organic (as N)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
8. Oil and grease	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Concentration	mg/L	<10 +	--- +	3 (NPDES Info for BRS)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
			Mass	lb/d	<150 +	--- +		
9. Phosphorus (as P), total (7723-14-0)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
			Mass					
10. Sulfate (as SO ₄) (14808-79-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
11. Sulfide (as S)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					

TABLE B. CERTAIN CONVENTIONAL AND NON CONVENTIONAL POLLUTANTS (40 CFR 122.21(k)(5)(ii))¹

Pollutant		Presence or Absence (check one)		Estimated Data for Pollutants Expected to be Present or Limited by an ELG (Provide both concentration and mass estimates for each pollutant.)					Intake Water Believed Present? (check only one response per item)	
		Believed Present	Believed Absent	Effluent			Source of Information (use codes in instructions)			
				Units	Maximum Daily Discharge (required)	Average Daily Discharge (if available)				
12.	Sulfite (as SO ₃) (14265-45-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No	
				Mass						
13.	Surfactants	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No	
				Mass						
14.	Aluminum, total (7429-90-5)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Concentration	mg/L <input checked="" type="checkbox"/>	<4.2 <input checked="" type="checkbox"/>	--- <input checked="" type="checkbox"/>	3 (NPDES Appl. for BRS)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
				Mass	lb/d <input checked="" type="checkbox"/>	<63 <input checked="" type="checkbox"/>	---- <input checked="" type="checkbox"/>			
15.	Barium, total (7440-39-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No	
				Mass						
16.	Boron, total (7440-42-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No	
				Mass						
17.	Cobalt, total (7440-48-4)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No	
				Mass						
18.	Iron, total (7439-89-6)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Concentration	mg/L <input checked="" type="checkbox"/>	<0.16 <input checked="" type="checkbox"/>	--- <input checked="" type="checkbox"/>	3 (NPDES Appl. for BRS)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
				Mass	lb/d <input checked="" type="checkbox"/>	<2.4 <input checked="" type="checkbox"/>	--- <input checked="" type="checkbox"/>			
19.	Magnesium, total (7439-95-4)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No	
				Mass						
20.	Molybdenum, total (7439-98-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No	
				Mass						
21.	Manganese, total (7439-96-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No	
				Mass						
22.	Tin, total (7440-31-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No	
				Mass						

EPA Identification Number	Facility Name Exploratory Ventures, LLC	Outfall Number EV202
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Form Approved 03/05/19
OMB No. 2040-0004

TABLE B. CERTAIN CONVENTIONAL AND NON CONVENTIONAL POLLUTANTS (40 CFR 122.21(k)(5)(ii)) ¹										
Pollutant		Presence or Absence (check one)		Estimated Data for Pollutants Expected to be Present or Limited by an ELG (Provide both concentration and mass estimates for each pollutant.)						
		Believed Present	Believed Absent	Effluent				Intake Water		
				Units	Maximum Daily Discharge (required)	Average Daily Discharge (if available)	Source of Information (use codes in instructions)	Believed Present? (check only one response per item)		
23.	Titanium, total (7440-32-6)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
24.	Radioactivity									
24.1	Alpha, total	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
24.2	Beta, total	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
24.3.	Radium, total	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
24.4	Radium 226, total	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						

¹ Sampling shall be conducted according to sufficiently sensitive test procedures (i.e., methods) approved under 40 CFR 136 for the analysis of pollutants or pollutant parameters or required under 40 CFR chapter I, subchapter N or O. See instructions and 40 CFR 122.21(e)(3).

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TABLE C. TOXIC METALS, TOTAL CYANIDE, AND TOTAL PHENOLS (40 CFR 122.21(k)(5)(iii)(A))¹

Pollutant (CAS Number, if available)	Presence or Absence (check one)		Estimated Data for Pollutants Expected to be Present in Discharge (Provide both concentration and mass estimates for each pollutant.)							
	Believed Present	Believed Absent	Effluent				Intake Water			
			Units	Maximum Daily Discharge (required)	Average Daily Discharge (if available)	Source of Information (Use codes in Instructions.)	Believed Present? (Check only one response per pollutant.)			
<input checked="" type="checkbox"/>	Check (✓) here if you believe all pollutants listed to be absent from the discharge. You need not complete Table C for the noted outfall <i>unless</i> you have quantitative data available.									
1. Antimony, Total (7440-36-0)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration						<input type="checkbox"/> Yes	<input type="checkbox"/> No
			Mass							
2. Arsenic, Total (7440-38-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration						<input type="checkbox"/> Yes	<input type="checkbox"/> No
			Mass							
3. Beryllium, Total (7440-41-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration						<input type="checkbox"/> Yes	<input type="checkbox"/> No
			Mass							
4. Cadmium, Total (7440-43-9)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration						<input type="checkbox"/> Yes	<input type="checkbox"/> No
			Mass							
5. Chromium, Total (7440-47-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration						<input type="checkbox"/> Yes	<input type="checkbox"/> No
			Mass							
6. Copper, Total (7440-50-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration						<input type="checkbox"/> Yes	<input type="checkbox"/> No
			Mass							
7. Lead, Total (7439-92-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration						<input type="checkbox"/> Yes	<input type="checkbox"/> No
			Mass							
8. Mercury, Total (7439-97-6)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration						<input type="checkbox"/> Yes	<input type="checkbox"/> No
			Mass							
9. Nickel, Total (7440-02-0)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration						<input type="checkbox"/> Yes	<input type="checkbox"/> No
			Mass							
10. Selenium, Total (7782-49-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration						<input type="checkbox"/> Yes	<input type="checkbox"/> No
			Mass							
11. Silver, Total (7440-22-4)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration						<input type="checkbox"/> Yes	<input type="checkbox"/> No
			Mass							
12. Thallium, Total (7440-28-0)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration						<input type="checkbox"/> Yes	<input type="checkbox"/> No
			Mass							
13. Zinc, Total (7440-66-6)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration						<input type="checkbox"/> Yes	<input type="checkbox"/> No
			Mass							
14. Cyanide, Total (57-12-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration						<input type="checkbox"/> Yes	<input type="checkbox"/> No
			Mass							
15. Phenols, Total	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration						<input type="checkbox"/> Yes	<input type="checkbox"/> No
			Mass							

¹ Sampling shall be conducted according to sufficiently sensitive test procedures (i.e., methods) approved under 40 CFR 136 for the analysis of pollutants or pollutant parameters or required under 40 CFR chapter I, subchapter N or O. See Instructions and 40 CFR 122.21(e)(3).

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TABLE D. ORGANIC TOXIC POLLUTANTS (Gas Chromatography/Mass Spectrometry or GC/MS Fractions) (40 CFR 122.21(k)(5)(iii)(B))¹

Pollutant (CAS Number, if available)	Presence or Absence (check one)		Estimated Data for Pollutants Expected to Be Present in Discharge (provide both concentration and mass estimates for each pollutant)					
	Believed Present	Believed Absent	Units	Effluent			Intake Water	
				Maximum Daily Discharge	Average Daily Discharge	Source of Information (use codes in instructions)	Believed Present? (check only one response per pollutant)	
<input checked="" type="checkbox"/>	Check here if all pollutants listed in Table D are expected to be absent from your facility's discharge.							
<input type="checkbox"/>	Check here if the facility believes it is exempt from Table D reporting requirements because it is a qualified small business. See the instructions for exemption criteria and for a list of materials you must attach to the application.							
Note: If you check either of the above boxes, you do not need to complete Table D for the noted outfall <i>unless</i> you have quantitative data available.								
1. Organic Toxic Pollutants (GC/MS Fraction—Volatile Compounds)								
1.1	Acrolein (107-02-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass				
1.2	Acrylonitrile (107-13-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass				
1.3	Benzene (71-43-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass				
1.4	Bromoform (75-25-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass				
1.5	Carbon tetrachloride (56-23-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass				
1.6	Chlorobenzene (108-90-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass				
1.7	Chlorodibromomethane (124-48-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass				
1.8	Chloroethane (75-00-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass				
1.9	2-chloroethylvinyl ether (110-75-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass				
1.10	Chloroform (67-66-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass				
1.11	Dichlorobromomethane (75-27-4)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass				

TABLE D. ORGANIC TOXIC POLLUTANTS (Gas Chromatography/Mass Spectrometry or GC/MS Fractions) (40 CFR 122.21(k)(5)(iii)(B))¹

Pollutant (CAS Number, if available)		Presence or Absence (check one)		Estimated Data for Pollutants Expected to Be Present in Discharge (provide both concentration and mass estimates for each pollutant)						
		Believed Present	Believed Absent	Units	Effluent			Intake Water		
					Maximum Daily Discharge	Average Daily Discharge	Source of Information (use codes in instructions)	Believed Present? (check only one response per pollutant)		
1.12	1,1-dichloroethane (75-34-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
1.13	1,2-dichloroethane (107-06-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
1.14	1,1-dichloroethylene (75-35-4)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
1.15	1,2-dichloropropane (78-87-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
1.16	1,3-dichloropropylene (542-75-6)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
1.17	Ethylbenzene (100-41-4)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
1.18	Methyl bromide (74-83-9)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
1.19	Methyl chloride (74-87-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
1.20	Methylene chloride (75-09-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
1.21	1,1,2,2-tetrachloroethane (79-34-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
1.22	Tetrachloroethylene (127-18-4)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
1.23	Toluene (108-88-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						
1.24	1,2-trans-dichloroethylene (156-60-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes	<input type="checkbox"/> No
				Mass						

TABLE D. ORGANIC TOXIC POLLUTANTS (Gas Chromatography/Mass Spectrometry or GC/MS Fractions) (40 CFR 122.21(k)(5)(iii)(B))¹

Pollutant (CAS Number, if available)	Presence or Absence (check one)		Estimated Data for Pollutants Expected to Be Present in Discharge (provide both concentration and mass estimates for each pollutant)					
	Believed Present	Believed Absent	Units	Effluent			Intake Water	
				Maximum Daily Discharge	Average Daily Discharge	Source of Information (use codes in instructions)	Believed Present? (check only one response per pollutant)	
1.25 1,1,1-trichloroethane (71-55-6)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
1.26 1,1,2-trichloroethane (79-00-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
1.27 Trichloroethylene (79-01-6)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
1.28 Vinyl chloride (75-01-4)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
2. Organic Toxic Pollutants (GC/MS Fraction—Acid Compounds)								
2.1 2-chlorophenol (95-57-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
2.2 2,4-dichlorophenol (120-83-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
2.3 2,4-dimethylphenol (105-67-9)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
2.4 4,6-dinitro-o-cresol (534-52-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
2.5 2,4-dinitrophenol (51-28-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
2.6 2-nitrophenol (88-75-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
2.7 4-nitrophenol (100-02-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
2.8 p-chloro-m-cresol (59-50-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					
2.9 Pentachlorophenol (87-86-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass					

TABLE D. ORGANIC TOXIC POLLUTANTS (Gas Chromatography/Mass Spectrometry or GC/MS Fractions) (40 CFR 122.21(k)(5)(iii)(B))¹

Pollutant (CAS Number, if available)	Presence or Absence (check one)		Estimated Data for Pollutants Expected to Be Present in Discharge (provide both concentration and mass estimates for each pollutant)				
	Believed Present	Believed Absent	Units	Effluent			Intake Water
				Maximum Daily Discharge	Average Daily Discharge	Source of Information (use codes in instructions)	Believed Present? (check only one response per pollutant)
2.10 Phenol (108-95-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
2.11 2,4,6-trichlorophenol (88-05-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3. Organic Toxic Pollutants (GC/MS Fraction—Base /Neutral Compounds)							
3.1 Acenaphthene (83-32-9)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.2 Acenaphthylene (208-96-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.3 Anthracene (120-12-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.4 Benzidine (92-87-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.5 Benzo (a) anthracene (56-55-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.6 Benzo (a) pyrene (50-32-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.7 3,4-benzofluoranthene (205-99-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.8 Benzo (ghi) perylene (191-24-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.9 Benzo (k) fluoranthene (207-08-9)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.10 Bis (2-chloroethoxy) methane (111-91-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.11 Bis (2-chloroethyl) ether (111-44-4)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				

TABLE D. ORGANIC TOXIC POLLUTANTS (Gas Chromatography/Mass Spectrometry or GC/MS Fractions) (40 CFR 122.21(k)(5)(iii)(B))¹

Pollutant (CAS Number, if available)	Presence or Absence (check one)		Estimated Data for Pollutants Expected to Be Present in Discharge (provide both concentration and mass estimates for each pollutant)				
	Believed Present	Believed Absent	Units	Effluent			Intake Water
				Maximum Daily Discharge	Average Daily Discharge	Source of Information (use codes in instructions)	Believed Present? (check only one response per pollutant)
3.12 Bis (2-chloroisopropyl) ether (102-80-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.13 Bis (2-ethylhexyl) phthalate (117-81-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.14 4-bromophenyl phenyl ether (101-55-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.15 Butyl benzyl phthalate (85-68-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.16 2-chloronaphthalene (91-58-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.17 4-chlorophenyl phenyl ether (7005-72-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.18 Chrysene (218-01-9)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.19 Dibenzo (a,h) anthracene (53-70-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.20 1,2-dichlorobenzene (95-50-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.21 1,3-dichlorobenzene (541-73-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.22 1,4-dichlorobenzene (106-46-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.23 3,3-dichlorobenzidine (91-94-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.24 Diethyl phthalate (84-66-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.25 Dimethyl phthalate (131-11-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				

TABLE D. ORGANIC TOXIC POLLUTANTS (Gas Chromatography/Mass Spectrometry or GC/MS Fractions) (40 CFR 122.21(k)(5)(iii)(B))¹

Pollutant (CAS Number, if available)	Presence or Absence (check one)		Estimated Data for Pollutants Expected to Be Present in Discharge (provide both concentration and mass estimates for each pollutant)				
	Believed Present	Believed Absent	Units	Effluent			Intake Water
				Maximum Daily Discharge	Average Daily Discharge	Source of Information (use codes in instructions)	Believed Present? (check only one response per pollutant)
3.26 Di-n-butyl phthalate (84-74-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.27 2,4-dinitrotoluene (121-14-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.28 2,6-dinitrotoluene (606-20-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.29 Di-n-octyl phthalate (117-84-0)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.30 1,2-diphenylhydrazine (as azobenzene) (122-66-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.31 Fluoranthene (206-44-0)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.32 Fluorene (86-73-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.33 Hexachlorobenzene (118-74-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.34 Hexachlorobutadiene (87-68-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.35 Hexachlorocyclopentadiene (77-47-4)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.36 Hexachloroethane (67-72-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.37 Indeno (1,2,3-cd) pyrene (193-39-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.38 Isophorone (78-59-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.39 Naphthalene (91-20-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				

TABLE D. ORGANIC TOXIC POLLUTANTS (Gas Chromatography/Mass Spectrometry or GC/MS Fractions) (40 CFR 122.21(k)(5)(iii)(B))¹

Pollutant (CAS Number, if available)	Presence or Absence (check one)		Estimated Data for Pollutants Expected to Be Present in Discharge (provide both concentration and mass estimates for each pollutant)				
	Believed Present	Believed Absent	Units	Effluent			Intake Water
				Maximum Daily Discharge	Average Daily Discharge	Source of Information (use codes in instructions)	Believed Present? (check only one response per pollutant)
3.40 Nitrobenzene (98-95-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.41 N-nitrosodimethylamine (62-75-9)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.42 N-nitrosodi-n-propylamine (621-64-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.43 N-nitrosodiphenylamine (86-30-6)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.44 Phenanthrene (85-01-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.45 Pyrene (129-00-0)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
3.46 1,2,4-trichlorobenzene (120-82-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
4. Organic Toxic Pollutants (GC/MS Fraction—Pesticides)							
4.1. Aldrin (309-00-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
4.2 α-BHC (319-84-6)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
4.3 β-BHC (319-85-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
4.4 γ-BHC (58-89-9)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
4.5 δ-BHC (319-86-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				
4.6 Chlordane (57-74-9)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration				<input type="checkbox"/> Yes <input type="checkbox"/> No
			Mass				

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EV202Form Approved 03/05/19
OMB No. 2040-0004**TABLE D. ORGANIC TOXIC POLLUTANTS (Gas Chromatography/Mass Spectrometry or GC/MS Fractions) (40 CFR 122.21(k)(5)(iii)(B))¹**

Pollutant (CAS Number, if available)		Presence or Absence (check one)		Estimated Data for Pollutants Expected to Be Present in Discharge (provide both concentration and mass estimates for each pollutant)					
		Believed Present	Believed Absent	Units	Effluent			Intake Water	
					Maximum Daily Discharge	Average Daily Discharge	Source of Information (use codes in instructions)	Believed Present? (check only one response per pollutant)	
4.7	4,4'-DDT (50-29-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass					
4.8	4,4'-DDE (72-55-9)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass					
4.9	4,4'-DDD (72-54-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass					
4.10	Dieldrin (60-57-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass					
4.11	α -endosulfan (115-29-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass					
4.12	β -endosulfan (115-29-7)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass					
4.13	Endosulfan sulfate (1031-07-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass					
4.14	Endrin (72-20-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass					
4.15	Endrin aldehyde (7421-93-4)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass					

TABLE D. ORGANIC TOXIC POLLUTANTS (Gas Chromatography/Mass Spectrometry or GC/MS Fractions) (40 CFR 122.21(k)(5)(iii)(B))¹

Pollutant (CAS Number, if available)		Presence or Absence (check one)		Estimated Data for Pollutants Expected to Be Present in Discharge (provide both concentration and mass estimates for each pollutant)					
		Believed Present	Believed Absent	Units	Effluent			Intake Water	
					Maximum Daily Discharge	Average Daily Discharge	Source of Information (use codes in instructions)	Believed Present? (check only one response per pollutant)	
4.16	Heptachlor (76-44-8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass					
4.17	Heptachlor epoxide (1024-57-3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass					
4.18	PCB-1242 (53469-21-9)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass					
4.19	PCB-1254 (11097-69-1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass					
4.20	PCB-1221 (11104-28-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass					
4.21	PCB-1232 (11141-16-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass					
4.22	PCB-1248 (12672-29-6)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass					
4.23	PCB-1260 (11096-82-5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass					
4.24	PCB-1016 (12674-11-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass					
4.25	Toxaphene (8001-35-2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concentration					<input type="checkbox"/> Yes <input type="checkbox"/> No
				Mass					

¹ Sampling shall be conducted according to sufficiently sensitive test procedures (i.e., methods) approved under 40 CFR 136 for the analysis of pollutants or pollutant parameters or required under 40 CFR chapter I, subchapter N or O. See instructions and 40 CFR 122.21(e)(3).

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TABLE E. CERTAIN HAZARDOUS SUBSTANCES AND ASBESTOS (40 CFR 122.21(k)(5)(v))¹

Pollutant	Presence or Absence (check one)		Reason Pollutant Believed Present in Discharge	Available Quantitative Data (specify units)
	Believed Present	Believed Absent		
<input checked="" type="checkbox"/>	Check (✓) here if you believe all pollutants listed to be absent from the discharge. You need not complete Table E for the noted outfall <i>unless</i> you have quantitative data available.			
1. Asbestos	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
2. Acetaldehyde	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
3. Allyl alcohol	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
4. Allyl chloride	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
5. Amyl acetate	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
6. Aniline	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
7. Benzonitrile	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
8. Benzyl chloride	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
9. Butyl acetate	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
10. Butylamine	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
11. Captan	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
12. Carbaryl	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
13. Carbofuran	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
14. Carbon disulfide	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
15. Chlorpyrifos	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
16. Coumaphos	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
17. Cresol	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
18. Crotonaldehyde	<input type="checkbox"/>	<input checked="" type="checkbox"/>		

TABLE E. CERTAIN HAZARDOUS SUBSTANCES AND ASBESTOS (40 CFR 122.21(k)(5)(v))¹

Pollutant	Presence or Absence (check one)		Reason Pollutant Believed Present in Discharge	Available Quantitative Data (specify units)
	Believed Present	Believed Absent		
19. Cyclohexane	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
20. 2,4-D (2,4-dichlorophenoxyacetic acid)	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
21. Diazinon	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
22. Dicamba	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
23. Dichlobenil	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
24. Dichlone	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
25. 2,2-dichloropropionic acid	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
26. Dichlorvos	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
27. Diethyl amine	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
28. Dimethyl amine	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
29. Dinitrobenzene	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
30. Diquat	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
31. Disulfoton	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
32. Diuron	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
33. Epichlorohydrin	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
34. Ethion	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
35. Ethylene diamine	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
36. Ethylene dibromide	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
37. Formaldehyde	<input type="checkbox"/>	<input checked="" type="checkbox"/>		

TABLE E. CERTAIN HAZARDOUS SUBSTANCES AND ASBESTOS (40 CFR 122.21(k)(5)(v))¹

Pollutant	Presence or Absence (check one)		Reason Pollutant Believed Present in Discharge	Available Quantitative Data (specify units)
	Believed Present	Believed Absent		
38. Furfural	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
39. Guthion	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
40. Isoprene	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
41. Isopropanolamine	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
42. Kelthane	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
43. Kepone	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
44. Malathion	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
45. Mercaptodimethur	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
46. Methoxychlor	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
47. Methyl mercaptan	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
48. Methyl methacrylate	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
49. Methyl parathion	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
50. Mevinphos	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
51. Mexacarbate	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
52. Monoethyl amine	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
53. Monomethyl amine	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
54. Naled	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
55. Naphthenic acid	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
56. Nitrotoluene	<input type="checkbox"/>	<input checked="" type="checkbox"/>		

TABLE E. CERTAIN HAZARDOUS SUBSTANCES AND ASBESTOS (40 CFR 122.21(k)(5)(v))¹

Pollutant	Presence or Absence (check one)		Reason Pollutant Believed Present in Discharge	Available Quantitative Data (specify units)
	Believed Present	Believed Absent		
57. Parathion	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
58. Phenolsulfonate	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
59. Phosgene	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
60. Propargite	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
61. Propylene oxide	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
62. Pyrethrins	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
63. Quinoline	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
64. Resorcinol	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
65. Strontium	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
66. Strychnine	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
67. Styrene	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
68. 2,4,5-T (2,4,5-trichlorophenoxyacetic acid)	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
69. TDE (tetrachlorodiphenyl ethane)	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
70. 2,4,5-TP [2-(2,4,5-trichlorophenoxy) propanoic acid]	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
71. Trichlorofon	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
72. Triethanolamine	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
73. Triethylamine	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
74. Trimethylamine	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
75. Uranium	<input type="checkbox"/>	<input checked="" type="checkbox"/>		

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TABLE E. CERTAIN HAZARDOUS SUBSTANCES AND ASBESTOS (40 CFR 122.21(k)(5)(v))¹

Pollutant	Presence or Absence (check one)		Reason Pollutant Believed Present in Discharge	Available Quantitative Data (specify units)
	Believed Present	Believed Absent		
76. Vanadium	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
77. Vinyl acetate	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
78. Xylene	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
79. Xylenol	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
80. Zirconium	<input type="checkbox"/>	<input checked="" type="checkbox"/>		

¹ Sampling shall be conducted according to sufficiently sensitive test procedures (i.e., methods) approved under 40 CFR 136 for the analysis of pollutants or pollutant parameters or required under 40 CFR chapter I, subchapter N or O. See instructions and 40 CFR 122.21(e)(3).

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EPA Form 2D
Notes and Comments

- (1). Item 3.1, Treatment Units: The manufacturing operations and equipment that contribute to the process wastewater discharge (Outfall EV201) are identified in the following Table 2D-1. The process wastewater treatment units are listed in Table 2D-2.

The treatment operations associated with the slag yard pond are identified in Table 2D-2.

- (2). Item 4.1, Line Drawing of Wastewater System: A line drawing showing the water flow through the facility is provided as Figure H-1 in Section H.

- (3). Item 5.1, Intermittent Flows: Refer to Table 2D-1 for information on the intermittent wastewater streams that are discharged to the process wastewater treatment system (Outfall EV201). The volume of quench water intermittently generated in the slag yard (Outfall EV202) is an estimated value based on engineering calculations and best professional judgement.

- (4). Item 6.4, Average Production Values: The anticipated actual average daily production values expected in the first three years of operation are summarized in Table 2D-3. The values are expressed in 1,000 pounds per day, which is the unit of measure used in the applicable ELG subparts.

- (5). Item 7.0, Effluent Characteristics: The estimated maximum concentration values for the process wastewater discharge (Outfall EV201) are based on actual monitoring data collected at the Big River Steel facility in 2021 and 2022. The mass discharge values are based on a flow rate of 1.250 MGD, which is the design flow rate.

The estimated maximum concentration values for the slag yard discharge (Outfall EV202) are based on actual monitoring data collected at the Big River Steel facility in 2021 and 2022. The mass discharge values are based on a flow rate of 1.800 MGD, which is the approximate capacity of the slag yard pond. It was assumed that the contents of the entire pond were discharged in a single day.

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Table 2D-1 – EPA Form 2D, Section 3.1 – Summary of Wastewater Streams Discharged to Treatment System (Outfall EV201)

Effluent Type	Process Area	Average Flow (m ³ /hr)	Maximum Flow (m ³ /hr)	Frequency	Influent Characteristics and/or Comments
Segment Shop, Roll Cooling Sump, and Sump Pits	ESP	9	45	Continuous	–
Entry Section	CGL	–	1	Intermittent	Oil-Contaminated Wastewater
Entry Looper	CGL	–	1	Intermittent	Oil-Contaminated Wastewater
Pre-Degreasing Section	CGL	3	4	Continuous	Alkaline Wastewater (water partly reused for refilling of alkaline section)
Degreasing Section	CGL	4	5	Continuous	Alkaline Wastewater (water partly reused for refilling of alkaline section)
Furnace	CGL	–	15	Intermittent	Cooling Water and Demineralized Water
Cooling Tower	CGL	–	10	Intermittent	Wastewater may Contain Iron Fines and TSS
Galvanizing Section	CGL	0	1	Intermittent	–
Skin Pass Mill (Rinse After SPM)	CGL	10	15	Continuous	Wastewater may Contain TSS including Aluminum, Zinc, and Iron Fines; also, Oil from Process
Rinse After SPM	CGL	0.2	1	Continuous	–
Tension Leveler	CGL	–	0.8	Intermittent	–
Exit Looper	CGL	–	1	Intermittent	Wastewater Contaminated with Oil

Effluent Type	Process Area	Average Flow (m ³ /hr)	Maximum Flow (m ³ /hr)	Frequency	Influent Characteristics and/or Comments
Exit Section	CGL	-	1	Intermittent	Wastewater Contaminated with Oil
Pre-Degreasing Section	CGL	1	3-10	Intermittent	Alkaline Wastewater Contaminated with Oil
Degreasing Section	CGL	1.5	3-10	Intermittent	Alkaline Wastewater Contaminated with Oil
Post Treatment	CGL	-	-	Intermittent	Flow Depends on Coating Media and Frequency of Media Changes
Pickling Section Waste Acid	PGL	9.2	25	Continuous	Acidic Wastewater Containing Iron (continuously discharged to acid tank farm)
Rinsing Section Waste Rinse Water (Acid Contamination)	PGL	7	25	Continuous	Acidic Wastewater Containing Iron (continuously discharged to acid tank farm)
Sump Pit	PGL	1.5	15	Intermittent	Acidic Wastewater Containing Iron
Water Quench, Sump Pit	PGL	5	10	Continuous	-
Entry Section, Sump Pit	PGL	5	10	Intermittent	Oil-Contaminated Wastewater (discharged from mobile pump during an emergency)
ISPM (SGS)	PGL	10	30	Intermittent	Wastewater Contaminated with Oil
Mechanical Equipment	PGL	1.5	6	Intermittent	Wastewater Contaminated with Oil

Effluent Type	Process Area	Average Flow (m ³ /hr)	Maximum Flow (m ³ /hr)	Frequency	Influent Characteristics and/or Comments
Rinsing Section, Waste Rinse Water	PLTCM	7	25	Continuous	Acidic Wastewater Containing Iron (continuously discharged to acid tank farm)
Pickling Section Sump Pit	PLTCM	1.5	15	Intermittent	Acidic Wastewater Containing Iron
TCM, Emulsion System	PLTCM	-	240	Intermittent	Wastewater from Emulsion Room (discharge from tanks)
TCM, Emulsion System	PLTCM	-	20	Intermittent	Wastewater from Sump Pits in Basement of Emulsion Building
TCM, Wastewater	PLTCM	-	20	Intermittent	Wastewater from Sump Pits in Hydraulic Room and from Fume Exhaust Ventilator
Pickling Section, Waste Acid	PLTCM	9.2	25	Continuous	Acidic Wastewater Containing Iron (continuously discharged to acid tank farm)
Entry Section, Sump Pit	PLTCM	5	-	Intermittent	Oil-Contaminated Wastewater (discharged from mobile pump during an emergency)
Exit Section, Sump Pit	PLTCM	5	-	Intermittent	Oil-Contaminated Wastewater (discharged from mobile pump during an emergency)
Pickling Section, Regenerated Acid	PLTCM	5.5	20	Continuous	Acidic Wastewater Containing Iron
Mechanical Equipment	PLTCM	1.5	6	Intermittent	Wastewater Contaminated with Oil

Effluent Type	Process Area	Average Flow (m ³ /hr)	Maximum Flow (m ³ /hr)	Frequency	Influent Characteristics and/or Comments
Scrubber Water Exhaust System (Waste Rinse Water)	PPPL	2	15	Intermittent	Acidic Wastewater Containing Iron
Wastewater	SPM	15	15	Intermittent	Wastewater Contaminated with Oil and Iron
Non-Contact Cooling Water	Entire Facility	-	198	Continuous	-
Contact Cooling Water	Entire Facility	-	159	Continuous	-
Total Discharge	WWTP	139	197	Continuous	Outfall EV201

m³/hr = Cubic Meters per Hour

ESP = Endless Strip Process (Continuous Casting Mill (CCM) Hot Strip Mill (HSM))

CGL = Continuous Galvanizing Line

PGL = Pickling and Galvanizing Line

PLTCM = Pickling Line, Tandem Cold Mill

PPPL = Push-Pull Pickling Line

SPM = Skin Pass Mill

WWTP = Wastewater Treatment Plant

Table 2D-2 – Form 2D, Section 3.1 – Summary of Wastewater Treatment Units
Outfall EV201 (Process Wastewater Effluent)

Operation	Average Flow
Steel Manufacturing (Process Wastewater, Contact Cooling Water, and Non-Contact Cooling Water)	1.250 MGD

Description	Codes from Table 2C-1	Final Disposal of Solid or Liquid Wastes other than by Discharge
○ Oil Removal Process	–	–
Floatation	1-H	–
○ Homogenization Process	–	–
Mixing	1-O	–
○ Metals Removal Process	–	–
Flocculation	1-G	–
Floatation	1-H	–
Sedimentation (Settling)	1-U	–
Belt Filtration	5-C	–
○ Aeration for Iron Oxidation Process	–	–
Chemical Oxidation	2-B	–
○ Sand Filtration Process	–	–
Rapid Sand Filtration	1-R	–
Discharge to Surface Water	4-A	–
○ Sludge Processing	–	–
Drying Beds	5-H	–
Landfill	5-Q	Landfill

See Section F, Process Description for Wastewater Treatment System and Slag Yard Pond, for more information.

Outfall EV202 (Discharge from Slag Yard Pond)

Operation	Average Flow
Slag Yard (Stormwater Runoff and Quench Water)	0.137 MGD

Description	Codes from Table 2C-1	Final Disposal of Solid or Liquid Wastes other than by Discharge
Sedimentation (Settling)	1-U	-
Discharge to Surface Water	4-A	-

See Section F, Process Description for Wastewater Treatment System and Slag Yard Pond, for more information.

Table 2D-3 – EPA Form 2D, Section 6.4 – Summary of Process Flow in Manufacturing Units and Applicable ELG Subparts and Production Rates

The anticipated actual average daily production values expected in the first three years of operation are summarized below. The throughput values are reported in million short tons per year (MT/yr) and 1,000 pounds per day (klb/day). The latter is the unit of measure used in the Effluent Limitations Guidelines for Steel Manufacturing (40 CFR Part 420). The values are expressed as tons of liquid steel or tons of hot rolled steel coils as appropriate (unless otherwise noted).

Step	Unit	Input (Annual)	Output (Annual)	Output (Daily)	ELG Subpart	Comments
1	Direct Reduced Iron (DRI) Unit	3.00 MT/yr Iron Oxide	3.00 MT/yr Briquettes Total; 1.90 MT/yr to EAFs; 1.10 MT/yr Briquettes to Sale	6,028 klb/day (DRI for sale)	Subpart M (Other Operations, §420.134(a))	Subpart M only applies to amount of DRI and fines that are produced and sold commercially (1.10 MT/yr). No credit is granted for DRI and fines used for internal steel production.
2A	Electric Arc Furnace (EAF) 1	1.15 MT/yr Scrap Steel; 0.95 MT/yr DRI	2.05 MT/yr Liquid Steel to Ladle Metallurgy Furnace (LMF) 1	11,233 klb/day	Subpart D (Steelmaking, §420.44(a))	Discharge of pollutants from semi-wet EAF steelmaking is prohibited.
2B	EAF 2	1.15 MT/yr Scrap Steel; 0.95 MT/yr DRI	2.05 MT/yr Liquid Steel to LMF 2	11,233 klb/day	Subpart D (Steelmaking, §420.44(a))	Same as above

Step	Unit	Input (Annual)	Output (Annual)	Output (Daily)	ELG Subpart	Comments
3A	LMF 1	2.05 MT/yr Liquid Steel (from EAF 1)	2.05 MT/yr Liquid Steel Total; 2.05 MT/yr to Endless Strip Process (EPS) Unit; or 0.75 MT/yr to Degasser 1	11,233 klb/day	No Applicable Subparts	---
3B	LMF 2	2.05 MT/yr Liquid Steel (from EAF 2)	2.05 MT/yr Liquid Steel Total; 2.05 MT/yr to EPS Unit; or 0.75 MT/yr to Degasser 2	11,233 klb/day	Same as above	---
3C	RH Degasser 1	0.75 MT/yr Liquid Steel (from LMF 1)	0.75 MT/yr to ESP	4,110 klb/day	Subpart E (Vacuum Degassing, §420.54)	---
3D	RH Degasser 2	0.75 MT/yr Liquid Steel (from LMF 2)	0.75 MT/yr to ESP	4,110 klb/day	Subpart E (Vacuum Degassing, §420.54)	---
4A	Endless Strip Process (ESP) Unit [Continuous Casting Mill (CCM)]	4.10 MT/yr Liquid Steel (from LMFs and/or RH Degassers)	4.00 MT/yr Raw Steel Strip to HSM	21,918 klb/day	Subpart F (Continuous Casting, §420.64)	---
4B	ESP Unit [Hot Strip Mill (HSM)]	4.10 MT/yr Liquid Steel (from CCM)	4.00 MT/yr Steel Coil to Downstream Process Units (as Shown Below)	21,918 klb/day	Subpart G (Hot Forming, §420.74(c))	---

Step	Unit	Input (Annual)	Output (Annual)	Output (Daily)	ELG Subpart	Comments
4B	ESP Unit (HSM)	(Above)	Output Path #4B-1 1.93 MT/yr to Pickling and Tandem Mill	10,576 klb/day	Accounted for in Step 4B	---
			Output Path #4B-2 2.07 MT/yr to Other Cold Mill Operations	11,342 klb/day	Accounted for in Step 4B	---
5A	Pickling and Tandem Mill (P&TM)	1.93 MT/yr Steel Coil (from HSM)	1.93 MT/yr Pickled Steel Coil	10,576 klb/day	Subpart I (Acid Pickling, §420.94(b))	One fume scrubber
5B	P&TM	(Above)	1.93 MT/yr Pickled and Formed Steel Coil	10,576 klb/day	Subpart J (Cold Forming, §420.104(a))	---
			Output Path #5-1 1.23 MT/yr Cold Rolled Coil ("Full Hard") to Sale	6,740 klb/day	Accounted for in Step 5B	---
			Output Path #5-2 0.70 MT/yr to Alkaline Cleaning Operation 1	3,836 klb/day	Accounted for in Step 5B	---
			Output Path #5-3 (Alternate) 0.33 MT/yr to Batch Annealing Units	1,808 klb/day	Accounted for in Step 5B	---

Step	Unit	Input (Annual)	Output (Annual)	Output (Daily)	ELG Subpart	Comments
6	Other Cold Mill Operations	2.07 MT/yr Steel Coil (from HSM)	2.07 MT/yr Steel Coil to Downstream Process Units (as Shown Below)	11,342 klb/day	Subpart J (Cold Forming, §420.104(a))	---
			Output Path #6-1 0.59 MT/yr to PGL Pickling Operation	3,232 klb/day	Accounted for in Step 6	---
			Output Path #6-2 0.66 MT/yr to Push-Pull Pickling Line	3,616 klb/day	Accounted for in Step 6	---
			Output Path #6-3 0.82 MT/yr Steel Coil Total to Sale (0.41 MT/yr Hot Rolled Steel Coil; 0.41 MT/yr Cold Rolled Coil Substitute)	4,494 klb/day	Accounted for in Step 6	---
7	PGL Pickling Operation	0.59 MT/yr Steel Coil (from Cold Mill)	0.59 MT/yr Steel Coil to Alkaline Cleaning Operation 2	3,232 klb/day	Subpart I (Acid Pickling, §420.94(b))	One fume scrubber
8A	Alkaline Cleaning Operation 1	0.70 MT/yr Steel Coil (from P&TM)	0.70 MT/yr Pickled Steel Coil to Galvanizing Unit	3,836 klb/day	Subpart K (Alkaline Cleaning, §420.114(a))	---

Step	Unit	Input (Annual)	Output (Annual)	Output (Daily)	ELG Subpart	Comments
8B	Alkaline Cleaning Operation 2	0.59 MT/yr Steel Coil (from PGL Pickling Operation)	0.59 MT/yr Pickled Steel Coil to Hot Dip Galvanizing Line	3,232 klb/day	Subpart K (Alkaline Cleaning, §420.114(a))	---
9	Galvanizing Line	0.70 MT/yr Pickled Steel Coil (from Alkaline Cleaning 1)	0.70 MT/yr "Gen3" Galvanized Steel Coil to Sale	3,836 klb/day	Subpart L (Hot Coating, §420.124(a))	---
10	Hot Dip Galvanizing Unit	0.59 MT/yr Steel Coil (from Alkaline Cleaning 2)	0.59 MT/yr Hot Rolled Coil Total to Sale (0.32 MT/yr Hot Rolled Pickled & Galvanized Coil; 0.27 MT/yr Cold Rolled Coil Substitute)	3,232 klb/day	Subpart L (Hot Coating, §420.124(a))	---
11	Push-Pull Pickling Line (PPPL)	0.66 MT/yr Steel Coil (from Cold Mill)	0.66 MT/yr Steel Coil to Annealing or Sale (as Shown Below)	3,616 klb/day	Subpart I (Acid Pickling, §420.94(b))	One fume scrubber
			Output Path #9-1 0.33 MT/yr Pickled Steel Coil to Batch Annealing	1,808 klb/day	Accounted for Above	---

Step	Unit	Input (Annual)	Output (Annual)	Output (Daily)	ELG Subpart	Comments
11	PPPL	(Above)	Output Path #9-2 0.33 MT/yr Hot Rolled Pickled and Oiled Steel Coil to Sale	1,808 klb/day	Accounted for Above	---
12A	Batch Annealing Units	0.33 MT/yr Pickled Steel Coil (from P&TM)	Output Path #10-1 0.33 MT/yr Pickled and Annealed Steel Coil to Skin Pass Mill	1,808 klb/day	Not Applicable (N/A)	---
12B	Batch Annealing Units	0.33 MT/yr Pickled Steel Coil (from PPPL)	Output Path #10-2 0.33 MT/yr Pickled and Annealed Steel Coil to P&TM	1,808 klb/day	N/A	---
13	Skin Pass Mill (SPM)	0.33 MT/yr Pickled Steel Coil (from Batch Annealing)	0.33 MT/yr Annealed Coil to Sale	1,808 klb/day	Subpart J (Cold Forming, §420.104(a))	---
14	Acid Regeneration Plant	20 Million Gallons per Year Spent Ferrous Chloride Solution (FCS)	To Be Determined (TBD) Reclaimed FCS	TBD	Subpart I (Acid Pickling, §420.94(b))	Three fume scrubbers Plant will not discharge to WWTP NSPS does not account for acid regeneration (absorber vent scrubbers) at new plants (only existing units).

Section D – DEQ Construction Permit Application Forms

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ATTACHMENT 1
GENERAL FACILITY INFORMATION

Wastewater Treatment Plant Attachments 1-12
--

1. Facility Name: Exploratory Ventures, LLC
2. Type of Facility: Steel Mill
3. Population Served:
Present: Not Applicable Design: ---

4. Flow:

	Present	Design
Average	New facility	0.880
Maximum	---	1.250
Peak	---	1.500

5. Water Quality:

Assumed Actual Source: Monitoring data for Big River Steel

	Influent:		Effluent:	
BOD5	No data available	mg/l	67	mg/l
TSS	---	mg/l	11	mg/l
NH3-N	---	mg/l	0.3	mg/l

Basis for Assumptions, if made:

N/A

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

7. List Treatment System:

a. Existing:

- | | |
|----------------|----------|
| 1. <u>None</u> | 5. _____ |
| 2. _____ | 6. _____ |
| 3. _____ | 7. _____ |
| 4. _____ | 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 (DAF)</u> | 7. <u>Sludge Drying</u> |
| 4. <u>Clarification</u> | 8. _____ |

ATTACHMENT 2
FLOW MEASUREMENT, SCREENING AND GRIT REMOVAL

A. Flow Measurement

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

B. Bar Screen

1. Area: Total Not Applicable 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 Not Applicable
2. Size: --- inches 3. Capacity: --- MGD
2. Auxiliary Bar Screen: Yes No

D. Grit Chamber

1. No. of Chambers Not Applicable 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 (2 per Basin) Capacity of each 500 ft³/m One operational blower plus
one backup unit per basin.

Total Capacity of Blowers 2,000 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

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

ATTACHMENT 7
CLARIFIERS

1. Type: Circular
2. Number of Tanks: 2
3. Surface Dimensions (ft):
Width _____ Length _____ Diameter 52.5 feet
4. Sidewall Depth: 11.5 feet
ft
5. Detention Period (minutes):
At design flow >3.3 hours At peak flow >2.7 hours
6. Overflow Rate (gpd/ft²):
At design flow 578 At peak flow 693
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. "Dewatering boxes" will be utilized. An absorbent may be added to solidify sludge if needed. Sludge digestion tanks or drying beds will not be installed.

Press plate filters will be used to dewater sludge collected in two clarifier units. Sludge will be shipped off-site for recycling or disposal.

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 basin (M2WB5)
4. Shape: Cylindrical
5. Dimensions (ft):
Width _____ Length _____ Diameter 14 feet Depth 26.5 feet (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:

	First Stage	Second Stage
1. Dimensions (ft):		
Width	_____	_____
Length	_____	_____
Diameter	_____	_____
Depth	_____	_____
2. Area (ft ³):	_____	_____
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 <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
12. Provision for flooding?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
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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ATTACHMENT 1
GENERAL FACILITY INFORMATION

Slag Yard Pond Attachments 1-12

1. Facility Name: Exploratory Ventures, LLC

2. Type of Facility: Steel Mill

3. Population Served:
Present: Not Applicable Design: ---

4. Flow:

	Present	Design
Average	New facility	0.137
Maximum	---	1.800
Peak	---	1.800

5. Water Quality:

Assumed Actual Source: Monitoring data for Big River Steel

	Influent:		Effluent:	
BOD5	No data available	mg/l	<5	mg/l
TSS	---	mg/l	<20	mg/l
NH3-N	---	mg/l	<0.3	mg/l

Basis for Assumptions, if made:

N/A

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

7. List Treatment System:

a. Existing:

- | | |
|----------------|----------|
| 1. <u>None</u> | 5. _____ |
| 2. _____ | 6. _____ |
| 3. _____ | 7. _____ |
| 4. _____ | 8. _____ |

b. Proposed:

- | | |
|-------------------------|----------|
| 1. <u>Settling Pond</u> | 5. _____ |
| 2. _____ | 6. _____ |
| 3. _____ | 7. _____ |
| 4. _____ | 8. _____ |

ATTACHMENT 2
FLOW MEASUREMENT, SCREENING AND GRIT REMOVAL

A. Flow Measurement

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

B. Bar Screen

1. Area: Total Not Applicable 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 Not Applicable
2. Size: --- inches 3. Capacity: --- MGD
2. Auxiliary Bar Screen: Yes No

D. Grit Chamber

1. No. of Chambers Not Applicable 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

Not Applicable

1. Required Air: _____ ft³/lb BOD₅/day
2. Furnished Air: _____ ft³/ lb BOD₅/day
3. Type of System: Diffused Air Mechanical

4. Diffused Air Equipment:

Number Blowers _____ Capacity of each _____ ft³/m

Total Capacity of Blowers _____ 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

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

ATTACHMENT 7
CLARIFIERS

Not Applicable

1. Type: _____
2. Number of Tanks: _____
3. Surface Dimensions (ft):
Width _____ Length _____ Diameter _____
4. Sidewall Depth: _____ ft
5. Detention Period (minutes):
At design flow _____ At peak flow _____
6. Overflow Rate (gpd/ft²):
At design flow _____ At peak flow _____
7. Surface Area: _____ 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: _____

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

Not Applicable

1. Use: _____
2. Location in process: _____
3. Type: _____
4. Shape: _____
5. Dimensions (ft):
Width _____ Length _____ Diameter _____ Depth _____
6. Effective Volume: _____ 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

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.

The slag yard will include a surface impoundment for storing stormwater runoff and quench water prior to discharge. The slag yard pond will function as a sedimentation basin. The solids in the stormwater runoff and quench water will settle out within the basin. The accumulated sediment will be removed when necessary for off-site disposal. Refer to Attachment L, Construction Specifications, for more information.

ATTACHMENT 12
TRICKLING FILTERS

Not Applicable

A. High Rate:

	First Stage	Second Stage
1. Dimensions (ft):		
Width	_____	_____
Length	_____	_____
Diameter	_____	_____
Depth	_____	_____
2. Area (ft ³):	_____	_____
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 <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
12. Provision for flooding?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
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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Section E – Financial Reports
(Submitted in Lieu of DEQ Disclosure Statement)

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Section E Financial Reports (Submitted in Lieu of Disclosure Statement)

Per the DEQ's regulations, certain applicants for an individual NPDES wastewater permit must submit a Disclosure Statement as part of the application. However, those applicants that are publicly traded companies and their subsidiaries have the option of submitting their most recent financial reports in lieu of filing a Disclosure Statement.

EV is a wholly owned subsidiary of U.S. Steel. EV has decided to submit the most recent Quarterly ("10-Q") Report and Annual ("10-K") Report for U.S. Steel in lieu of submitting a Disclosure Statement.

The 10-Q Report for the 2nd Quarter of 2022 is available at the following web address: https://s26.q4cdn.com/153509673/files/doc_financials/2022/q2/As-Filed-form10q220630-with-Exhibits.pdf.

The 10-K Report for fiscal year 2021 is available at the following web address: https://s26.q4cdn.com/153509673/files/doc_downloads/2022/03/2021-Annual-Report.pdf.

Printed copies of the financial reports are available upon request.

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Section F – Process Description and Design Calculations for Wastewater Treatment System and Slag Yard Pond

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Section F

Process Description and Design Calculations for Wastewater Treatment System and Slag Yard Pond

A process description for the wastewater treatment system to be constructed by EV is presented in this section of the permit application. Design calculations and operating parameters for the various treatment units are enclosed.

The Construction Plans and Specifications for the wastewater treatment components are provided in Section L of the application. Drawings of the treatment units are enclosed therein as Sheets C1 through C25. Other pertinent documents include the following figures presented in Section H and Section J:

- Figure H-1 Simplified Water Flow and Water Balance Diagram
- Figure J-1 Wastewater Facilities Map
- Figure J-2 Wastewater Treatment Plant Layout
- Figures J-3A-D Wastewater Process Flow Diagrams
- Figure J-4 Diagram of Slag Yard Pond

Russula S.A. is the design engineering firm for the wastewater treatment system. The information provided herein was obtained from the following Russula document: (1) "Water Treatment Plant, Wastewater Circuit, Technical Specification" (MTM/001 PS22/01642-Rev. 02, August 2022).

This section also contains a process description for the slag yard pond to be constructed by EV. Design calculations and operating parameters for the surface impoundment are provided. Harbor designed the slag yard and pond. The Construction Plans and Specifications for the basin are presented in Section L of the application. Drawings of the surface impoundment are enclosed therein as Sheets C201 through C305. These sheets also cover the two effluent pipelines (wastewater effluent and slag pond effluent) and the outfall structure at the Mississippi River.

1.0 Description of Overall Water Usage at the Facility

EV plans to construct a scrap steel-to-steel products manufacturing facility located in Osceola, Arkansas (the "Facility"). It is designed to produce a full range of high-strength steel products for key niche markets, primarily through the recycling of scrap metal.

Raw water for the steel manufacturing operations will be provided by four high-capacity groundwater withdrawal wells. The water will be prepared for use in a series of water treatment plants located throughout the Facility. The water will subsequently be 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 will be approximately 1,338 cubic meters per hour (m³/hr), which is equivalent to 5,890 gallons per minute (gpm) or 8.482 million gallons per day (MGD). Of that

overall amount, about 987 m³/hr (4,346 gpm or 6.258 MGD) of water will be lost to evaporation in the plant's cooling towers. The remaining 351 m³/hr (1,544 gpm or 2.224 MGD) of water will consist of contact cooling water, non-contact cooling water, and process wastewater. EV 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; approximately 154 m³/hr (676 gpm or 0.974 MGD) of water will be reclaimed. 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. The design capacity of the wastewater treatment plant will be 1.250 MGD, which is equivalent to a flow rate of 197 m³/hr (868 gpm). The process wastewater effluent will be continuously discharged to the Mississippi River at Outfall EV201.

The Facility will include a 34-acre slag yard for storing the residue generated during the steel manufacturing operations. The slag will subsequently be recovered for reuse as a road-building material. A 2.4-acre pond will be used to store the stormwater runoff from the slag yard. Water may be sprayed onto the slag to quench the hot material. The quench water will also flow to the pond. The commingled stormwater and quench water will be periodically discharged to the Mississippi River at Outfall EV202. No treatment will be performed; however, the pond will function as a sedimentation basin. Approximately 0.137 MGD of slag yard runoff and quench water will be generated.

2.0 Description of Wastewater Streams

The process wastewater streams generated by EV during its steel manufacturing operations will be categorized in three general groups. These streams are as follows:

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

All three process wastewater streams will be generated at multiple locations throughout the Facility. Both continuous and batch discharges will be generated. Refer to the following Table F-1 for more information on the proposed wastewater streams. Said table is presented at the end of this narrative.

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

- Sand Filter Backwash (Stream #4)
- Contact Cooling Water (NCW, Stream #5)
- Non-Contact Cooling Water (NCCW, Stream #6)

All three non-process wastewater streams will be treated on-site. The filter backwash stream will be an intermittent discharge. The NCW and NCCW streams will be continuous discharges.

3.0 Stages of Wastewater Treatment Process

The 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, EV 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 it into 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 batch 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 three batch mixing tanks prior to treatment. The alkaline discharges (Stream #3) will be collected in two batch mixing tanks prior to processing.

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

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 followed by floatation 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 one of two dissolved air floatation (DAF) units. "Micro-bubbles" of air will cause the suspended solids (containing metals) and oil particles to coalesce and float to the surface of the tanks for removal. Three streams will be generated in the DAF units: 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 the sludge processing area for dewatering (Stage #7).

Stage #4 – Clarification: The wastewater from the DAF units will be transferred to two clarifier units. The suspended solids will be removed via gravity settling. The clarified wastewater will then be transferred to two aeration basins 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 material will subsequently be shipped off-site for disposal. 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 two treatment basins 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 the suspended solids, primarily the insoluble iron particles generated in Stage #5. The filtered effluent will subsequently be processed in one of two ways: (1) the water will be transferred to an ultrafiltration unit or reverse osmosis unit for treatment and subsequent reuse; or (2) the effluent will be pumped to the Mississippi River and discharged at Outfall EV201. The sand filters will be periodically backwashed to remove the captured solids. 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. Dewatering boxes may also be used. A suitable absorbent may also be added to solidify the material if necessary. The dry material will subsequently be shipped off-site for disposal. 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.)

4.0 Wastewater Treatment Units

A brief description of the various wastewater treatment units is presented in this section. Pertinent design and operating parameters are provided. Refer to Section L, Construction Plans and Specifications, for more information. (The layout of the overall wastewater treatment plant is shown on Sheet C1. Wastewater flow paths are shown on Figures C2 through C4.)

4.1 Emulsion Tanks M2EB1.1 and M2EB1.2

Emulsion Tanks M2EB1.1 and M2EB1.2 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 it into 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 M2EF4).
- Water from the Sludge Processing Pit (M2WB10) (Line M2WS10) (intermittent flow).
- Water from Basin M2WB1.1 to overflow the oil (Line M2W1).

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

- Wastewater from Batch Tanks M2WB7.1 and M2WB7.2.
- Wastewater from Acid Tanks M2AT1.1 and M2AT1.2.
- Water from Basin WB1.1 to be used for cleaning the Emulsion Tanks (Line M2W1).

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 M2WB1.1 will be pumped into the bottom of a given 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 M2WB5 for additional processing.

Each Emulsion Tank will be equipped with a mixer unit (Agitator M2EAG1.1.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 an operating capacity of 75 cubic meters (m³), which is equivalent to 19,813 gallons (gal). (See Section L, Sheet C5.)

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 M2EP1.1.X and M2EP1.2.X will be used to transfer the degreased wastewater from the Emulsion Tanks to Receiving Tank M2WB5. The pump groups were selected based on the following operating conditions:

Pump Groups M2EP1.1.X (1 lead pump + 1 lag pump) and M2EP1.2.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 M2WB7.1 and M2WB7.2

Batch Tanks M2WB7.1 and M2WB7.2 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 M2WB5 (Line M2W5).
- Homogenized acid discharges from Acid Tanks M2AT1.1, M2AT1.2, and M2AT1.3 (Line M2A1).
- Homogenized alkaline discharges from Alkali Tanks M2AT2.1 and M2AT2.2 (Line M2A2).

- Degreased emulsified oily discharges from Emulsion Tanks M2EB1.1 and M2EB1.2 (Line M2E1).
- Water from Transfer Basin M2WB8.1 (Line M2W8.1).
- Water from Transfer Basin M2WB8.2 (Line M2W8.2).
- Drainage from Stabilizer Tanks M2WB6.1 and M2WB6.2 (Line M2WS6).
- Discharge from the containment area for the Batch Tanks (Line M2WD6) (intermittent flow).

The two Batch Tanks will be ASTs. Each tank will have an operating capacity of 100 m³ (26,417 gal). (See Section L, Sheet C10.)

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 M2WP7.1.X and M2WP7.2.X will be used to transfer the treated wastewater from the two Batch Tanks to Emulsion Tanks M2EB1.1 and M2EB1.2. The water may also be sent to Stabilizer Tank M2WB6.1 or DAF Units M2DAF2.1 and M2DAF2.2. The pump groups were selected based on the following operating conditions:

Pump Groups M2WP7.1.X (1+ 1) and M2WP7.2.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 M2WD6.1 back into the Batch Tanks. The sump pump was selected based on the following operating conditions:

Pump M2WDP6.1

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

4.3 Acid Tanks M2AT1.1, M2AT1.2 and M2AT3

Acid Tanks M2AT1.1, M2AT1.2, and M2AT1.3 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 M2EF1).
- Discharges from the acid containment area (intermittent flow).

The three Acid Tanks will be ASTs. Each tank will have an operating capacity of 95 m³ (25,096 gal). (See Section L, Sheet C6.)

Acid Tanks M2AT1.1, M2AT1.2 and M2AT1.3 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 M2WB5 (or the Acid Regeneration Plant, described below). The influent flow will concurrently be routed to one of the other Acid Tanks. The homogenized wastewater will pass through strainers (M2AS1.1, M2AS1.2, and M2AS1.3) during transfer to Tank M2WB5.

The contents of M2AT1.1, M2AT1.2 and M2AT1.3 will be continually circulated to avoid phase separation (decanting) of the wastewater during storage. Pump Groups M2ARP1.1.X, M2ARP1.2.X, and M2ARP1.3.X will be operated for this purpose. The pumps will also be used to transfer wastewater between the three tanks if necessary. The pump groups were selected based on the following operating conditions:

Pump Groups M2ARP1.1.X (1+1), M2ARP1.2.X (1+1) and M2ARP1.3.X (1+1)

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

Pump Groups M2AP1.1.X, M2AP1.2.X, and M2AP1.3.X will be used to transfer the wastewater from the three Acid Tanks to Receiving Tank M2WB5. The pump groups were selected based on the following operating conditions:

Pump Groups M2AP1.1.X (1+1), M2AP1.2.X (1+1), and M2AP1.3.X

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

As an alternative, the contents of the three Acid Tanks may be transferred to the Acid Regeneration Plant for reclamation. The acidic wastewater will pass through strainers (M2AS1.4) during the transfer. Pump Group M2ARP1.4.X will be used to transfer the wastewater to the Acid Regeneration Plant. The pump group was selected based on the following operating conditions:

Pump Group M2ARP1.4.X (1+1)

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

The three Acid Tanks will be connected to an acid scrubber (M2WSC1) for the control of air emissions. The scrubber inlet will receive air containing acid vapors. The air stream will be scrubbed using water. The wastewater will then flow by gravity back to Scrubber Tank M2WSCT1 for reuse in the scrubbing process. The recirculation line (M2WSCL1) will be equipped with a pH meter for the control of acid saturation. The saturated scrubber water will periodically be discharged to the acid containment area when necessary. Pump Group M2WSCP1.X will provide

water to the acid scrubber. The pump group was selected based on the following operating conditions:

Pump Group M2ARP1.4.X (1+1)

- Flowrate = 4 m³/hr (18 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 M2ADP1.1 back into the Acid Tanks. The sump pump was selected based on the following operating conditions:

Pump M2ADP1.1

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

4.4 Alkali Tanks M2AT2.1 and M2AT2.2

Alkali Tanks M2AT2.1 and M2AT2.2 will be used to homogenize the in-coming alkaline discharges (Stream #3) from the Facility prior to treatment. The vessels will be configured to receive the following wastewater streams:

- Alkaline discharges (Line M2EF2.1).
- Discharges from the alkaline containment area (Line M2AD2) (intermittent flow).

The Alkali Tanks will be ASTs. Each storage vessel will have an operating capacity of 80 m³ (21,134 gal). (See Section L, Sheet C7.)

The contents of Alkali Tanks M2AT2.1 and M2AT2.2 will be continually circulated to avoid phase separation (decanting) of the wastewater during storage. Pump groups M2ARP2.1X and M2ARP2.2X will be operated for this purpose. The pump groups were selected based on the following operating conditions:

Pump Groups M2ARP2.1X (1+1) and M2ARP2.2X (1+1)

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

Pump Groups M2AP2.1X and M2AP2.1X will be used to transfer the wastewater from the Alkali Tanks to Receiving Tank M2WB5. The homogenized alkaline stream can also be directed to Batch Tanks M2WB7.1 and M2WB7.2 or to Stabilizer Tank M2WB6.1, depending on the operating circumstances. The pump groups were selected based on the following operating conditions:

Pump Groups M2AP2.1X (1+1) and M2AP2.2X (1+1)

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

The Alkali 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 M2WDP2.1 back into the Alkali Tanks. The sump pump was selected based on the following operating conditions:

Pump M2WDP2.1

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

4.5 Receiving Tank M2WB5

Receiving Tank M2WB5 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 three influent streams: the treated wastewater (Stream #1) from oil removal process (Stage #1); the acid discharges (Stream #2); and the alkaline discharges (Stream #3).

Receiving Tank M2WB5 will be configured to receive the following wastewater streams:

- Degreased emulsified oily discharges from Emulsion Tanks M2EB1.1 and M2EB1.2 (Lines M2E1.1 and Line M2E1.2).
- Homogenized acid discharges from Acid Tanks M2AT1.1, M2AT1.2 and M2AT1.3 (Line M2A1).
- Homogenized alkaline discharges from Alkali Tanks M2AT2.1 and M2AT2.2 (Line M2A2).
- Discharges from the Basin M2WB5 containment area.

In addition, the following streams can also be routed to Receiving Basin M2WB5 if necessary:

- Alkaline discharges (Lines M2EF2.1 and M2EF2.2).
- Wastewater emptied from Basin M2WB1.1 prior to cleaning (Line M2W1).

Receiving Tank M2WB5 will be an AST. The equalization tank will have an operating capacity of 100 m³ (26,417 gal). (See Section L, Sheet C8.)

Receiving Tank M2WB5 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 M2WAG5.1). 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 M2WP5.X will be used to transfer the wastewater from Receiving Tank M2WB5 to Stabilizer Tank M2WB6.1. The pump group was selected based on the following operating conditions:

Pump Group M2WP5.X (2+1)

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

Receiving Tank M2WB5 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 M2WDP5.1 back into Tank M2WB5. The sump pump was selected based on the following operating conditions:

Pump M2WDP5.1

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

4.6 Stabilizer Tanks M2WB6.1 and M2WB6.2

Stabilizer Tanks M2WB6.1 and M2WB6.2 will be operated as part of the metals removal process (Stage #3). Wastewater will be continuously pumped from Receiving Basin M2WB5 to Stabilizer Tank M2WB6.1. 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 M2WB6.2 for additional pH adjustment. A coagulant and/or a flocculant will also be added at this time. 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 Units.

Stabilizer Tank M2WB 6.1 will primarily receive the following wastewater stream:

- Homogenized wastewater from Receiving Tank M2WB5 (Line M2W5).

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

- Homogenized acid discharges from Acid Tanks M2AT1.1, M2AT1.2, and M2AT1.3 (Line M2A1).
- Homogenized alkaline discharges from Alkali Tanks M2AT2.1 and M2AT2.2 (Line M2A2).
- Treated wastewater from Batch Tanks M2WB7.1 and M2WB7.2 (Line M2W7).

- Water from Basin M2WB1.1 (Line M2W1) for purposes of cleaning the Stabilizer Tanks.

The two Stabilizer Tanks will be ASTs. Each tank will have an operating capacity of 80 m³ (21,134 gal). (See Section L, Sheet C9.)

The Stabilizer Tanks will be equipped for pH adjustment of the wastewater. Tank M2WB6.1 will have separate automated dosing systems for sodium hydroxide, lime slurry and a coagulant. Stabilizer Tank M2WB6.2 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 M2WB6.1 and M2WB6.2 to the DAF Units. Pump Group M2WSP6.X can also be used to transfer water from the two Stabilizer Tanks to Collecting Basin M2WB2 or Batch Tanks M2WB7.1 and M2WB7.2, depending on the operating circumstances. The pump group was selected based on the following operating conditions:

Pump Group M2WSP6.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 M2WD6.1 back into the Stabilizer Tanks. The sump pump was selected based on the following operating conditions:

Pump M2WDP6.1

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

4.7 DAF Units M2DAF2.1 and M2 DAF2.2

Two DAF Units 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 suspended solids (containing metals) and oil particles to coalesce and float to the surface of the tanks for removal. The DAF Units will receive the following wastewater streams:

- pH-adjusted wastewater from Stabilizer Tank M2WB6.2.
- pH-adjusted wastewater from Batch Tanks M2WB7.1 and M2WB7.2.

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 M2WB8.1 and M2WB8.2 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 Units M2DAF2.1 and M2DAF2.2 will each have an operating capacity of 450 m³/hr (1,981 gpm). (See Section L, Sheet C11.)

Pump Groups M2WSP1.X and M2WSP2.X will be used to transfer the heavy sludge layer collected at the bottom of the DAF Units to the adjacent Sludge Processing Area. The pump groups were selected based on the following operating conditions:

Pump Group M2WSP1.X (1+1) and M2WSP2.X (1+1)

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

The NCCW from Collection Basin M2WB1.1 (Line M2W1) can be routed to the DAF Units to clean the sludge transfer lines (M2WS1 and M2WS2).

4.8 Transfer Basins M2WB8.1 and M2WB8.2

Transfer Basins M2WB8.1 and M2WB8.2 will serve as flow equalization basins. The wastewater will subsequently be pumped to Clarifiers M2WST1 and M2WST2.

Basins M2WB8.1 and M2WB8.2 will receive the following wastewater streams:

- Wastewater effluent from DAF Units 1 and 2.

The wastewater will flow by gravity from the DAF Units to the basins. The wastewater may also be pumped via Lines M2E6.1 and M2E6.2.

In addition, the following stream may also be routed to Basins M2WB8.1 and M2WB8.2 if necessary:

- Wastewater from Collection Basin M2WB2.

The two Transfer Basins will be aboveground concrete tanks. Each unit will have an operating capacity of 16 m³ (4,227 gal). (See Section L, Sheets C14A/B.) The basins will have the following dimensions:

Transfer Basins M2WB8.1 and M2WB8.2

- Volume = 16 m³ (4,227 gal)
- Length = 4,000 millimeters (mm) (13 feet (ft))
- Width = 4,000 mm (13 ft)
- Height = 2,300 mm (8 ft)
- Height of Water Surface = 1,000 mm (3 ft)

Pump Groups M2WP8.1.X and M2WP8.2.X will be used to transfer the wastewater from Transfer Basins M2WB8.1 and M2WB8.2 to Clarifiers M2WST1 and M2WST2. The pump groups were selected based on the following operating conditions:

Pump Groups M2WP8.1.X (1+1) and M2WP8.2.X (1+1)

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

4.9 Collection Basin M2WB1

Collection Basin M2WB1 will receive the following wastewater stream:

- Non-Contact Cooling Water (Line M2W1.1).

The NCCW will subsequently be pumped to Aeration Basins M2WB4.1 and M2WB4.2 for treatment.

In addition, the water in Collection Basin M2WB1 can also be routed to the following units:

- Collection Basin M2WB2.
- Emulsion Tanks M2EB1.1 and M2EB1.2 (for cleaning or overflow).
- Filtered Water Basin M2WB9.1.

Collection Basin M2WB1 will be an aboveground concrete tank. The unit will have an operating capacity of approximately 300 m³ (79,252 gal). (See Section L, Sheets C12A-G and 13A-H.)

The capacity of Basin M2WB1 is large enough to accommodate the incoming wastewater stream. The tank has the following dimensions:

Collection Basin M2WB1

- Volume = 300 m³ (79,252 gal)

- Length = 15,700 mm (52 ft)
- Width = 7,600 mm (25 ft)
- Height = 3,400 mm (11 ft)
- Height of Water Surface = 2,500 mm (8 ft)

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

Pump Group M2WP1.X will be used to transfer the wastewater from Collection Basin M2WB1 to Aeration Basins M2WB4.1 and M2WB4.2. The pump group was selected based on the following operating conditions:

Pump Group M2WP1.X1 (1+1)

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

4.10 Collection Basin M2WB2

Collection Basin M2WB2 will receive various intermittent wastewater streams. The unit will also be used as a temporary holding basin if necessary. Basin M2WB2 will be configured to receive the following wastewater streams:

- Backwash from the Sand Filters M2WSF1.X.
- Blowdowns from M2WI.2 Line.
- Decanted water from Oils Separation Area, Basin M2WOIB1.
- Drain water from blowdowns of Lines M2WD1.1 and M2WD1.2 lines (intermittent stream).
- Drain water from DAF Lines M2WS1 and M2WS2 (intermittent stream).
- Drain water from Stabilizer Tanks M2WB6.1 and M2WB6.2 via Line M2WS6 (intermittent stream).
- Drainage from Lime Slurry Containment Area M2WD12 via Line M2WD12 (intermittent stream).
- Drain water from Basin M2WB1 via Line M2W1 (intermittent stream).
- Drain water from Basins M2WB4.1 and M2WB4.2 (intermittent stream).
- Drain water from Basin M2WB3 (intermittent stream).
- Drain water from Basins M2WB9.1 & M2WB9.2 (intermittent stream).

The wastewater will subsequently be pumped to Transfer Basins M2WB8.1 and M2WB8.2 or Clarifiers M2WST1 and M2WST2 for treatment. The wastewater can also be sent to DAF Units M2DAF2.1 and M2DAF2.2.

Collection Basin M2WB2 will be an aboveground concrete tank. The unit will have an operating capacity of approximately 230 m³ (60,760 gal). (See Section L, Sheets C12A-G and 13A-H.)

The capacity of Basin WM2B2 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 = 230 m³ (60,760 gal)
- Length = 12,000 mm (39 ft)
- Width = 8,000 mm (26 ft)
- Height = 4,400 mm (14 ft)
- Height of Water Surface = 2,400 mm (8 ft)

Basin WB2 will be equipped with two mixer units (Agitators M2WAG2.1 and M2WAG2.1). They will be operated to prevent precipitation of suspended solids within the tank.

Pump Groups M2WSP2.1.X and M2WSP2.2.X will be used to transfer wastewater from Collection Basin M2WB2 to Transfer Basins M2WB8.1 and M2WB8.2 and/or to Clarifiers M2WST1 and M2WST2 and/or DAF Units M2DAF2.1 and M2DAF2.2. The pump groups were selected based on the following operating conditions:

Pump Groups M2WSP2.1.X (1+1) and M2WSP2.2.X (1+1)

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

4.11 Clarifiers M2WST1 and M2WST2 and Filter Presses M2WSPF1 and M2WSPF2

Clarifiers M2WST1 and M2WST2 will be used to remove entrained solids from the wastewater (Stage #4) via gravity settling. The units will normally be operated in parallel; the clarifiers can also be operated individually if necessary. (The units are sometimes referred to as "thickeners.") The clarifiers will receive the following streams:

- Water from Transfer Basin M2WB8.1 (Line M2W8.1).
- Water from Transfer Basin M2WB8.2 (Line M2W8.2).

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

- Water from Collection Basin M2WB2.

The treated wastewater from Clarifiers WST1 and WST2 will subsequently flow by gravity to Aeration Basins M2WB4.1 and M2WB4.1, respectively, for further treatment (Stage #5).

The two clarifiers will be equipped with surface and bottom scrapers to remove floating oils and sludge, respectively. The sludge collected in the clarifiers will be pumped to Filter Presses M2WSPF1 and M2WSPF2. The sludge will be dewatered; the resulting filter cake will be deposited in roll-off boxes. The material will subsequently be shipped off-site for disposal. 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 M2WB2. The oil layer from the clarifiers will be routed to the Sludge Processing Area.

Clarifiers M2WST1 and M2WST2 will be aboveground concrete units. (See Section L, Sheets C15A-C.) The design parameters for each clarifier are provided below:

Clarifiers M2WST1 and M2WST2

- Hydraulic residence time = >3.33 hours
- Settling velocity = <1.12 meters/hour (<3.7 feet/hour)

The basic operating dimensions for each clarifier are as follows:

Clarifiers M2WST1 and M2WST2

- Volume = 749 m³ (197,865 gal)
- Diameter = 16,000 mm (53 ft)
- Surface area = 201 square meters (m²) (2,164 square feet) (ft²)
- Height of water surface from top of sludge cone = 3,500 mm (11 ft)

In the event of a shutdown of the treatment system, each clarifier will have a sludge storage volume of 105 m³ (27,738 gallons).

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

Filter Presses M2WSPF1 and M2WSPF2 will be aboveground units. (See Section L, Sheet C16.)

Sludge Pumps M2WSP4.1 and M2WSP4.2 will be used to continuously transfer the sludge from Clarifiers M2WST1 and M2WST2 to Filter Presses M2WSPF1 and M2WSPF2. The pumps were selected based on the following operating conditions:

Sludge Pumps M2WSP4.1 and M2WSP4.2

- Flowrate = 90 m³/hr (396 gpm)
- Pressure = 12 bar (174 psia)

Sludge Pumps M2WSP4.1 and M2WSP4.2 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 M2WDP4.1 and M2WDP4.2 into the respective Clarifier. The sump pumps were selected based on the following operating conditions:

Drain Pumps M2WDP4.1 and M2WDP4.2

- Flowrate = 2 m³/hr (9 gpm)
- Pressure = 1 bar (14.5 psia)

Rakes will be used to skim any floating materials from the top of the water surface in Clarifiers M2WST1 and M2WST2. The material will be directed into Oil Tanks M2WOB4.1 and M2WOB4.2. The material will then be pumped to Filter Presses M2WSPF1 and M2WSPF2. Pneumatic Pumps M2WOP4.1 and M2WOP4.2 will be used for this purpose. The pumps were selected based on the following operating conditions:

Pneumatic Pumps M2WOP4.1 and M2WOP4.2

- Flowrate = 10 m³/hr (44 gpm)
- Pressure = 12 bar (174 psia)

4.12 Aeration Basins M2WB4.1 and M2WB4.2 and Overflow Basin M2WB3

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 Basins M2WB4.1 and M2WB4.2. The aerated wastewater will then be routed to the sand filters for solids removal (Stage #6).

Aeration Basin M2WB4.1 will receive the following wastewater streams:

- Wastewater from Clarifier M2WST1 (Line M2WI4.1).
- NCCW from Basin M2WB1 (Line M2W1).

Aeration Basin M2WB4.2 will receive the following wastewater streams:

- Wastewater from Clarifier M2WST2 (Line M2WI4.2).
- NCCW from Basin M2WB1 (Line M2W1).

The aerated wastewater will subsequently flow by gravity to Overflow Basin M2WB3 prior to treatment in the sand filters.

Aeration Basins M2WB4.1 and M2WB4.2 will be aboveground concrete tanks. Each unit will have an operating capacity of 255 m³ (67,364 gal). (See Section L, Sheets C12A-G and C13A-H.) The design parameters for the tanks are provided below:

Aeration Basins M2WB4.1 and M2WB4.2

- Hydraulic residence time = >60 minutes
- Minimum height of water surface = 2,000 mm (6.6 ft)

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

Aeration Basins M2WB4.1 and M2WB4.2

- Volume = 255 m³ (67,364 gal)
- Length = 14,000 mm (46 ft)
- Width = 6,500 mm (21 ft)
- Height = 3,400 mm (11 ft)
- Height of Water Surface = 2,800 mm (9 ft)

Aeration Basin WB4 will be equipped with blowers and fine bubble diffusers. Blower Groups M2WBP4.1.X and M2WBP4.2.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 = 800 normal m³/hr (470 standard cubic feet per minute)
- Pressure = 0.6 bar (8.7 psia)

Overflow Basin M2WB3 will receive the gravity discharge from Aeration Basins M2WB4.1 and M2WB4.2. It will serve as a holding basin for the aerated water prior to sand filtration.

Basin M2WB3 will be an aboveground concrete tank. It will have a capacity of 134 m³ (35,399 gal). (See Section L, Sheets C12A-G and C13A-H.) The basic operating dimensions for each aeration tank are as follows:

Basin M2WB3

- Volume = 134 m³ (35,399 gal)
- Length = 13,400 mm (44 ft)
- Width = 4,000 mm (13 ft)
- Height = 3,400 mm (11 ft)
- Height of Water Surface = 2,500 mm (8 ft)

Pump Group M2WP3.X will be used to continuously transfer the wastewater from Overflow Basin M2WB3 to Sand Filters M2WSF1.1 through M2WSF.6. The pump group was selected based on the following operating conditions:

Pump Group M2WP3.X (1+1)

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

4.13 Sand Filtration Units M2WSF1.1 through M2WSF1.6

The wastewater 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 processed in one of two ways: (1) the water will be transferred to Filtered Water Basin M2WB9.1 prior to processing in the Ultrafiltration Unit or Reverse Osmosis Unit; or (2) the effluent will be pumped to the Mississippi River and discharged at Outfall EV201.

Sand Filtration System M2WSF1.X will receive the following wastewater stream:

- Aerated water from Overflow Basin M2WB3

The Sand Filtration System will consist of six aboveground filter units (M2WSF1.1 through M2WSF1.6). (See Section L, Sheet C17.) 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 M2WB3. The design parameters for the filtration equipment are provided below:

Sand Filtration System M2WSF1.X

- Filtration velocity = ≤ 19 meters per hour (m/hr) (1.0 feet per minute (ft/min))
- Backwash velocity = 25 m/hr (1.4 ft/min)
- Air backwash velocity = ≤ 55.8 m/hr (3.1 ft/min)

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

Sand Filters M2WSF1.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)

The sand filters will be periodically backwashed to remove the captured TSS. The equipment will be configured and automatically operated so that some filters remain in service while the other units are being backwashed. The backwashed units will automatically return to service once the cleaning process has been completed. The backwash will be routed to Collection Basin M2WB2 for treatment.

As noted in Section 4.12, Pump Group M2WP3.X will be used to continuously transfer the wastewater through Sand Filters M2WSF1.1 through M2WSF1.6. The pumps will be located at Overflow Basin M2WB3.

Pump Group M2WP9.1.X will be used to backwash the sand filters. The pump group was selected based on the following operating conditions:

Pump Group M2WP9.1.X (1+1)

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

Sand Filtration System M2WSF1.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 (M2W3) to the filters and to the backwash inlet line (M2W9.1).

4.14 Filtered Water Basins M2WB9.1 and M2WB9.2

Filtered Basin M2WB9.1 will be used to store the filtered wastewater effluent from the Sand Filters. It will receive the following streams:

- Filtered water from Sand Filters M2WSF1.X (Line M2W3)
- Water from Basin M2WB1 (to be used to clean the filters in case of emergency)

The wastewater in Basin M2WB9.1 will subsequently be sent to Filtered Water Basin M2WB9.2. As an alternative, the water can also be sent to Receiving Basin M2WRB1 for subsequent processing in the Ultrafiltration System.

Filtered Water Basin M2WB9.2 will be used to store the filtered wastewater effluent before it is discharged to the Mississippi River. It will receive the following streams:

- Filtered water from Basin M2WB9.1.
- Water discharged from RO Unit to Effluent Basin M2WRB3.

Basin M2WB91.1 will be an aboveground concrete tank. The basin will have a capacity of 420 m³ (110,950 gal). (See Section L, Sheets C12A-G and C13A-H.) The basic operating dimensions for the tank are as follows:

Basin M2WB91.1

- Volume = 420 m³ (110,950 gal)
- Length = 12,000 mm (39 ft)
- Width = 14,000 mm (46 ft)
- Height = 3,400 mm (11 ft)
- Height of Water Surface = 2,500 mm (8 ft)

Basin M2WB91.2 will be an aboveground concrete tank. The basin will have a capacity of 336 m³ (88,762 gal). (See Section L, Sheets C12A-G and C13A-H.) The basic operating dimensions for the tank are as follows:

Basin M2WB91.2

- Volume = 336 m³ (88,762 gal)
- Length = 9,600 mm (31 ft)
- Width = 14,000 mm (46 ft)
- Height = 3,400 mm (11 ft)
- Height of Water Surface = 2,500 mm (8 ft)

Pump Group M2WP9.1.X will be used to transfer the wastewater effluent from Filtered Basin M2WB9.1 to Filtered Water Basin M2WB9.2. The pump group was selected based on the following operating conditions:

Pump Group M2WP9.1.X (1+1)

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

Pump Group M2WP9.2.X will be used to transfer the final wastewater effluent from Filtered Water Basin M2WB9.2 to the Mississippi River. The effluent will be pumped through a below-ground pipeline. The pump group was selected based on the following operating conditions:

Pump Group M2WP9.2.X (1+1)

- Flowrate = 450 m³/hr (1,981 gpm)
- Pressure = 3.5 bar (51 psia)

4.15 Sludge Processing Area

The Sludge Processing Area will be installed adjacent to the Emulsion Tanks and DAF Units. It will be used for dewatering of the sludge prior to off-site disposal of the material.

The Sludge Processing Area will receive the following wastewater streams:

- Oil layer from Emulsion Tanks M2EB1.1 and M2EB1.2.
- Sludge and floating solids from DAF Units M2DAF2.1 and M2DAF2.2.
- Drainage from DAF Units M2DAF2.1 and M2DAF2.2 during cleaning.
- Oil layers from Clarifiers M2WST1 and M2WST2.

The sludge from the Emulsion Tanks and DAF Units 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 consist of a concrete pad with secondary containment. The unit will be approximately 28 meters long by 25 meters wide (92 feet by 81 feet). It will be equipped with a truck loading station.

The sludge will be allowed to air dry. Dewatering boxes may also be used. A suitable absorbent may also be added to solidify the material if necessary. The dry material will subsequently be shipped off-site for disposal. 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 (M2WB10). The material will subsequently be transferred to the Emulsion Tanks M2EB1.1 and M2EB1.2 for treatment. The water can also be sent to the DAF Units or to Transfer Basins M2WB8.1 and M2WB8.2. Pump Group M2WSP10.X will be operated for this purpose. The pump group was selected based on the following operating conditions:

- Pump Group M2WSP10.X (1+1)
- Flowrate = 10 m³/hr (44 gpm)
 - Pressure = 3 bar (44 psia)

4.16 Receiving Basin M2WRB1

Receiving Basin M2WRB1 will be used to collect and homogenize certain wastewater discharges prior to treatment in Ultrafiltration System M2WRUF1.X. Basin M2WRB1 will primarily receive the following wastewater stream:

- Discharge from Filtered Water Basin M2WB9.1 (via Line M2W9.2.1).

In addition, Basin M2WRB1 will also be configured to receive the following stream:

- Blowdowns from Line M2WI1.

Basin M2WRB1 will be an aboveground concrete tank. It will have an operating capacity of 151 m³ (39,890 gal). (See Section L, Sheets C18A-D.)

The homogenized water from Basin M2WRB1 will pass through Strainers M2WRS1.X before entering the Ultrafiltration System. The strainers will filter out any entrained solids. The backwash from the strainers will be sent to Basin M2PWB1 in the Sludge Processing Area.

Basin M2WRB1 will be emptied using Pump Group M2WRP1.X. The pump group was selected based on the following operating conditions:

Pump Group M2WRP1.X (1+1)

- Flowrate = 200 m³/hr (881 gpm)
- Pressure = 3.5 bar (51 psia)

4.17 Ultrafiltration System M2WRUF1.X

Ultrafiltration (UF) System M2WRUF1.X will be used to treat the process wastewater effluent for reuse. It will receive the water from Receiving Basin M2WRB1. After filtration, the wastewater will be pumped to Reverse Osmosis Unit M2WRO1.X via Line M2WRUFO1.

The membranes for the UF System will be periodically backwashed to clean them. The backwash will be sent to Basin M2PWB1 in the Sludge Processing Area.

The UF System will have an operating capacity of 200 m³/hr (881 gpm). (See Section L, Sheet C19.)

4.18 Filtered Water Basin M2WRB2

Filtered Water Basin M2WRB2 will receive the filtered water produced in the UF System. The water will then be transferred to Reverse Osmosis (RO) Unit M2WRO1.X for additional treatment prior to reuse. The filtered water will also be used to backwash the membranes in the UF System.

Basin M2WRB2 will be an aboveground concrete tank. It will have an operating capacity of 119 m³ (31,440 gal). (See Section L, Sheets C18A-D.)

Pump Group M2WRP2.X will be used to transfer the water from Basin M2WRB2 to the RO Unit. The pump group was selected based on the following operating conditions:

Pump Group M2WRP2.X (1+1)

- Flowrate = 180 m³/hr (793 gpm)
- Pressure = 3.0 bar (44 psia)

Pump Group M2WRUFP1.X will be used to backwash the UF System. The pump group was selected based on the following operating conditions:

Pump Group M2WRUFP2.X (1+1)

- Flowrate = 200 m³/hr (881 gpm)
- Pressure = 3.6 bar (52 psia)

14.19 Reverse Osmosis Unit M2WRO1.X

Reverse Osmosis (RO) Unit M2WRO1.X will receive the filtered water from Filtered Water Basin M2WRB2. After treatment in the RO Unit, the water will be transferred to Basin M2PB3. This basin

provides clean water to the “make-up circuit” which supplies the water treatment plants and cooling towers. The concentrate generated in the RO Unit will be transferred to Effluent Basin M2WRB3.

The RO Unit will have an operating capacity of 180 m³/hr (793 gpm). (See Section L, Sheet C20.)

14.20 Effluent Basin M2WRB3

Effluent Basin M2WRB3 will receive the concentrate discharged from RO Unit M2WRO1.X. It will serve as a batch holding tank. Once the basin is full, the water will be transferred to Filtered Water Basin M2WB9.2.

Effluent Basin M2WRB3 will be an aboveground concrete tank. It will have a capacity of 43 m³ (11,360 gal). (See Section L, Sheets C12A-G and C13A-H.)

Pump Group M2WRP3.X will be used to transfer the water from Effluent Basin M2WRB3 to Filtered Water Basin M2WB9.2. The pump group was selected based on the following operating conditions:

Pump Group M2WUF2.X (1+1)

- Flowrate = 45 m³/hr (198 gpm)
- Pressure = 3.0 bar (44 psia)

14.21 Basin M2WOIB1

Basin M2WOIB1 is located in the Oils Separation Area. It will be used to accumulate oily wastewater pending treatment. The basin will receive the following waste streams:

- Wastewater from sumps in Roll Shop
- Wastewater from cooling sump and sump pits in Roll Shop

Basin M2WOIB1 will be equipped with a baffle that retains the floating oil and grease. An “oil channel” will intermittently discharge the oil and grease to Oil Basin M2WOB1.1. The decanted water will be sent to Collecting Basin M2WB2 or to the Emulsion Tanks.

Basin M2WOIB1 will be an aboveground concrete tank. It will have an operating capacity of 62 m³ (16,380 gal). (See Section L, Sheets C14A/B.) The dimensions of the tank are provided below:

Basin M2WOIB1

- Volume = 62 m³ (16,380 gal)
- Length = 3,000 mm (10 ft)
- Width = 10,300 mm (34 ft)

- Height = 2,500 mm (8 ft)
- Height of Water Surface = 2,000 mm (6 ft)

Oil Basin M2WOB1.1 will be an aboveground concrete tank. It will have an operating capacity of 457 m³ (120,727 gal). (See Section L, Sheets C14A/B.) The dimensions of the tank are provided below:

Basin M2WOIB1.1

- Volume = 1.73 m³ (457 gal)
- Length = 1,800 mm (6 ft)
- Width = 1,200 mm (4 ft)
- Height = 1,000 mm (3 ft)
- Height of Water Surface = 800 mm (3 ft)

Pump Group M2WOP1.2.X will be used to transfer the decanted water to Collecting Basin M2WB2 or the Emulsion Tanks. The pump group based on the following operating conditions:

Pump Group M2WOP1.2.X (1+1)

- Flowrate = 50 m³/hr (220 gpm)
- Pressure = 1 bar (14.5 psia)

Pneumatic Pump M2WOP1.1.1 will be used to empty Basin M2WOIB1. The oily wastewater stream will be sent to the Sump Pits Receiving Tank M2WRLT1. The pump was selected based on the following operating conditions:

Pump M2WOP1.1 (1+0)

- Flowrate = 10 m³/hr (44 gpm)
- Pressure = 3 bar (44 psia)

5.0 Ancillary Equipment

The 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
- Sulfuric Acid System
- Roll Shop Receiving Tank
- Lubricant Tank

It is important to note that EV 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.

EV 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 piping 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 M2WB5
- Emulsion Tanks M2EB1.1 and M2EB1.2
- Stabilizer Tanks M2WB6.1 and M2WB6.2
- Batch Tanks M2WB7.1 and M2WB7.2

Two bulk Caustic Storage Tanks, M2DT2.1 and M2DT2.2, will be operated at the wastewater treatment building. The capacity of each tank will be 25 m³ (6,600 gallons). The caustic tanks will be constructed of fiberglass reinforced plastic (FRP). (See Section L, Sheet C4.)

Pump Group M2DAP2.X will be used to transfer the sodium hydroxide solution. The pumps were selected based on the following operating conditions:

Pump Group M2DAP2.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 piping 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 M2WB6.1 and M2WB6.2
- Batch Tanks M2WB7.1 and M2WB7.2

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

One bulk Lime Storage Silo, M2DT3.1, 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. (See Section L, Sheets C4 and C23.)

One Lime Slurry Tank, M2DT3.2, will be operated adjacent to the silo. The capacity of the vessel will be 8 m³ (2,113 gallons). The silo will be constructed of FRP. (See Section L, Sheets C4 and C23.)

The Lime Slurry Area will have the following operating conditions:

Lime Slurry Area

- Slurry Concentration = 10%
- Minimum Flow Rate = 0.55 m³/hr (2.4 gpm)
- Pressure = 2 bar (29 psia)

Pump Group M2DAP3.X will be used to transfer the lime slurry. The pumps were selected based on the following operating conditions:

Pump Group WPDAP3.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.

The Lime Slurry Area will be equipped with secondary containment and a collection sump. Any leakage from the process equipment will be captured and transferred to Basin M2BWB2 for treatment. Drain Pump M2WDP12 will be used to transfer the accumulated material. The pump was selected based on the following operating conditions:

Drain Pump Group M2WDP12

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

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 piping 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 M2WB5
- Emulsion Tanks M2EB1.1 and M2EB1.2
- Stabilizer Tanks M2WB6.1 and M2WB6.2
- Batch Tanks M2WB7.1 and M2WB7.2

One bulk Chlorine Storage Tank, M2DT4, will be operated in the wastewater treatment building. The capacity of the tank will be 21 m³ (5,550 gallons). The chlorine tank will be constructed of FRP. (See Section L, Sheet C4.)

Pump Group M2DAP4.X will be used to transfer the chlorine solution. The pumps were selected based on the following operating conditions:

Pump Group M2DAP 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 piping network which will dispense the chemical to local tote bins equipped with feed pumps. The system will provide chlorine to the following locations:

- Clarifier M2WST1
- Clarifier M2WST2

One bulk Chlorine Storage Tank, M2DT6, will be operated in the clarifiers area. The capacity of the tank will be 21 m³ (5,550 gallons). The chlorine tank will be constructed of FRP. (See Section L, Sheet C4.)

Pump Group M2DAP 6.X will be used to transfer the chlorine solution. The pumps were selected based on the following operating conditions:

Pump Group M2DAP 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 piping network which will dispense the chemical. The system will provide peroxide to the following locations:

- Sand filters main inlet line (M2W3 line)
- Sand filters backwash inlet line (M2W9.1 line)

One bulk Peroxide Storage Tank, M2DT5, 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. (See Section L, Sheet C4.)

Pump Group M2DAP5.X will be used to transfer the peroxide solution. The pumps were selected based on the following operating conditions:

Pump Group M2DAP 5.X (1+1)

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

5.6 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.

5.7 Roll Shop Receiving Tank M2WRLT1

The Roll Shop Receiving Tank, M2WRLT1, 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 Receiving Tank can be filled using a hose connection or Line M2WRLT1.

The Roll Shop Receiving Tank will be operated at the wastewater treatment building. The capacity of the tank will be 25 m³ (6,600 gallons). The storage tank will be constructed of steel. (See Section L, Sheet C21.)

Pump Group M2WRLP1.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 M2WRLP1.X (1+1)

- Flowrate = 10 m³/hr (44 gpm)
- Pressure = 3 bar (44 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 M2WDRLP1.1 into the Receiving Tank. The sump pump was selected based on the following operating conditions:

Pump M2WDRLP1.1

- Flowrate = 10 m³/hr (44 gpm)
- Pressure = 3 bar (44 psia)

5.8 Lubricant Tank M2WLT1

The Lubricant Tank, M2WLT1, 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 tank can be filled using a hose connection or Line M2WL1.

The Lubricant Tank will be operated at the wastewater treatment building. The capacity of the tank will be 25 m³ (6,600 gallons). The storage tank will be constructed of steel. (See Section L, Sheet C22.)

Pump M2WLP1.1 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 M2WLP1.1

- Flowrate = 10 m³/hr (44 gpm)
- Pressure = 3 bar (44 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 M2WDLP1 into the Lubricant Tank. The sump pump was selected based on the following operating conditions:

Pump M2WDLP1

- Flowrate = 10 m³/hr (44 gpm)
- Pressure = 3 bar (44 psia)

6.0 Operation of Slag Yard Pond

Slag will be generated as a by-product of the steel manufacturing operations at the Facility. It will be produced during separation of the impurities from the molten steel in the steelmaking furnaces. The slag will be a molten liquid that solidifies upon cooling. The material will be a complex solution of silicates and oxides.

The slag will be routinely collected and removed from the Melt Shop. The material will be transferred via large trucks to the Slag Yard for storage. The slag will subsequently be recovered for reuse as a road-building material. Water may be sprayed onto the slag to quench the hot material. The Slag Yard at the Facility will encompass approximately 33.9 acres

The Slag Yard Pond will be located down-gradient of the Slag Yard. This surface impoundment will be used to accumulate the stormwater runoff from the Yard. The quench water will also flow to the basin. The Pond will encompass approximately 2.4 acres.

The Slag Yard Pond will function as a sedimentation basin. The solids in the stormwater runoff and quench water will settle out within the basin. The accumulated sediment will be removed when necessary for off-site disposal.

The wastewater in the Slag Yard Pond will be periodically discharged to the Mississippi River. The water will be pumped through a below-ground pipeline to Outfall EV202.

Approximately 0.137 MGD of stormwater runoff and quench water will be generated. The commingled wastewater will be discharged on a batch basis depending on the weather conditions and the pond level. Approximately 0.500 MGD will be discharged to Outfall EV202. The estimated rate of wastewater generation in the Slag Yard is based on the following information: (1) the Slag Yard (including the pond) encompasses an area of 33.86 acres total; and (2) the average rainfall in Osceola, Arkansas is 50.28 inches per year (1981 through 2010), which is equivalent to 4.19 feet per year. It was assumed that all the rain which falls within the Slag Yard will flow to the pond for eventual discharge at Outfall EV202; rain will also fall directly into the basin. The total amount is equal to 46.226 million gallons per year, which is equivalent to an average daily rate of generation of 0.127 MGD. Also, it is estimated, based on best professional judgement, that an average of 10,000 gallons per day (0.010 MGD) of quench water will be used in the Slag Yard. The quench water will also flow to the pond for eventual discharge at Outfall EV202.

Upon request, EV will provide the 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 F-1 – Summary of Wastewater Streams Discharged to Treatment System (Outfall EV201)

Effluent Type	Process Area	Average Flow (m ³ /hr)	Maximum Flow (m ³ /hr)	Frequency	Influent Characteristics and/or Comments
Segment Shop, Roll Cooling Sump, and Sump Pits	ESP	9	45	Continuous	-
Entry Section	CGL	-	1	Intermittent	Oil-Contaminated Wastewater
Entry Looper	CGL	-	1	Intermittent	Oil-Contaminated Wastewater
Pre-Degreasing Section	CGL	3	4	Continuous	Alkaline Wastewater (water partly reused for refilling of alkaline section)
Degreasing Section	CGL	4	5	Continuous	Alkaline Wastewater (water partly reused for refilling of alkaline section)
Furnace	CGL	-	15	Intermittent	Cooling Water and Demineralized Water
Cooling Tower	CGL	-	10	Intermittent	Wastewater may Contain Iron Fines and TSS
Galvanizing Section	CGL	0	1	Intermittent	-
Skin Pass Mill (Rinse After SPM)	CGL	10	15	Continuous	Wastewater may Contain TSS including Aluminum, Zinc, and Iron Fines; also, Oil from Process
Rinse After SPM	CGL	0.2	1	Continuous	-

Effluent Type	Process Area	Average Flow (m ³ /hr)	Maximum Flow (m ³ /hr)	Frequency	Influent Characteristics and/or Comments
Tension Leveler	CGL	-	0.8	Intermittent	-
Exit Looper	CGL	-	1	Intermittent	Wastewater Contaminated with Oil
Exit Section	CGL	-	1	Intermittent	Wastewater Contaminated with Oil
Pre-Degreasing Section	CGL	1	3-10	Intermittent	Alkaline Wastewater Contaminated with Oil
Degreasing Section	CGL	1.5	3-10	Intermittent	Alkaline Wastewater Contaminated with Oil
Post Treatment	CGL	-	-	Intermittent	Flow Depends on Coating Media and Frequency of Media Changes
Pickling Section Waste Acid	PGL	9.2	25	Continuous	Acidic Wastewater Containing Iron (continuously discharged to acid tank farm)
Rinsing Section Waste Rinse Water (Acid Contamination)	PGL	7	25	Continuous	Acidic Wastewater Containing Iron (continuously discharged to acid tank farm)
Sump Pit	PGL	1.5	15	Intermittent	Acidic Wastewater Containing Iron
Water Quench, Sump Pit	PGL	5	10	Continuous	-
Entry Section, Sump Pit	PGL	5	10	Intermittent	Oil-Contaminated Wastewater (discharged from mobile pump during an emergency)

Effluent Type	Process Area	Average Flow (m ³ /hr)	Maximum Flow (m ³ /hr)	Frequency	Influent Characteristics and/or Comments
ISPM (SGS)	PGL	10	30	Intermittent	Wastewater Contaminated with Oil
Mechanical Equipment	PGL	1.5	6	Intermittent	Wastewater Contaminated with Oil
Rinsing Section, Waste Rinse Water	PLTCM	7	25	Continuous	Acidic Wastewater Containing Iron (continuously discharged to acid tank farm)
Pickling Section Sump Pit	PLTCM	1.5	15	Intermittent	Acidic Wastewater Containing Iron
TCM, Emulsion System	PLTCM	–	240	Intermittent	Wastewater from Emulsion Room (discharge from tanks)
TCM, Emulsion System	PLTCM	–	20	Intermittent	Wastewater from Sump Pits in Basement of Emulsion Building
TCM, Wastewater	PLTCM	–	20	Intermittent	Wastewater from Sump Pits in Hydraulic Room and from Fume Exhaust Ventilator
Pickling Section, Waste Acid	PLTCM	9.2	25	Continuous	Acidic Wastewater Containing Iron (continuously discharged to acid tank farm)
Entry Section, Sump Pit	PLTCM	5	–	Intermittent	Oil-Contaminated Wastewater (discharged from mobile pump during an emergency)

Effluent Type	Process Area	Average Flow (m ³ /hr)	Maximum Flow (m ³ /hr)	Frequency	Influent Characteristics and/or Comments
Exit Section, Sump Pit	PLTCM	5	–	Intermittent	Oil-Contaminated Wastewater (discharged from mobile pump during an emergency)
Pickling Section, Regenerated Acid	PLTCM	5.5	20	Continuous	Acidic Wastewater Containing Iron
Mechanical Equipment	PLTCM	1.5	6	Intermittent	Wastewater Contaminated with Oil
Scrubber Water Exhaust System (Waste Rinse Water)	PPPL	2	15	Intermittent	Acidic Wastewater Containing Iron
Wastewater	SPM	15	15	Intermittent	Wastewater Contaminated with Oil and Iron
Non-Contact Cooling Water	Entire Facility	–	198	Continuous	–
Contact Cooling Water	Entire Facility	–	159	Continuous	–
Total Discharge	WWTP	139	197	Continuous	Outfall EV201

m³/hr = Cubic Meters per Hour

ESP = Endless Strip Process (Continuous Casting Mill (CCM) Hot Strip Mill (HSM))

CGL = Continuous Galvanizing Line

PGL = Pickling and Galvanizing Line

PLTCM = Pickling Line, Tandem Cold Mill

PPPL = Push-Pull Pickling Line

SPM = Skin Pass Mill

WWTP = Wastewater Treatment Plant

Section G – Projected Technology-based and Water Quality-based
Mass Permit Limitations for Outfall EV201

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Section G

Projected Technology-based and Water Quality-based Mass Permit Limitations for Outfall EV201

EV is constructing a new scrap-steel-to-steel products manufacturing complex in Osceola, Arkansas. The process wastewater from the steel mill operations will be treated on-site. The effluent from the wastewater treatment plant will be discharged to the Mississippi River at Outfall EV201.

The process wastewater effluent will be subject to the Effluent Limitations Guidelines (ELG) for the Iron and Steel Manufacturing Point Source Category (40 Code of Federal Regulations, Part 420). Nine industrial subcategories will be applicable. The 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 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 EV201 are provided herein for the reviewer's convenience. The permit limitations reflect the proposed manufacturing levels and wastewater discharge flow rate. The anticipated effluent permit limits for selected wastewater constituents for EV's wastewater treatment plant are presented in the following tables. The engineering calculations are also enclosed. The material flow through the manufacturing units is illustrated in Figure G-1. The applicable ELG subparts and process throughput rates (annual and daily) are identified therein. Refer to Table 2D-3 in Section C for additional information.

Outfall EV202, the wastewater discharge from the slag yard pond, will not be regulated under the Effluent Guidelines for Steel Manufacturing. The discharge limits for that outfall will be based strictly on the Arkansas water quality standards.

Table G-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	686.94	1,743.52	N/A	N/A
Oil & Grease	216.58	525.51	104.25	156.38
Chromium, Total	0.40	0.99	N/A	N/A
Chromium, Hexavalent	0.09	0.27	534	1,072
Lead, Total	1.69	5.07	1,876	3,765
Nickel, Total	0.30	0.89	51,745	103,823
Zinc, Total	2.41	7.23	10,851	21,773
Naphthalene	0.05	0.10	78,228	156,961
Tetrachloroethylene	0.07	0.15	150,339	301,647

N/A = Not Applicable

Table G-2 – Anticipated Effluent Limits for Outfall EV201 (Monthly Average Mass Values)

Parameter	Monthly Average Limit (lb/day)	Basis of Limit
Total Suspended Solids	686.94	Technology-based Limit
Oil & Grease	104.25	Water Quality-based Limit
Chromium, Total	0.40	Technology-based Limit
Chromium, Hexavalent	0.09	Technology-based Limit
Lead, Total	1.69	Technology-based Limit
Nickel, Total	0.30	Technology-based Limit
Zinc, Total	2.41	Technology-based Limit
Naphthalene	0.05	Technology-based Limit
Tetrachloroethylene	0.07	Technology-based Limit

Table G-3 – Anticipated Effluent Limits for Outfall EV201 (Daily Maximum Mass Values)

Parameter	Daily Maximum Limit (lb/day)	Basis of Limit
Total Suspended Solids	1,743.52	Technology-based Limit
Oil & Grease	156.38	Water Quality-based Limit
Chromium, Total	0.99	Technology-based Limit
Chromium, Hexavalent	0.27	Technology-based Limit
Lead, Total	5.07	Technology-based Limit
Nickel, Total	0.89	Technology-based Limit
Zinc, Total	7.23	Technology-based Limit
Naphthalene	0.10	Technology-based Limit
Tetrachloroethylene	0.15	Technology-based Limit

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	22,466	1000 lb/day	0.00	0.00
Lead	0	0	22,466	1000 lb/day	0.00	0.00
Zinc	0	0	22,466	1000 lb/day	0.00	0.00
pH	0.0	0.0				

Discharge of pollutants from semi-wet electric arc furnace steelmaking to navigable waters is prohibited.

Production Units: Electric Arc Furnace (EAF) Units 1 and 2

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	8,220	1000 lb/day	60.01	21.45
Lead	0.0000939	0.0000313	8,220	1000 lb/day	0.77	0.26
Zinc	0.000141	0.0000469	8,220	1000 lb/day	1.16	0.39
pH	6.0 MIN	9.0 MAX				

Production Units: RH Degasser Units 1 and 2

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	21,918	1000 lb/day	160.00	57.21
O&G	0.00313	0.00104	21,918	1000 lb/day	68.60	22.79
Lead	0.0000939	0.0000313	21,918	1000 lb/day	2.06	0.69
Zinc	0.000141	0.0000469	21,918	1000 lb/day	3.09	1.03
pH	6.0 MIN	9.0 MAX				

Production Unit: Endless Strip Process (ESP) Unit, Continuous Casting Mill (CCM)

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	Production	Units	Mass, Max.	Mass, Monthly
					Daily (lb/day)	Avg. (lb/day)
	Kg/kg (pounds per 1,000 lb) of product					
TSS	0.0435	0.0163	21,918	1000 lb/day	953.43	357.26
O&G	0.0109	0.00545	21,918	1000 lb/day	238.91	119.45
pH	6.0 MIN	9.0 MAX				

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

Production Unit: ESP Unit, Hot Strip Mill (HSM)

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	No. of Fume Scrubbers	Mass, Max.	Mass, Monthly
				Daily (lb/day)	Avg. (lb/day)
	Kg per day per Fume Scrubber				
TSS	5.72	2.45	3	37.83	16.20
O&G	2.45	0.819		16.20	5.42
Lead	0.0368	0.0123		0.24	0.08
Zinc	0.0491	0.0164		0.32	0.11
pH	6.0 MIN	9.0 MAX			

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

NSPS are not established for acid regeneration plants (absorber vent scrubber) at new facilities.

Three fume scrubbers: Pickling & Tandem Mill (SN-26), Pickle Galvanizing Line (SN-38a), and Push-Pull Pickling Line (SN-23b)

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	Production	Units	Mass, Max.	Mass, Monthly
					Daily (lb/day)	Avg. (lb/day)
Kg/kg (pounds per 1,000 lb) of product						
TSS	0.0025	0.00125	23,726	1000 lb/day	59.32	29.66
O&G	0.00104	0.000417	23,726	1000 lb/day	24.68	9.89
Chromium	0.0000418	0.0000167	23,726	1000 lb/day	0.99	0.40
Lead (NA)	0.0000188	0.0000063	23,726	1000 lb/day	0.45	0.15
Nickel	0.0000376	0.0000125	23,726	1000 lb/day	0.89	0.30
Zinc (N/A)	0.0000125	0.0000042	23,726	1000 lb/day	0.30	0.10
Naphthalene	0.0000042	0.0000021	23,726	1000 lb/day	0.10	0.05
Tetrachloroethylene	0.0000063	0.00000315	23,726	1000 lb/day	0.15	0.07
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.

Production Units: Pickling & Tandem Mill, Other Cold Mill Operations, and Skin Pass Mill

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	Production	Units	Mass, Max.	Mass, Monthly
					Daily (lb/day)	Avg. (lb/day)
Kg/kg (pounds per 1,000 lb) of product						
TSS	0.0146	0.00626	7,068	1000 lb/day	103.19	44.25
O&G	0.00626	0.00209	7,068	1000 lb/day	44.25	14.77
pH	6.0 MIN	9.0 MAX				

Production Unit: Cleaning Sections for Galvanizing Line and Hot Dip Galvanizing Line

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	Production	Units	Mass, Max.	Mass, Monthly
					Daily (lb/day)	Avg. (lb/day)
Kg/kkg (pounds per 1,000 lb) of product						
TSS	0.0438	0.0188	7,068	1000 lb/day	309.58	132.88
O&G	0.0188	0.00626	7,068	1000 lb/day	132.88	44.25
Lead	0.000282	0.0000939	7,068	1000 lb/day	1.99	0.66
Zinc	0.000376	0.000125	7,068	1000 lb/day	2.66	0.88
Chromium (hexavalent)	0.0000376	0.0000125	7,068	1000 lb/day	0.27	0.09
pH	6.0 MIN	9.0 MAX				

Production Units: Galvanizing Line and Hot Dip Galvanizing Unit

Subpart M—Other Operations Subcategory

§420.134 New source performance standards (NSPS).

(a) Direct-reduced iron.

Pollutant or pollutant property	Maximum for any 1 day	Average of daily values for 30 consecutive days	Production	Units	Mass, Max.	Mass, Monthly
					Daily (lb/day)	Avg. (lb/day)
Kg/kkg (pounds per 1,000 lb) of product						
TSS	0.00998	0.00465	6,028	1000 lb/day	60.16	28.03
pH	6.0 MIN	9.0 MAX				

Subpart M only applies to amount of DRI and any fines that are produced and sold commercially. EV will use majority of DRI and fines for internal steel production.

No ELG subpart applies to Coil Coating Line (CCL).

Production Unit: Direct Reduced Iron (DRI) Unit

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	1,743.52	686.94	1.250	167.24	65.89	167,243.87	65,893.46
O&G	525.51	216.58	1.250	50.41	20.77	50,408.89	20,774.69
Chromium	0.99	0.40	1.250	0.10	0.04	95.13	38.01
Chromium (hexavalent)	0.27	0.09	1.250	0.03	0.01	25.49	8.47
Lead	5.07	1.69	1.250	0.49	0.16	486.00	161.95
Nickel	0.89	0.30	1.250	0.09	0.03	85.57	28.45
Zinc	7.23	2.41	1.250	0.69	0.23	693.69	230.74
Naphthalene	0.10	0.05	1.250	0.01	0.00	9.56	4.78
Tetrachloroethylene	0.15	0.07	1.250	0.01	0.01	14.34	7.17
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.

Used proposed flow rate of 1.250 MGD at Outfall EV201 to calculate effluent concentration values.

Outfall EV201

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

= 1.250 MGD

Effluent Mass Limits

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

= (10 mg/L) * (1.250 MGD) * (8.34)

= 104.25 lb/day (monthly average)

= (15 mg/L) * (1.250 MGD) * (8.34)

= 156.38 lb/day (daily maximum)

Outfall EV201

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	686.94	1,743.52	N/A	N/A
Oil & Grease	216.58	525.51	104.25	156.38
Chromium, Total	0.40	0.99	N/A	N/A
Chromium, Hexavalent	0.09	0.27	534	1,072
Lead, Total	1.69	5.07	1,876	3,765
Nickel, Total	0.30	0.89	51,745	103,823
Zinc, Total	2.41	7.23	10,851	21,773
Naphthalene	0.05	0.10	78,228	156,961
Tetrachloroethylene	0.07	0.15	150,339	301,647

Note 1: Technology-based limits for all parameters were calculated using production capacities and ELG for Steel Manufacturing (spreadsheet attached).

Note 2: Water quality-based limits for oil and grease were calculated using Arkansas water quality standards and effluent flow rate (spreadsheet attached).

Note 3: Water quality-based limits for hexavalent chromium, lead, nickel, zinc, naphthalene, and tetrachloroethylene were calculated using DEQ's permit limit calculation spreadsheet for BRS in January 2021 (attached).

Outfall EV201

Parameter	Anticipated Permit Limits	Monthly Average Mass
	lb/day	Basis of Limit
Total Suspended Solids	686.94	Technology-based Limit
Oil & Grease	104.25	Water Quality-based Limit
Chromium, Total	0.40	Technology-based Limit
Chromium, Hexavalent	0.09	Technology-based Limit
Lead, Total	1.69	Technology-based Limit
Nickel, Total	0.30	Technology-based Limit
Zinc, Total	2.41	Technology-based Limit
Naphthalene	0.05	Technology-based Limit
Tetrachloroethylene	0.07	Technology-based Limit

Outfall EV201**Anticipated Permit Limits****Daily Maximum Mass**

Parameter	lb/day	Basis of Limit
Total Suspended Solids	1,743.52	Technology-based Limit
Oil & Grease	156.38	Water Quality-based Limit
Chromium, Total	0.99	Technology-based Limit
Chromium, Hexavalent	0.27	Technology-based Limit
Lead, Total	5.07	Technology-based Limit
Nickel, Total	0.89	Technology-based Limit
Zinc, Total	7.23	Technology-based Limit
Naphthalene	0.10	Technology-based Limit
Tetrachloroethylene	0.15	Technology-based Limit

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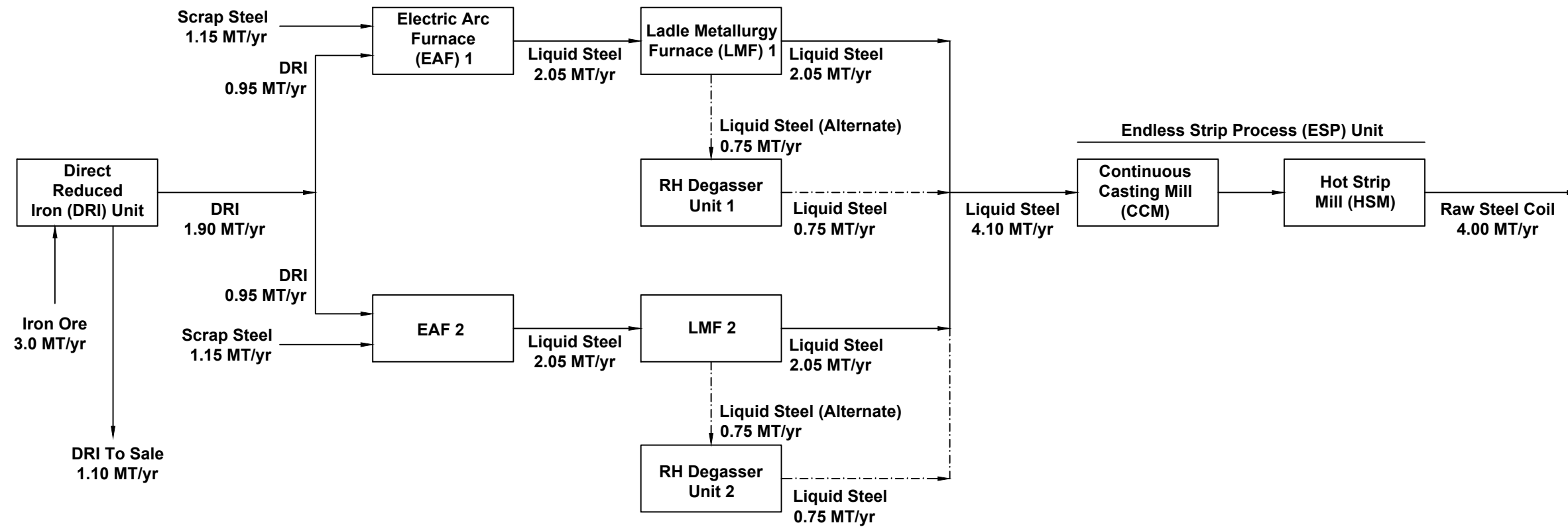
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P		
1	CALCULATIONS OF ARKANSAS WATER QUALITY-BASED EFFLUENT LIMITATIONS																	
2	The spreadsheet logic will function correctly when ALL yellow cells with "?" have data entered.								For an Arkansas River/Stream									
3	Do not enter data in yellow cells marked "Reserved". White cells marked "Reserved" have comp								(Reserved)									
4	STEP 1: INPUT TWO LETTER CODE FOR ECOREGION (Use Code at Right)								DL									
5																		
6																		
7	FACILITY								Codes & TSS for Ecoregions and Large Rivers									
8									Ouachita Mts. Eco (OM) =		2.0 mg/l		Arkansas (Ft. Smith to Dardanelle Dam)		12.0 mg/l			
9	Permittee								Big River Steel		Ozark Highlands Eco (OH) =		2.5 mg/l		Arkansas (Dardanelle Dam to Terry L&D)		10.5 mg/l	
10	NPDES Permit No.								AR0052582		Boston Mts. Eco (BM) =		1.3 mg/l		Arkansas (Terry L&D to L&D No. 5)		8.3 mg/l	
11	Outfall No.(s)								001		Ark River Valley Eco (AV) =		3.0 mg/l		Arkansas (L&D No. 5 to Mouth)		9.0 mg/l	
12	Plant Effluent Flow (MGD)								1.25		Gulf Coastal Eco (GC) =		5.5 mg/l		White (Above Beaver Lake)		2.5 mg/l	
13	Plant Effluent Flow (cfs)								1.93		Delta Ecoregion (DL) =		8.0 mg/l		White (Below Bull Shoals to Black Riv)		3.3 mg/l	
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)								1				White (From Black River to Mouth)		18.5 mg/l			
18	Name of Receiving Stream:								Mississippi River				St. Francis River		18.0 mg/l			
19																		
20	Is this a lake or reservoir? (enter '1' if yes, '0' = no; make entry as a number)								0				Ouachita (Above Caddo River)		2.0 mg/l			
21	(Reserved)								0				Ouachita (Below Caddo River)		5.5 mg/l			
22	(Reserved) DO NOT INPUT DATA INTO CELL H22, H23 & H24....LEAVE BLANK→								?				Red River		33.0 mg/l			
23	(Reserved)												Total Hardness for:					
24	(Reserved)												Arkansas River = 125 mg/l		Red River = 211 mg/l			
25	(Reserved)												Ouachita River = 28 mg/l		St. Francis River = 103 mg/l			
26	(Reserved)												White River = 116 mg/l					
27	(Reserved)												Gulf Coastal = 31 mg/l		Ouachita Mount = 31 mg/l			
28	(Reserved)												Ozark Highlands = 148 mg/l		Ark River Valley = 25 mg/l			
29	Ecoregion TSS (mg/l) (For Large River, See List to Right)								8.00				Boston Mount = 25 mg/l		Delta = 81 mg/l			
30	Ecoregion Hardness (mg/l) For Large Rivers Ecoregion TSS and Hardness may not apply								81.00				Large Rivers					
31	Enter 7Q10 (cfs) as the Critical Flow (Reserved) (Reserved)								119000.00		(Reserved)		Mississippi River, Arkansas River, Red River					
32	Long Term Ave / Harmonic Mean Flow (cfs)								357000.00		(Reserved) (Reserved)		White (Below confluence with Black River)					
33	Using Diffusers (Yes/No)								No				Ouachita (Below confluence with Little Miss. River)					
34	pH (Avg)								7.00				For industrial and federal facility, use the highest monthly average flow					
35	Percent (%) of Critical Flow for Chronic Criteria								0.25				for the past 24 months. For POTWs, use the design flow.					
36	Percent (%) of Critical Flow for Acute Criteria								0.06									
37	Water Effect Ratio (WER)								1.00		These cells		#VALUE! => No violation or Not Applicable					
38	Ave Monthly Limit LTA Multiplier (Ref: page 103 TSD for WQ-Based Toxics Control)								1.55		must be		9999999.00 => No EPA/ADEQ Guideline					
39	Max Daily Limit LTA Multiplier (Ref: " " " ")								3.11		unlocked							
40	Max Daily Limit LTA Multiplier for Human Health (Ref: 2009 CPP; Section 5.27.2)								1.64		to change.							
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									

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
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	381564.802	0.246760137	0.00			3520000.00	-0.92	519636.77	0.1939076	0	
74	Chromium(3)			3360000	-0.93	485809.037	0.204646612	0.00			2170000.00	-0.27	1237728.63	0.0917277	0	
75	Copper			1040000	-0.74	223227.013	0.358961238	0.00			2850000.00	-0.9	438595.20	0.2217904	0	
76	Lead			2800000	-0.8	530500.798	0.190693894	0.00			2040000.00	-0.53	677629.77	0.1557381	0	
77	Mercury			2900000	-1.14	270941.426	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	291572.81	0.300067592	0.00			3340000.00	-0.68	812166.88	0.1333807	0	
80	Silver			2400000	-1.03	281856.825	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				
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					
118																
119	Selenium			Acute			WER X 20				20.00					
120				Chronic			WER X 5				5.00					

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
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																
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 Factor	Background Conc. Cb ug/l	Effluent Conc. Ce ug/l	Domestic Supply IWC ug/l	Acute Aquatic IWC ug/l	Chronic Aquatic IWC ug/l	Bioacc. IWC ug/l	[Reserved]	Arkansas Acute Aquatic ug/l	Arkansas Chronic Aquatic ug/l	Arkansas Bioacc. ug/l	EPA Bioacc. ug/l
133				ug/l	Factor	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l		ug/l	ug/l	ug/l	ug/l
137	METALS AND CYANIDE															
138	1. Antimony Total		1	60	2.13			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			0.00	0.00	0.00	0.00	9999999	9999999.00	9999999.00	9999999	1.4
140	3. Beryllium Total		1	0.5	2.13			0.00	0.00	0.00	0.00	9999999	9999999.00	9999999.00	4	4
141	4. Cadmium Total		1	1	2.13			0.00	0.00	0.00	0.00	9999999	11.94	3.58	9999999	5
142	6. Chromium (Tri)		1	10	2.13			0.00	0.00	0.00	0.00	9999999	2256.37	731.94	9999999	100
143	7. Chromium (hex)		1	10	2.13		9999999	346.17	5768.04	1384.61	115.39	9999999	15.71	10.58	9999999	100
144	8. Copper Total		1	0.5	2.13			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		9999999	346.17	5768.04	1384.61	115.39	9999999	269.04	10.48	9999999	50
146	10. Mercury Total		1	0.005	2.13			0.00	0.00	0.00	0.00	9999999	6.46	0.012	9999999	2
147	12. Nickel Total		1	0.5	2.13		9999999	346.17	5768.04	1384.61	115.39	9999999	2603.30	289.12	9999999	46,000
148	13. Selenium Total		1	5	2.13			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			0.00	0.00	0.00	0.00	9999999	7.82	9999999.00	9999999	
150	15. Thallium Total		1	0.5	2.13			0.00	0.00	0.00	0.00	9999999	9999999.00	9999999.00	9999999	4.7
151	16. Zinc Total		1	20	2.13		9999999	346.17	5768.04	1384.61	115.39	9999999	319.04	291.33	9999999	260,000
152	129. Phenols, Total		1	5	2.13			0.00	0.00	0.00	0.00	9999999	9999999.00	9999999.00	9999999	
153	17. Cyanide Total		1	10	2.13			0.00	0.00	0.00	0.00	9999999	22.36	5.2	9999999	4,000
156	DIOXIN															
157	18. 2-3-7-8-TCDD		3	0.00001	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	1.00E-06	
159	VOLATILE COMPOUNDS															
160	19. Acrolein		3	50	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
161	20. Acrylonitrile		3	20	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
162	21. Benzene		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
163	22. Bromoform		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
164	23. Carbon Tetrach		3	2	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
165	24. Chlorobenzene		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
166	25. Chlorodibromomethane		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
167	26. Chloroethane		3	50	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
168	27. 2-Chloroethylvinyl ether		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
169	28. Chloroform		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
170	29. Dichlorobromomethane		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
171	30. 1-1-Dichloroethane		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
172	31. 1-2-Dichloroethane		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
173	32. 1-1-Dichlorethylene		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
174	33. 1,2 Dichloropropane		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
175	34. 1,3 Dichloropropylene		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
176	35. Ethylbenzene		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
177	37. Methyl Chloride		3	50	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
178	36. Methyl bromide		3	50	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
179	38. Methylene chloride		3	20	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
180	39. 1-1-2-2-Tetrachloroethane		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
181	40. Tetrachloroethylene		1	10	2.13		9999999	346.17	5768.04	1384.61	115.39	9999999	5280	840	88.5	
182	41. Toluene		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
183	42. 1,2-trans-dichloroethylene		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
184	44. 1-1-2-Trichloroethane		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
185	43. 1-1-1-Trichloroethane		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
186	45. Trichloroethylene		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
187	46. Vinyl Chloride		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
189	ACID COMPOUNDS															
190	47. 2-Chlorophenol		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
191	48. 2-4-Dichlorophenol		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
192	49. 2-4 Dimethylphenol		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
193	50. 4,6-Dinitro-o-Cresol		3	50	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
194	51. 2,4-Dinitrophenol		3	50	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
195	52.-53. Nitrophenols		3	20	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
196	54. 4 Chloro-3-methylphenol		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
197	55. Pentachlorophenol		3	5	2.13			0.00	0.00	0.00	0.00	9999999	8.72	6.69	9999999	
198	56. Phenol		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
199	57. 2-4-6-Trichlorophenol		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
201						Ambient Background Conc. Cb	Effluent Conc. Ce	Domestic Supply IWC	Acute Aquatic IWC	Chronic Aquatic IWC	Human Health IWC	[Reserved]	Acute Aquatic Criteria ug/l	Chronic Aquatic Criteria ug/l	Human Health Criteria ug/l	
202	BASE/NEUTRAL COMPOUNDS															
203	58. Acenaphthene		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
204	59. Acenaphthylene		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
205	60. Anthracene		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
206	61. Benzidine		3	50	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
207	62. Benzo(a) anthracene		3	5	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
208	63. Benzo(a) pyrene		3	5	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
209	64. 3,4-benzoflouranthene		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
210	65. Benzo(g,h,i)perylene		3	20	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
211	66. Benzo(k) fluoranthene		3	5	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
212	67. Bis(2-chloroethoxy)methane		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
213	68. Bis(2-chloroethyl) Ether		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
214	69. Bis(2-Chloroisopropyl) ether		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
215	70. Bis(2-ethylhexyl)phthalate		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
216	71. 4-Bromophenyl phenyl ether		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
217	72. Butylbenzyl phthalate		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
218	73. 2-chloronaphthalene		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
219	74. 4-chlorophenyl phenyl ether		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
220	75. Chrysene		3	5	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
221	76. Dibenzo(a,h)anthracene		3	5	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
222	77-79. Dichlorobenzene(1,2,4,5)		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
223	80. 3,3' Dichlorobenzidine		3	5	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
224	81. Diethyl Phthalate		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
225	82. Dimethyl phthalate		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
226	83. Di-n-Butyl phthalate		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
227	84. 2-4-Dinitrotoluene		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
228	85. 2-6-Dinitrotoluene		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
229	86. Di-n-octyl phthalate		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
230	87. 1,2-diphenylhydrazine		3	20	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
231	88. Fluoranthene		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
232	89. Fluorene		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
233	90. Hexachlorobenzene		3	5	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
234	91. Hexachlorobutadiene		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
235	92. Hexachlorocyclopentadiene		3	10	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	
236	93. Hexachloroethane		3	20	2.13			0.00	0.00	0.00	0.00	9999999	9999999	9999999	9999999	

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Applicable ELG Subparts

DRI Unit
 Subpart M (Other Operations)
 6,028 klb/day (Off-Site Sale Only)

MT/yr = Million Short Tons per Year
 klb/day = 1,000 Pounds per Day

EAF 1 and EAF 2
 Subpart D (Steelmaking)
 11,233 klb/day Each

RH Degassers 1 and 2
 Subpart E
 (Vacuum Degassing)
 4,110 klb/day Each

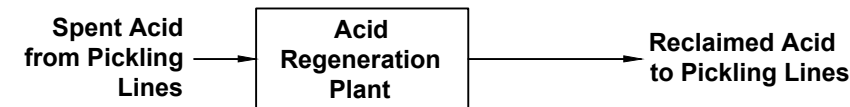
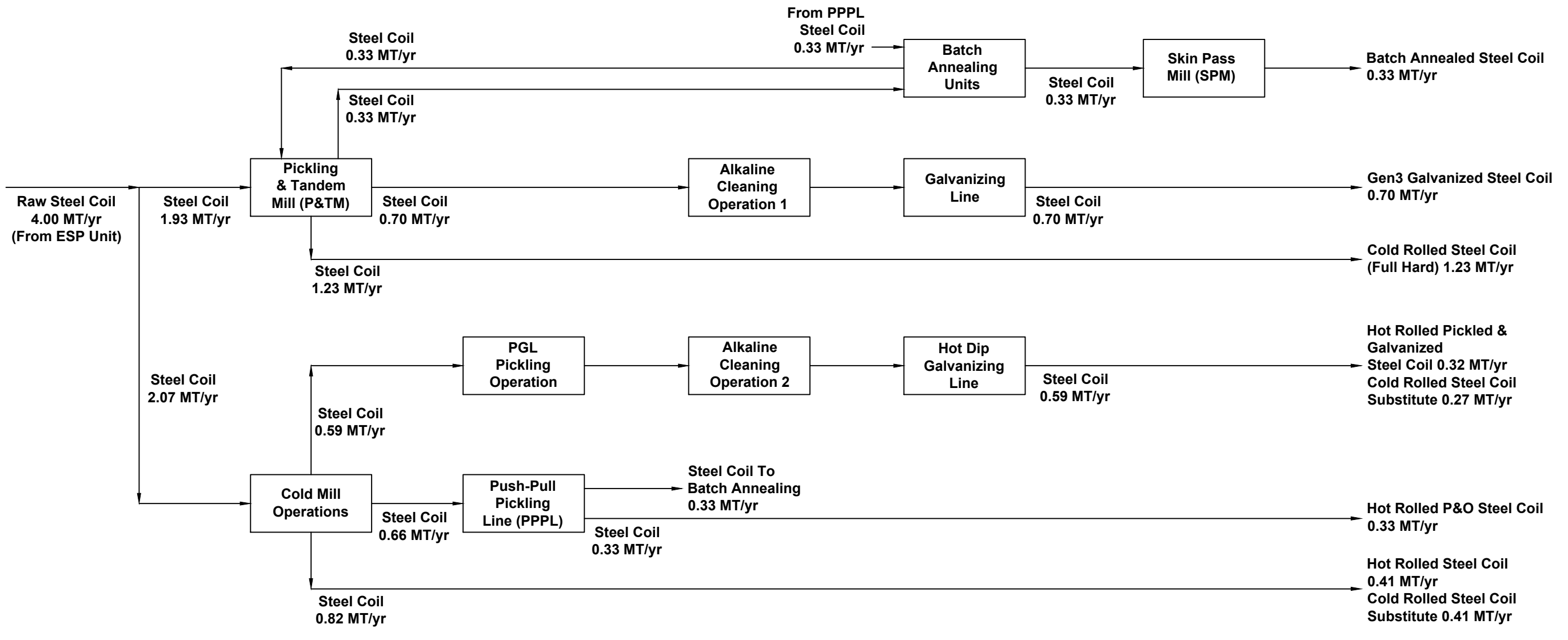
LMF 1 and LMF 2
 No Applicable Subparts

CCM
 Subpart F
 (Continuous Casting)
 21,918 klb/day

HSM
 Subpart G
 (Hot Forming)
 21,918 klb/day

NO	REVISION DESCRIPTION	DATE
X		X-X-X

Drawn By:
AES
 Date:
10-6-22
 Project No:
BHLP-22172
 Scale:
NONE



Applicable ELG Subparts

P&TM Subpart I (Acid Pickling) 10,576 klb/day	PGL Pickling Subpart I (Acid Pickling) 3,232 klb/day	Alkaline Cleaning 1 Subpart K (Alkaline Cleaning) 3,836 klb/day	Galvanizing Line Subpart L (Hot Coating) 3,836 klb/day	SPM Subpart J (Cold Forming) 1,808 klb/day
P&TM Subpart J (Cold Forming) 10,576 klb/day	PPPL Subpart I (Acid Pickling) 3,616 klb/day	Alkaline Cleaning 2 Subpart K (Alkaline Cleaning) 3,232 klb/day	HD Galvanizing Line Subpart L (Hot Coating) 3,232 klb/day	
Cold Mill Subpart J (Cold Forming) 11,342 klb/day	Acid Regen. Plant No Applicable Subparts (No Discharge to WWTP)		Batch Annealing Units No Applicable Subparts	



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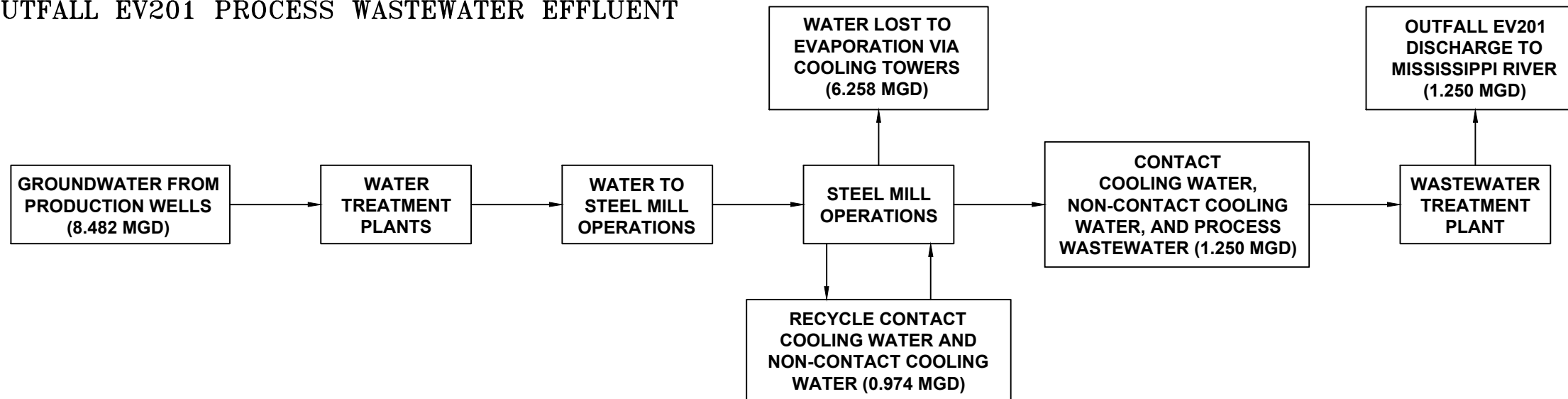
EXPLORATORY VENTURES, LLC
STEEL MANUFACTURING COMPLEX
OSCEOLA
ARIZONA
MANUFACTURING PROCESS FLOW DIAGRAM

DATE	X-X-X
REVISION DESCRIPTION	
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Drawn By: AES	
Date: 10-6-22	
Project No: BHP-22172	
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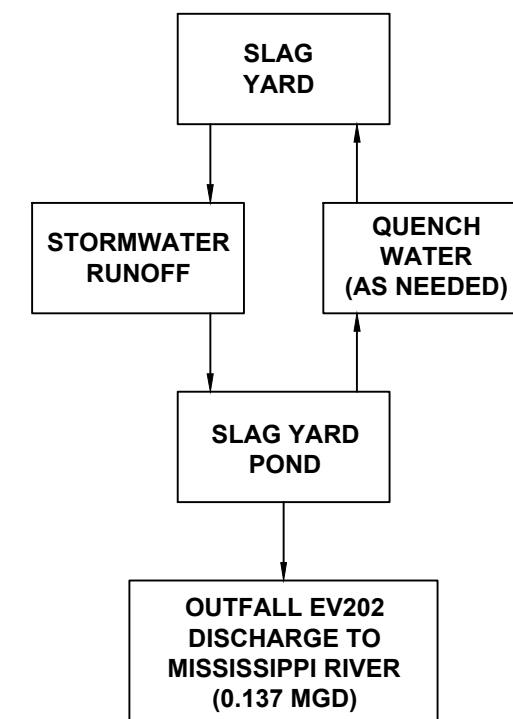
Section H – Water Flow and Water Balance Diagram

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OUTFALL EV201 PROCESS WASTEWATER EFFLUENT



OUTFALL EV202 SLAG YARD POND



EXPLORATORY VENTURES, LLC
 STEEL MANUFACTURING COMPLEX

OSCEOLA
 ARKANSAS

DATE
 X-X-X

REVISION DESCRIPTION

NO
 X X

Drawn By:
AES

Date:
9-26-22

Project No:
BHLP-22172

Scale:
NONE

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Section I – Vicinity Map, Site Map, and Topographic Maps

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**PROCESS
DESCRIPTION AND
DESIGN
CALCULATIONS FOR
WASTEWATER
FACILITIES**



a **U.S. Steel** company

**HARBOR PROJECT
No. BHLP-22172**

NOVEMBER 2022

Prepared for:

EXPLORATORY VENTURES, LLC

1000 East County Road 860

P.O. Box 707

Osceola, Arkansas 72370

Phone: (870) 819-3031

Prepared by:

Harbor

5800 Evergreen Drive

Little Rock, AR 72205

P: 501.663.8800

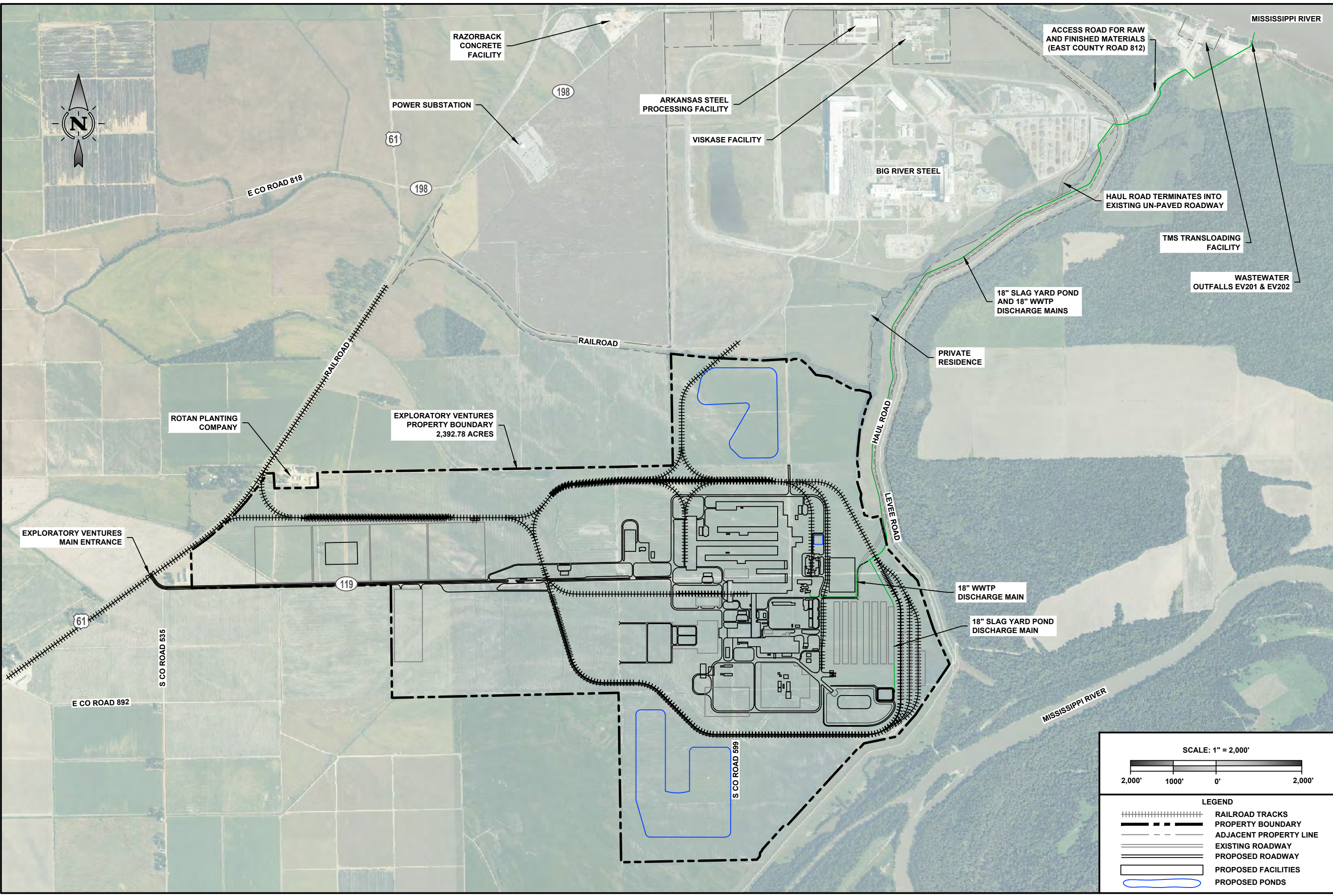
F: 501.588.0123

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SCALE: 1" = 2,000'

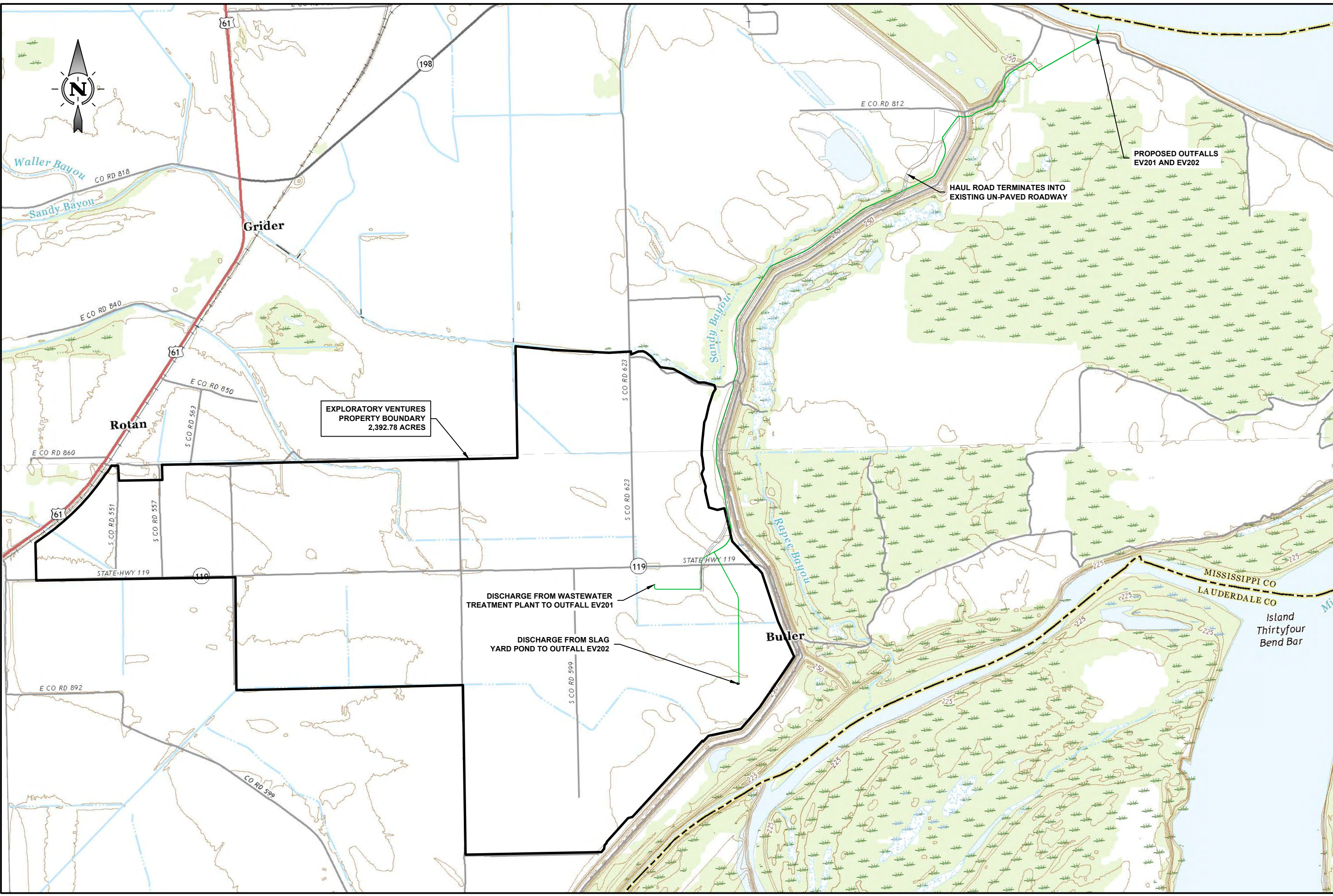
2,000' 1000' 0' 2,000'

LEGEND

	RAILROAD TRACKS
	PROPERTY BOUNDARY
	ADJACENT PROPERTY LINE
	EXISTING ROADWAY
	PROPOSED ROADWAY
	PROPOSED FACILITIES
	PROPOSED PONDS

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EXPLORATORY VENTURES, LLC	
STEEL MANUFACTURING COMPLEX	
OSCEOLA	ARKANSAS
VICINITY MAP	
NO	DATE
X	X-X-X
REVISION DESCRIPTION	
X	X
Drawn By: AES	
Date: 9-29-22	
Project No: BHLP-22172	
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EXPLORATORY VENTURES, LLC
STEEL MANUFACTURING COMPLEX

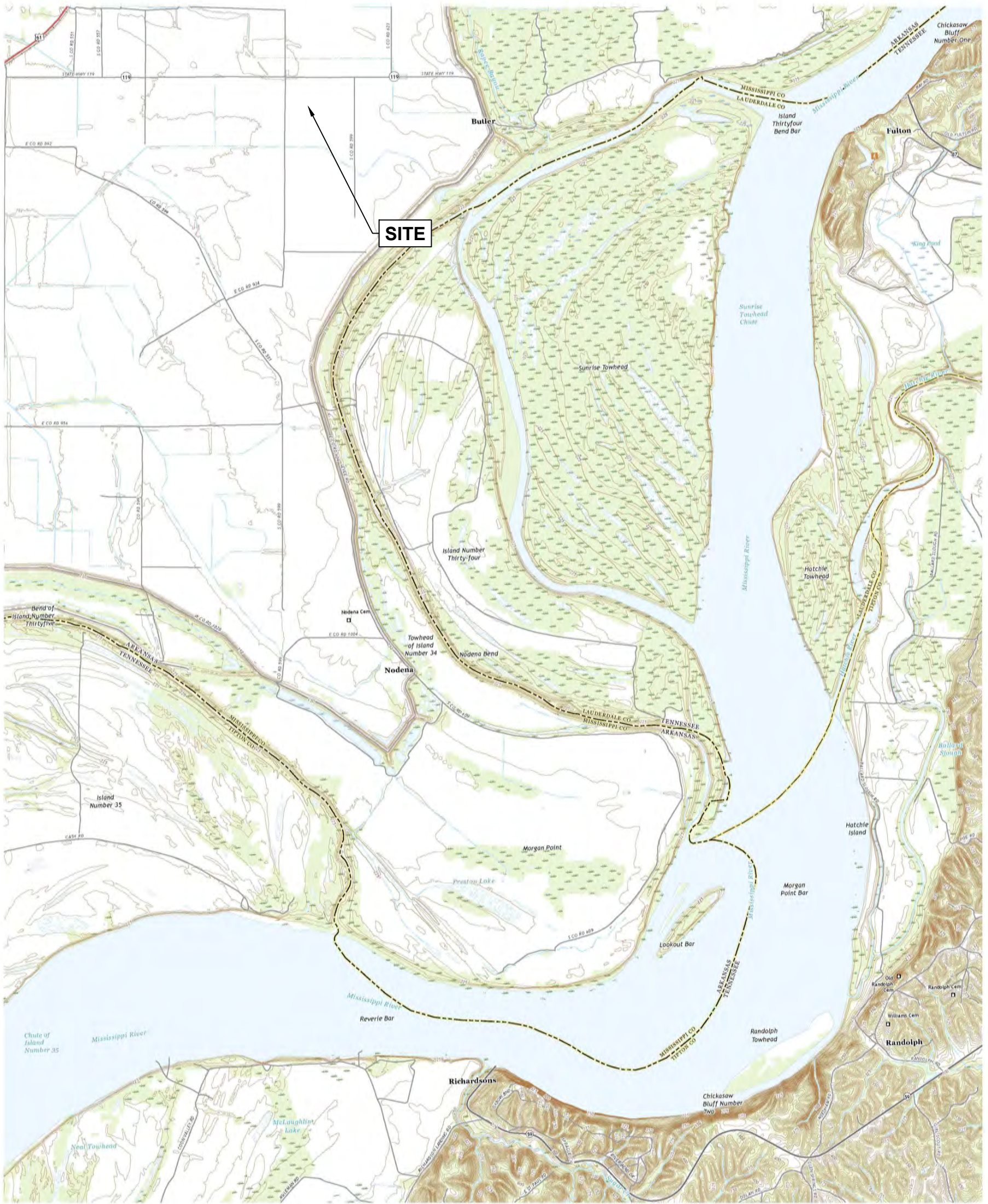
TOPOGRAPHIC MAP

NO.	REVISION DESCRIPTION	DATE
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X		
X		
X		

Drawn By:
AES
 Date:
9-26-22
 Project No:
BHLP-22172
 Scale:
1" = 2,000'

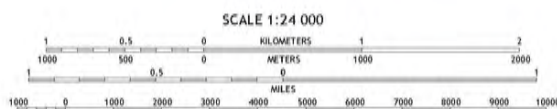
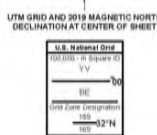
ARKANSAS

OSCEOLA



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 600-meter grid/Universal Transverse Mercator, Zone 15S1165
This map is not a legal document. Boundaries may be
generalized for this map scale. Private lands within government
reservations may not be shown. Obtain permission before
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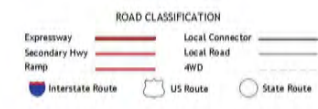
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Roads:.....U.S. Census Bureau, 2016 - 2017
Name:.....GNIS, 1980 - 2017
Hydrography:.....National Hydrography Dataset, 1999 - 2020
Contours:.....National Elevation Dataset, 2001 - 2016
Boundaries:.....Multiple sources; see metadata file 2018 - 2019
Public Land Survey System:.....BLM, 2018
Wetland:.....FWS National Wetlands Inventory 1974 - 1981



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 0.6.18



1	2	3	1 Keller
2	3	4	2 Osceola
3	4	5	3 Goldsbut
4	5	6	4 Wilson
5	6	7	5 Gitt Edge
6	7	8	6 Pecan Point
7	8	9	7 Drummonds
8	9	10	8 Munford



NODENA, AR, TN
2020

NO	REVISION DESCRIPTION	DATE
X	X	X-X-X

EXPLORATORY VENTURES, LLC
STEEL MANUFACTURING COMPLEX

OSCEOLA ARKANSAS

TOPOGRAPHIC MAP

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1-4
Scale: 1" = 4,000'



U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

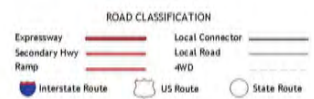
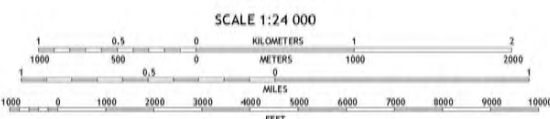
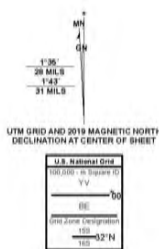


OSCEOLA QUADRANGLE
ARKANSAS - TENNESSEE
7.5-MINUTE SERIES



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 15S1165
This map is not a legal document. Boundaries may be
generalized for this map scale. Private lands within government
reservations may not be shown. Obtain permission before
entering private lands.

Image: NAD83, June 2016 - November 2017
Road: U.S. Census Bureau, 2016 - 2017
Name: G85, 1980 - 2020
Hydrography: National Hydrography Dataset, 1999 - 2020
Contour: National Elevation Dataset, 2016
Boundary: Multiple sources; see metadata file 2018 - 2019
Public Land Survey System: BLM, 2018
Wetland: FWS National Wetland Inventory, 1974 - 1981



1	2	3	1 Dell
4	5	6	2 Luxora
7	8	7	3 Rose
		8	4 Kater
			5 Gottsdit
			6 Wilson
			7 Huden
			8 Gitt Edge

OSCEOLA, AR, TN
2020

NO	REVISION DESCRIPTION	DATE
X	X	X-X-X

EXPLORATORY VENTURES, LLC
STEEL MANUFACTURING COMPLEX

OSCEOLA ARKANSAS

TOPOGRAPHIC MAP

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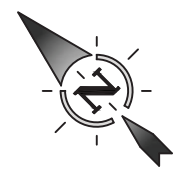
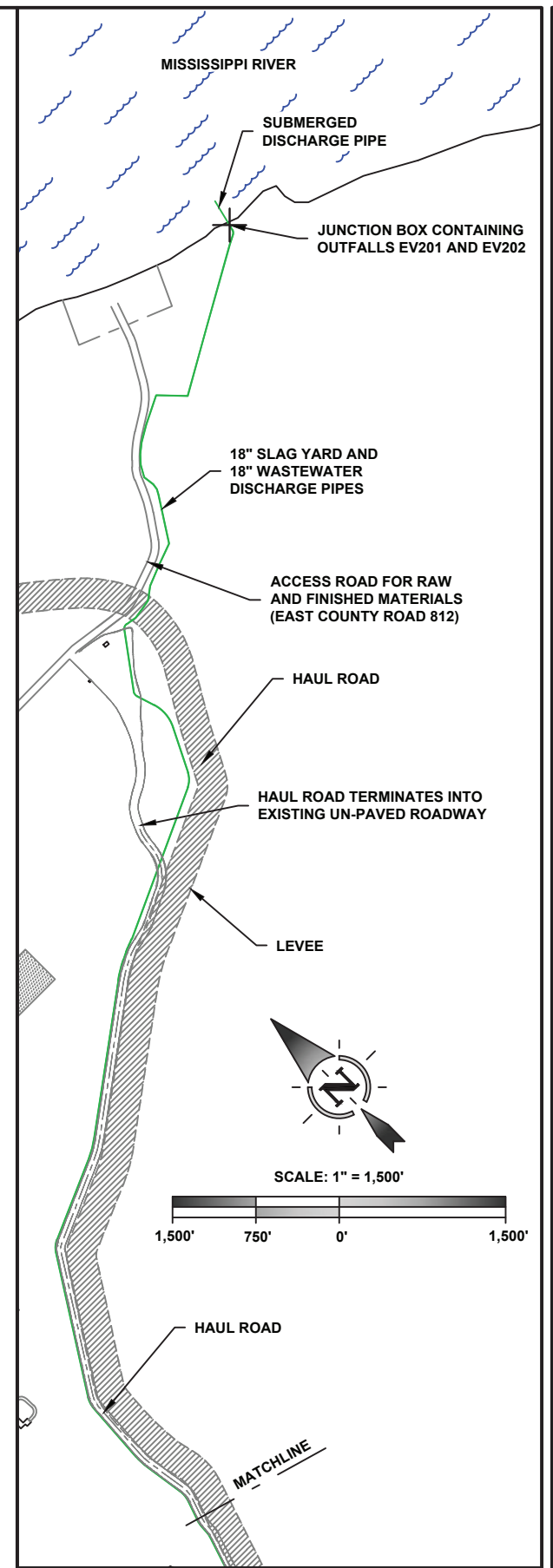
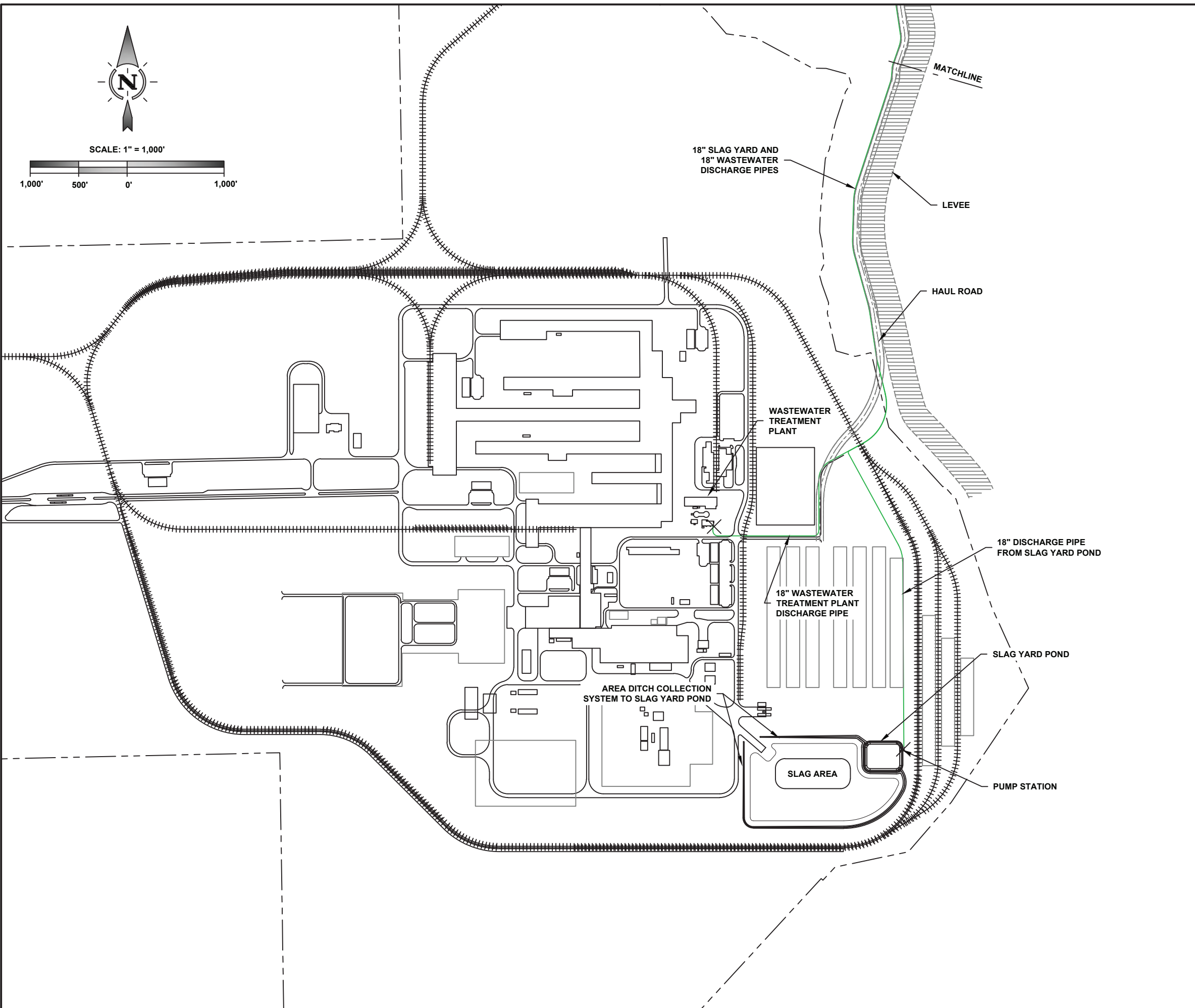
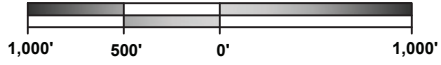
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Section J – Maps and Diagrams of Wastewater Treatment System and Slag Yard Pond

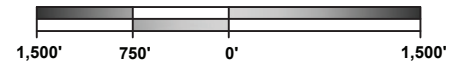
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SCALE: 1" = 1,000'



SCALE: 1" = 1,500'



LEGEND

	RAILROAD TRACKS
	PROPERTY BOUNDARY
	18" DISCHARGE PIPE
	NEW ROADWAY
	EXISTING ROADWAY



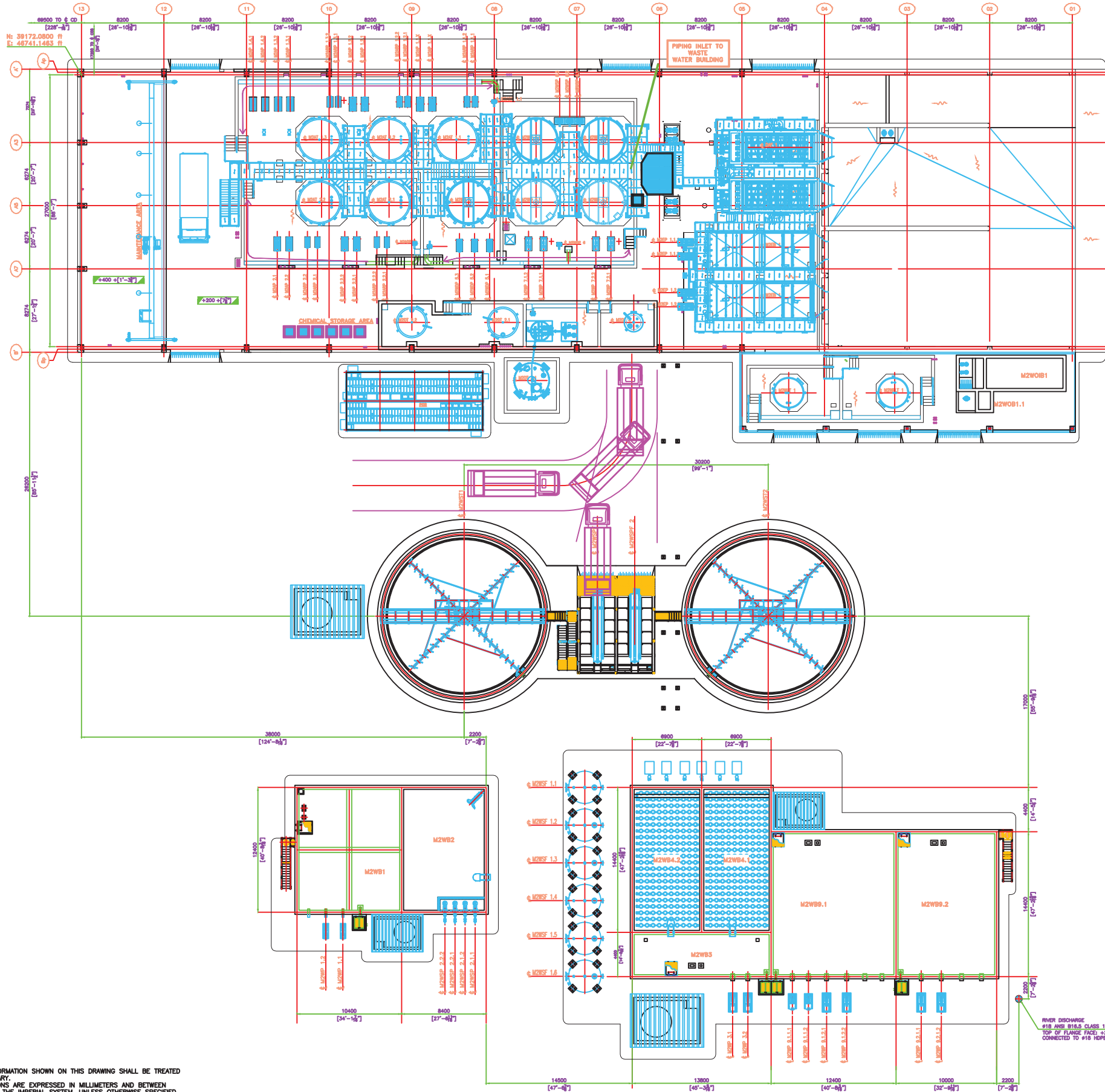
5800 Evergreen Drive
Little Rock, AR 72205
Ph (501)663-8800
Fax (501)588-0123
www.harboenv.com

EXPLORARY VENTURES, LLC
STEEL MANUFACTURING COMPLEX
OSCEOLA
ARKANSAS
GENERAL LAYOUT - WASTEWATER FACILITIES

NO	REVISION DESCRIPTION	DATE
X		X-X-X
X		
X		

Drawn By: AES
Date: 9-27-22
Project No: BHP-22172
Scale: NOTED
J-1

042699

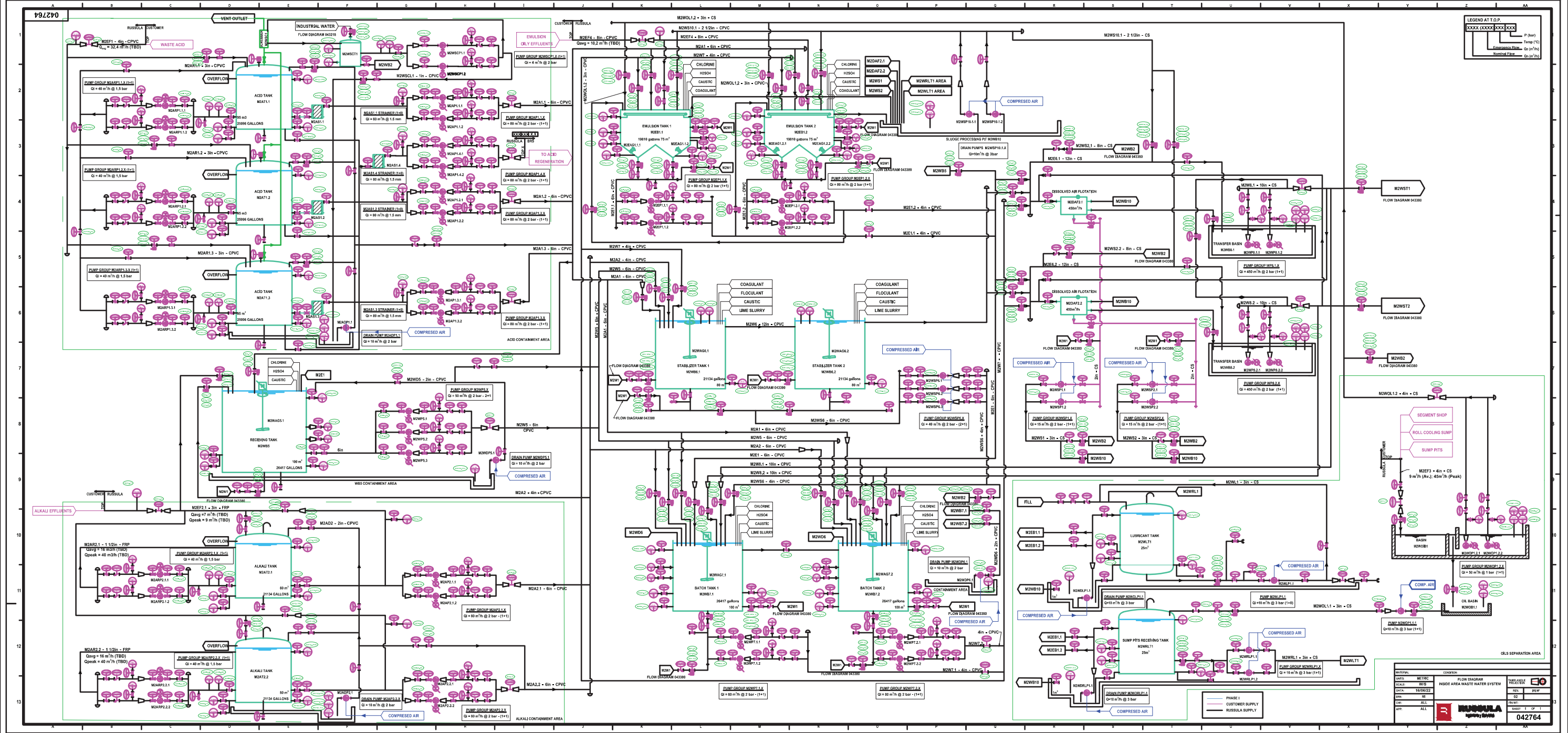


NOTES:
 1. ALL THE INFORMATION SHOWN ON THIS DRAWING SHALL BE TREATED AS PRELIMINARY.
 2. ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS AND BETWEEN BRACKETS IN THE IMPERIAL SYSTEM, UNLESS OTHERWISE SPECIFIED.
 3. ALL ELEVATIONS NOTED ON THIS DRAWING ARE BASED ON ±0,00 LEVEL CORRESPONDING TO ELEVATION +242'.

MATERIAL		CONDITION	
UNIT:	DUAL	LAYOUT WASTE WATER	
SCALE:	1:140	REV:	05
DATE:	31-03-22	DATE:	05
DRG:	JLM	APP:	ALL
CHK:	ALL	APP:	ALL
APP:	ALL	APP:	ALL
RUSSULA Ingeniería y Servicios		SHEET 1 OF 1 042699	

NO	REVISION DESCRIPTION	DATE
X	X	X-X-X

Drawn By:
AES
 Date:
9-29-22
 Project No:
BHLP-22172
 Scale:
NONE



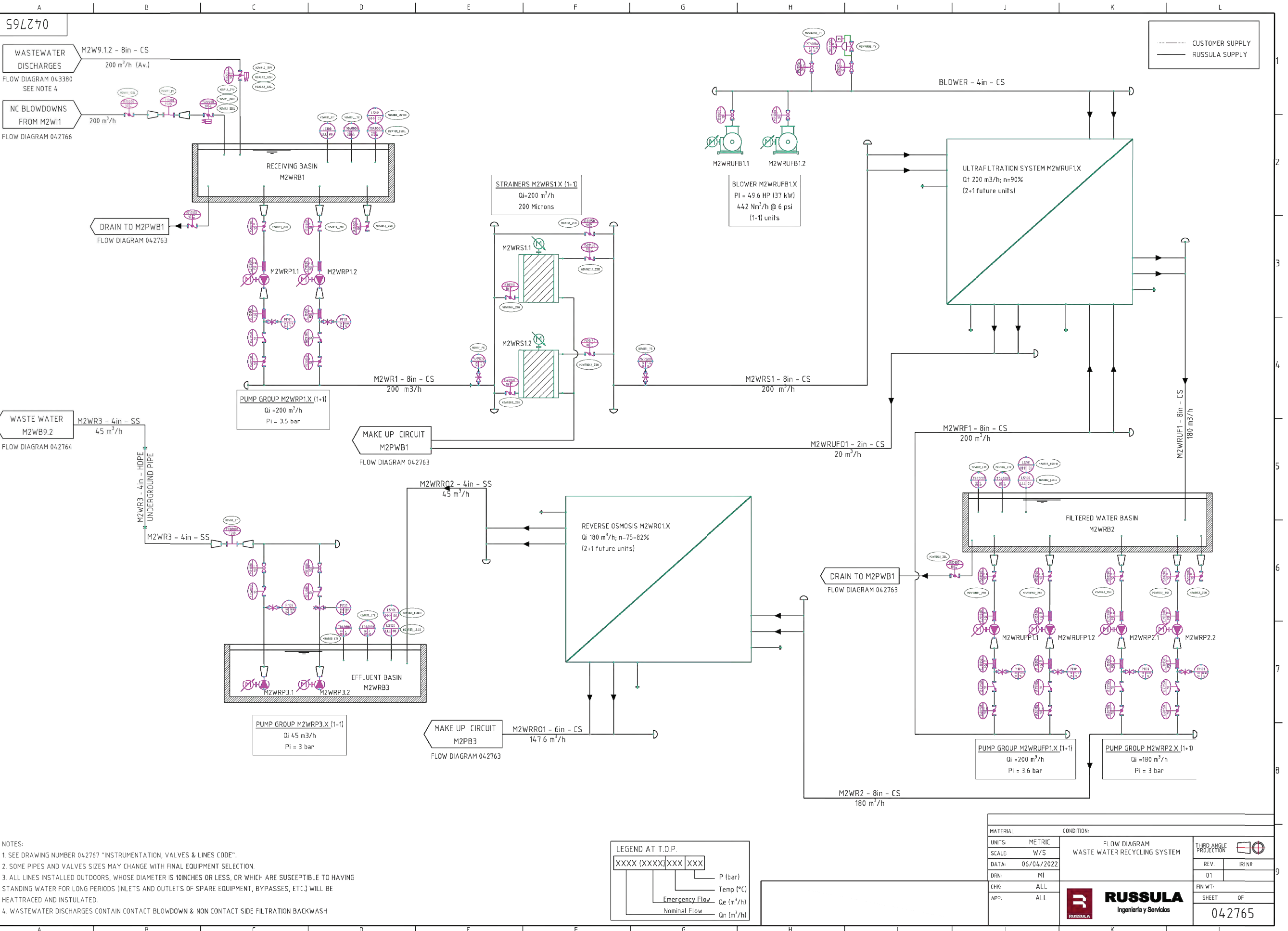
LEGEND AT T.O.P.

XXXX XXXX XXX	P (bar)
XXXX XXXX XXX	Temp (°C)
XXXX XXXX XXX	Flow (m³/h)
XXXX XXXX XXX	Signal Line
XXXX XXXX XXX	Flow (m³/h)

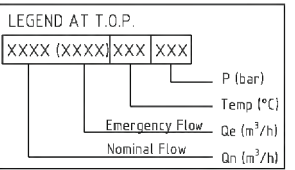
NO.	DATE	REVISION DESCRIPTION
X	X-X-X	
X	X-X-X	
X	X-X-X	

DATE	16/06/22
SCALE	AS SHOWN
APP.	ALL
PROJ.	STEEL MANUFACTURING COMPLEX
NO.	042764

DATE	X-X-X
NO.	X
REVISION DESCRIPTION	



- NOTES:
- SEE DRAWING NUMBER 042767 "INSTRUMENTATION, VALVES & LINES CODE".
 - SOME PIPES AND VALVES SIZES MAY CHANGE WITH FINAL EQUIPMENT SELECTION
 - ALL LINES INSTALLED OUTDOORS, WHOSE DIAMETER IS 10 INCHES OR LESS, OR WHICH ARE SUSCEPTIBLE TO HAVING STANDING WATER FOR LONG PERIODS (INLETS AND OUTLETS OF SPARE EQUIPMENT, BYPASSES, ETC.) WILL BE HEAT TRACED AND INSULATED.
 - WASTEWATER DISCHARGES CONTAIN CONTACT BLOWDOWN & NON CONTACT SIDE FILTRATION BACKWASH

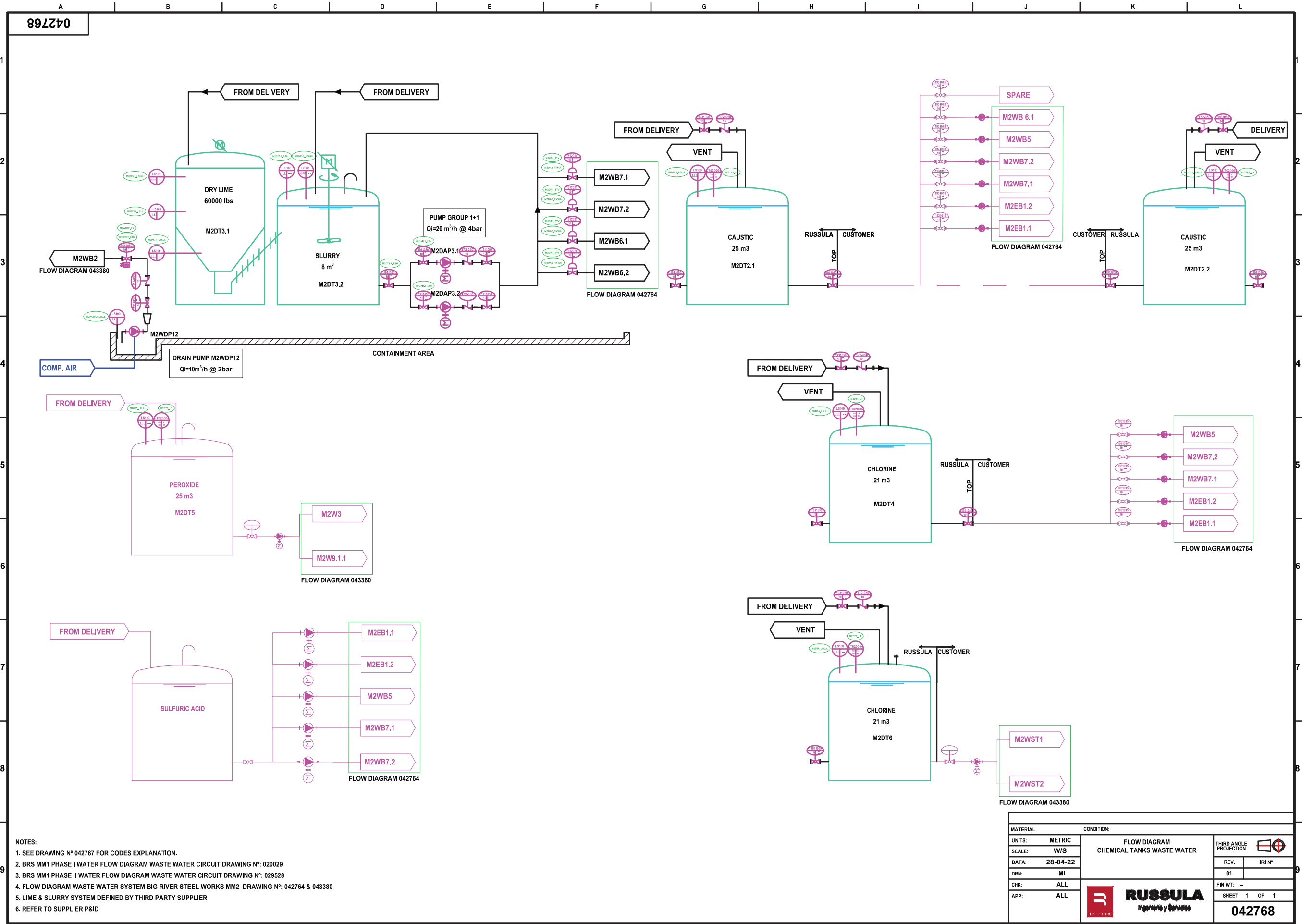


MATERIAL		CONDITION	
UNITS:	METRIC	FLOW DIAGRAM	
SCALE:	W/S	WASTE WATER RECYCLING SYSTEM	
DATE:	06/04/2022	THIRD ANGLE PROJECTION	
DRN:	MI	REV:	01
CHK:	ALL	IR: NO	
APP:	ALL	FIN WT:	
RUSSULA Ingeniería y Servicios		SHEET	042765

NO	DATE	REVISION DESCRIPTION
X	X-X-X	

Drawn By: **AES**
 Date: **9-29-22**
 Project No: **BHLP-22172**
 Scale: **NONE**
J-3C

042768



- NOTES:
- SEE DRAWING N° 042767 FOR CODES EXPLANATION.
 - BRS MM1 PHASE I WATER FLOW DIAGRAM WASTE WATER CIRCUIT DRAWING N°: 020029
 - BRS MM1 PHASE II WATER FLOW DIAGRAM WASTE WATER CIRCUIT DRAWING N°: 029528
 - FLOW DIAGRAM WASTE WATER SYSTEM BIG RIVER STEEL WORKS MM2 DRAWING N°: 042764 & 043380
 - LIME & SLURRY SYSTEM DEFINED BY THIRD PARTY SUPPLIER
 - REFER TO SUPPLIER P&ID

MATERIAL:	CONDITION:	FLOW DIAGRAM	
UNITS: METRIC		CHEMICAL TANKS WASTE WATER	
SCALE: W/S		THIRD ANGLE PROJECTION	
DATA: 28-04-22		REV. 01	IRI N°
DRN: MI		FIN WT: -	
CHK: ALL		SHEET 1 OF 1	
APP: ALL		042768	



DATE	X-X-X
REVISION DESCRIPTION	
NO	X
Drawn By: AES	
Date: 9-29-22	
Project No: BHLF-22172	
Scale: NONE	
J-3D	

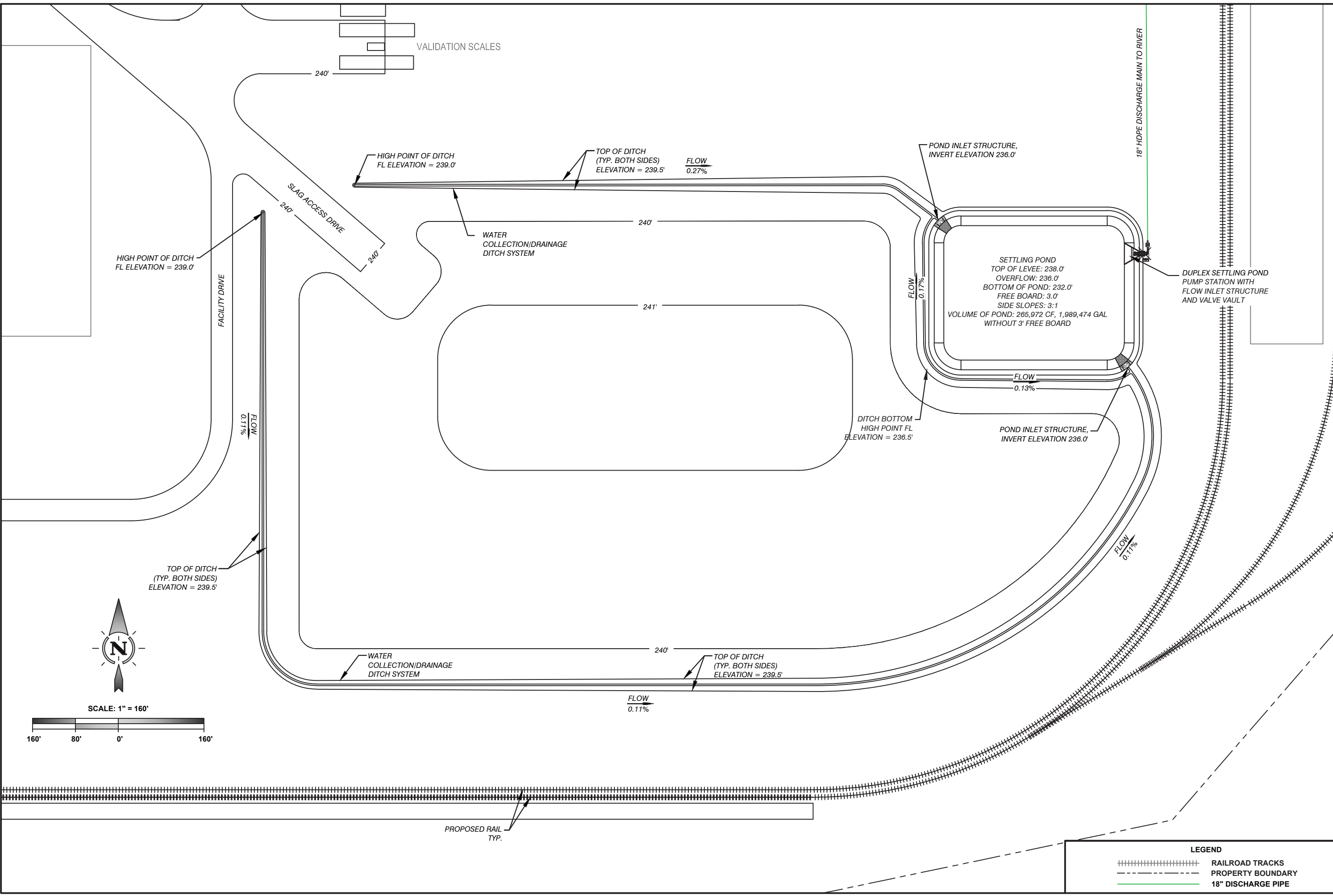
NO	REVISION DESCRIPTION
X	X
X	X

Drawn By: AES
 Date: 9-29-22

Project No: BHP-22172

Scale: NOTED

J-4



LEGEND

=====	RAILROAD TRACKS
-----	PROPERTY BOUNDARY
-----	18" DISCHARGE PIPE

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Section K – 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 local 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 whole-foot 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 0.7 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, NNGS12
National Geodetic Survey
SSMC-3 #6202
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 1:1,200 (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.

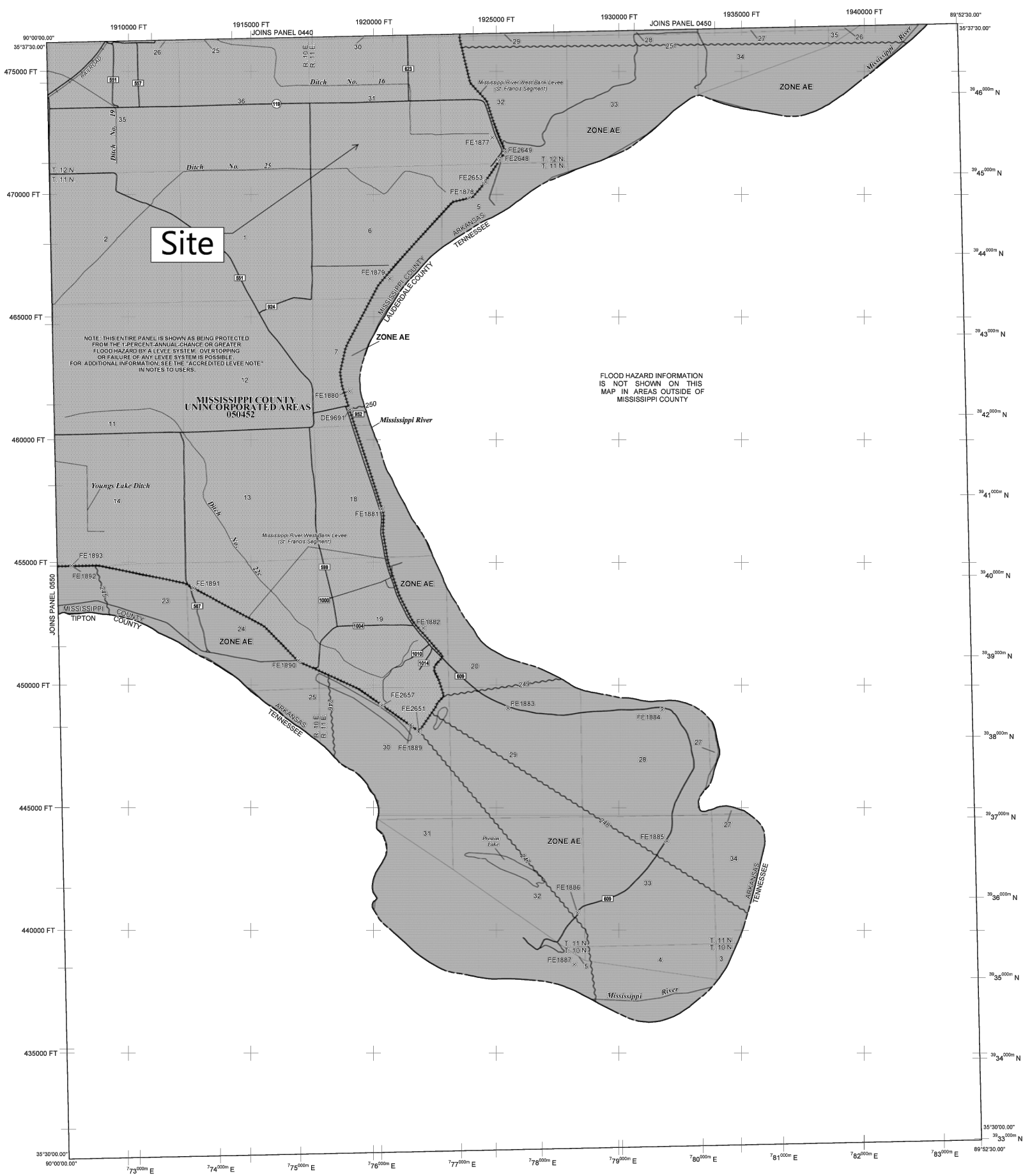
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

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 1-877-FEMA MAP (1-877-336-2927) or visit the FEMA website at http://www.fema.gov.

Accredited 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 area 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/nfip/index.shtml.



LEGEND

- SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD
ZONE A No Base Flood Elevations determined.
ZONE AE Base Flood Elevations determined.
ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decommissioned. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.
FLOODWAY AREAS IN ZONE AE
OTHER FLOOD AREAS
ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
OTHER AREAS
ZONE X Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D Areas in which flood hazards are undetermined, but possible.
COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS
OTHERWISE PROTECTED AREAS (OPAs)
CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.
Floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
Base Flood Elevation line and value; elevation in feet
(Elev. 987)
Base Flood Elevation value where uniform within zone; elevation in feet
* Referenced to the North American Vertical Datum of 1988 (NAVD 88)
Cross section line
Transect line
Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
1000-meter Universal Transverse Mercator grid ticks, zone 15
5000-foot grid ticks: Arkansas State Plane coordinate system, north zone (FIPSZONE 0301), Lambert Conformal Conic
Bench mark (see explanation in Notes to Users section of this FIRM panel)
DX5510
M1.5
River Mile
MAP REPOSITORIES
Refer to Map Repositories list on Map Index
EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
June 18, 2010
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

NATIONAL FLOOD INSURANCE PROGRAM
PANEL 0575E
FIRM
FLOOD INSURANCE RATE MAP
MISSISSIPPI COUNTY,
ARKANSAS
AND INCORPORATED AREAS
PANEL 575 OF 650
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFIX
MISSISSIPPI COUNTY 050452 0575 E
Map Number 05093C0575E
EFFECTIVE DATE
JUNE 18, 2010
Federal Emergency Management Agency



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

Table with columns: DATE, REVISION DESCRIPTION, NO. Includes text: EXPLORATORY VENTURES, LLC STEEL MANUFACTURING COMPLEX ARKANSAS OSCEOLA FEMA FLOOD PLAIN MAP

DATE	REVISION DESCRIPTION
X-X-X	

NO.	REVISION DESCRIPTION
X	
X	

Drawn By:
AES
Date:
10-13-22
Project No:
BHLP-22172
Scale:
NONE
K-2

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.
ZONE AE Base Flood Elevations determined.
ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE VE Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachments so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain boundary
 Floodway boundary
 Zone boundary
 Zone D boundary
 CBRS and OPA boundary
 Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
 Base Flood Elevation line and value; elevation in feet*
 Base Flood Elevation value where uniform within zone; elevation in feet*
 * Referenced to the North American Vertical Datum of 1988 (NAVD 88)

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
 1000-meter Universal Transverse Mercator grid ticks, zone 15
 5000-foot grid ticks; Arkansas State Plane coordinate system, north zone (FIPSZONE 0301); Lambert Conformal Conic
 6000000 FT
 DX5510 Bench mark (see explanation in Notes to Users section of this FIRM panel)
 M1.5 River Mile
 MAP REPOSITORIES Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
 June 18, 2010
 EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.
 To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6920.

MAP SCALE 1" = 1000'
 0 1000 2000 FEET
 0 300 600 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0440E

FIRM FLOOD INSURANCE RATE MAP

MISSISSIPPI COUNTY, ARKANSAS AND INCORPORATED AREAS

PANEL 440 OF 650
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

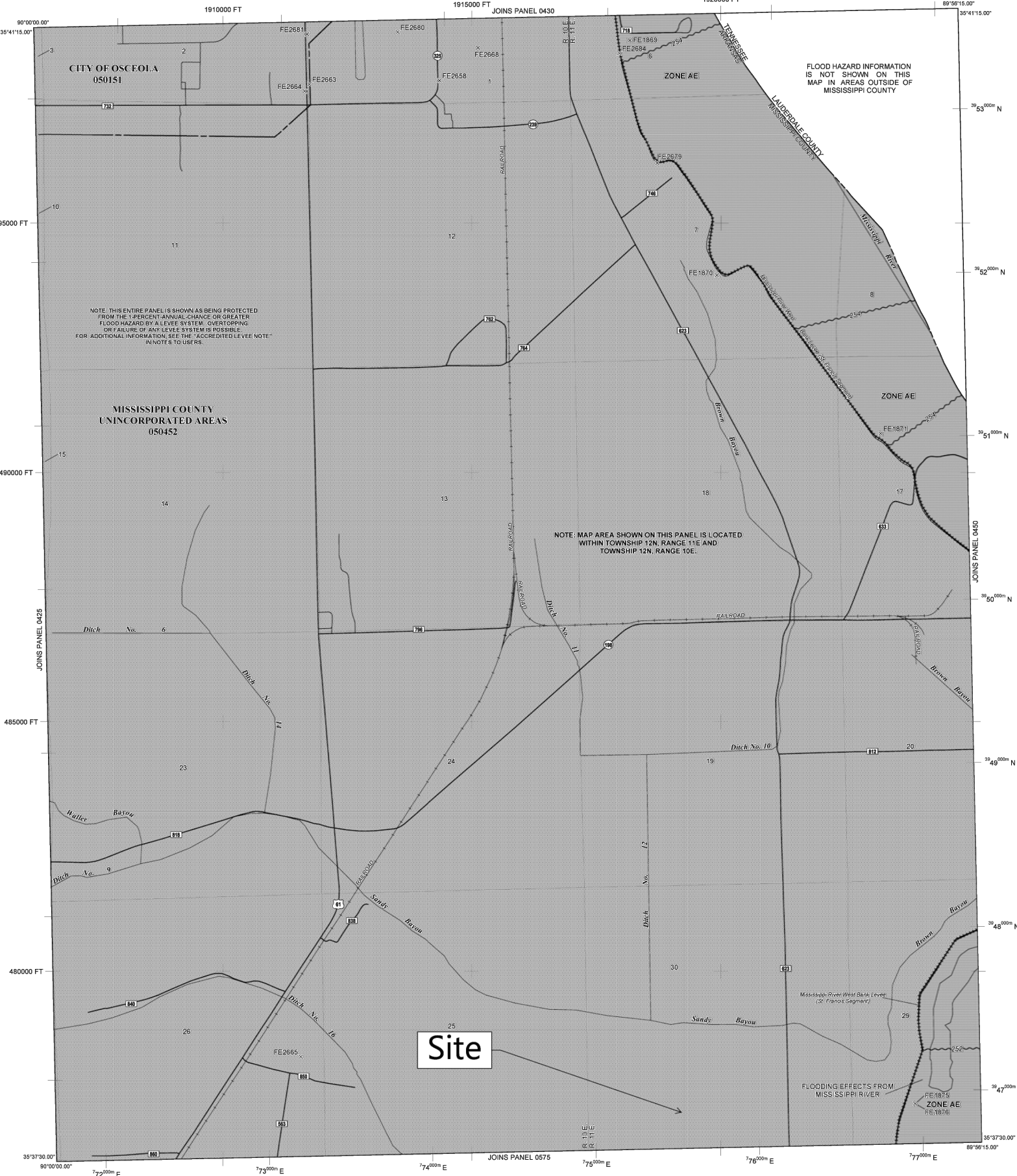
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MISSISSIPPI COUNTY	050452	0440	E
OSCEOLA, CITY OF	050151	0440	E

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
05093C0440E
 EFFECTIVE DATE
JUNE 18, 2010

Federal Emergency Management Agency



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 local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

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The projection used in the preparation of this map was 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, NNGS12
 National Geodetic Survey
 SSMC-3 #6202
 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>.

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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 1-877-FEMA-MAP (1-877-336-2827) or visit the FEMA website at <http://www.fema.gov>.

Accredited 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/nfip/index.shtml>.

Section L – Construction Plans and Specifications
for Wastewater Treatment System and Slag Yard Pond

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**TECHNICAL
SPECIFICATIONS
FOR
WASTEWATER
FACILITIES**



a **U.S. Steel** company

**HARBOR PROJECT
No. BHLP-22172**

NOVEMBER 2022

Prepared for:

EXPLORATORY VENTURES, LLC

1000 East County Road 860
P.O. Box 707
Osceola, Arkansas 72370
Phone: (870) 819-3031

Prepared by:

Harbor

5800 Evergreen Drive
Little Rock, AR 72205
P: 501.663.8800
F: 501.588.0123
www.harborenv.com



Engineering | Compliance | Sustainability

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Surface Impoundment – Controls 02592A
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GENERAL CONDITIONS

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22. Indemnification

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.

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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

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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

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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

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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.

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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

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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.

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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

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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

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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

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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.

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- 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

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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

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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

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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.

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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.

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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

01300 - 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.

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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

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- 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

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- (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.

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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

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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.

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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

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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 recompactd 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.

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- 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 M2EB1.1 AND M2EB1.2.

Table 1. Dimensions of M2EB1.X tanks

Volume (m ³)	75
Length (mm)	10,000
Width (mm)	3,500
Height (mm)	2,050

Table 2. Transfer pump groups M2EP1.1.X (1+1) and M2EP1.2.X (1+1)

Flowrate (m ³ /h)	80
Pressure (bar)	2.0

2.2 BATCH TANKS M2WB7.1 AND M2WB7.2.

Table 3. Dimensions of M2WB7.X tanks

Volume (m ³)	100
Diameter (mm)	4,267
Height (mm)	7,315

Table 4. Recirculation pump groups M2WP7.1.X (1+1) & M2WP7.2.X (1+1)

Flowrate (m ³ /h)	80
Pressure (bar)	2.0

2.3 ACID TANKS M2AT1.1, M2AT1.2, and M2AT1.3.

Table 5. Dimensions of M2AT1.X tanks

Volume (m ³)	95
Diameter (mm)	4,267
Height (mm)	7,020

Table 6. Recirculation pumps M2ARP1.1.X (1+1) & M2ARP1.2.X (1+1) & M2ARP1.3.X (1+1)

Flowrate (m ³ /h)	80
Pressure (bar)	1.5

Table 7. Transfer pump groups M2AP1.1.X (1+1) & M2AP1.2.X (1+1) & M2AP1.3.X (1+1)

Flowrate (m ³ /h)	80
Pressure (bar)	2.0

Table 8. Drain pump M2ADP1.1

Flowrate (m ³ /h)	10
Pressure (bar)	2.0

Table 9. Transfer pump group M2AP1.4X (1+1)

Flowrate (m ³ /h)	80
Pressure (bar)	2.0

Table 10. Transfer pump group M2SCP1.X (1+1)

Flowrate (m ³ /h)	4
Pressure (bar)	2.0

2.4 ALKALI TANKS M2AT2.1 AND M2AT2.

Table 11. Dimensions of AT2.X tank

Volume (m ³)	80
Diameter (mm)	4,267
Height (mm)	6,096

Table 12. Recirculation pump groups M2ARP2.1.X (1+1) & M2ARP2.2.X (1+1)

Flowrate (m ³ /h)	40
Pressure (bar)	1.5

Table 13. Transfer pump groups M2AP2.1.X (1+1) & M2AP2.2.X (1+1)

Flowrate (m ³ /h)	80
Pressure (bar)	2.0

Table 14. Drain pump M2ADP2.1

Flowrate (m ³ /h)	10
Pressure (bar)	2.0

2.5 RECEIVING BASIN M2WB5.

Table 15. Dimensions of M2WB5 basin.

Volume (m ³)	100
Diameter (mm)	4,267
Height (mm)	8,077

Table 16. Transfer pump group M2WP5.X (2+1)

Flowrate (m ³ /h)	50
Pressure (bar)	2.0

Table 17. Drain pump M2WDP5.1

Flowrate (m ³ /h)	10
Pressure (bar)	2.0

Table 18. Placeholder

Flowrate (m ³ /h)	
Pressure (bar)	

2.6 STABILIZER TANKS M2WB6.1 AND M2WB6.2.

Table 19. Dimensions of M2WB6.X tanks

Volume (m ³)	80
Diameter (mm)	4,267
Height (mm)	6,375

Table 20. Transfer pump group M2WSP6.X (2+1)

Flowrate (m ³ /h)	40
Pressure (bar)	2.0

Table 21. Drain pump M2WDP6.1

Flowrate (m ³ /h)	10
Pressure (bar)	2.0

2.7 DAF Units M2DAF1 and M2DAF2.

Table 22. M2WSP1.X (1+1)

Flowrate (m ³ /h)	15
Pressure (bar)	2.0

2.8 COLLECTING BASIN M2WB1.

Table 23. Dimensions of M2WB1 basin

Volume (m ³)	300
Length (mm)	15,700
Width (mm)	7,600
Height (mm)	3,400
Water surface height (mm)	2,500

Table 24. Transfer pump group M2WP1.X (1+1)

Flowrate (m ³ /h)	250
Pressure (bar)	2.0

2.9 TRANSFER BASINS M2WB8.1 AND M2WB8.2.

Table 25. Dimensions of M2WB8.X basins

Volume (m ³)	16
Length (mm)	4,000
Width (mm)	4,000
Height (mm)	2,300
Water surface height (mm)	1,000

Table 26. Transfer pump groups M2WP8.1.X (1+1) and M2WP8.2.X (1+1)

Flowrate (m ³ /h)	450
Pressure (bar)	2

2.10 COLLECTING BASIN M2WB2.

Table 27. Dimensions of M2WB2 basin

Volume (m ³)	230
Length (mm)	12,000
Width (mm)	8,000
Height (mm)	4,400
Water surface height (mm)	2,400

Table 28. Transfer pump groups M2WSP2.1 (1+1) and M2WSP2.2 (1+1)

Flowrate (m ³ /h)	200
Pressure (bar)	1.5

2.11 CLARIFIERS (THICKENERS) M2WST1 and M2WST2.

Table 29. Design parameters for thickeners M2WST1 and M2WST2.

Parameter	Value	Units
Hydraulic residence time	> 3.33	h
Settling velocity	< 1.12	m/h

Table 30. Dimensions of thickeners M2WST1 and M2WST2

Parameter	Value	Units
Diameter	16000	mm
Water surface height above top of sludge cone	3500	mm
Volume	749	m ³
Surface	201	m ²

Table 31. Sludge pumps M2WSP4.1 and M2WSP4.2

Flowrate (m ³ /h)	90
Pressure (bar)	12

Table 32. Drain pumps M2WDP4.1 and M2WDP4.2

Flowrate (m ³ /h)	2
Pressure (bar)	1.0

Table 33. Pneumatic pumps M2WOP4.1.X and M2WOP4.2.X

Flowrate (m ³ /h)	10
Pressure (bar)	12

2.12 FILTER PRESSES M2WSPF1 and M2WSPF2

See Section 3.6.

2.13 AERATION BASINS M2WB4.1 and M2WB4.2

Table 34. Design parameters of M2WB4.X aeration tanks.

Parameter	Value	Units
Hydraulic residence time	> 60	min
Minimum height of water surface	2000	mm

Table 35. Dimensions of aeration tanks M2WB4.1 and M2WB4.2

Volume (m ³)	255
Height (mm)	3400
Water surface height (mm)	2800

Length (mm)	14000
Width (mm)	6500

Table 36. Blower groups M2WBP4.1.X (1+1) and M2WBP4.2.X (1+1)

Flowrate (Nm ³ /h)	800
Pressure (bar)	0.6

2.14 OVERFLOW BASIN M2WB3.

Table 37. Dimensions of M2WB3 tank

Volume (m ³)	134
Length (mm)	13400
Width (mm)	4000
Height (mm)	3400
Water surface height (mm)	2500

Table 38. M2WP3.X pump group

Flowrate (m ³ /h)	450
Pressure (bar)	2.5

2.15 SAND FILTERS M2WSF1.1 TO M2WSF1.6.

Table 39. Design parameters of M2WSF1 sand filtration.

Parameter	Value	Units
Filtration velocity	≤ 19	m/h
Backwash velocity	25	m/h
Air backwash velocity	≤ 55.8	m/h

Table 40. Technical characteristics of filters M2WSF 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 41. Backwash pump group M2WP9.1.X (1+1)

Flowrate (m ³ /h)	200
Pressure (bar)	2.5

Table 42. Drain pump group M2WP9.2.X (1+1)

Flowrate (m ³ /h)	450
Pressure (bar)	3.5

2.16 FILTERED WATER BASINS M2WB9.1 and M2WB9.2.

Table 43. Dimensions of M2WB9.1 and M2WB9.2 tanks

Parameter	M2WB9.1	M2WB9.2
Volume (m ³)	420	336
Length	12000	9600
Width (mm)	14000	14000
Height (mm)	3400	3400
Water surface height (mm)	2500	2500

2.17 EFFLUENT BASIN M2WRB3.

Table 44. Transfer pump group M2RUF1.X (1+1)

Flowrate (m ³ /h)	45
Pressure (bar)	3.0

2.18 OIL COLLECTION BASINS M2WOIB1 and M2WOIB1.1.

Table 45. Dimensions of M2WOIB1 basin

Parameter	M2WOIB1
Volume (m ³)	62
Length	3,000
Width (mm)	10,300
Height (mm)	2,500
Water surface height (mm)	2,000

Table 46. Dimensions of M2WOIB1.1 basin

Parameter	M2WOIB1
Volume (m ³)	1.73
Length	1,800
Width (mm)	1,200
Height (mm)	1,000
Water surface height (mm)	800

Table 47. Transfer pump group M2OP1.2.X (1+1)

Flowrate (m ³ /h)	50
Pressure (bar)	1.0

Table 48. Pneumatic pump M2OP1.1.1

Flowrate (m ³ /h)	10
Pressure (bar)	3.0

2.19 SLUDGE PROCESSING AREA.

Table 49. Sludge pump group M2WSP10.X (1+1)

Flowrate (m ³ /h)	10
Pressure (bar)	3.0

2.20 ROLL SHOP RECEIVING TANK M2WRLT1.

Table 50. Dimensions of M2WRLT1 tank

Volume (m ³)	25
Diameter (mm)	3,048
Height (mm)	3,500

Table 51. Transfer pump group M2WRLP1.X

Flowrate (m ³ /h)	10
Pressure (bar)	3.0

Table 52. Drain pump WDRLP1

Flowrate (m ³ /h)	10
Pressure (bar)	3.0

2.21 LUBRICANT TANK M2WLT1.

Table 53. Dimensions of M2WLT1 tank

Volume (m ³)	25
Diameter (mm)	3,048
Height (mm)	3,500

Table 54. Transfer pump M2WLP1.1

Flowrate (m ³ /h)	10
Pressure (bar)	3.0

Table 55. Drain pump M2WDLP1

Flowrate (m ³ /h)	10
Pressure (bar)	3.0

2.22 DRY LIME AREA.

Table 56. Lime slurry installation

Minimum flowrate (m ³ /h)	0.55
Pressure (bar)	2.0
Slurry concentration, %	10
Preparation tank, m ³	3.78

Table 57. Drain pump M2WDP12.1

Flowrate (m ³ /h)	10
Pressure (bar)	2.0

3. EQUIPMENT SPECIFICATIONS

3.1. CENTRIFUGAL PUMPS

Table 1. M2AP1.1.X pumps

Parameter	Unit	Value
Quantity	-	2 ; (1+1)
Type	-	Centrifugal plastic. Horizontal in a bench.
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. M2AP1.2.X pumps

Parameter	Unit	Value
Quantity	-	2 ; (1+1)
Type	-	Centrifugal plastic. Horizontal in a bench.
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

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 3. M2AP1.3.X pumps

Parameter	Unit	Value
Quantity	-	2 ; (1+1)
Type	-	Centrifugal plastic. Horizontal in a bench.
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 4. M2AP2.1.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

Parameter	Unit	Value
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 5. M2AP2.2.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 6. M2WP1.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	250
Peak Flow	gpm - m ³ /h	2
Guaranteed Nominal Pressure	psi - bar	<7

Maximum NPSH required	m	Cast steel A216-WCB or similar
Volute material	-	Ductile Iron
Impeller material	-	NBR
Elastomers material	-	NEMA 12 - IP55
Motor enclosure	-	F according to NEMA
Motor insulation class	-	IC 411
Motor cooling method	-	Variable Frequency Drive
Motor driving	-	Continuous
Operation	-	Outdoors
Installation	-	2; (1+1)

Table 7. M2WP3.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	450
Peak Flow	gpm - m ³ /h	2.5
Guaranteed Nominal Pressure	psi - bar	<7
Maximum NPSH required	m	Cast steel A216-WCB or similar
Volute material	-	Ductile Iron
Impeller material	-	NBR
Elastomers material	-	NEMA 12 - IP55
Motor enclosure	-	F according to NEMA
Motor insulation class	-	IC 411
Motor cooling method	-	Variable Frequency Drive
Motor driving	-	Continuous
Operation	-	Outdoors
Installation	-	2; (1+1)

Table 8. M2WP5.X pumps

Parameter	Unit	Value
Quantity	-	3 ; (2+1)
Type	-	Centrifugal. Horizontal in a bench.
Work fluid	-	Wastewater
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
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. M2WP7.1.X pumps

Parameter	Unit	Value
Quantity	-	2 ; (1+1)
Type	-	Centrifugal. Horizontal in a bench.
Work fluid	-	Wastewater
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 10. M2WP7.2.X pumps

Parameter	Unit	Value
Quantity	-	2 ; (1+1)
Type	-	Centrifugal. Horizontal in a bench.
Work fluid	-	Wastewater
Guaranteed Nominal Flow	gpm - m ³ /h	352 - 80
Peak Flow	gpm - m ³ /h	-

Guaranteed Pressure	Nominal	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 11. M2WP9.1.1.X pumps

Parameter		Unit	Value
Quantity		-	2; (1+1)
Type		-	Centrifugal. Horizontal in a bench.
Work fluid		-	Clean Cooling Water
Guaranteed Nominal Flow		m ³ /h	200
Guaranteed Pressure	Nominal	bar	2.5
Maximum NPSH required		m	<7
Volute material		-	Cast steel A216-WCB or similar
Impeller material		-	Ductile Iron
Elastomers material		-	NBR
Motor enclosure		-	NEMA 12 - IP55
Motor insulation class		-	F according to NEMA
Motor cooling method		-	IC 411
Motor driving		-	Variable Frequency Drive
Operation		-	Continuous
Installation		-	Outdoors

Table 12. M2WP9.1.2.X pumps

Parameter		Unit	Value
Quantity		-	2; (1+1)
Type		-	Centrifugal. Horizontal in a bench.
Work fluid		-	Clean Cooling Water
Guaranteed Nominal Flow		m ³ /h	450
Guaranteed Flow (2 nd point)		m ³ /h	200

Guaranteed Nominal Pressure	bar	2.5
Maximum NPSH required	m	<7
Volute material	-	Cast steel A216-WCB or similar
Impeller material	-	Ductile Iron
Elastomers material	-	NBR
Motor enclosure	-	NEMA 12 - IP55
Motor insulation class	-	F according to NEMA
Motor cooling method	-	IC 411
Motor driving	-	Variable Frequency Drive
Operation	-	Continuous
Installation	-	Outdoors

Table 13. M2WP9.2.1.X pumps

Parameter	Unit	Value
Quantity	-	2; (1+1)
Type	-	Centrifugal. Horizontal in a bench.
Work fluid	-	Clean Cooling Water
Guaranteed Nominal Flow	m ³ /h	450
Guaranteed Nominal Pressure	bar	3.5
Maximum NPSH required	m	<7
Volute material	-	Cast steel A216-WCB or similar
Impeller material	-	Ductile Iron
Elastomers material	-	NBR
Motor enclosure	-	NEMA 12 - IP55
Motor insulation class	-	F according to NEMA
Motor cooling method	-	IC 411
Motor driving	-	Variable Frequency Drive
Operation	-	Continuous
Installation	-	Outdoors

Table 14. M2EP1.1.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	-

Parameter	Unit	Value
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 15. M2EP1.2.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
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 16. M2WSP4.1sludge pump

Sludge pump to the press plate filter	Data
Item	M2WSP 4.1
Units	1
Type	Centrifugal
Construction	Horizontal with baseplate

Sludge pump to the press plate filter	Data
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 17. M2WSP4.2 sludge pump

Sludge pump to the press plate filter	Data
Item	M2WSP 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 18. M2ARP1.1.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 required	NPSH 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	-	Contactora
Operation	-	Continuous
Installation	-	Indoors

Table 19. M2ARP1.2.X (1+1) pump group

Parameter	Unit	Value
Quantity	-	2 ; (1+1)
Type	-	Centrifugal. Horizontal in a bench.
Work fluid	-	Acid effluents
Guaranteed Nominal Flow	gpm m ³ /h	- 176 - 40
Peak Flow	gpm m ³ /h	- -
Guaranteed Nominal Pressure	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	-	Contactora
Operation	-	Continuous
Installation	-	Indoors

Table 20. M2ARP1.3.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 required	NPSH	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		-		Contactors
Operation		-		Continuous
Installation		-		Indoors

Table 21. M2AP1.4.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	- 352 - 80
Guaranteed Pressure	Nominal psi bar	- 29 - 2
Maximum required	NPSH m	<7
Volute material	-	Plastic, Defined by manufacturer
Impeller material	-	Plastic, Defined by manufacturer
Elastomers material	-	Defined by manufacturer
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
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Table 22. M2ARP2.1.X (1+1) pump group

Parameter	Unit	Value
Quantity	-	2 ; (1+1)
Type	-	Centrifugal. Horizontal in a bench.
Work fluid	-	Alkali effluents
Guaranteed Nominal Flow	gpm m ³ /h	- 176 - 40
Peak Flow	gpm m ³ /h	- 22 - 1.5
Guaranteed Nominal Pressure	psi bar	- <7
Maximum NPSH required	m	Plastic. Defined by manufacturer
Volute material	-	Plastic. Defined by manufacturer
Impeller material	-	Defined by manufacturer
Elastomers material	-	Open Impeller
Impeller	-	IEC - IP55
Motor enclosure	-	F according IEC 34-1
Motor insulation class	-	IC 411
Motor cooling method	-	Contactator
Motor driving	-	Continuous
Operation	-	Indoors
Installation	-	22 - 1.5

Table 23. M2ARP2.2.X (1+1) pump group

Parameter	Unit	Value
Quantity	-	2 ; (1+1)
Type	-	Centrifugal. Horizontal in a bench.
Work fluid	-	Alkali effluents
Guaranteed Nominal Flow	gpm m ³ /h	- 176 - 40
Peak Flow	gpm m ³ /h	- -
Guaranteed Nominal Pressure	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	-	Contactator
Operation	-	Continuous
Installation	-	Indoors

Table 24. M2WSP2.1.X

Parameter	Unit	Value
Quantity	-	2; (1+1)
Type	-	Centrifugal. Submersible with autocoupling
Work fluid	-	Dirty process water with oil
Guaranteed Nominal Flow	m ³ /h	200
Guaranteed Nominal Pressure	bar	1.5
Cable length	m	15
Volute material	-	Cast steel A216-WCB or similar
Impeller material	-	Stainless steel Duplex or similar
Elastomers material	-	NBR
Impeller	-	Free flow vortex impeller. Minimum free passage: 60mm
Motor enclosure	-	IEC - IP68
Motor insulation class	-	F according to NEMA
Motor cooling method	-	Surface cooling
Motor driving	-	Variable Frequency Drive
Operation	-	Continuous
Installation	-	Submerged

Table 25. M2WSP2.2.X

Parameter	Unit	Value
Quantity	-	2; (1+1)
Type	-	Centrifugal. Submersible with autocoupling
Work fluid	-	Dirty process water with oil
Guaranteed Nominal Flow	m ³ /h	200

Guaranteed Pressure	Nominal	bar	1.5
Cable length		m	15
Volute material		-	Cast steel A216-WCB or similar
Impeller material		-	Stainless steel Duplex or similar
Elastomers material		-	NBR
Impeller		-	Free flow vortex impeller. Minimum free passage: 60mm
Motor enclosure		-	IEC - IP68
Motor insulation class		-	F according to NEMA
Motor cooling method		-	Surface cooling
Motor driving		-	Variable Frequency Drive
Operation		-	Continuous
Installation		-	Submerged

Table 26. M2WDP4.1 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 27. M2WDP4.2 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 28. M2WRP1.X pumps

Parameter	Unit	Value
Quantity	-	2; (1+1)
Type	-	Centrifugal. Horizontal in a bench.
Work fluid	-	Clean cooling water
Guaranteed Nominal Flow	m ³ /h	200
Guaranteed Nominal Pressure	bar	3,5
Maximum NPSH required	m	<7
Volute material	-	Cast steel A216-WCB or similar
Impeller material	-	Ductile Iron
Elastomers material	-	NBR
Motor enclosure	-	NEMA 12 - IP55
Motor insulation class	-	F according to NEMA
Motor cooling method	-	IC 411
Motor driving	-	Variable Frequency Drive
Operation	-	Continuous
Installation	-	Indoors

Table 29. M2WRP2.X pumps

Parameter	Unit	Value
Quantity	-	2; (1+1)
Type	-	Centrifugal. Horizontal in a bench.
Work fluid	-	Clean cooling water
Guaranteed Nominal Flow	m ³ /h	180
Guaranteed Nominal Pressure	bar	3
Maximum NPSH required	m	<7
Volute material	-	Cast steel A216-WCB or similar

Impeller material	-	Ductile Iron
Elastomers material	-	NBR
Motor enclosure	-	NEMA 12 - IP55
Motor insulation class	-	F according to NEMA
Motor cooling method	-	IC 411
Motor driving	-	Variable Frequency Drive
Operation	-	Continuous
Installation	-	Indoors

Table 30. M2WRUFP1.X pumps

Parameter	Unit	Value
Quantity	-	2; (1+1)
Type	-	Centrifugal. Horizontal in a bench.
Work fluid	-	Clean cooling water
Guaranteed Nominal Flow	m ³ /h	200
Guaranteed Nominal Pressure	bar	3,6
Maximum NPSH required	m	<7
Volute material	-	Cast steel A216-WCB or similar
Impeller material	-	Ductile Iron
Elastomers material	-	NBR
Motor enclosure	-	NEMA 12 - IP55
Motor insulation class	-	F according to NEMA
Motor cooling method	-	IC 411
Motor driving	-	Variable Frequency Drive
Operation	-	Continuous
Installation	-	Indoors

Table 31. M2WRP3.X pumps

Parameter	Unit	Value
Quantity	-	2; (1+1)
Type	-	Centrifugal. Submersible with autocoupling.
Work fluid	-	Clean cooling water
Guaranteed Nominal Flow	m ³ /h	45
Guaranteed Nominal Pressure	bar	3
Cable length	m	15
Volute material	-	Stainless Steel

Impeller material	-	Stainless Steel
Elastomers material	-	NBR
Impeller	-	Open impeller
Motor enclosure	-	IEC - IP68
Motor insulation class	-	F according to NEMA
Motor cooling method	-	Surface cooling
Motor driving	-	Variable Frequency Drive
Operation	-	Continuous
Installation	-	Submerged

Table 32. M2WP8.1.X pumps

Parameter	Unit	Value
Quantity	-	4; (2+2)
Type	-	Centrifugal. Submersible with autocoupling
Work fluid	-	Dirty process water with oil
Guaranteed Nominal Flow	m ³ /h	450 (Must work also in 200 and 100 m ³ /h)
Guaranteed Nominal Pressure	bar	2
Cable length	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 to NEMA
Motor cooling method	-	Surface cooling
Motor driving	-	Variable Frequency Drive
Operation	-	Continuous
Installation	-	Submerged

Table 33. M2WP8.2.X pumps

Parameter	Unit	Value
Quantity	-	4; (2+2)
Type	-	Centrifugal. Submersible with autocoupling
Work fluid	-	Dirty process water with oil
Guaranteed Nominal Flow	m ³ /h	450 (Must work also in 200 and 100 m ³ /h)
Guaranteed Nominal Pressure	bar	2
Cable length	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 to NEMA
Motor cooling method	-	Surface cooling
Motor driving	-	Variable Frequency Drive
Operation	-	Continuous
Installation	-	Submerged

Table 34. M2WOP1.2.X pumps

Parameter	Unit	Value
Quantity	-	2; (1+1)
Type	-	Centrifugal. Submersible with autocoupling
Work fluid	-	Dirty process water with oil
Guaranteed Nominal Flow	m ³ /h	50
Guaranteed Nominal Pressure	bar	1
Cable length	m	15
Volute material	-	Cast steel A216-WCB or similar
Impeller material	-	Stainless steel Duplex or similar
Elastomers material	-	NBR
Impeller	-	Open
Motor enclosure	-	IEC - IP68
Motor insulation class	-	F according to NEMA
Motor cooling method	-	Surface cooling
Motor driving	-	Variable Frequency Drive
Operation	-	Continuous
Installation	-	Submerged

Table 35. M2WSCP1.X pumps

Parameter	Unit	Value
Quantity	-	2 ; (1+1)
Type	-	Horizontal direct coupling (Plastic)
Work fluid	-	Acid Effluents
Guaranteed Nominal Flow	gpm - m ³ /h	17,6 - 4

Guaranteed Pressure	Nominal	psi bar	-	29 - 2
Maximum required	NPSH	m		<7
Volute material		-		Plastic, Defined by manufacturer
Impeller material		-		Plastic, Defined by manufacturer
Elastomers material		-		Defined by manufacturer
Impeller		-		Open Impeller
Motor enclosure		-		IEC - IP55
Motor insulation class		-		F according IEC 34-1
Motor cooling method		-		IC 411
Motor driving		-		Contactora
Operation		-		Continuous
Installation		-		Indoors

3.2. PNEUMATIC PUMPS

Table 36. M2ADP1.1 pump

Flowrate (m ³ /h)	10
Pressure (bar)	2.0
Type	Diaphragm pump, air-operated
Units	1
Connections	Flanged, ANSI 150 Lbs

Table 37. M2ADP2.1 pump

Flowrate (m ³ /h)	10
Pressure (bar)	2.0
Type	Diaphragm pump, air-operated
Units	1
Connections	Flanged, ANSI 150 Lbs

Table 38. M2WDP5.1 pump

Flowrate (m ³ /h)	10
Pressure (bar)	2.0
Type	Diaphragm pump, air-operated

Units	1
Connections	Flanged, ANSI 150 Lbs

Table 39. M2WDP6.1 pump

Flowrate (m ³ /h)	10
Pressure (bar)	2.0
Type	Diaphragm pump, air-operated
Units	1
Connections	Flanged, ANSI 150 Lbs

Table 40. M2WDL1.1 pump

Flowrate (m ³ /h)	10
Pressure (bar)	3.0
Type	Diaphragm pump, air-operated
Units	1
Connections	Flanged, ANSI 150 Lbs

Table 41. M2WRLP1.X pumps

Flowrate (m ³ /h)	10
Pressure (bar)	3.0
Type	Diaphragm pump, air-operated
Units	2
Connections	Flanged, ANSI 150 Lbs

Table 42. M2WSP6.X pump group (2+1)

Flowrate (m ³ /h)	40
Pressure (bar)	2.0
Type	Diaphragm pump, air-operated
Units	3

Table 43. M2WLP1.1 pump

Flowrate (m ³ /h)	10
Pressure (bar)	3.0
Type	Diaphragm pump, air-operated

Units	2
Connections	Flanged, ANSI 150 Lbs

Table 44. M2WDRLP1.1 pump

Flowrate (m ³ /h)	10
Pressure (bar)	3.0
Type	Diaphragm pump, air-operated
Units	1
Connections	Flanged, ANSI 150 Lbs

Table 45. M2WOP4.1.X pump

Flowrate (m ³ /h)	10
Pressure (bar)	12
Type	Diaphragm pump, air-operated
Units	2
Connections	Flanged, ANSI 150 Lbs

Table 46. M2WOP4.2.X pump

Flowrate (m ³ /h)	10
Pressure (bar)	12
Type	Diaphragm pump, air-operated
Units	2
Connections	Flanged, ANSI 150 Lbs

Table 47. M2WDP12 pump

Flowrate (m ³ /h)	10
Pressure (bar)	2.0
Type	Diaphragm pump, air- operated
Units	1
Connections	Flanged, ANSI 150 Lbs

Table 48. M2WOP1.1.1 pump

Flowrate (m ³ /h)	10
Pressure (bar)	3.0
Type	Diaphragm pump, air- operated

Units	1
Connections	Flanged, ANSI 150 Lbs

Table 49. M2WSP10.1.X pumps

Flowrate (m ³ /h)	10
Pressure (bar)	3.0
Type	Diaphragm pump, air-operated
Units	2
Connections	Flanged, ANSI 150 Lbs

3.3. AGITATORS

Table 50. Agitator M2WAG2.X

Agitator of M2WB2	Data
Item	M2WAG2.X
Units	2
Technical data:	
Structure	Stainless Steel
Motors:	
Feeding	480 V/3 ph/60 Hz
Type of starter	VFD

Table 51. Agitator M2WAG5.1

Agitator of M2WB5	Data
Item	M2WAG5.1
Units	1
Technical data:	
Structure	Stainless Steel
Motors:	
Feeding	480 V/3 ph/60 Hz
Type of starter	VFD

Table 52. Agitator M2EAG1.1.X

Agitator of M2EB1.1	Data
Item	M2EAG1.1.X
Units	2
Technical data:	
Structure	Stainless Steel
Motors:	
Feeding	480 V/3 ph/60 Hz
Type of starter	VFD

Table 53. Agitator M2EAG1.2.X

Agitator of M2EB1.2	Data
Item	M2EAG1.2.X
Units	1
Technical data:	
Structure	Stainless Steel
Motors:	
Feeding	480 V/3 ph/60 Hz
Type of starter	VFD

Table 54. Agitator M2WAG6.1

Agitator of M2WB6.1	Data
Item	M2WAG 6.1
Units	1
Technical data:	
Structure	Stainless Steel
Motors:	
Feeding	480 V/3 ph/60 Hz
Type of starter	VFD

Table 55. Agitator M2WAG6.2

Agitator of M2WB6.2	Data
Item	M2WAG6.2
Units	1
Technical data:	
Structure	Stainless Steel
Motors:	
Feeding	480 V/3 ph/60 Hz
Type of starter	VFD

Table 56. Agitator M2WAG7.1

Agitator of M2WB7.1	Data
Item	M2WAG7.1
Units	1
Technical data:	
Structure	Stainless Steel
Motors:	
Feeding	480 V/3 ph/60 Hz
Type of starter	VFD

Table 57. Agitator M2WAG7.2

Agitator of M2WB7.2	Data
Item	M2WAG7.2
Units	1

Technical data:	
Structure	Stainless Steel
Motors:	
Feeding	480 V/3 ph/60 Hz
Type of starter	VFD

3.4. BLOWERS

Table 58. Blower M2WBP1.X

Blower of M2WSF1.X	Data
Item	M2WBP1.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 59. Blower M2WBP4.1.X

Blower of M2WB4.1	Data
Item	M2WBP4.1.X
Type	Lobular
Units	2 (1+1)
Technical data:	
Flow	800 Nm ³ /h
Pressure	0.6 bar
Structure	Stainless Steel
Motors:	
Feeding	480 V/3 ph/60 Hz
Type of starter	Frequency converter
Installation	Outdoors

Table 60. Blower M2WRUFB1.X

Blower of M2WRUF1.X	Data
Item	M2WRUFB1.X
Type	Lobular
Units	2 (1+1)
Technical data:	
Flow	442 Nm ³ /h
Pressure	0.7 bar
Structure	Stainless Steel
Motors:	

Feeding	480 V/3 ph/60 Hz
Type of starter	Frequency converter
Installation	Indoors

3.5. THICKENERS

Table 61. Thickener M2WST1

Thickener	Data
Item	M2WST1
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
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

Table 62. Thickener M2WST2

Thickener	Data
Item	M2WST2
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
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 63. Press plate filter M2WSPF1

Press plate filter for sludge dewatering	Data
Item	M2WSPF 1
Units	1
Type	Press plate filter
Service	Sludge dewatering
Technical data:	
Structure	Carbon Steel
Capacity	2000 l
Hydraulic pressure	12 bar
Motors:	
Feeding	460 V/3 ph/60 Hz
Hydraulic pump motor	5.5 kW
Plates car motor	0.55 kW
Type of starter	Direct starter

Table 64. Press plate filter M2WSPF2

Press plate filter for sludge dewatering	Data
Item	M2WSPF 2
Units	1
Type	Press plate filter
Service	Sludge dewatering
Technical data:	
Structure	Carbon Steel
Capacity	2000 l
Hydraulic pressure	12 bar
Motors:	
Feeding	460 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 65. Sand filters M2WSPF1.X

Sand filters	Data
Item	M2WSF1.X
Technical data:	
Type of fluid	Water + suspended solids
Type	Vertical filters

Number of filters	6 (3+3)
Type of sand	Silica sand
Diameter	3200 mm
Total flow rate	450 m ³ /h
Filtration velocity	19m/h
Backwash mode	Counter-washing with water
Backwash velocity	25 m/h
Backwash flowrate	200 m ³ /h
Filter material	Carbon steel
Notes	Pneumatic valves, solenoid valves and interconnecting piping are included

3.8. STRAINERS

Table 66. Strainer M2AS1.1

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

Table 67. Strainer M2AS1.2

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

Table 68. Strainer M2AS1.3

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

Table 69. Strainer M2AS1.4

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

Table 70. Strainers M2WRS1.X

Type	Flanged
Pressure Drop - Clean Filter	0,1 bar
Pressure Drop - Dirty Filter	0,5 bar
Mesh	200 µm
Maximum Working Pressure	6.0 bar

3.9 CAUSTIC SYSTEM.

Table 71. 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 72. 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 73. Lime silo

Dry lime silo	Data
Item	DT 3.1
Units	1

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 74. 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 75. 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 76. 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 77. 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

3.12 CHLORINE SYSTEM, CLARIFIERS (THICKENERS) AREA.

Table 78. 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 79. 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

PART 4 - CIVIL WORKS SPECIFICATION

4.1 INTRODUCTION

The purpose of this Section is to explain the conditions, calculations and results of wastewater basin's 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 construction 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). The foundations for the thickeners and press filters were also designed within this range of depth. 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 slabs, or slightly sloped slabs, 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 at ground level as a worst-case scenario for lateral earth pressure loads.

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 and Arkansas Act 22, 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 4500 psi (316 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.

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.

General geometric and dimensional tolerances for civil works are stated in Russula Spec. PS22_01642_CTS_001_cast-in-place concrete structures.

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, M2WB3 and M2WB9 were designed with concrete walls of 300 mm (12 in) thick with dropped beams and upper slab of 800 mm (31.5 in) thick. Reinforcement rebars will be #6 separated each 200 mm (7.87 in) to resist stress around 360 KN/m (24669.36 lb/ft).

B. THICKENERS

In relation to the thickeners, concrete pillars designed were 500 x 500 mm (19.7 x 19.7 in) because they will support structure, water, and sludge weight. Upper concrete walls will be 400 mm (15.7 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 drawing 043279.

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.

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SECTION 02592
SURFACE IMPOUNDMENT

PART 1 - SCOPE

1.1 WORK INCLUDED IN THIS SECTION

A. Levee Excavation - The removal of soil accurately to the grade and cross section as shown on the plans and as established by the Engineer. This work is conducted after all clearing and grubbing.

B. Levee Filling and Grading - All work required to bring the soil elevation to the proper grade and cross section as shown on the plans and established by the Engineer. Includes finished grade work with topsoil or clay and seeding. This work is conducted after all clearing and grubbing.

C. Liner Installation - The installation of a Geosynthetic Clay Liner in accordance with manufacturer's guidelines and specifications included in this Section.

1.2 RELATED WORK SPECIFIED ELSEWHERE

Clearing and Grubbing - Section 02110

PART 2 - PRODUCTS

2.1 Geosynthetic Clay Liner (GCL)

A. The GCL shall consist of a layer of granular sodium bentonite clay needlepunched between two geotextiles and laminated to a thin flexible membrane liner (Bentomat CL). The GCL shall comply with all of the criteria listed in this Section.

B. Bentonite shall be a high-swelling sodium bentonite, with a minimum swell index of 24 mL/2g and a maximum fluid loss of 18 mL.

C. Bentonite shall have a granular consistency (15 percent max. passing a No. 200 sieve [75 µm]), to ensure uniform distribution throughout the GCL and minimal edge loss during handling and installation.

D. Prior to using an alternate GCL, the Contractor must furnish independent test results demonstrating that the proposed alternate material meets all requirements of this specification. Contractor must also provide evidence of successful use of the proposed alternate material on past similar projects. This evidence can

SURFACE IMPOUNDMENT

include past direct shear results against similar materials under similar site conditions, and/or past permeability/compatibility test results with a similar leachate or waste stream. The Contractor also must obtain prior approval of the alternative GCL by the Project Engineer.

2.1.1 Definitions

For the purposes of this specification guideline, the following terms are defined below:

Geosynthetic Clay Liner (GCL): A manufactured hydraulic barrier consisting of clay bonded to a layer or layers of geosynthetics.

Geomembrane: An essentially impermeable geosynthetic composed of one or more geosynthetic sheets.

Geotextile: Any permeable geosynthetic comprised solely of textiles.

Minimum Average Roll Value: For geosynthetics, the value calculated as the typical value minus two (2) standard deviations from documented quality control test results for a defined population from one specific test method associated with one specific property.

Overlap: Where two adjacent GCL panels contact, the distance measuring perpendicular from the overlying edge of one panel to the underlying edge of the other.

2.1.2 Submittals

A. With the bid, the Contractor shall furnish the following information:

1. Conceptual description of the proposed plan for placement of the GCL panels over the area of installation.
2. GCL manufacturer's MQC Plan for documenting compliance to Sections 2.1.1 and 2.1.2 of these specifications.
3. GCL manufacturer's historical data for multi-axial tension testing of the laminated GCL.
4. A copy of GCL manufacturer's ISO quality Certificate of Registration.

B. At the Engineer's or Owner's request the Contractor shall furnish:

1. A representative sample of the GCLs.
2. A project reference list for the GCL(s) consisting of the

principal details of at least ten projects totaling at least 100,000 square metres in size.

C. Upon shipment, the Contractor shall furnish the GCL manufacturer's Quality Assurance/Quality Control (QA/QC) certifications to verify that the materials supplied for the project are in accordance with the requirements of this specification.

D. As installation proceeds, the Contractor shall submit certificates of subgrade acceptance, signed by the Contractor and CQA Inspector (see Sections 3.3.4 and 3.3) for each area that is covered by the GCL.

2.1.3 Qualifications

A. GCL Manufacturer must have produced at least 30 million square metres of GCL within the past three years, including at least 3 million square metres with 65 N/10cm peel strength.

B. The GCL Installer must either have installed at least 100,000 square metres of GCL, **or** must provide to the Engineer satisfactory evidence, through similar experience in the installation of other types of geosynthetics, that the GCL will be installed in a competent, professional manner.

2.1.4 Construction Quality Assurance (CQA)

A. The Owner and Engineer shall provide a third-party inspector for CQA of the GCL installation. The inspector shall be an individual or company who is independent from the manufacturer and installer, who shall be responsible for monitoring and documenting activities related to the CQA of the GCL, throughout installation. The inspector shall have provided CQA services for the installation of the proposed or similar GCL for at least 5 completed projects totaling not less than 100,000 square metres.

B. Testing of the GCL, as necessary to support the CQA effort, shall be performed by a third party laboratory retained by the Contractor and independent from the GCL manufacturer and installer. The laboratory shall have provided GCL CQA testing of the proposed or similar GCL for at least 5 completed projects totaling not less than 100,000 square metres.

C. CQA shall be provided in accordance with the *GCL CQA Manual* provided by the engineer.

2.1.5 Materials

A. Acceptable GCL product is Bentomat CL, as manufactured by CETCO Limited or an engineer-approved equal. See Bentomat CL Certified Properties below.

BENTOMAT® CL CERTIFIED PROPERTIES

MATERIAL PROPERTY	ANALYSIS CONDUCTED BASED ON TEST METHOD	TEST FREQUENCY	REQUIRED VALUES
Bentonite Swell Index ²	ASTM D 5890	10,000 m ²	24ml / 2g min.
Bentonite Mass per unit Area ³	ASTM D 5993/EN 14196	5,000 m ²	4.0 kg/m ²
Bentonite Fluid Loss	ASTM D 5891	10,000 m ²	18 ml max.
GCL Peel Strength	ASTM D 6496	5,000 m ²	65 N
GCL Index Flux	ASTM D 5887	25,000 m ²	No Observable Flow
GCL Permeability	ASTM D 5887	25,000 m ²	No Observable Flow
Tensile Strength ¹	EN ISO 10319	20,000 m ²	8 kN/m
Elongation	EN ISO 10319	20,000 m ²	15 percent typical
Mass per unit area of woven geotextile	ASTM D 5261	1 per 20,000 m ²	100 g/m ²
Mass per unit area of (non woven) needle-punched geotextiles	ASTM D 5261	1 per 20,000 m ²	200 g/m ²
Mass per unit area of flexible Membrane liner	ASTM D 5261	1 per 20,000 m ²	160 g/m ²

Bentomat ® CL is a reinforced GCL consisting of a layer of natural sodium Bentonite between a woven and a non-woven geotextile which are needle-unched together and laminated to a thin flexible membrane liner.

Notes:

- 1 All tensile testing is performed in the machine direction.
- 2 Bentonite properties as removed from the finished GCL.
- 3 Bentonite mass/area reported at 12 percent moisture.

B. The GCL and its components shall have the properties shown in the Bentomat CL Certified Properties table.

C. The moisture content of the bentonite in the finished GCL shall be between 20 and 40 percent, to ensure uniform bentonite distribution, consistent needlepunch density, and adequate electrical conductivity to maximize leak location survey sensitivity.

D. GCL shall be needlepunch-reinforced, with a minimum peel strength of 65 N/10cm. To maximize large-displacement shear strength, GCL reinforcement shall be achieved solely through needlepunching, without any supplemental heat treatment.

2.1.6 Product Quality Documentation

The GCL manufacturer shall provide the Contractor or other designated party with manufacturing QA/QC certifications for each shipment of GCL. The certifications shall be signed by a responsible party employed by the GCL manufacturer and shall include:

A. Certificates of analysis for the bentonite clay used in GCL production demonstrating compliance with the swell index and fluid loss values shown in the Bentomat CL Certified Properties table.

B. Manufacturer's test data for finished GCL product(s) demonstrating compliance with the values shown in the Bentomat CL Certified Properties table.

C. GCL lot and roll numbers supplied for the project (with corresponding shipping information).

2.1.7 Product Labeling

A. Prior to shipment, the GCL manufacturer shall label each roll, identifying:

1. Product identification information (Manufacturer's name and address, brand product code).
2. Lot number and roll number.
3. Roll length, width and weight.

2.1.8 Packaging

A. The GCL shall be wound around a rigid core whose diameter is sufficient to facilitate handling. The core is not necessarily intended to support the roll for lifting but should be sufficiently strong to prevent collapse during transit.

B. All rolls shall be labeled and bagged in packaging that is resistant to photo degradation by ultraviolet (UV) light.

2.1.9 Accessory Bentonite

A. The granular bentonite sealing clay used for overlap seaming,

penetration sealing and repairs shall be made from the same natural sodium bentonite as used in the GCL and shall be as recommended by the GCL manufacturer. Seaming of GCLs shall be conducted in accordance with the manufacturer's specifications for each particular GCL. Please refer to the installation guidelines for Bentomat GCLs.

PART 3 - EXECUTION

3.1 LEVEE EXCAVATION

The original ground shall be excavated to conform to the elevations and dimensions as shown on the plans. The inside of all levees shall be excavated six (6) inches below finished grade to facilitate placement of six (6) inches of impervious clay material. The clay shall be salvaged from the soil which has been excavated for the levees and/or pond. If impervious clay is not found on the site, the bottom of the pond shall be compacted as set forth below.

3.2 LEVEE FILL AND COMPACTION

A. Prior to placing any fill for the pond levees, the ground to be occupied by such fill shall be cleared of all trees, trash or other objectionable materials and surface scarified to a depth of six (6) inches to permit proper bonding.

B. All fill shall be placed in layers of not more than six (6) inches in uncompacted thickness. Each layer shall be compacted by at least four (4) passes over its entire surface by a tractor weighing at least ten (10) tons and exerting a pressure of not less than six (6) lbs. per square in of tread, or a sheepsfoot roller or other device to produce equal compaction. Material shall be compacted to not less than ninety (90) percent of maximum density for the material used as determined by the modified Proctor Compaction Test, ASTM T-130. Additional compaction shall be provided if the above specified compaction methods are not sufficient to obtain the ninety (90) percent compaction. Initial compaction test shall be paid by the Owner. Any testing required because of additional compaction will be paid by the Contractor. It is the intent that the material in the pond area be so dispersed that the upper six (6) inches of fill areas will be an impervious clay material.

C. After compacting, the Contractor shall spread topsoil over the surface of the compacted fill and excavation areas except for the area below the waterline of the pond levees. The Contractor may utilize topsoil stockpiled on the site to give the seeding area at

least a four (4) inch covering of topsoil. The Contractor shall furnish all additional topsoil necessary to complete the aforementioned requirement.

The area shall 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 of the levees. 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.

D. The pond bottom shall be level with localized variations of \pm 3 inches from the datum elevation allowance; full gradual variation from end to end, side to side, or center to side or end are not allowable.

E. No leakage will be allowed to occur from the pond after construction is completed. Should water leak from the pond, the Contractor shall perform all work necessary to stop the leak or leaks, and prevent their reoccurrence.

F. Any borrow material that is needed for completion of pond construction shall be obtained from the job site. Borrow material will not be paid for separately but will be included in the lump sum price as set forth in the contract documents.

3.3 Liner Installation

3.3.1 Shipping and Handling

A. The manufacturer assumes responsibility for initial loading the GCL. Shipping will be the responsibility of the party paying the freight. Unloading, on-site handling and storage of the GCL are the responsibility of the Contractor, Installer or other designated party.

B. A visual inspection of each roll should be made during unloading to identify if any packaging has been damaged. Rolls with damaged packaging should be marked and set aside for further inspection. The packaging should be repaired prior to being placed in storage.

C. The party responsible for unloading the GCL should contact the Manufacturer prior to shipment to ascertain the appropriateness of the proposed unloading methods and equipment.

3.3.2 Storage

A. Storage of the GCL rolls shall be the responsibility of the installer. A dedicated storage area shall be selected at the job site that is away from high traffic areas and is level, dry and well drained.

B. Rolls should be stored in a manner that prevents sliding or rolling from the stacks and may be accomplished by the use of chock blocks. Rolls should be stacked at a height no higher than that at which the lifting apparatus can be safely handled (typically no higher than four).

C. All stored GCL materials and the accessory bentonite must be covered with a plastic sheet or tarpaulin until their installation.

D. The integrity and legibility of the labels shall be preserved during storage.

3.3.3 Earthwork

A. Any earthen surface upon which the GCL is installed shall be prepared and compacted in accordance with the project specifications and drawings.

B. If the GCL is placed over an earthen subgrade, the surface must be compacted to at least 90 percent modified Proctor density or to the extent required by the project specifications. Engineer's approval of the subgrade must be obtained prior to installation. The finished surface must be firm and unyielding, without abrupt elevation changes, voids, cracks, ice or standing water.

C. The subgrade surface must be free of vegetation, sharp-edged rocks, stones, sticks, construction debris and other foreign material that could contact the GCL. The subgrade should be rolled with a smooth-drum compactor to remove any wheel ruts, footprints or other abrupt grade changes. Furthermore, all protrusions extending more than 12mm from the subgrade surface shall either be removed, crushed or pushed into the surface with a smooth-drum compactor. The GCL may be installed on a frozen subgrade, but the subgrade soil in the unfrozen state should meet the above requirements.

D. On a continuing basis, the project CQA inspector shall certify acceptance of the subgrade before GCL placement.

E. It shall be the installer's responsibility thereafter to indicate to the Engineer any change in the condition of the subgrade that could cause the subgrade to be out of compliance with any of the requirements listed in this Section.

F. At the top of sloped areas of the job site, an anchor trench for the GCL shall be excavated or an equivalent runout shall be utilized in accordance with the project plans and specifications and as approved by the CQA Inspector. When utilizing an anchor trench design, the trench shall be excavated and approved by the CQA Inspector prior to GCL placement. No loose soil shall be allowed at the bottom of the trench and no sharp corners or protrusions shall exist anywhere within the trench.

3.3.4 GCL Placement

A. The areas to be lined with GCL shall be agreed upon by the Installer and the Engineer prior to installation.

B. GCL rolls should be delivered to the working area of the site in their original packaging. Immediately prior to deployment, the packaging should be carefully removed without damaging the GCL. The orientation of the GCL (i.e., which side faces up) should be in accordance with the Engineer's recommendations.

C. Equipment, which could damage the GCL, shall not be allowed to travel directly on it. If the installation equipment causes rutting of the subgrade, the subgrade must be restored to its originally accepted condition before placement continues.

D. Care must be taken to minimize the extent to which the GCL is dragged across the subgrade in order to avoid damage to the bottom surface of the GCL. A temporary geosynthetic subgrade covering commonly known as a slip sheet or rub sheet may be used to reduce friction damage during placement.

E. The GCL panels shall be placed parallel to the direction of the slope.

F. All GCL panels should lie flat on the underlying surface, with no wrinkles or fold, especially at the exposed edges of the panels.

3.3.5 Anchorage

A. As directed by the project drawings and specifications, the end of the GCL roll shall be placed in an anchor trench at the top of

the slope or an equivalent runout design shall be utilized. When utilizing an anchor trench design, the front edge of the trench should be rounded so as to eliminate any sharp corners. Loose soil should be removed from the floor of the trench. The GCL should cover the entire trench floor but does not extend up the rear trench wall.

3.3.6 Seaming

A. The GCL seams are constructed by overlapping their adjacent edges. Care should be taken to ensure that the overlap zone is not contaminated with loose soil or other debris. Bentonite-enhanced seams are required for installation of membrane-laminated GCLs.

B. The minimum dimension of the longitudinal overlap for Bentomat CL should be 150 mm. End-of-roll overlapped seams should be similarly constructed, but the minimum overlap should measure 300 mm.

C. Seams at the ends of the panels should be constructed such that they are shingled in the direction of the grade to prevent the potential for runoff flow to enter the overlap zone.

D. Bentonite-enhanced seams are constructed between the overlapping adjacent panels described above. The underlying edge of the longitudinal overlap is exposed and then a continuous bead of granular sodium bentonite is applied within the zone defined by the edge of the underlying panel and the 150 mm line. A similar bead of granular sodium bentonite is applied at the end-of-roll overlap. The granular bentonite shall be applied at a minimum application rate of 0.4 kg/m.

3.3.7 Detail Work

A. The GCL shall be sealed around penetrations and embedded structures embedded in accordance with the design drawings and the GCL Manufacturer.

B. Cutting the GCL should be performed using a sharp utility knife. Frequent blade changes are recommended to avoid damage to the geotextile components of the GCL during the cutting process.

3.3.8 Damage Repair

A. If the GCL is damaged (torn, punctured, perforated, etc.) during installation, it may be possible to repair it by cutting a patch

to fit over the damaged area. The patch shall be obtained from a new GCL roll and shall be cut to size such that a minimum overlap of 300 mm is achieved around all of the damaged area. Granular bentonite or bentonite mastic should be applied around the damaged area prior to placement of the patch. It may be desirable to use an adhesive to affix the patch in place so that it is not displaced during cover placement.

3.3.9 Cover Placement

A. Cover soils shall be free of large stones or other foreign matter that could damage the GCL. Cover soils should be approved the project Engineer with respect to particle size, uniformity and chemical compatibility. Cover soils with high concentrations of calcium (e.g., limestone, dolomite) are not acceptable.

B. Soil cover shall be placed over the GCL using construction equipment that minimizes stresses on the GCL. A minimum thickness of 300 mm of cover should be maintained between the equipment tires/tracks and the GCL at all times during the covering process. This thickness recommendation does not apply to frequently trafficked areas or roadways, for which a minimum thickness of 600 mm is required.

C. Soil cover should be placed in a manner that prevents the soil from entering the GCL overlap zones. Cover soil shall be pushed up slopes, not down slopes, to minimize tensile forces on the GCL.

D. Although direct vehicular contact with the GCL is to be avoided, lightweight, low ground pressure vehicles (such as 4-wheel all-terrain vehicles) may be used to facilitate the installation of any geosynthetic material placed over the GCL. The GCL supplier or CQA engineer should be contacted with specific recommendations on the appropriate procedures in this situation.

3.4 PAYMENT

All work covered in this section of the specifications shall be included in the lump sum price as set forth in the contract documents. No other items will be paid for separately.

SECTION 02592A
SURFACE IMPOUNDMENT
PUMP CONTROLS SPECIFICATION

PART 1 - REFERENCE STANDARDS

The work in this section is subject to the requirements of applicable portions of the following standards:

- A. Hydraulic Institute
- B. ANSI - American National Standards Institute
- C. ASTM - American Society for Testing and Materials
- D. IEEE - Institute of Electrical and Electronics Engineers
- E. NEMA - National Electrical Manufacturers Association
- F. NEC - National Electrical Code
- G. ISO - International Standards Organization
- H. UL - Underwriters Laboratories, Inc.

PART 2 - EQUIPMENT ENCLOSURE AND ACCESSORIES

a. Equipment Enclosure

The pump control panel enclosure shall be rated UL Type 4X 316 SS for outdoor use. Enclosure shall be designed to enclose electrical and electronic equipment and protect against harsh, industrial environments and sized according to the application, and include a 3-point latch. Enclosure shall be Saginaw EL Series or approved equal.

b. Power Distribution

Fuses & Fuse Holders

Fuses shall be of the type, voltage and amperage required for adequate protection of control transformer. All fuses shall be installed in compatible touch-safe, indicating type fuse holders. Fuses shall be Ferraz, Bussman or approved equal.

c. Main Circuit Breaker

Main circuit breaker shall be of the type, voltage and amperage required for adequate branch circuit protection. The main circuit breaker shall be 22kAIC and shall be installed in compatible touch-safe. Main circuit breaker shall be ABB T3 series or approved equal.

d. Pump Circuit Breakers

Pump circuit breakers shall be of the type, voltage and amperage required for adequate protection of the 480V control panel. The Pump circuit breakers shall be 22kAIC and shall be installed in compatible touch-safe, including a rotary handle assembly. Pump circuit breakers shall be Square D HDL series or approved equal.

e. Control Power Transformer

Control power transformer shall be panel mount, UL Listed, epoxy encapsulated core and coil type. Size control power transformer as required to provide 120-volt power for internal control circuits with 50% spare. Transformer shall be Acme AE series or approved equal.

f. Terminal Blocks

Provide terminals for all control circuit wire terminations for both field wiring and internal wiring. Terminals shall be capable of terminating #26-8 AWG stranded wires. Terminals shall be equipped with labeling devices designed specifically for use with provided terminal blocks. Terminals shall be Phoenix Contact UK6N or approved equal.

PART 3 - PUMP STATION CONTROLLER

a. Hardware

- i. The controller shall be microprocessor based capable of having software changes and updates via personal computer (notebook). The controller user interface shall have a color display with a minimum screen size of 3-1/2" x 4-5/8" for easy viewing of system status parameters and for field programming. The display shall have a back light with contrast adjustment. Password protection of system settings shall be standard.
- ii. The controller shall provide internal galvanic isolation to all digital and analog inputs as well as all fieldbus connections.
- iii. The pump system controller shall be a standard product developed and supported by the pump manufacturer.
- iv. The controller shall have the ability to be connected to a battery to maintain power on controller during periods of loss of supply power.
- v. The controller shall have built in data logging capability. Logged values shall be displayed on the controller and able to be exported to computer via standard connection. A minimum of 3600 samples per logged value with the following parameters available for logging:
 - Average flow-rate (inflow and outflow)
 - Number of flow reading taken
 - Station operating hours
 - Time since service
 - Total Number of pump starts
 - Total Number of pump starts per hour
 - Pump Starts per hour
 - Individual operating hours
 - Discharge pressure (head pressure)
 - Power consumption
 - Average current consumption

- Number of anti-blocking attempts
- vi. The controller shall display the following as status readings from a single display on the controller (this display shall be the default "home" screen):
- Current station liquid level with corresponding water graphic
 - Alarm status on the station (if any)
 - Lead pump on and off setpoints and graphically display on water graphic
 - System status with current operating mode
 - Status of each pump with current operating mode and total hours run on the pump
 - Estimated flow-rate, (not requiring flow meter connection)
 - Date and Time
 - Station Name
- vii. The controller shall have as a minimum the following hardware inputs and outputs:
- Three analog inputs (4-20mA or 0-10VDC)
 - Three digital inputs
 - Two digital outputs
 - Ethernet connection
 - Field Service connection to PC for advanced programming and data logging
 - Expandable inputs and outputs using expandable I/O modules for up to: 30 digital inputs, 23 digital relay outputs (240VAC, 2A), 9 analog inputs (4-20mA, 0-20mA, 0-10V), 9 analog outputs (0-10V), 12 PTC inputs for motor protection
- viii. The controller shall be capable of receiving a redundant sensor input to function as a backup to the primary sensor.
- ix. The controller shall be capable of displaying instantaneous power consumption (Watts or kilowatts) and cumulative energy consumption (kilowatt-hours).
- x. The controller shall be capable of displaying instantaneous specific energy use (kw/gpm), (optional flow meter must be connected or advanced flow calculation activated).
- xi. The controller shall be capable of displaying an estimated flow-rate on the default status screen.

b. Functionality

The pump station controller shall provide "out of the box" control of a typical lift (empty) station, with an intuitive color user-interface. The pump station controller

shall come with pre-built configuration parameters which are selectable via the user interface, including:

- i. Pump mode, for each pump, between Auto/ Manual / Off.
- ii. Functionality for advanced pump control of up to 6 pumps.
- iii. Setpoint adjustment for pump activation/deactivation and level alarms.
- iv. Level device or ball floats
 - Redundant level device handling from two 4-20mA devices
- v. Functionality for grouping and alternation of up to 6 pump
- vi. Station optimization including:
 - Anti-seizing function (prevent pump from choking/seizing up due to lack of operation)
 - Maximum pumps to run (overload protection)
 - Maximum starts per hour (pump protection)
 - Inter-pump start and stop delays
 - Maximum run time (turn off inefficient or partially blocked pumps)
 - Anti-blocking function
 - o Pump controller shall have the ability to "flush" or "reverse" sewage pumps if the control system deems the pump to be blocked
 - o Triggers are selected and tolerances set by user and include low flow, current, torque, power factor, and pump over temperature
 - Foam-Draining function (draining of pump station down to inlet level.
 - Pump groups with the ability to select alternation within groups or between groups

c. Faults and Alarm

- i. The pump system controller shall store up to 50 warning and alarms in memory.
- ii. The time, date and duration of each alarm shall be recorded.
- iii. All Faults and Alarms shall be able to be disabled by user.
- iv. All Faults and Alarms shall have a user adjustable time delay of activation.
- v. All Faults and Alarms shall have a Warning option allowing the user to set the condition with a warning threshold or change the Alarm to a Warning.

- vi. All Faults and Alarms shall be user selectable to send over SCADA
- vii. All Faults and Alarms shall be selectable by the user as Automatic reset or require Manual reset at the control system.
- viii. Control system shall have a user-defined alarm option available for any alarm of fault condition not preloaded into control system
- ix. The controller shall display all alarm conditions :

Overflow	High Level
Dry Running	Float Switch Inconsistency
System Power Loss	Overflow
High Level	Float Switch Inconsistency
Loss of sensor signal (4-20mA)	Max Starts/Hour, Pump
VFD Trip/Failure	System Failure
Contactor feedback, Pump	Flow Meter Failure
Power Meter Failure	Controller Hardware Fault
Battery Backup Fault (UPS)	Communication Fault (GENIbus)
Communications Card Fault	SCADA Callback Error
Ethernet Fault	User-defined Sensor Fault
Discharge Pressure Sensor Fault	Water of Pit Floor
Gas Detector	Extra Fault Failure
Motor Protection, Tripped	Common Phase Error
Low Flow	Auto/On/Off Switch Change
Time for Service	Pump Over Temperature
Pump Moisture/Seal Failure	Latest Runtime of Pump
VFD not ready	Torque
Pump Blocked	Contactor Feedback, Mixer
Time for Service, Mixer	Max Starts/Hour, Mixer
Loss of Sensor signal (4-20 mA)	

d. Flow Monitoring

- i. The pump system controller shall be able to accept a physical flow meter input.
- ii. Simple Flow Calculation
 - The pump system shall be able to calculate station inflow and pump outflow rates using volumetric-over-time calculations (i.e., draw down test)
- iii. Advanced Flow Calculation
 - The pump system shall be able to utilize the following parameters monitored within the control system to calculate flow within 1% to 2% of a physical flow meter:
 - o Nominal pump power (Pnom)
 - o Nominal head pressure (Hnom)
 - o Pit Area (sqft)
 - o Nominal flow rate (gpm)

- The pump system shall be able to utilize the following parameters monitored within the control system to calculate flow within 1% to 2% of a physical flow meter:

e. Variable Frequency Drive (VFD) Control

- i. The pump system controller shall have the ability to control up to six (6) variable frequency drives.
- ii. The pumps system controller shall be able to control the system in one of the following control modes:
 - Fixed Frequency (pump is to run at a constant frequency)
 - Linear Control (pump speed is adjusted according to pit inflow)
 - Minimum Control (pump will run at economy frequency, and if flow drops even further, frequency will drop but keep pump running)
 - PID Control (pump is to controlled from another input other than level or if user wants to control system using the control parameters Kp, Ti, Td, etc.)
- iii. The pump system shall have the ability to perform Automatic Energy Optimization utilizing pump power information and advanced flow information from advanced flow calculation or physical flow meter.
 - Determines specific energy curve by adjusting frequency and comparing to pump wire-to-water efficiency (Wh/gal)
 - Displays specific energy curve for user, which at that point can choose to run at the calculated economy frequency.
 - System retests periodically.
 - Economy frequency shall be over-ridden to run system at maximum speed in the event of excessive inflow or if high level alarm
- iv. The pump system shall be able to communicate commands and speed references to VFD using hard-wired commands or GENIbus.

f. Communication

- i. The pump system controller shall have the ability to communicate through the following common fieldbus protocols via communications card installed inside the controller:
 - Modbus RTU
 - Modbus TCP/IP
 - Modbus TCP/IP via cellular using CDMA or GPRS

- GRM via cellular using CDMA or GPRS (3G/4G)
- ii. The pump system controller shall have the ability to send text messages over GPRS to up to 3 different phone numbers via communications card installed inside the controller.
- iii. The controller shall have a built in Ethernet connection allowing controller to be connected to network and access of controller via web browser and internet anywhere around the world where internet communication is available.
- iv. The controller shall have the ability to communicate GENIbus to down-stream components that make up the entire control system

PART 4 - PUMP MONITORING UNIT

The pump control system will also be capable of integrating with an optional pump monitoring unit. The pump monitoring unit shall be manufactured by the pump and pump controller manufacturer to ensure full compatibility as a system. The features of the pump monitoring unit shall include:

- a. Protect the pump against overheating
- b. Monitor the status of these items:
 - i. motor winding temperature
 - ii. leakage - water-in oil (WIO) and water-in-air (WIA)
- iii. moisture in pump
- c. Measure the stator insulation resistance
- d. Stop the pump in case of alarm
- e. Remotely monitor the pump via RS-485 communication (Modbus or GENIbus)
- f. Control pump via a frequency converter.

g. Motor Starter

Starter for motor starting shall be NEMA rated with 120-volt coil and one normally open auxiliary contact. The overload shall be solid state with adjustable trip dial and shall disable the motor during an overload condition. The overload shall include a switch to choose manual/auto reset. Select starter appropriate for the horsepower, voltage, and current of the motor being started. Provide one starter for each pump. Motor starter shall be Square D, ABB or approved equal.

h. Motor Circuit Breaker

Motor circuit breaker shall be thermal-magnetic UL489 for the specific voltage, with visible trip indication. Motor circuit breaker shall be Eaton, ABB, Square D approved equal.

PART 5 - RELAYS

a. General Purpose Relays

General purpose relays shall be ice cube design with have 8A contacts and standard blade style DIN rail mounted touch-safe socket. Relays shall be idec RJ series with SJ series sockets or approved equal.

b. Seal Failure Sensor Relay

The seal failure sensor relay shall be a DIN rail mounted SPDT conductivity based liquid-level control with adjustable sensitivity and an LED indicator, ABB LLC series or approved equal unless otherwise specified by the pump manufacturer. One seal failure sensor relay shall be provided for each pump. The pump seal fail pilot light shall be UL Type 4X, with 120VAC amber LED and amber lens, ABB HWIP series 22mm or approved equal.

PART 6 - OPERATOR INTERFACE DEVICES

a. General

All operator interface devices shall be located on the internal swingout panel front unless indicated otherwise. Each device shall be labeled according to its function and the designation of any associated equipment.

b. H-O-A Switch

The H-O-A switch shall be selector type and mounted on an angle bracket inside the enclosure, IDEC or approved equal. One H-O-A switch shall be supplied for each pump. Each H-O-A switch shall be labeled according to function and designation of the associated pump.

c. Pump Running Pilot Light

The pump running pilot light shall be UL Type 4X, with 120VAC green LED and green lens, ABB HWIP series 22mm or approved equal. One pump running pilot light shall be supplied for each pump. Each pump running pilot light shall be labeled according to function and designation of the associated pump. The pump running pilot light shall be illuminated when the associated pump starter is engaged.

d. Pump Overtemp Pilot Light

The pump overtemp pilot light shall be UL Type 4X, with 120VAC red LED and red lens, ABB HWIP series 22mm or approved equal. One pump failure pilot light shall be supplied for each pump. Each overtemp failure pilot light shall be labeled according to function and designation of the associated pump. The pump overtemp pilot light shall be illuminated when the associated pump motor circuit protector has tripped or the associated pump temperature sensor has tripped.

e. Audible Alarm

The audible alarm shall be a 120 volt, 95dB at 2 feet, Include a gasket and be UL listed Type 4X, Floyd Bell MW-09 Series or approved equal. The audible alarm shall output a warble tone. The audible alarm shall include a silence & test switch.

PART 7 - DEVICE LABELING

External or flush mounted devices shall be labeled with engraved laminated phenolic nameplates secured with permanent pressure sensitive adhesive. Internal labels shall be white polyester permanent pressure sensitive tape printed with black thermal transfer lettering.

SECTION 02592B
SURFACE IMPOUNDMENT
PUMP STATION

PART 1 - GENERAL

1.1 SCOPE

1.1.1 Pumps to be supplied as specified herein and shall be of submersible suitable for use in general industrial applications.

1.1.2 Pumps to be supplied under this specification shall be suitable for use in Class 1 Division 1 Group C and D applications having heavy duty, high efficiency design.

1.2 QUALITY ASSURANCE

1.2.1 The equipment covered under this specification shall be a standard product of proven reliability. All units specified shall be supplied by a single pump manufacturer.

1.2.2 The pumps shall be tested in accordance with the ANSI / HI 11.6: 2012 Hydraulic Institute's Pump Standards, Latest Edition, as required.

1.2.3 Approved manufactures:
a. Grundfos
b. Pre-Approved Equal

1.2.4 Named as "Approved" does not grant permission for the named manufacturer to deviate from the specifications as written. Unless specific written approval is granted before the bid, all proposed or submitted equipment shall meet specifications as written, in entirety.

1.3 SUBMITALS

1.3.1 With the submittal - the pump manufacturer shall include a typical pump outline drawing, typical cross-sectional drawing, and typical price book curve for the required conditions to demonstrate compliance with the referenced specifications.

1.3.2 For approval, the pump manufacturer shall submit the following:
A. Certified pump outline drawing
B. Typical cross section
C. Single line characteristic curve
D. Multiple line characteristic curves showing variable speed operation plotted against a system curve for VFD applications

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- E. Pump installation and operations manual
- F. Motor driver wiring diagram
- G. Control module wiring diagram
- H. Performance and test procedure
- I. Make available a full video (s) that completely demonstrates the assembly and dismantling of the proposed pump.

1.4 SHIPPING, DELIVERY, STORAGE AND HANDLING

1.4.1 Submersible pumps shall ship fully assembled.

1.4.2 Specific Installation and Operating Instructions shall be included in the shipment.

1.4.3 The skidded pump and related equipment shall be unloaded, stored and installed in strict accordance with the manufacturer's Installation and Operating Instructions. The contractor shall review in detail and implement items relating to mounting, lubrication, power requirements and pump rotation as contained in the manufacturer's Installation and Operating Instructions to insure proper warranty. If storage is planned to be longer than three (3) months or in a harsh environment, the manufacturer's long term storage instructions shall be followed.

1.5 START-UP FIELD SERVICE

1.5.1 The bid shall include at minimum two (2) days start-up field service for the purpose of supervising pump start-up and instruction of proper pump operation and maintenance.

- A. Inspect and approve installation - ½ day
- B. Supervise field run test - 1 day
- C. Instruct owner in proper start up procedures as well as operations of the pump - ½ day

1.6 WARRANTY

1.6.1 Pumps are to be warranted for 1 year or 18 months from the date of shipment to the original buyer, to be free from defects in material and/or workmanship and to conform to any applicable drawings and specifications.

PART 2 - PRODUCT SELECTIONS

2.1 OPERATING SELECTION

2.1.1 The required units shall be non-clog, inverter-duty rated submersible pumps.

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2.1.2 The pump shall have a continuously rising head capacity curve from run-out flow through shutoff.

2.1.3 The pump shall be designed to operate continuously for an extended periods at any point in the allowable operating range of the curve without cavitation, overheating or excessive vibration. The motor nameplate horsepower rating shall not be greater than specified herein.

2.1.4 TABLE 1 - PERFORMANCE DATA

Pump Item Number	1 & 2	
Number of Units Required	2	
Rated Duty Point Condition		
Capacity (Flow)	3800	GPM
Total Dynamic Head (TDH)	208.8	Feet
Minimum Hydraulic Efficiency	78	%
Minimum Wire to Water Efficiency	65	%
Minimum Motor Efficiency	84	%
Maximum Motor HP Required	308	HP
Maximum Pump Operating Speed	1190	RPM
Electrical Characteristics Required		
Voltage	460	Volt
Phase	3	PH
Hertz	60	Hz
Service Factor	1.15	
Minimum Shutoff Head	247	Feet
Maximum NPSH Required	32.81	Feet
Minimum Spherical Diameter Passage Through the Impeller (in)	3-15/16	Inches

Minimum Suction Size	8	Inches
Minimum Discharge Size	8	Inches
Pumped Liquid	Water	
Pumping Temperature	104 Max. °F	
Specific Gravity @ Pumping Temperature	1	

2.2 PUMP DESIGN

2.2.1 Each pump shall have a flanged guide claw attached to the pump discharge flange by an ANSI flange connection. A replaceable Nitrile Butadiene Rubber (NBR) profile seal shall be provided as an integral part of the guide claw to form a leak-proof seal with the base discharge elbow.

2.2.2 The guide claw shall direct the pump down by two vertical guide rails to the discharge connection in a simple linear movement without tilting the pump side wards. There shall be no need for any personnel to enter the wet well in order to remove the pumps. No portion of the pump shall be supported directly on the bottom of the wet well, guide rails or lifting chain. A cast iron or fabricated steel base plate with integral guide rail holders shall be provided. The base plate shall be designed with an integral 90° elbow.

2.3 PRODUCT - CONSTRUCTION

2.3.1 Major pump components including casing, impellers, and motor frame shall be of gray cast iron minimum ASTM A48 Class 35 with surfaces devoid of blowholes or other irregularities.

2.3.2 All exposed nuts or bolts shall be 316 stainless steel. All metal surfaces coming into contact with the pumped media, other than stainless steel, shall be protected by a factory applied spray coating epoxy paint finish coating on the exterior of the pump.

2.3.3 Critical mating surfaces where watertight sealing is required shall be machined and fitted with NBR O-rings. Joint sealing will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides without the requirement of a specific torque limit. Rectangular cross-sectioned gaskets requiring specific torque limits to achieve compression shall not be considered as adequate or equal.

2.3.4 Pump and motor shaft shall be the same unit. Pump and motor shall be shipped from the factory as a finished product. Pumps that are assembled outside of the manufacture's facility shall not be found acceptable.

2.4 CABLE AND CABLE ENTRY SEAL

2.4.1 The power and control cable shall be of sufficient length to ensure no splices are required.

2.4.2 EMC Shielded power cables to be used when variable frequency drives are used.

2.4.3 The cable entry system shall preclude specific torque requirements and consist of a cylindrical elastomeric grommets and a terminal board assembly to insure a completely watertight and submersible seal. The assembly shall provide ease of changing the cable using the same entry seal. The cable entry junction chamber and motor chamber shall be separated by a terminal board.

2.5 PUMP MOTOR

2.5.1 The pump motor shall be explosion proof, induction type with a squirrel cage rotor, shell type design, housed in an air filled, watertight chamber according to IEC class IP 68 and NEMA MG1, part 31. The motor shall be inverter duty and incorporate class H insulation. Oil filled motors shall not be considered acceptable or equal.

2.5.2 The stator shall be trickle impregnated and heat shrunk fitted into the cast iron stator housing. The use of bolts, pins or other fastening devices requiring penetration of the stator housing is not acceptable. The motor shall be designed for continuous duty handling pumped media of 104°F (40°C) and capable of up to 15 spaced starts per hour.

2.5.3 The motor shall have voltage tolerance of plus or minus 10% with having a temperature rise class F.

2.5.4 The motor horsepower shall be adequate so that the pump is non-overloading throughout the entire pump performance curve from shut-off through run-out. Service factor shall be 1.15.

2.6 COOLING SYSTEM

2.6.1 Each unit shall be adequately cooled by the pumped media. No secondary cooling systems such as non-potable water shall be required.

2.6.2 The cooling system shall properly operate at all speeds of operation between 30Hz -60Hz.

2.7 BEARINGS

2.7.1 Motor bearings shall be grease lubricated for the life of the bearing. The upper motor bearing shall be a single row

deep-groove bearing and the lower bearings shall compensate for axial thrust and radial forces. The minimum L10 bearing life shall be 50,000 hours within allowed operating range of the pump curve at the maximum pump speed.

2.8 MECHANICAL SEALS

2.8.1 Pump shall be provided with a mechanical seal system consisting of two seal assemblies. Seals shall operate in a lubricant that lubricates the seal faces at a constant rate.

2.8.2 The primary seal located between the pump and the lubricant chamber shall contain one stationary sealing face and one positively driven rotating sealing face. Sealing faces shall be silicon carbide on silicon carbide.

2.8.3 The secondary seal is located between the lubricant chamber and the motor housing and shall contain one stationary sealing face and one positively driven rotating sealing face. Sealing faces shall be silicon carbide on carbon.

2.9 IMPELLER

2.9.1 The enclosed 2 channel impeller shall be of ductile cast iron according to ASTM-Grade 80-55-06, statically and dynamically balanced of centrifugal design with long, self-cleaning and non-clogging channels. Only enclosed impellers shall be accepted; semi-open, recessed or vortex impeller will not be considered equal.

2.9.2 Impeller(s) shall be keyed to the shaft and have an impeller bolt for locking the impeller to the shaft. The impeller shall be capable of passing a minimum 3-15/16 inch diameter solid.

2.10 WEAR SURFACES

2.10.1 The suction wear gap clearance between impeller and pump casing shall be in axial direction only. The clearance shall be fully adjustable with external adjusting screws without having to completely disassemble the pump.

2.11 VOLUTE/SUCTION COVER

2.11.1 The pump volute shall be single piece cast iron, ASTM A48 Class 35B with removable suction plate and smooth passages large enough to pass any solids that may enter the impeller.

2.12 AUTO COUPLING SYSTEM

2.12.1 Pumps shall be equipped with a complete auto coupling system to include factory upper guide rail brackets, base

elbow, guide claw. Fabricated non factory components shall not be accepted.

2.12.2 Upper guide rail bracket shall be 316 stainless steel.

2.12.3 Base elbow shall have a smooth interior to allow for specific solids passage. Base elbow shall be gray cast iron, ASTM A-48, Class 35 or better, being devoid of blowholes or other irregularities. Base elbows shall have a factory applied spray coating.

2.12.4 Minimum guide rail diameter shall be minimum 3". Guide rails to be 316 stainless steel with minimum thickness of 0.15" (schedule 40).

2.12.5 Sealing design shall incorporate a NBR gasket profile. The NBR profile gasket shall extend through the guide claws in order to accomplish an adequate leak proof crush between the base elbows and pump discharge.

2.13 PUMP PROTECTION

2.13.1 Each pump shall incorporate three thermal sensors, one per stator phase and be connected in series, to monitor the temperature of the motor. Should the thermal sensors activate, the motor shall be stopped and an alarm indication shall be activated.

2.13.2 Pumps shall incorporate two normally closed moisture switches. The moisture switches shall be incorporated into the pump to sense moisture in the bottom of the stator housing and the junction box. The switches shall be wired in series so that if a switch opens the motor is de-energized and the pump is stopped.

2.13.3 A water leakage sensor shall be installed in the seal chamber to monitor the condition of the primary seal. The sensor shall measure the water content in the oil and convert the value into an analog current signal. The sensor shall measure the water content in the oil chamber from 0%-20% and send a continuous 4-20mA signal to a factory supplied, DIN rail mounted seal fail module to allow for seal fail monitoring. This shall allow for constant trending of seal leakage without the need to remove the pump from the wet well. The sensor shall be fitted in a stainless steel tube for mechanical protection.

2.14 PUMP VOLUTE COATING

2.14.1 Each pump shall have an interior coating to resist against abrasive liquids. The coating shall be applied to the inside of a volute except from the exact machined fastening surfaces.

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2.14.2 Cleaning:

2.14.2.1 Sand blast SA 2 ½ at foundry

2.14.2.2 Machine washed or degreasing by degreasing agent

2.14.3 Finishing layer:

2.14.3.1 Approximately 300 microns applied by brush

2.14.4 Coating:

2.14.4.1 Ceramic S-Metal BELZONA 1321 or equivalent

PART 3 - MATERIALS OF CONSTRUCTION

3.1 The non-clog pump shall conform to the materials of construction as listed for this design.

3.2 MATERIALS

Pump Components	Standard Material
Pump Casing	Cast Iron ASTM A-48, Class 35 B
Impeller	Ductile Cast Iron ASTM 80-55-06
Motor Housing	Cast Iron ASTM A-48, Class 35 B
Cooling Jacket	Galvanized Steel
Lifting Bail	Galvanized Steel
Primary Mechanical Seal	Silicon Carbide / Silicon Carbide
Pump Shaft	High Tensile Carbon Steel

PART 4 - TESTING

4.1 FACTORY TESTING

4.1.1 All factory testing shall be in accordance with the standards of the Hydraulic Institute, ANSI/HI 11.6:2012, 2B. All testing is to be performed at the pump manufacturer's facility.

4.1.2 Performance testing shall be non-witnessed.

4.1.3 Field/functional testing will be performed to insure proper mechanical operation at the jobsite.

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.

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- 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.

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- 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

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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.

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- 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

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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.

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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

CHAIN LINK FENCES, GATES & BARBED WIRE

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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

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- 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.

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- 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

HYDROMULCHING

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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

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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.

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

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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

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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

CAST-IN-PLACE CONCRETE

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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.

CAST-IN-PLACE CONCRETE

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

06650-1

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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

06650-2

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:

GENERAL MECHANICAL PROVISIONS

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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

GENERAL MECHANICAL PROVISIONS

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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

BASIC MATERIALS & METHODS

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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

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).

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- 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.

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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

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- 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.

GENERAL ELECTRICAL REQUIREMENTS

16000 - GENERAL ELECTRICAL REQUIREMENTS

- 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.

GENERAL ELECTRICAL REQUIREMENTS

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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.

16050 - BASIC MATERIALS AND METHODS

- 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

16050 - BASIC MATERIALS AND METHODS

- 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

16050 - BASIC MATERIALS AND METHODS

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.

16110 - CONDUITS AND RACEWAYS

- 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

CONDUITS AND RACEWAYS

16110 - CONDUITS AND RACEWAYS

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

16110 - CONDUITS AND RACEWAYS

- 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.

CONDUITS AND RACEWAYS

16110-5

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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

16450 - 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.

GROUNDING

16450-2

WASTEWATER FACILITIES FOR EXPLORATORY VENTURES, LLC OSCEOLA ARKANSAS

DATE
NOVEMBER 2022

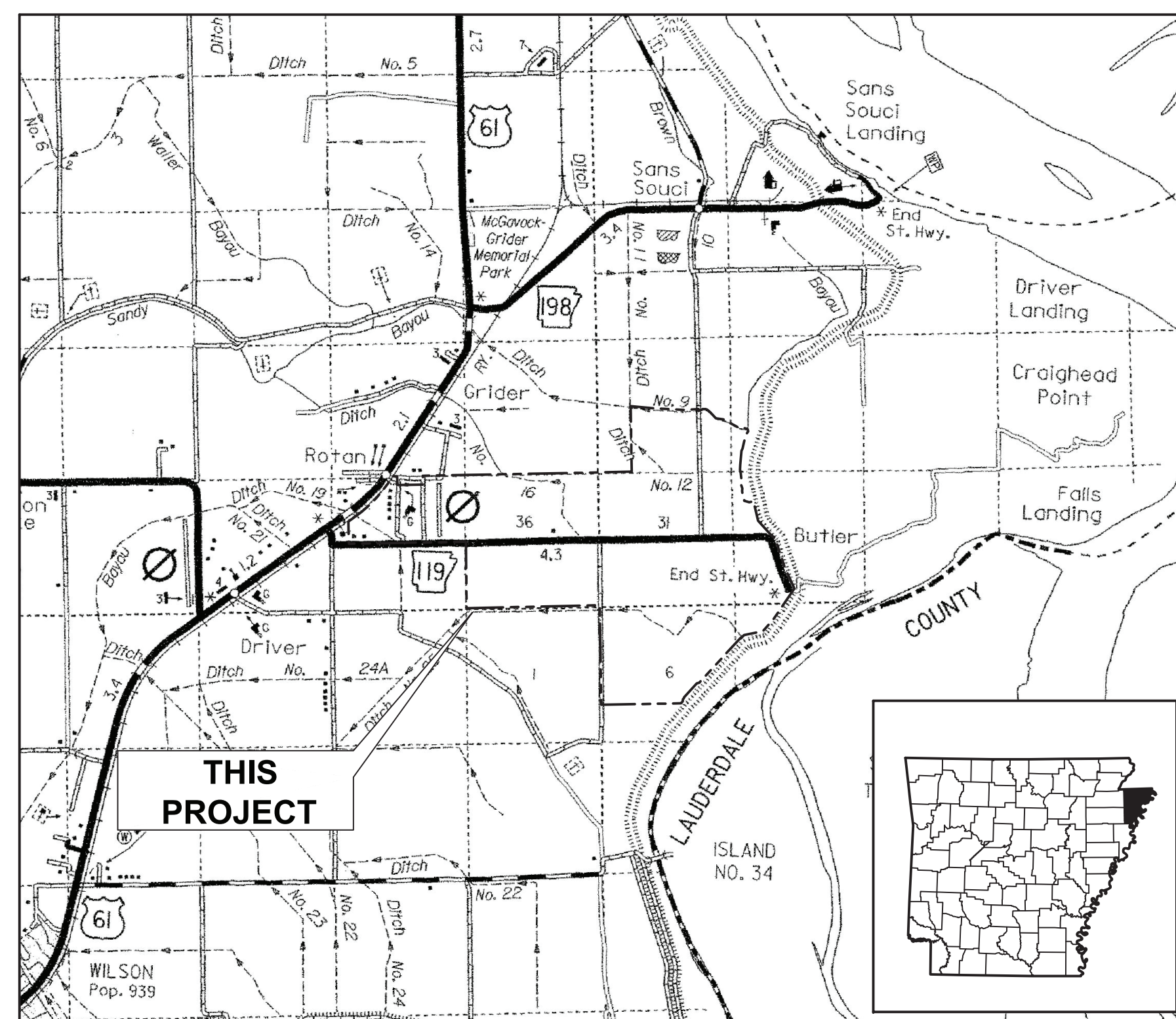
HARBOR PROJECT NUMBER
BHLP-22172

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P&ID OF WWTP 1.....	C2
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ACID TANKS M2AT1.1, 1.2, & 1.3.....	C6
ALKALI TANKS M2AT2.1 & 2.2.....	C7
RECEIVING TANK M2WB5.....	C8
STABILIZER TANKS M2WB6.1 & 6.2.....	C9
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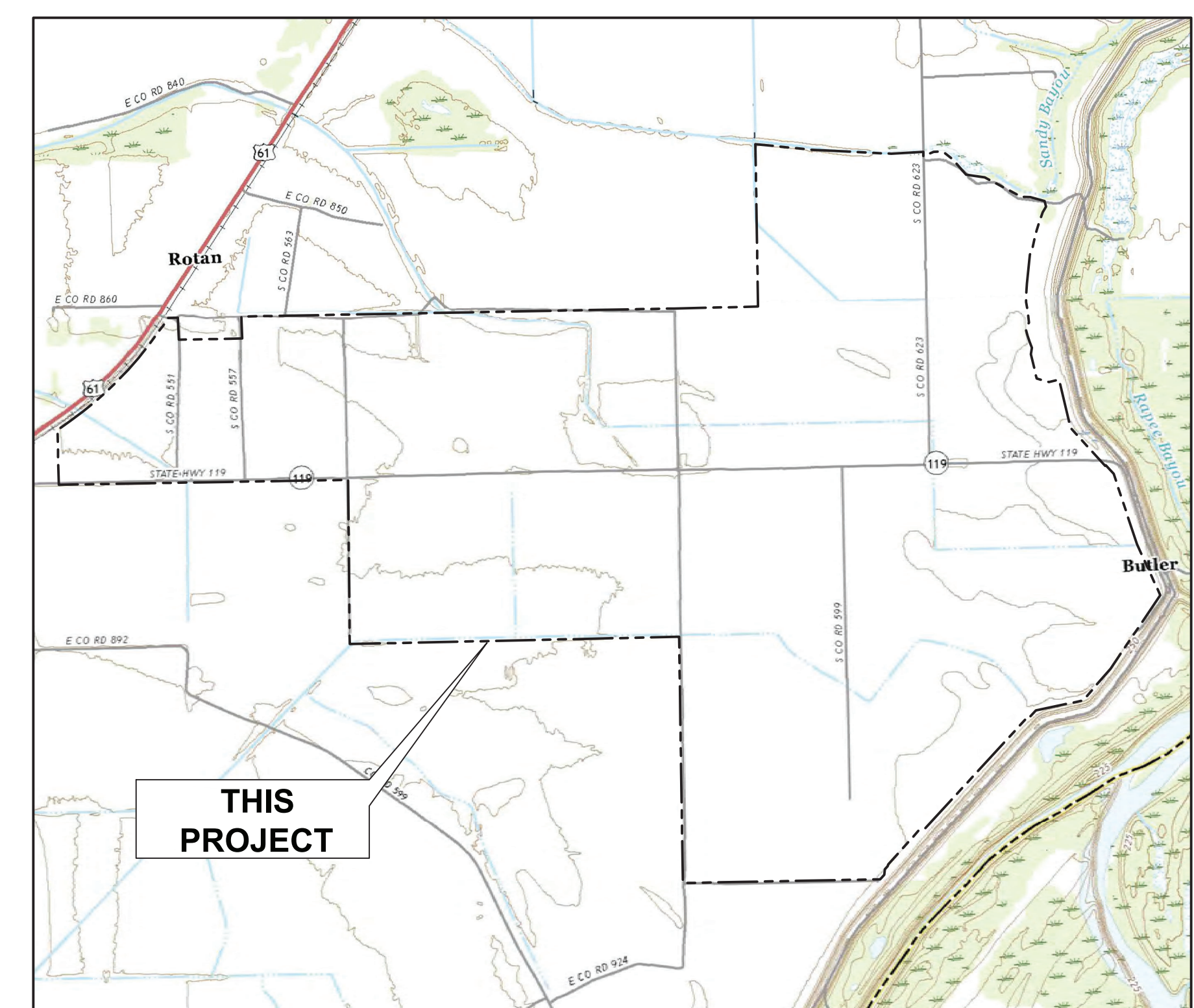


VICINITY MAP
SCALE: 1" = 5,000'



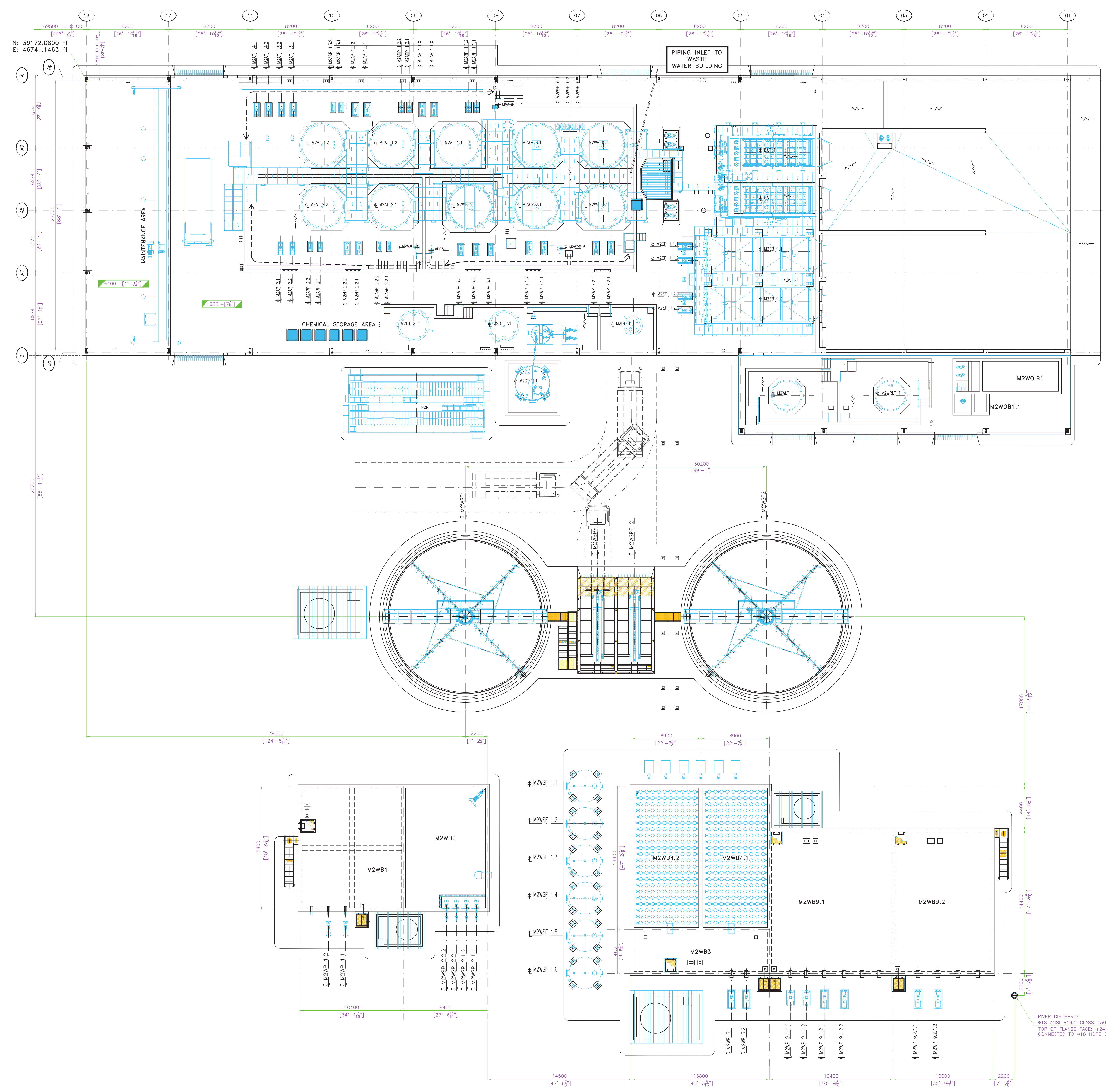
Harbor

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



PROJECT LOCATION
SCALE: 1" = 2,000'

NO.	DATE	REVISION DESCRIPTION
1	10/19/22	AS PRELIMINARY
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NOTES:
 1. ALL THE INFORMATION SHOWN ON THIS DRAWING SHALL BE TREATED AS PRELIMINARY.
 2. ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS AND BETWEEN BRACKETS IN THE IMPERIAL SYSTEM, UNLESS OTHERWISE SPECIFIED.
 3. ALL ELEVATIONS NOTED ON THIS DRAWING ARE BASED ON ±0.00 LEVEL CORRESPONDING TO ELEVATION +242'.

MATERIAL	CONDITION	LAYOUT	FIRST ANGLE PROJECTION
UNITS: DUAL		WASTE WATER	
SCALE: 1:140			
DATE: 31-03-22			
DRN: JLM			
CHK: ALL			
APP: ALL			
REV. 05	IRI N°	FIN. WT:	SHEET 1 OF 1
RUSSULA Ingeniería y Servicios		042699	

Drawn By: **AES** Date: **10-19-22**
 Checked By: **AHR** Scale: **38" x 48" 1:140**
 Project Number: **BHLP-22172**
C1

LEGEND AT T.2.P
 XXXX XXXX XXXX
 P Bur1
 Temp FC
 Emergency Flow
 Normal Flow



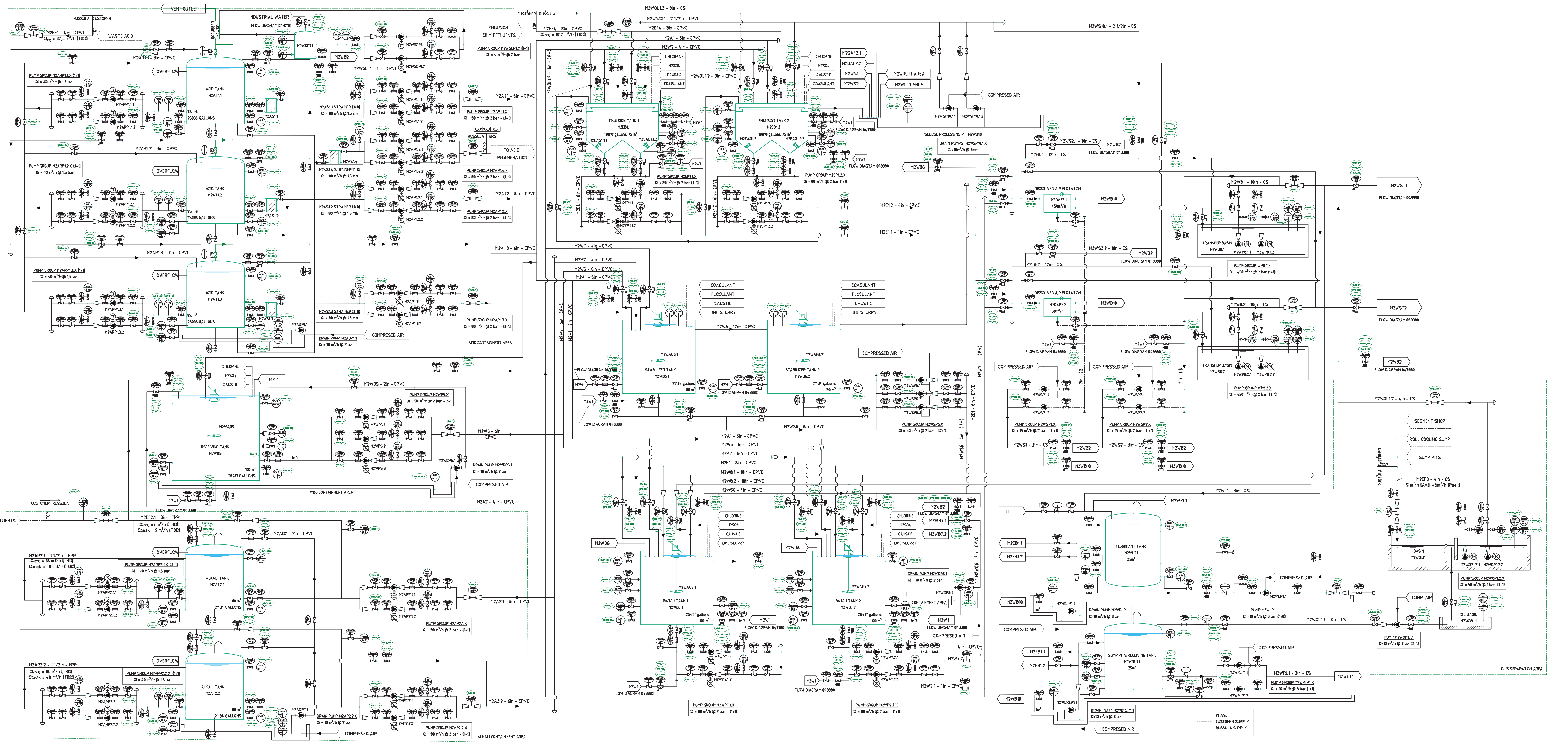
ARIZONA
 REGISTERED
 PROFESSIONAL
 ENGINEER
 No. 1000000000
 ANDREW H. RIFE

EXPLOATORY VENTURES, LLC
 STEEL MANUFACTURING COMPLEX
 P&ID OF WASTEWATER TREATMENT PLANT 1

OSCEOLA

NO.	DATE	REVISION DESCRIPTION
1	10/19/22	ISSUE FOR CONSTRUCTION

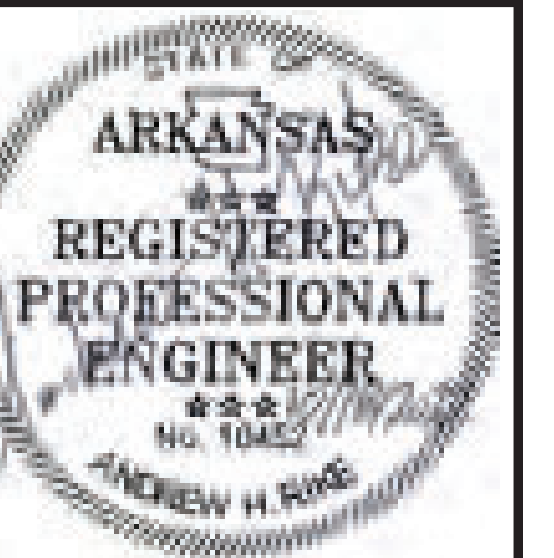
Drawn By: **AES** Date: **10-19-22**
 Scale: **W/S** Scale: **3/8" = 1'-0"**
 Checked By: **AHR** Project Number: **BHLP-22172**
C2



MATERIAL	METRIC	CONDITION
SCALE:	16/06/22	FLOW DIAGRAM
DATE:	MI	INSIDE AREA WASTEWATER SYSTEM
CHK:	ALL	
APP:	ALL	



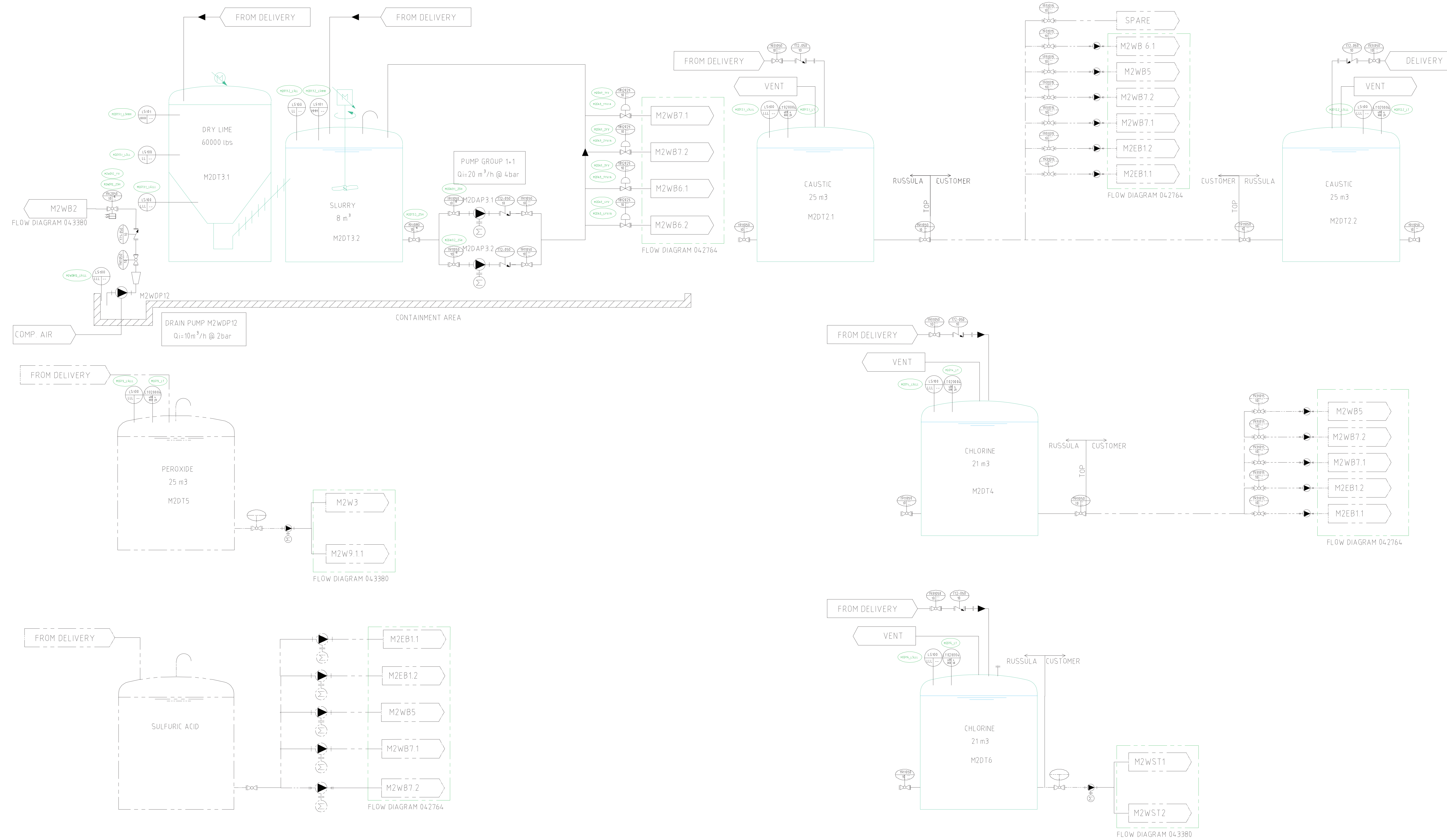
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EXPLO RATORY VENTURES, LLC
STEEL MANUFACTURING COMPLEX
P&ID OF WASTEWATER TREATMENT PLANT 3

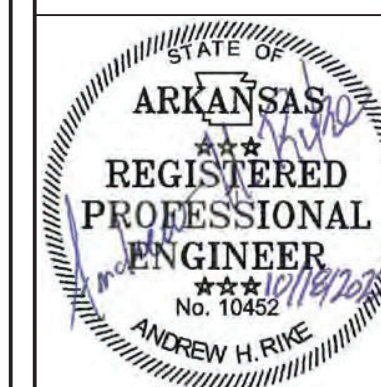
NO	DATE	REVISION DESCRIPTION
XX	XX-XX-XX	

Drawn By:	AES	Date:	10-19-22
Checked By:	AHR	Scale:	9"x12" NONE
Project Number:		BHL P-22172	
C4			



- NOTES:
- SEE DRAWING Nº 04.2767 FOR CODES EXPLANATION
 - BRS MM1 PHASE I WATER FLOW DIAGRAM WASTE WATER CIRCUIT DRAWING Nº 020029
 - BRS MM1 PHASE II WATER FLOW DIAGRAM WASTE WATER CIRCUIT DRAWING Nº 029528
 - FLOW DIAGRAM WASTE WATER SYSTEM BIG RIVER STEEL WORKS MM2 DRAWING Nº 04.2764 & 04.3380
 - LIME & SLURRY SYSTEM DEFINED BY THIRD PARTY SUPPLIER
 - REFER TO SUPPLIER P&ID

MATERIAL	CONDITION	THIRD ANGLE PROJECTION
UNITS:	METRIC	
SCALE:	W/S	
DATA:	28-04-22	REV.
DRN:	MI	IR Nº
CHK:	ALL	D1
APP:	ALL	FIN WT.
R RUSSULA Ingeniería y Servicios		SHEET 1 OF 1
		042768



EXPLORATORY VENTURES, LLC
STEEL MANUFACTURING COMPLEX
EMULSION TANKS M2EB1.1 AND 1.2

OSCEOLA

DATE: XX-XX-XX

REVISION DESCRIPTION

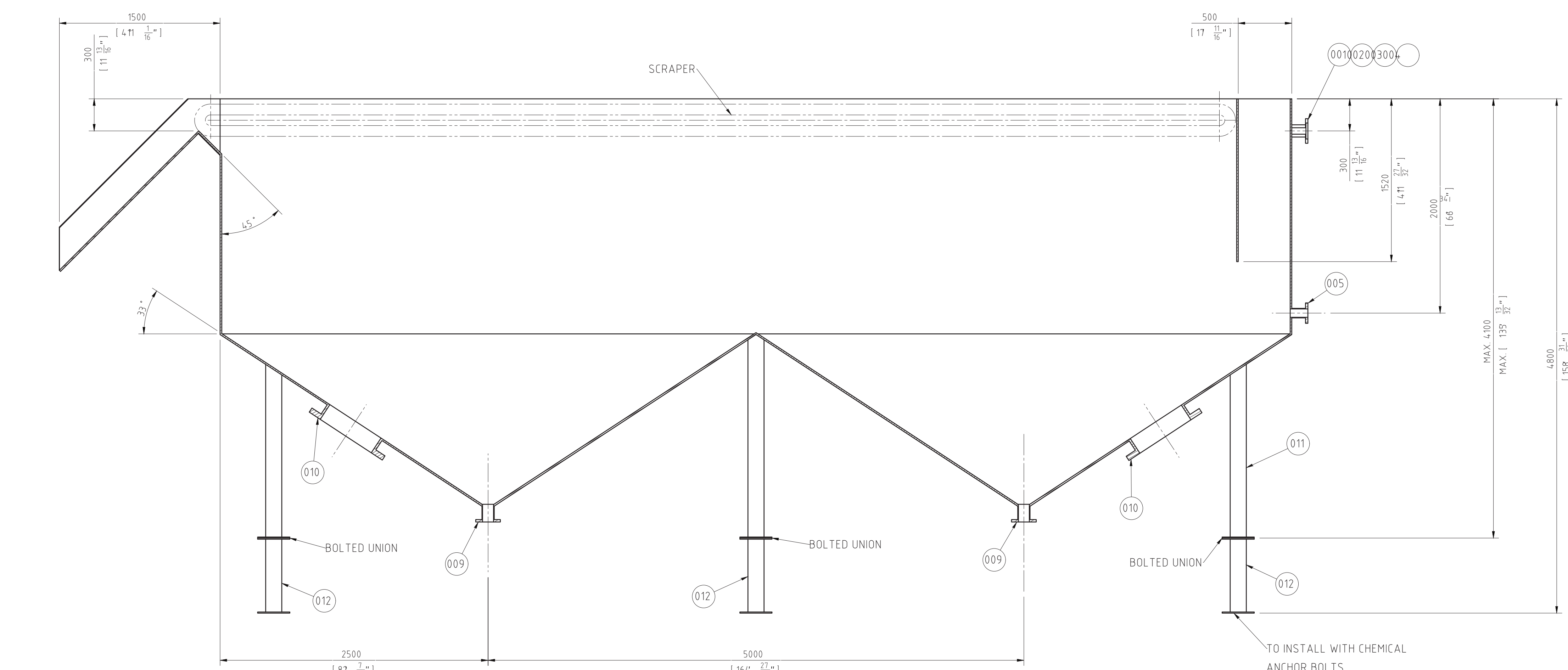
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Checked By: **AHR** Scale: **24"x36" 1:25**

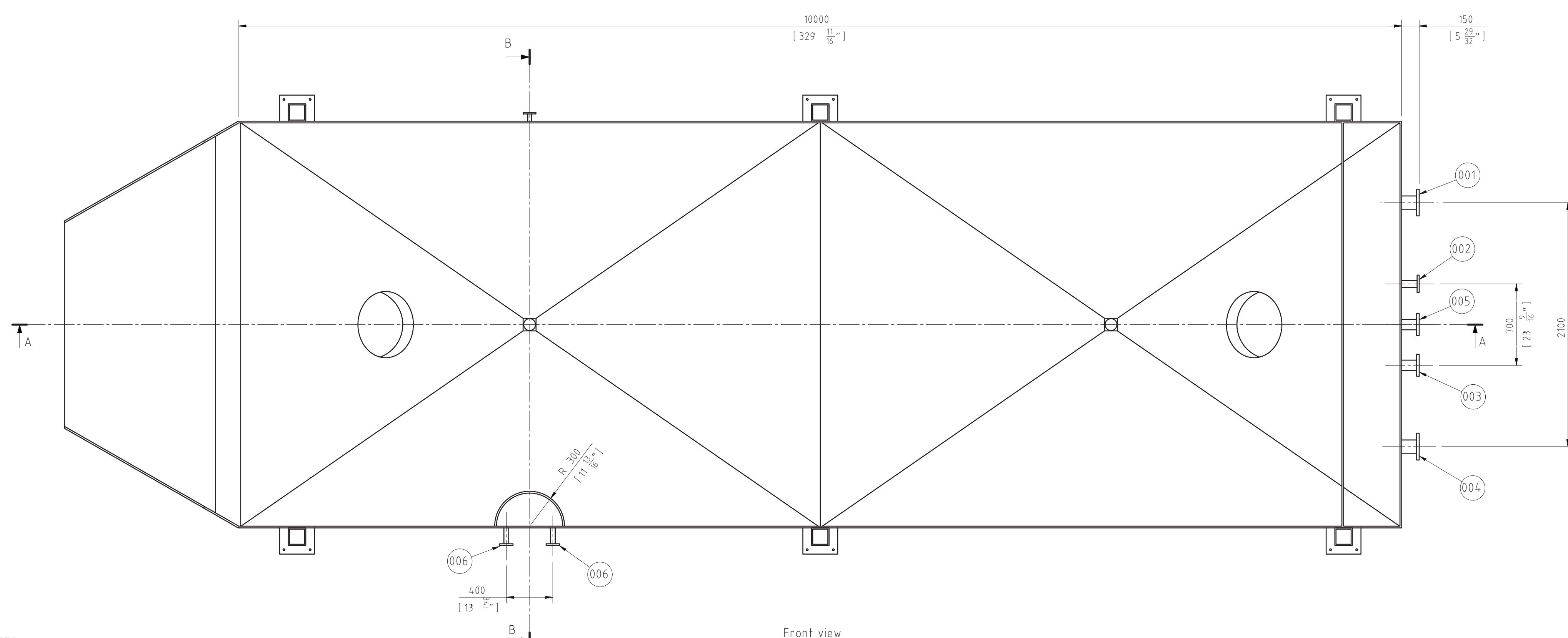
Project Number: **BHLP-22172**

C5

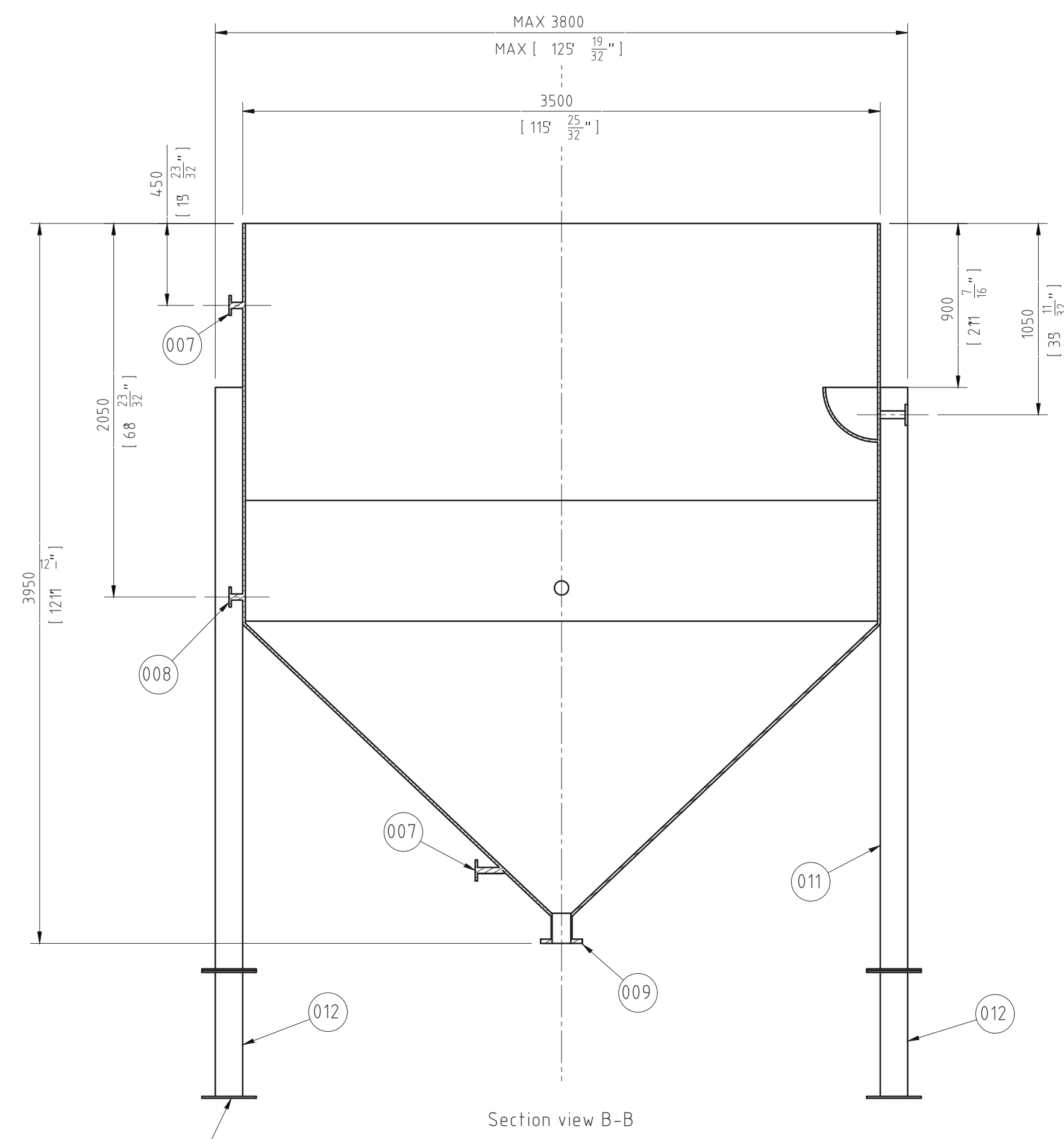
REFERENCE LIST FOR ONE UNIT	
ITEM	DESCRIPTION
001	1 INLET FLANGE 4" 150 lbs
002	1 INLET FLANGE 2" 150 lbs
003	1 INLET FLANGE 3" 150lbs
004	1 INLET FLANGE 4" - 150 lbs
005	1 INLET FLANGE 3" 150 lbs
006	2 INSTRUMENTATION FLANGE 1 1/4" 150 lbs
007	3 INSTRUMENTATION FLANGE 1 1/4" 150 lbs
008	1 INSTRUMENTATION 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



Section view A-A



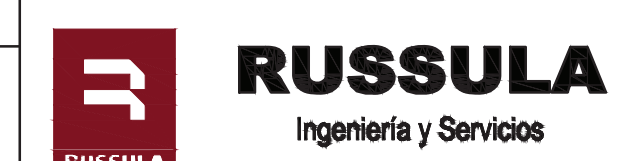
Front view

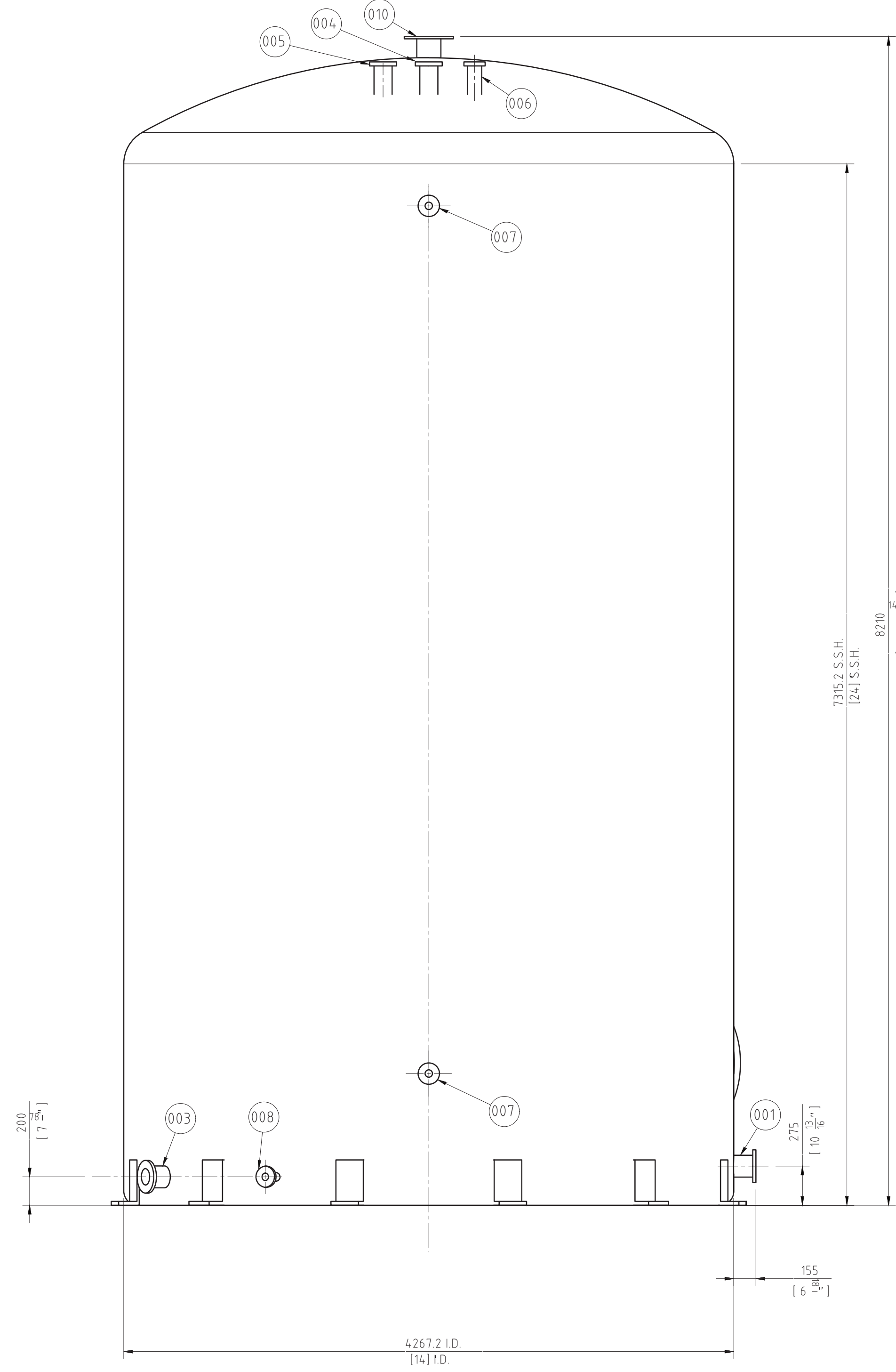
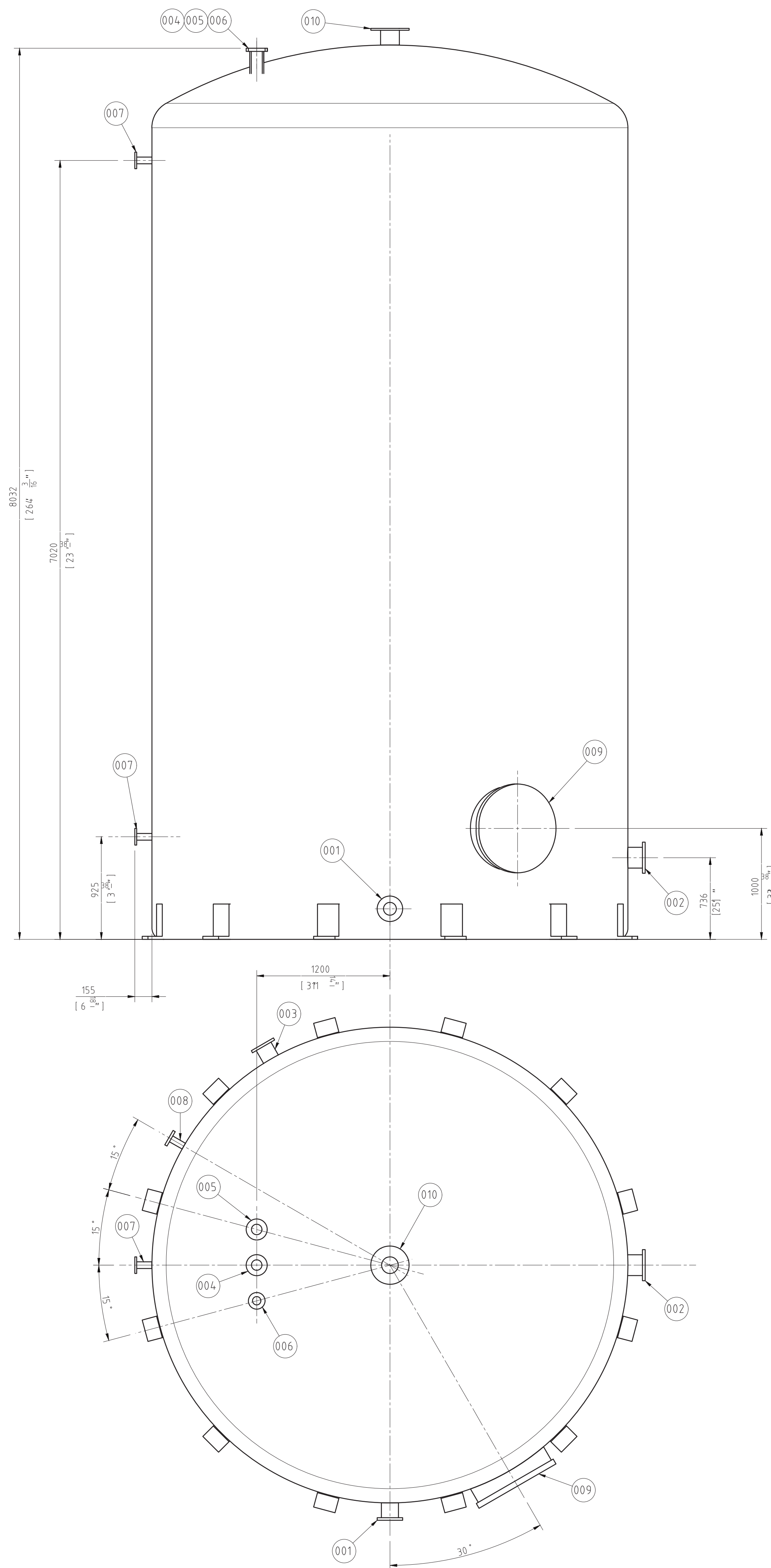


Section view B-B

- 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: 19813 gal (75 m3).
 - pH: 1 - 14
 - TEMPERATURE: 5º - 85ºC
 - THE DIMENSIONS MAY BE MODIFIED TO ADJUST TO A STANDARD SIZE.
 - FLANGES DRILLS WILL BE STRADDLE TO BOTH SIDES OF MAIN AXLE.
 - THE REPRESENTED STRUCTURE IS FOR QUOTATION PURPOSES ONLY. THE SUPPLIER MUST CALCULATE THE NECESSARY STRUCTURE.

MATERIAL	CONDITION	THIRD ANGLE PROJECTION
UNITS: METRIC	EMULSION TANK EB 1.X	
SCALE: 1:25		REV. 00 IRI Nº
DATA: 05-06-19		FIN WT: Kg.
DRN: ERC		SHEET 1 OF 1
CHK: ALL		029973
APP: ALL		





REFERENCE LIST FOR ONE UNIT		
ITEM QTY		DESCRIPTION
001	1	PUMP FLANGE M2ARP1.1X - 4" - 150 lbs
002	1	PUMP FLANGE M2ARP1.1X - 6" - 150 lbs
003	1	DRAIN FLANGE - 4" - 150 lbs
004	1	INLET FLANGE - 4" - 150 lbs
005	1	RECIRCULATION FLANGE - 4" - 150 lbs
006	1	INLET DRAIN FLANGE - 3" - 150 lbs
007	2	LEVEL SWITCH FLANGE - 2" - 150 lbs
008	1	LEVEL TRANSDUCER FLANGE - 2" - 150 lbs
009	1	MANWAY
010	1	SCRUBBER FLANGE - 6" - 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: 25096 gal (95 m³).
 - pH: <1
 - TEMPERATURE: 5^o - 90^oC
 - THE DIMENSIONS MAY BE MODIFIED TO ADJUST TO A STANDARD SIZE.
 - FLANGES DRILLS WILL BE STRADDLE TO BOTH SIDES OF MAIN AXLE.

MATERIAL		CONDITION	
UNITS: DUAL	TANK M2AT1.X		
SCALE: 1:25	THIRD ANGLE PROJECTION		
DATA: 09-05-22	REV.	IRI Nº	
DRN: MI	01		
CHK: ALL	FIN WT:		
APP: ALL	SHEET 1 OF 1		
		043086	

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

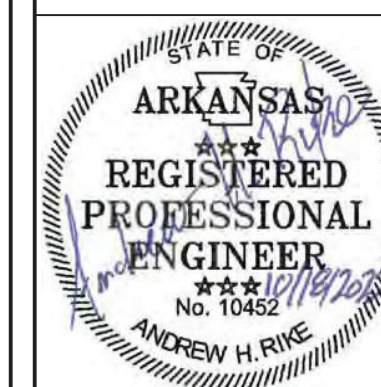
STATE OF ARKANSAS
 REGISTERED PROFESSIONAL ENGINEER
 No. 1062
 ANDREW H. RYKE

OSCEOLA ARKANSAS

EXPLORATORY VENTURES, LLC
 STEEL MANUFACTURING COMPLEX

ACID TANKS M2AT1.1, 1.2, AND 1.3

DATE	XX-XX-XX	NO	XX X
REVISION DESCRIPTION		Drawn By:	Date:
		AES	10-19-22
		Checked By:	Scale:
		AHR	24"x36" 1:25
		Project Number:	
		BHLP-22172	
		C6	



ARKANSAS

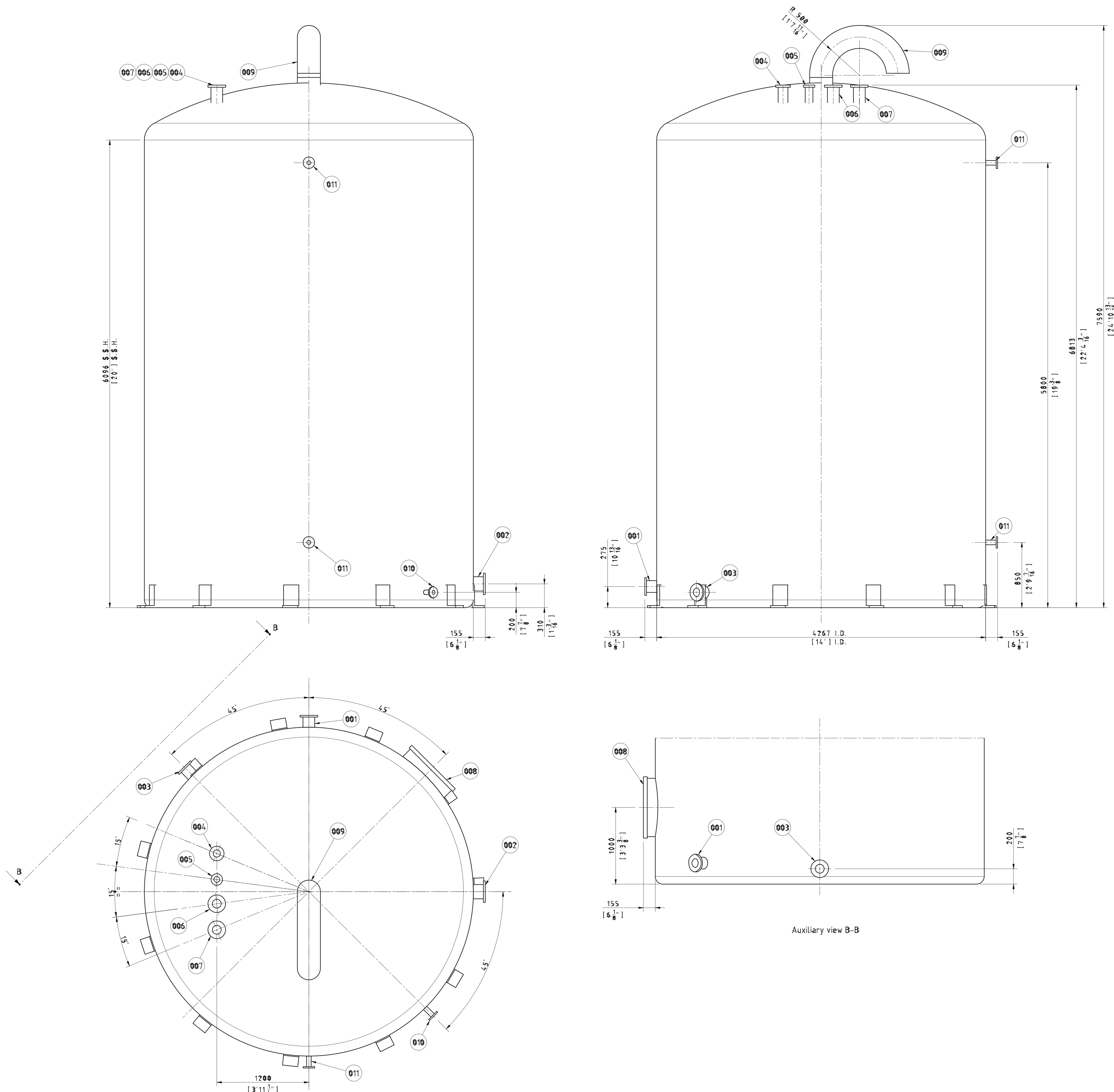
EXPLORATORY VENTURES, LLC
STEEL MANUFACTURING COMPLEX

OSCEOLA

ARKANSAS

ALKALI TANKS M2AT2.1 AND 2.2

REFERENCE LIST FOR ONE UNIT		
ITEM	QTY	DESCRIPTION
001	1	PUMP FLANGE M2ARP2.X - 4" 150 lbs
002	1	PUMP FLANGE M2AP2.X - 6" 150 lbs
003	1	DRAIN FLANGE - 4" 150 lbs
004	1	RECIRCULATION FLANGE - 3" 150 lbs
005	1	INLET DRAIN FLANGE - 2" 150 lbs
006	1	INLET FLANGE SUMP PITS - 4" 150 lbs
007	1	INLET FLANGE - 4" 150 lbs
008	1	SIDE MANWAY
009	1	U-VENT - 12" - 150 lbs
010	1	LEVEL TRANSDUCER FLANGE - 2" - 150 lbs
011	2	LEVEL SWITCH FLANGE - 2" - 150 lbs



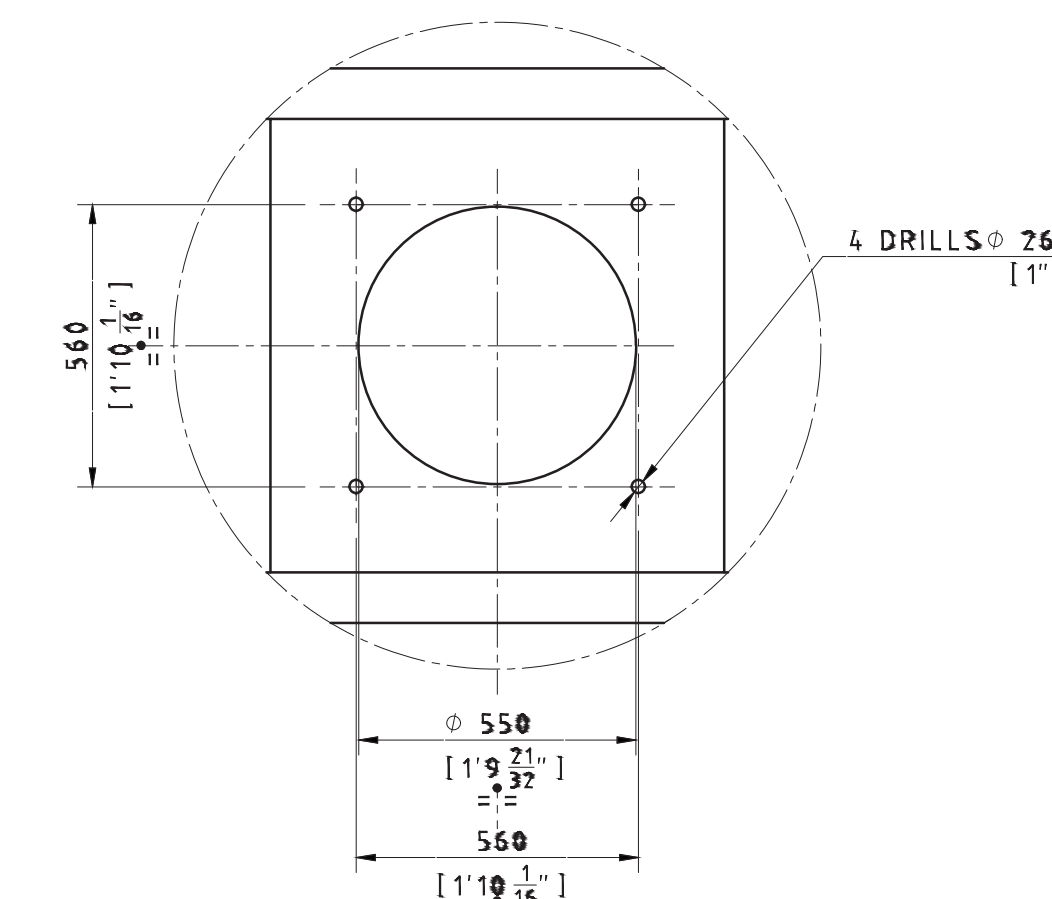
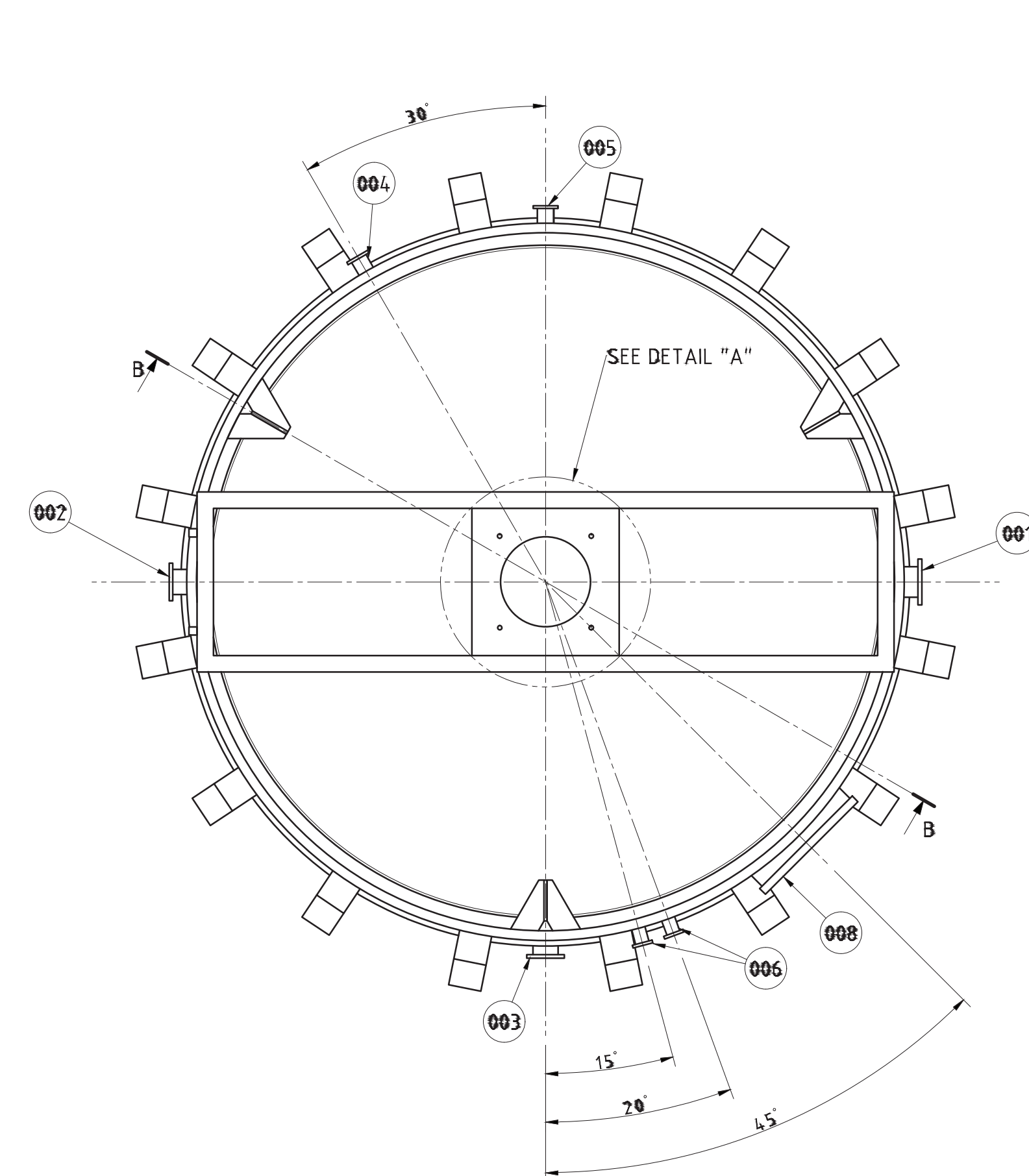
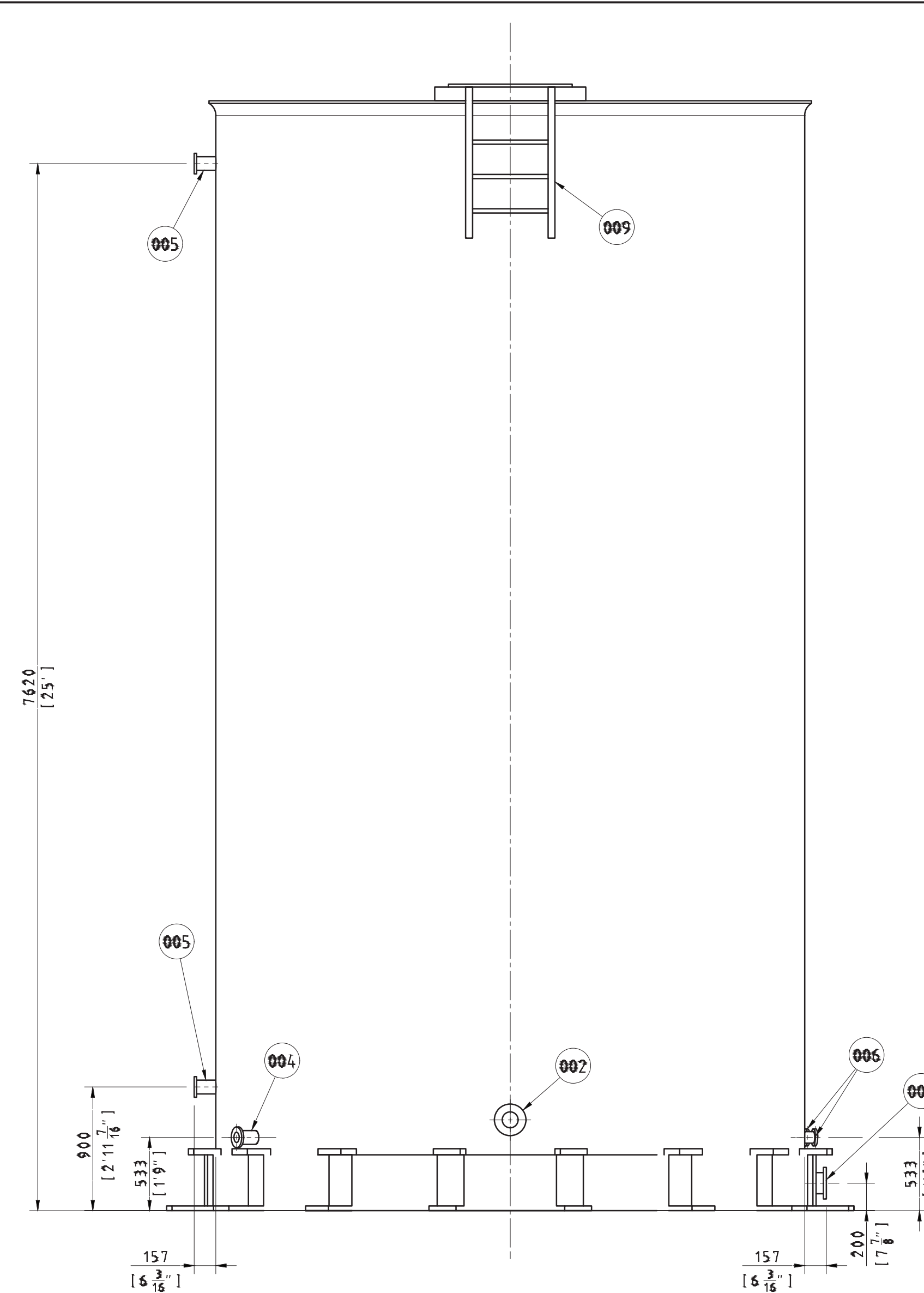
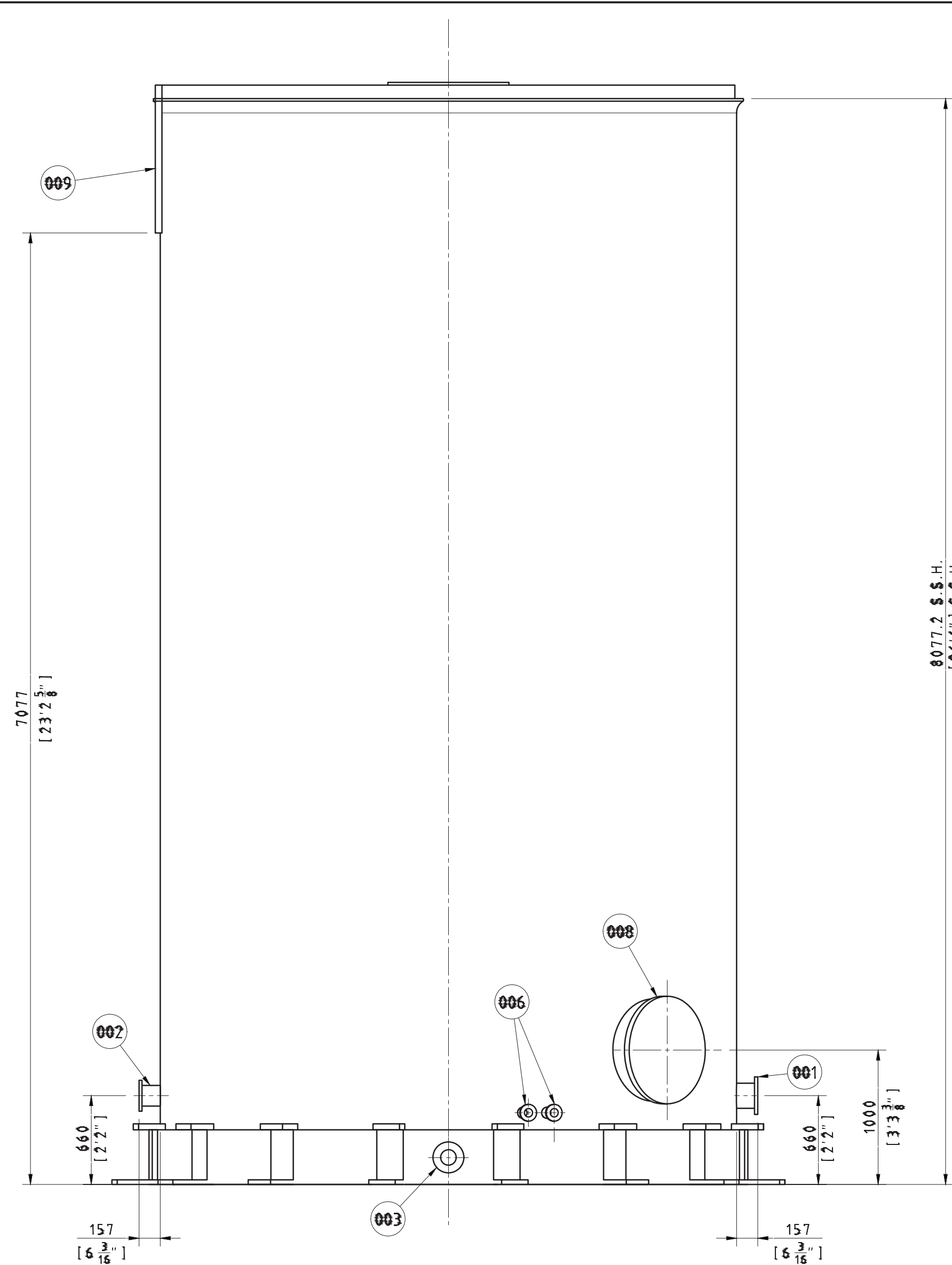
- NOTES:
1. DIMENSIONS APPROXIMATED. ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS AND BETWEEN BRACKETS IN THE IMPERIAL SYSTEM, UNLESS OTHERWISE SPECIFIED.
 2. TANK LOCATION: INDOORS.
 3. NET WORKING CAPACITY: 21134 gal (80 m3).
 4. pH: 1 - 14
 5. TEMPERATURE: 50 - 85°C
 6. THE DIMENSIONS MAY BE MODIFIED TO ADJUST TO A STANDARD SIZE.
 7. FLANGES DRILLS WILL BE STRADDLE TO BOTH SIDES OF MAIN AXLE.

MATERIAL	CONDITION:		TANK M2AT2.X	
UNITS:	DUAL	THIRD ANGLE PROJECTION		
SCALE:	1:25	REV.	IRI Nº	
DATA:	10-05-22	00		
DRN:	MI	FIN WT:	SHEET 1 OF 1	
CHK:	ALL	043087		
APP:	ALL	RUSSULA Ingeniería y Servicios		

NO	REVISION DESCRIPTION	DATE
XX		XX-XX-XX

Drawn By: **AES** Date: **10-19-22**
 Checked By: **AHR** Scale: **24"x36" 1:25**
 Project Number: **BHLP-22172**

C7

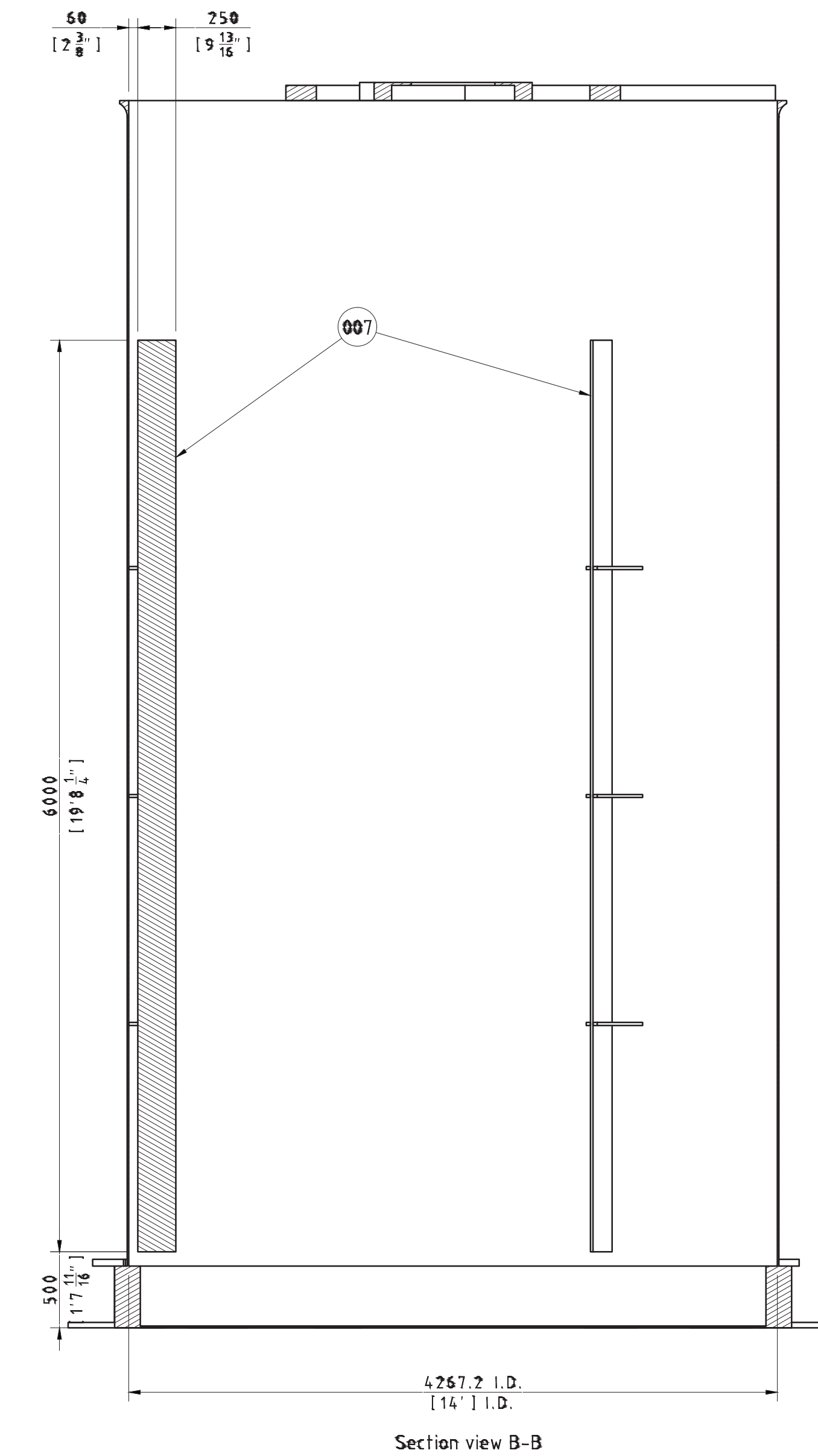


Detail A - MIXER PLATE SUPPORT
Scale: 1:15

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: 264.17 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.
 - FLANGES DRILLS WILL BE STRADDLE TO BOTH SIDES OF MAIN AXLE.
 - SEE BELOW MIXER LOAD DATA: USE AT LEAST THREE TIMES THIS VALUES FOR THE DIMENSIONING OF THE TANK AND AGITATOR SUPPORT.
- RADIAL FORCE: 518 N
 AXIAL FORCE: 1930 N
 TORQUE: 1316 Nm
 TOTAL WEIGHT: 570 kg

REFERENCE LIST FOR ONE UNIT		
ITEM	QTY	DESCRIPTION
001	1	PUMP FLANGE - 6" - 150 lbs
002	1	TANKS CLEANING FLANGE - 4" - 150 lbs
003	1	DRAIN FLANGE - 4" - 150 lbs
004	1	LEVEL TRANSDUCER FLANGE - 2" - 150 lbs
005	2	LEVEL SWITCH FLANGE - 2" - 150 lbs
006	2	pH TRANSDUCER FLANGE - 1-1/4" - 150 lbs
007	3	BAFFLE WITH GUSSETS
008	1	SIDE MANWAY
009	1	PLATFORM AND LADDER



Section view B-B

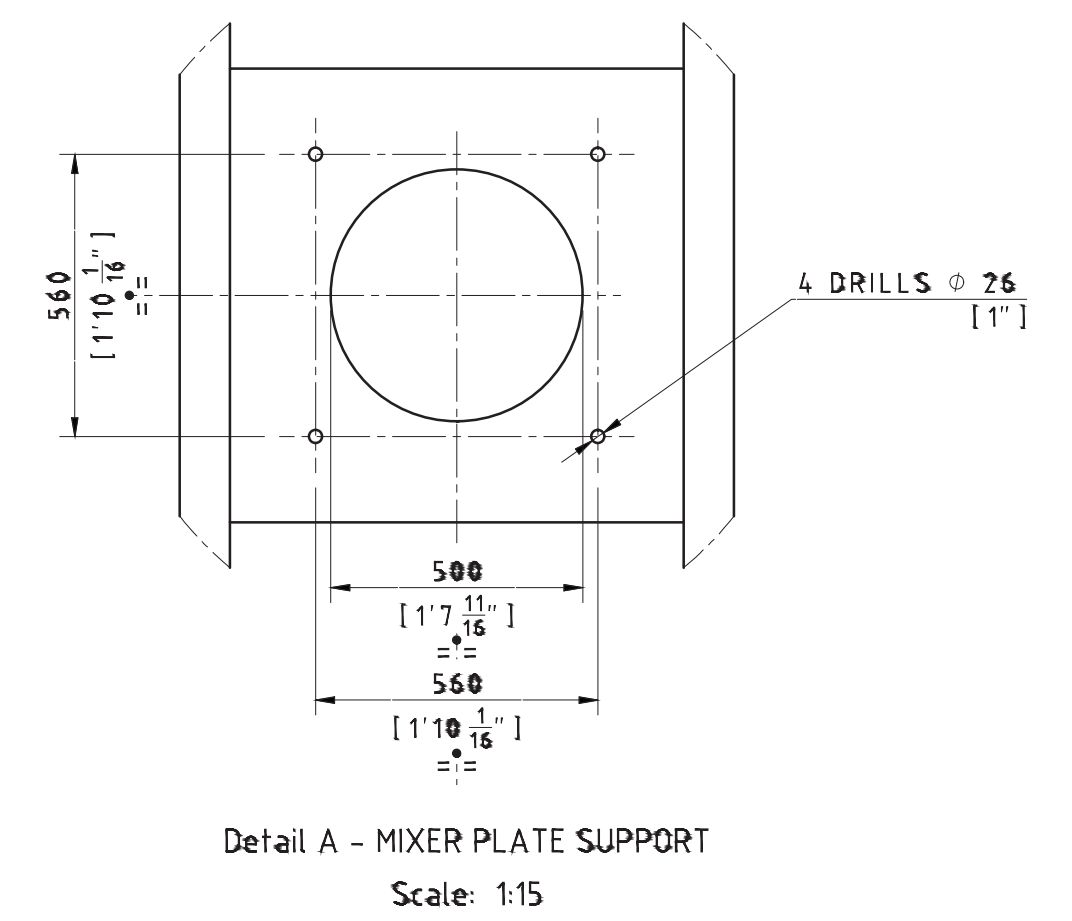
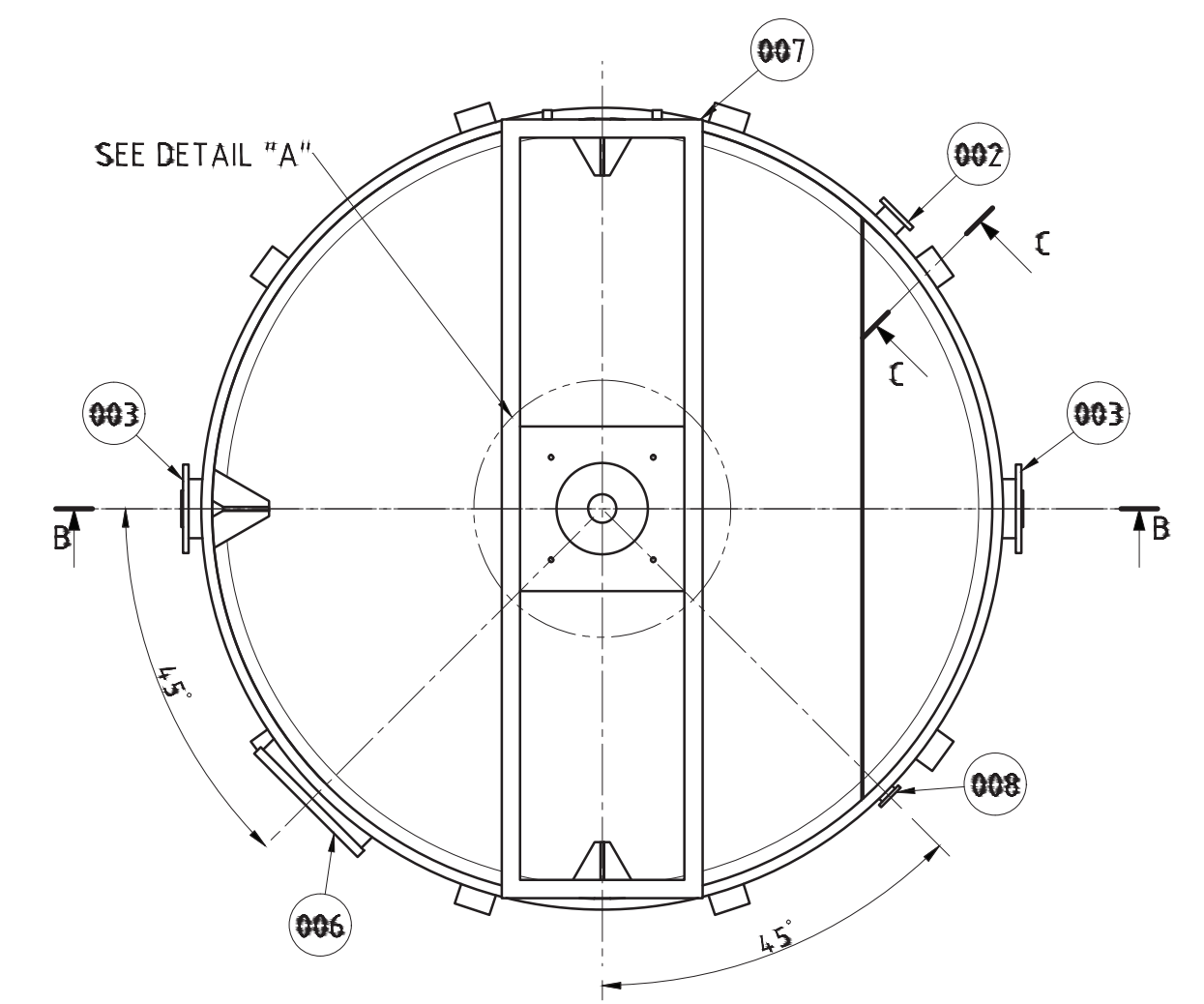
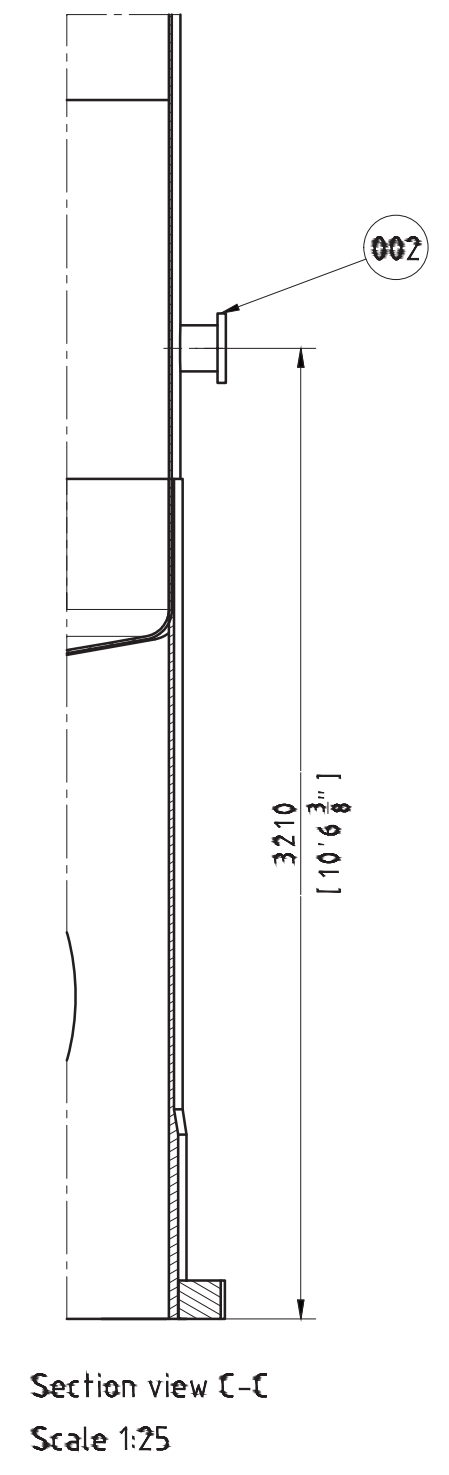
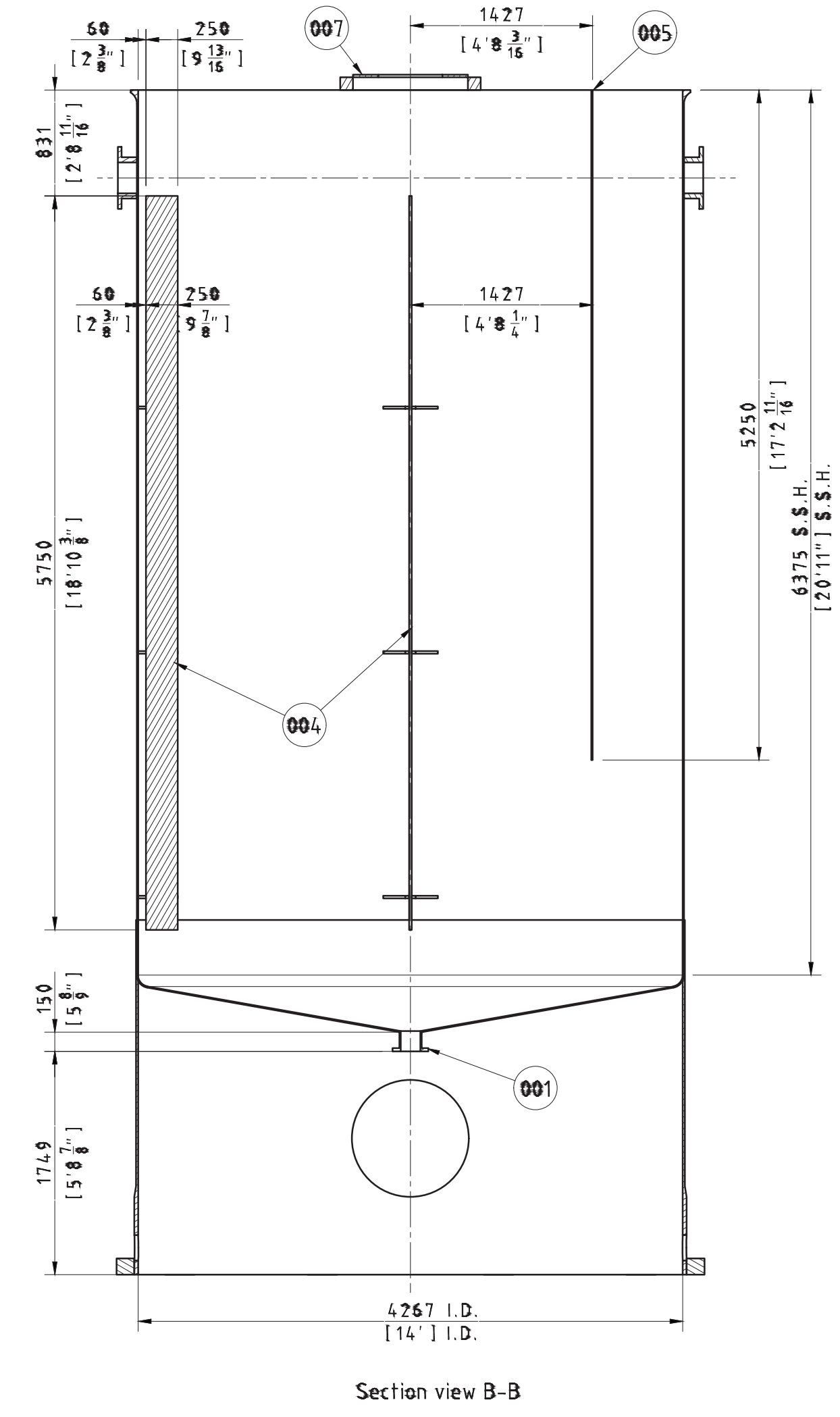
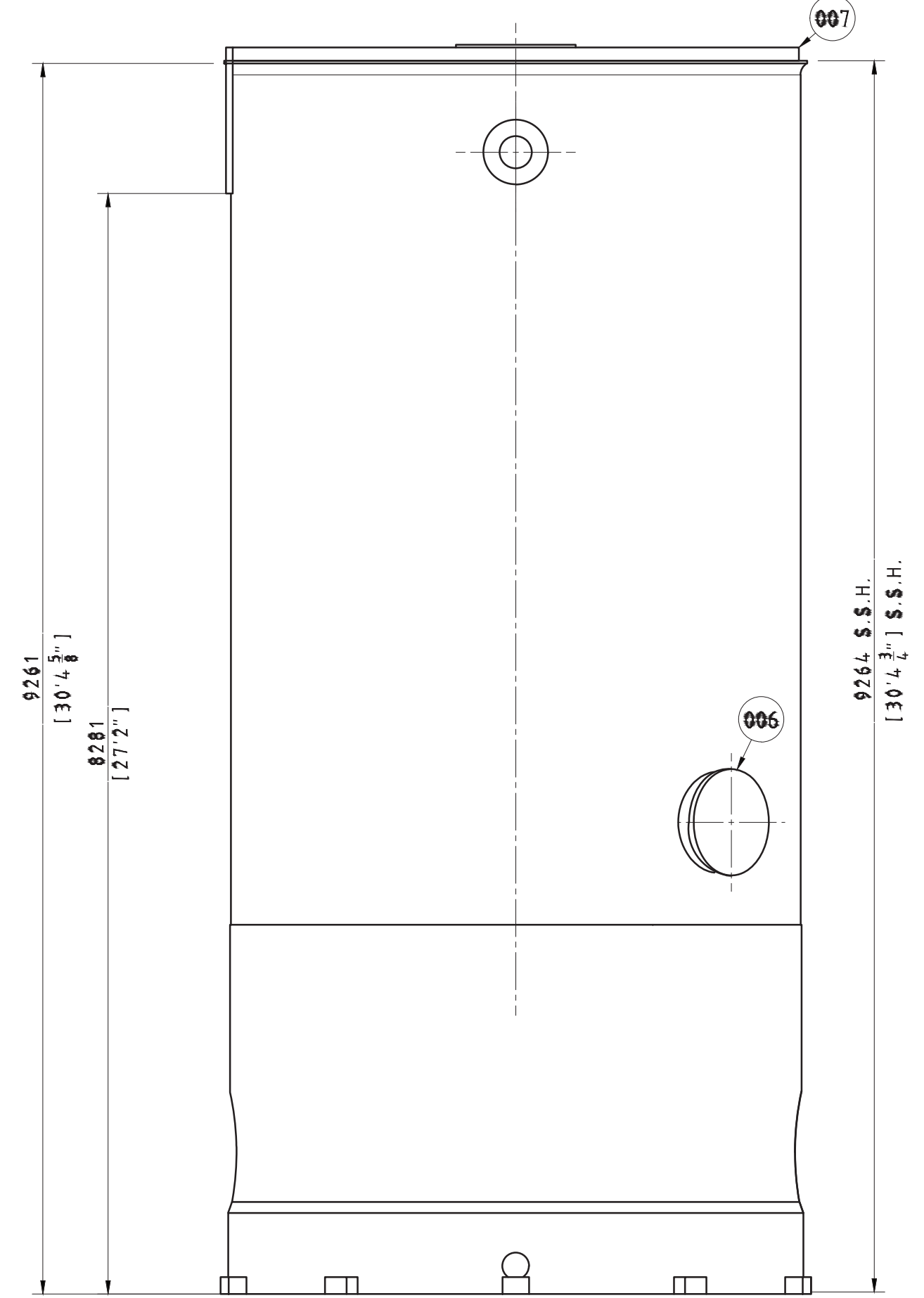
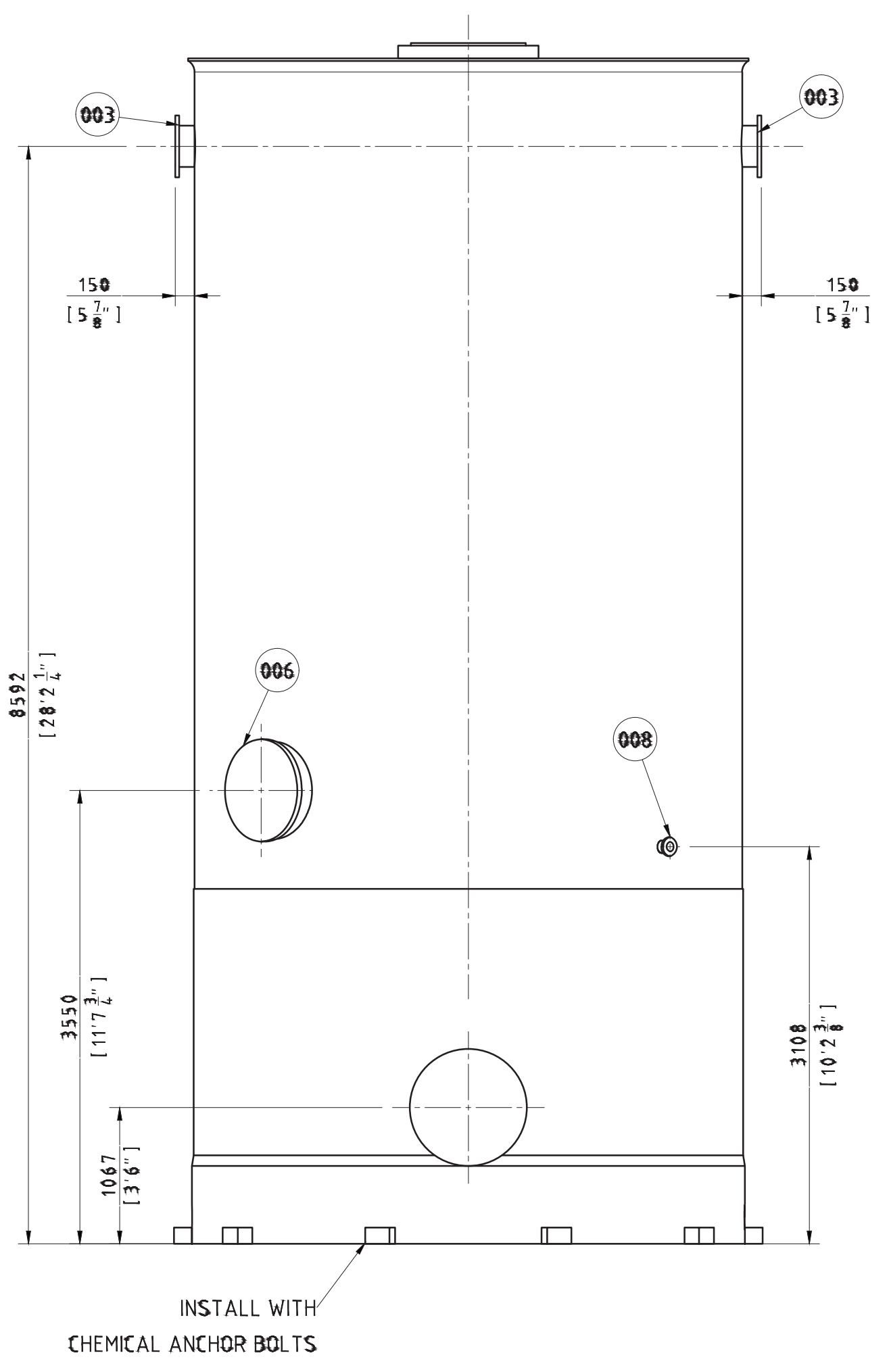
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UNITS:	DUAL	REV.	00	IRI Nº
SCALE:	1:25	CHK:	ALL	APP:
DATA:	10-05-22	FIN WT:	SHEET 1 OF 1	
DRN:	ERC	043088		
APP:	ALL	RUSSULA Ingeniería y Servicios		



DATE	XX-XX-XX	Drawn By:	AES	Date:	10-19-22
REVISION DESCRIPTION		Checked By:	AHR	Scale:	24"x36" 1:30
NO	XX	Project Number:	BHLP-22172		
					C8

NO	REVISION DESCRIPTION
XX	X

REFERENCE LIST FOR ONE UNIT		
ITEM	QTY	DESCRIPTION
001	1	PUMP FLANGE M2WSP6.X - 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	LEVEL SWITCH FLANGE - 2" - 150 lbs

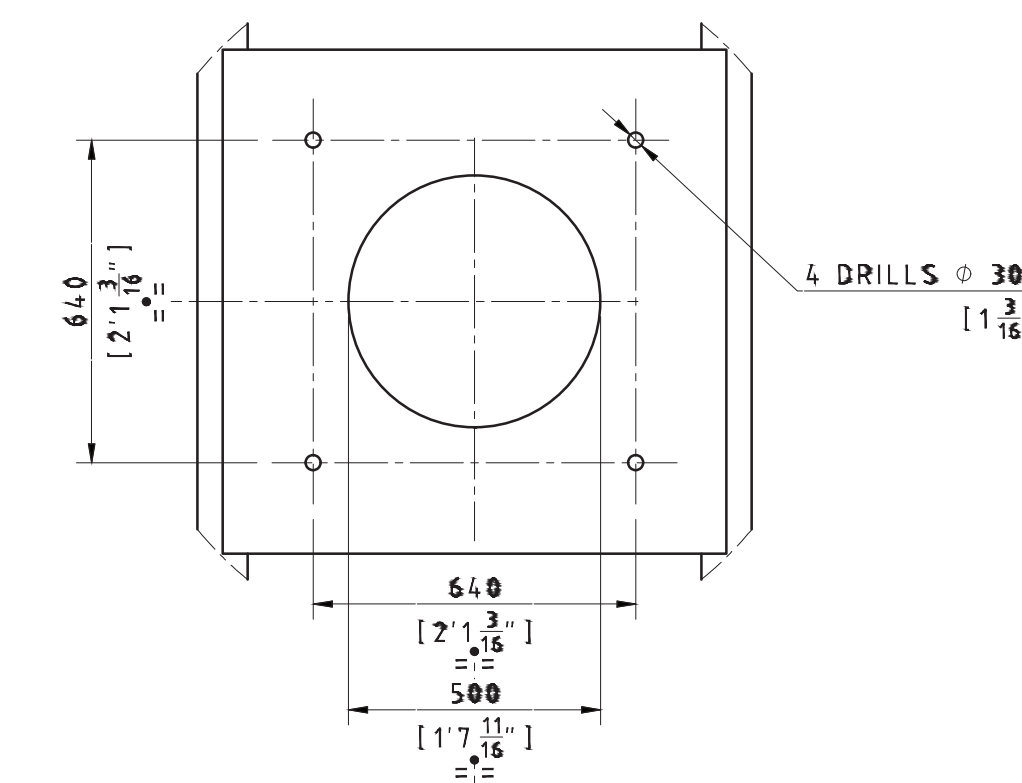


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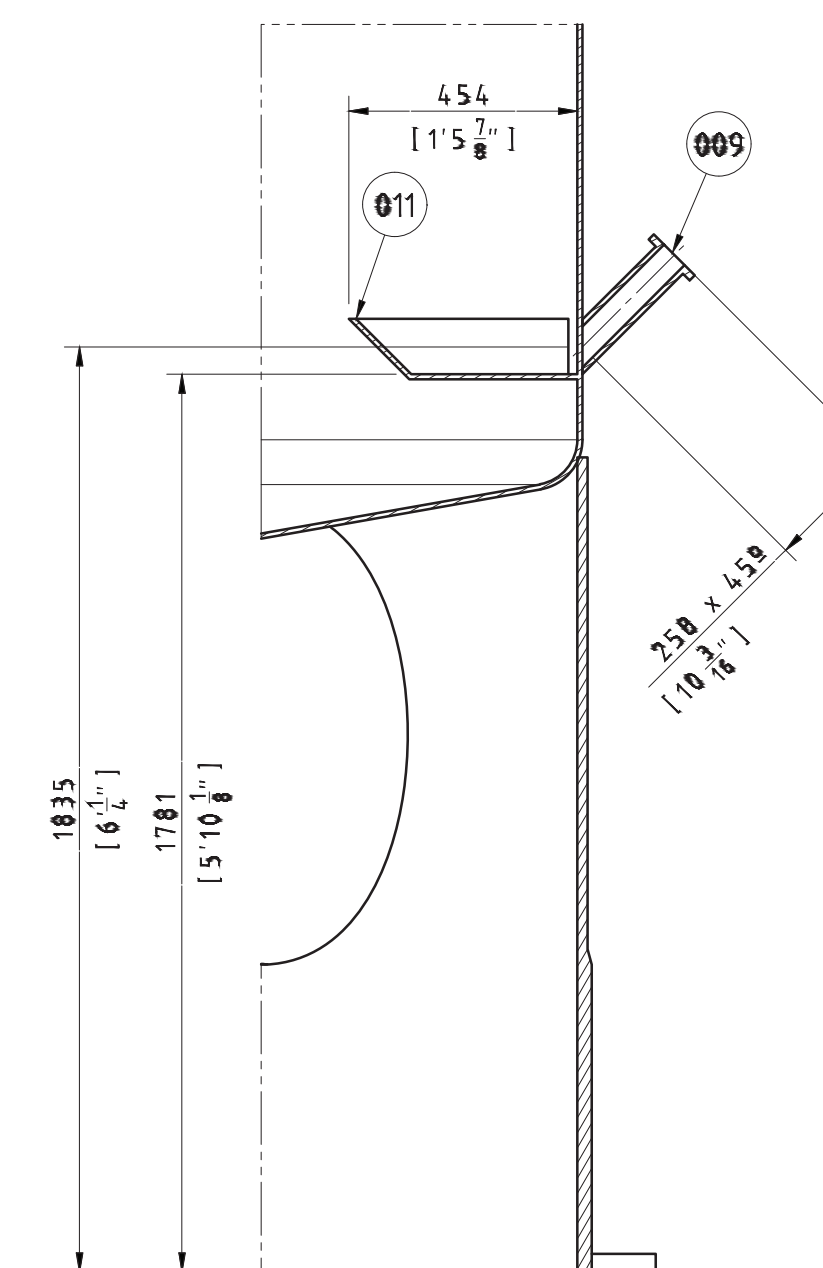
- DIMENSIONS APPROXIMATED. ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS AND BETWEEN BRACKETS IN THE IMPERIAL SYSTEM, UNLESS OTHERWISE SPECIFIED.
- TANK LOCATION: INDOORS.
- NET WORKING CAPACITY: 21134 gal (80 m3).
- pH: 1-14
- TEMPERATURE: 5°C - 85°C
- THE DIMENSIONS MAY BE MODIFIED TO ADJUST TO A STANDARD SIZE.
- LADDER, PLATFORM AND HANDRAIL 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. RADIAL FORCE LOCATED AT THE END OF THE SHAFT. REST OF FORCES IN FIXATION PLATE.
RADIAL FORCE: 935 N
AXIAL FORCE: 3430 N
TORQUE: 2107 Nm
TOTAL WEIGHT: 900 kg

MATERIAL	CONDITION:	TANK WB6.X	THIRD ANGLE PROJECTION
UNITS: DUAL			
SCALE: 1:40			
DATA: 10-05-22			
DRN: MI			
CHK: ALL			
APP: ALL			
FIN WT:		SHEET 1 OF 1	
APP: ALL		043089	

REFERENCE LIST FOR ONE UNIT		
ITEM	QTY	DESCRIPTION
001	1	PUMP FLANGE M2WP7.1X - 6" - 150 lbs
002	4	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	SIDE MANWAY
008	1	PLATFORM AND LADDER
009	2	pH METER FLANGE - 1-1/4" - 150 lbs
010	1	CLEANING FLANGE - 1" - 150 lbs
011	1	pH METER CUP



Detail A - MIXER PLATE SUPPORT
 Scale: 1:15

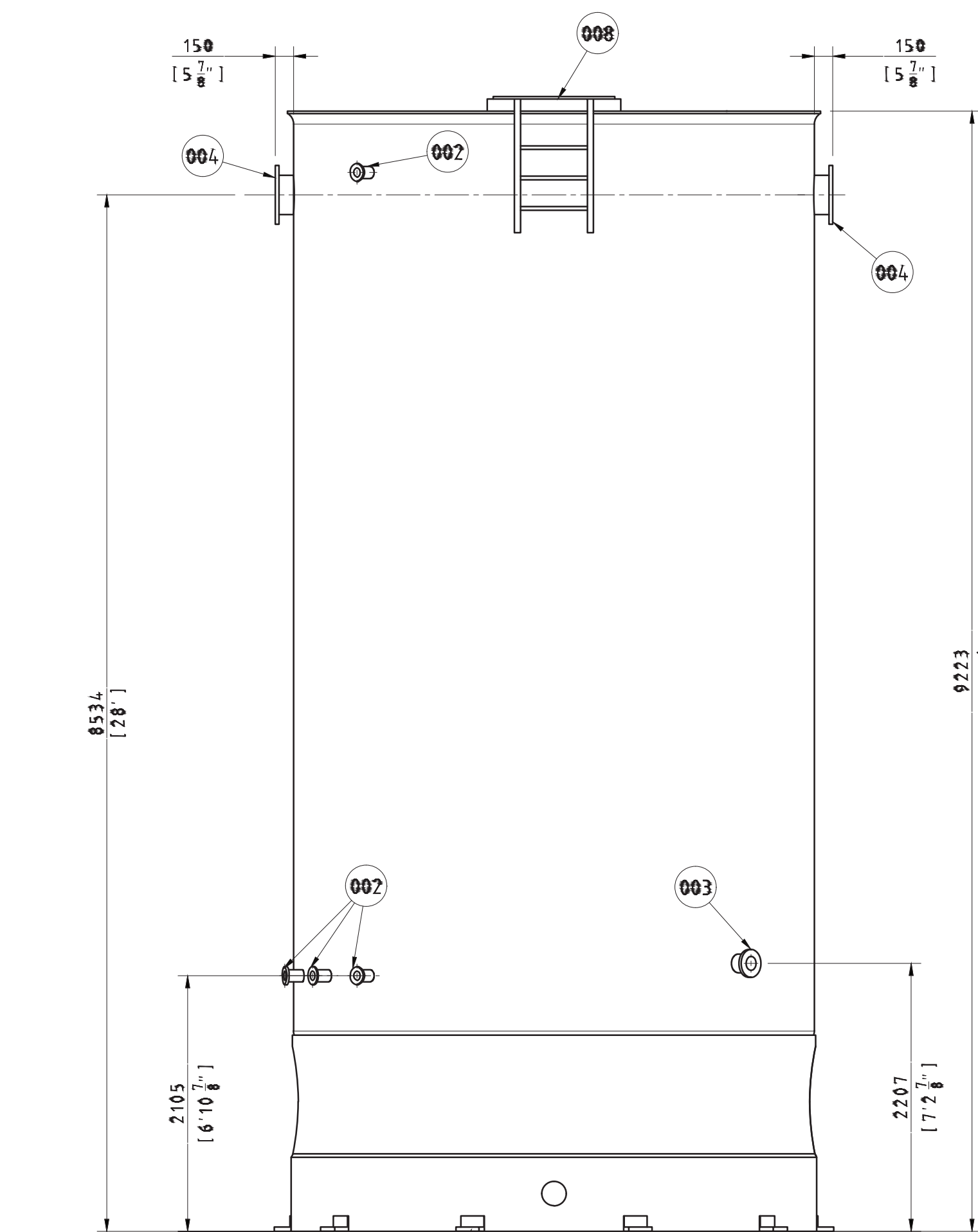


Section view D-D
 Scale: 1:15

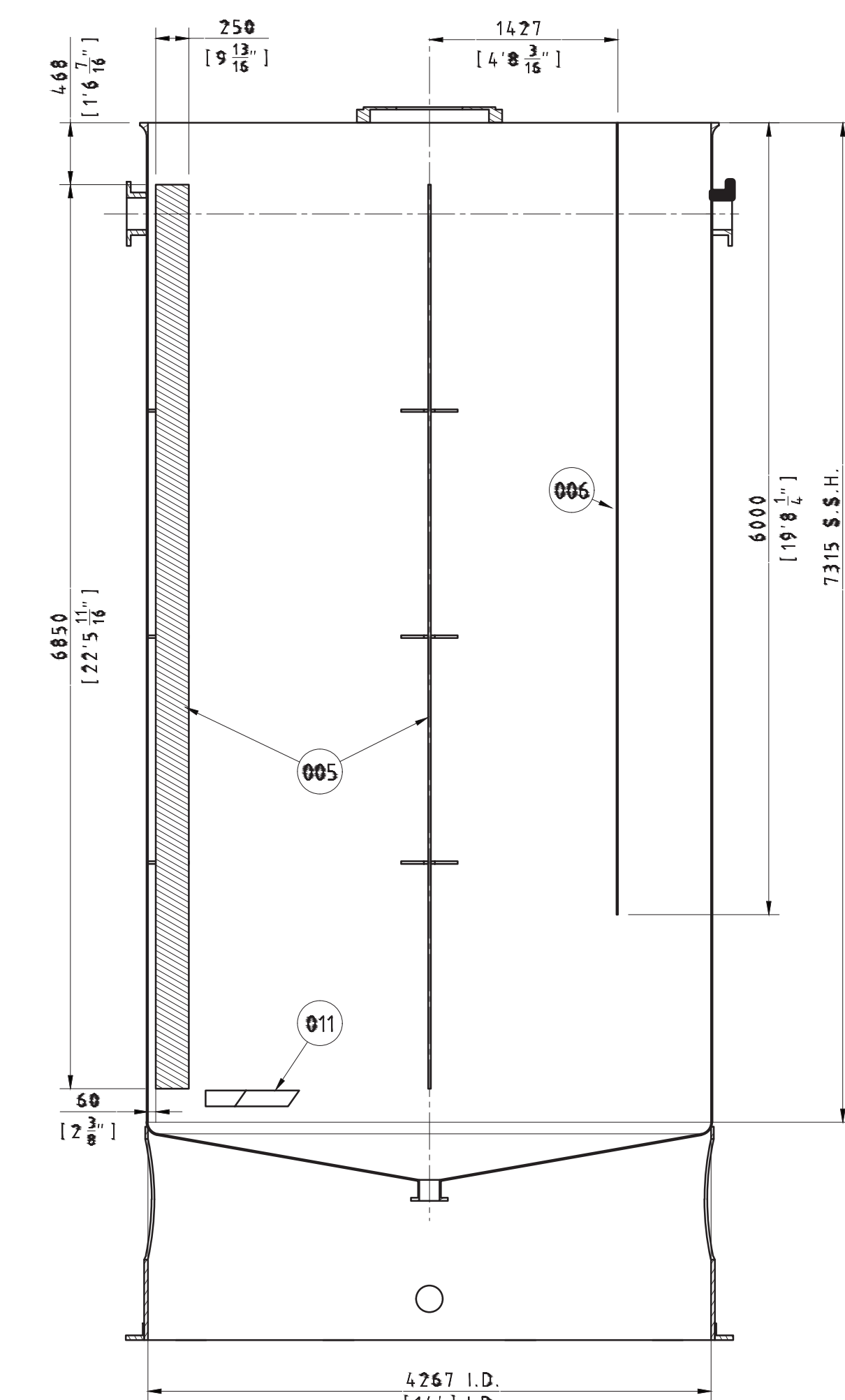
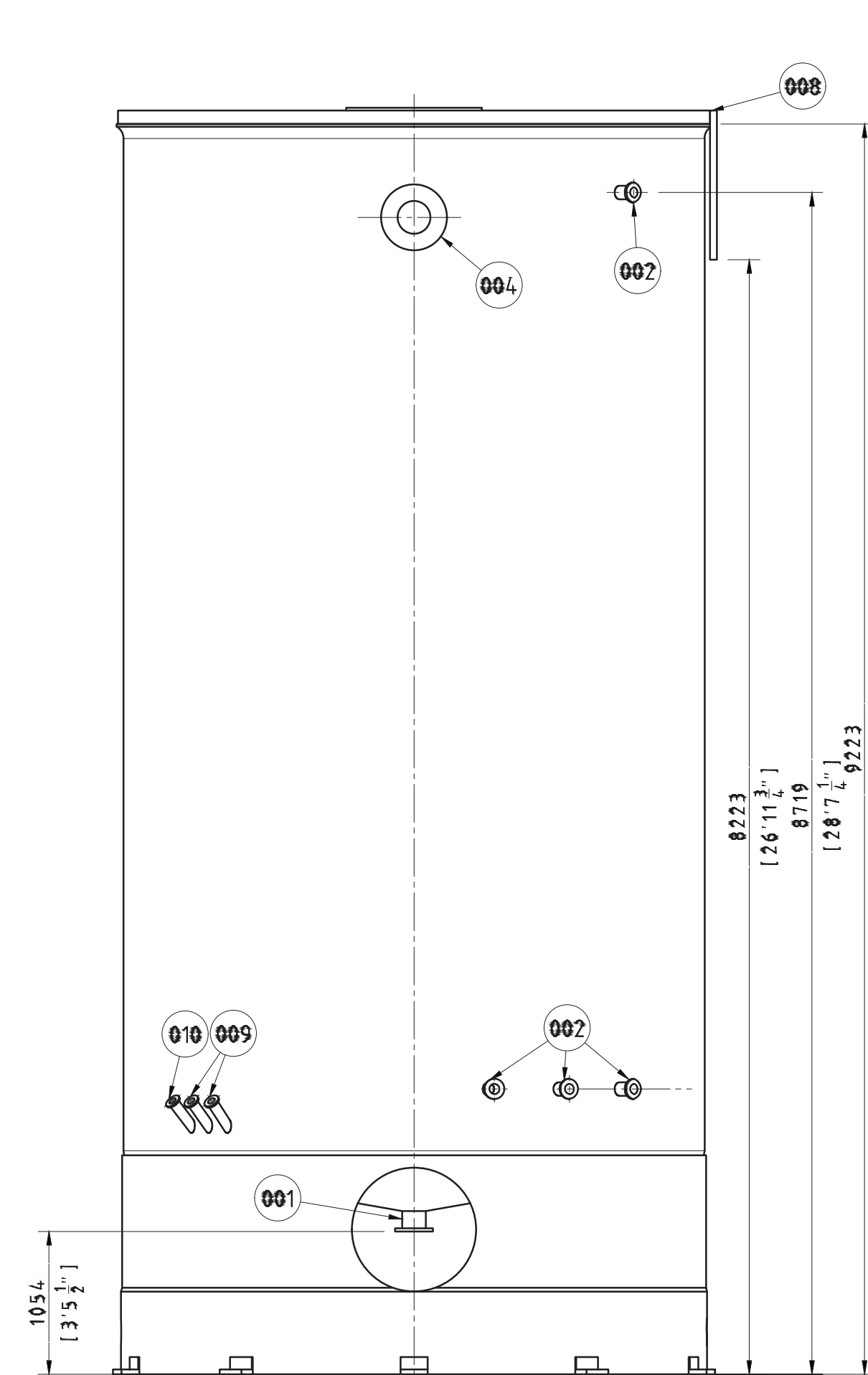
MATERIAL		CONDITION:	
UNITS:	DUAL	TANK M2WB7.X	
SCALE:	1:40	THIRD ANGLE PROJECTION	
DATA:	10-05-22	REV.	IRI Nº
DRN:	MI	00	
CHK:	ALL	FIN WT:	
APP:	ALL	SHEET 1 OF 1	



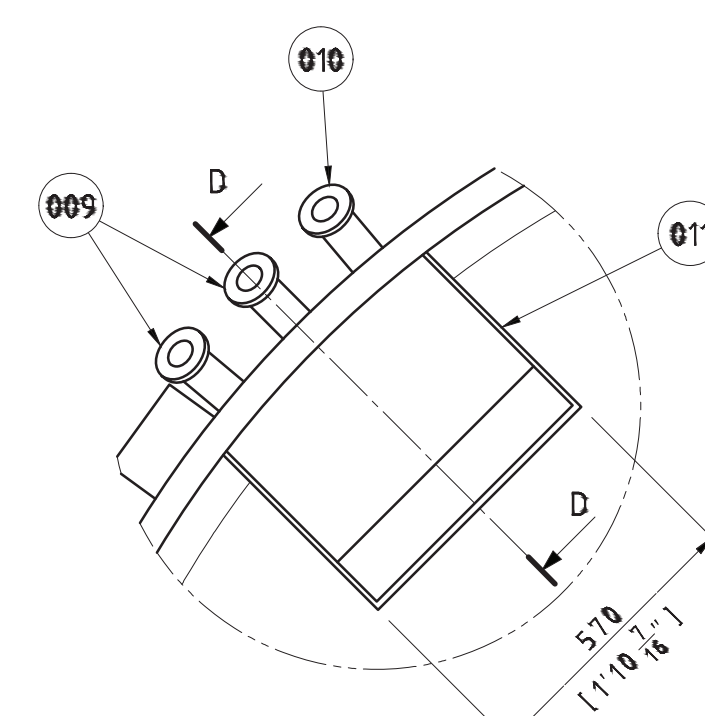
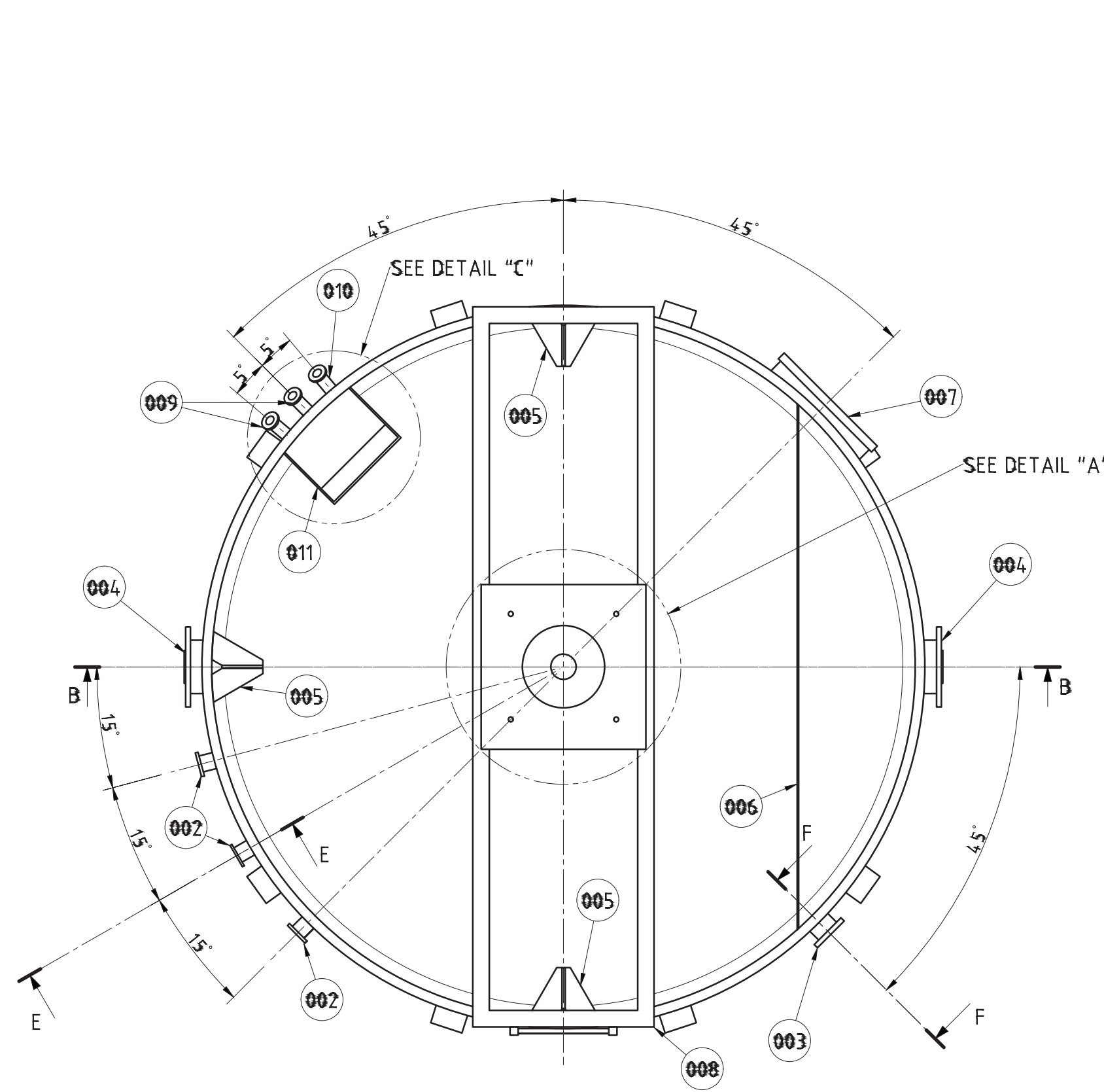
043090



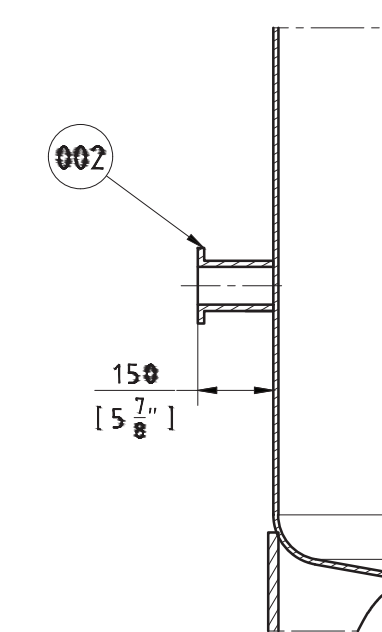
INSTALL WITH
 CHEMICAL ANCHOR BOLTS



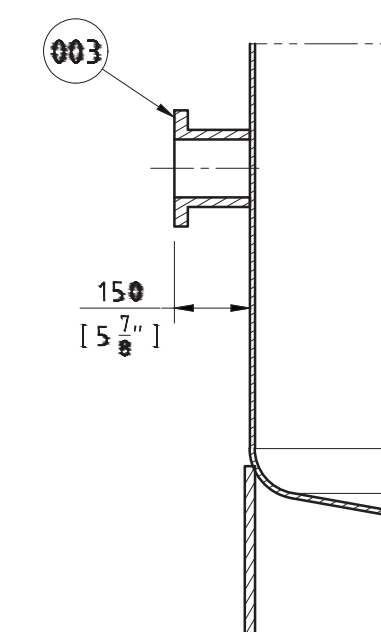
Section view B-B



Detail C
 Scale: 1:15



Section view E-E
 Scale: 1:15



Section view F-F
 Scale: 1:15

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: 5º - 85ºC
- 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. RADIAL FORCE LOCATED AT THE END OF THE SHAFT. REST OF FORCES IN FIXATION PLATE.

RADIAL FORCE: 1303 N
 AXIAL FORCE: 4740 N
 TORQUE: 3100 Nm
 TOTAL WEIGHT: 1250 kg

NO	DATE	REVISION DESCRIPTION
XX	XX-XX-XX	

Drawn By: **AES** Date: **10-19-22**
 Checked By: **AHR** Scale: **24"x36" 1:40**

Project Number:
BHLP-22172

C10



ARKANSAS

EXPLORATORY VENTURES, LLC
 STEEL MANUFACTURING COMPLEX

DAF UNITS M2DAF2.1 AND 2.2

DATE
 X-XX-XX

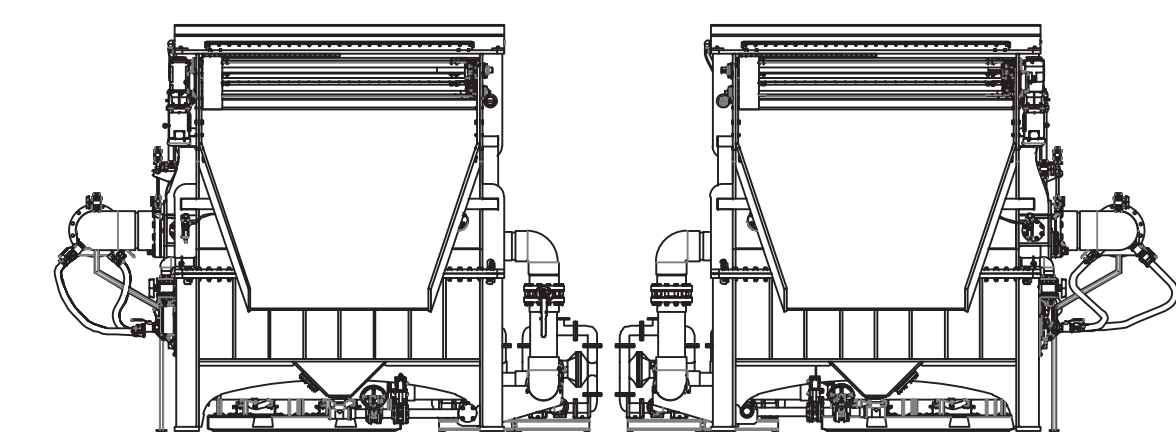
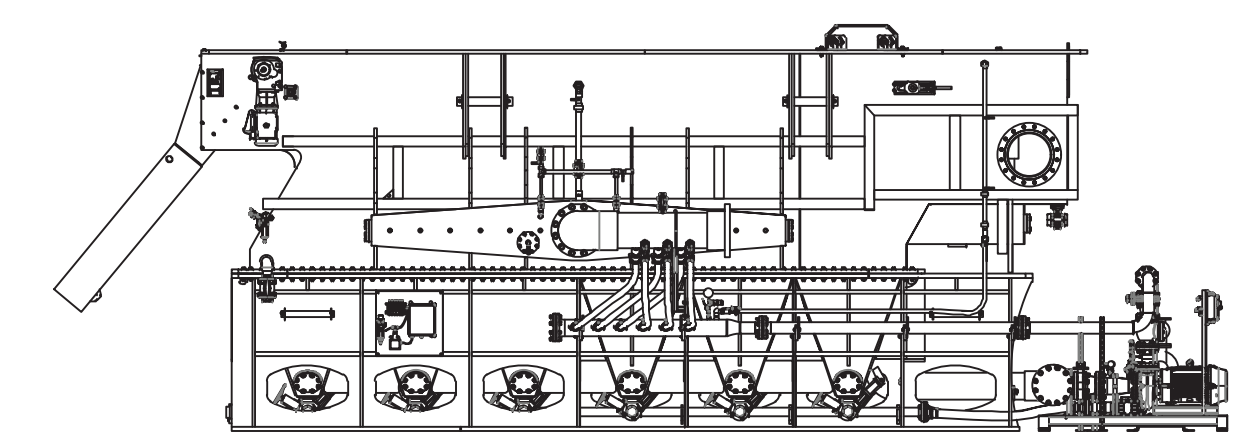
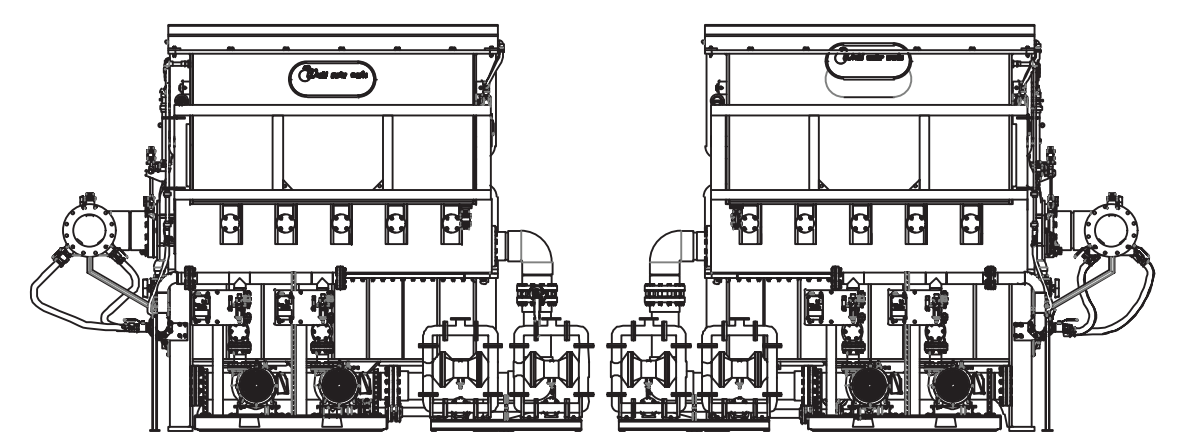
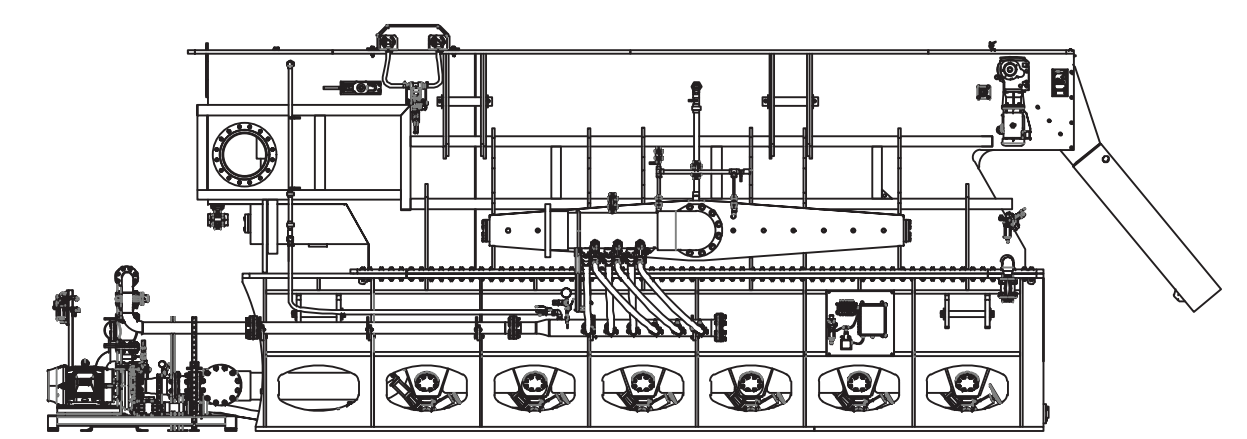
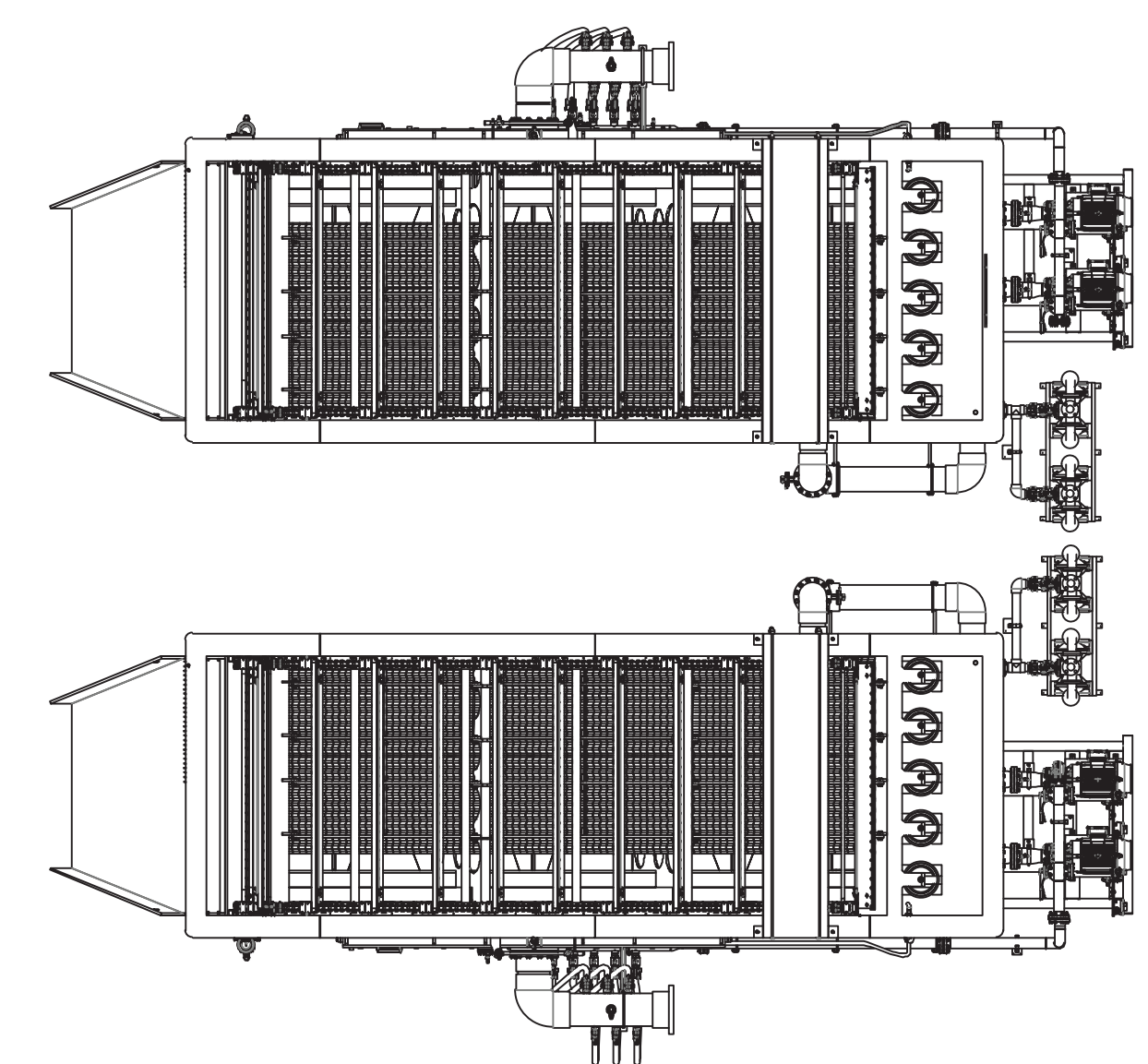
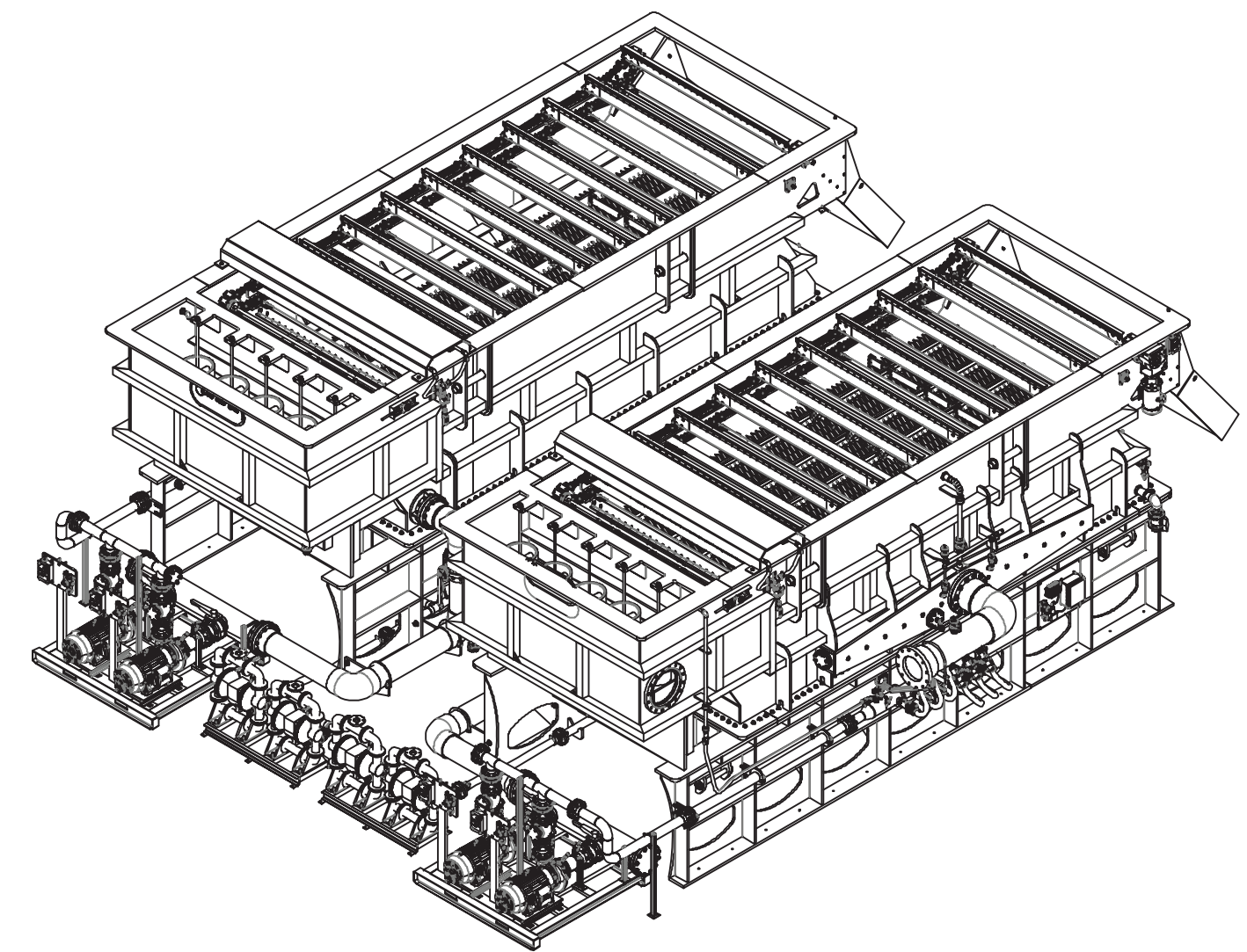
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Drawn By: **AES** Date: **10-19-22**
 Checked By: **AHR** Scale: **24"x36" NONE**

Project Number:
BHLP-22172

C11

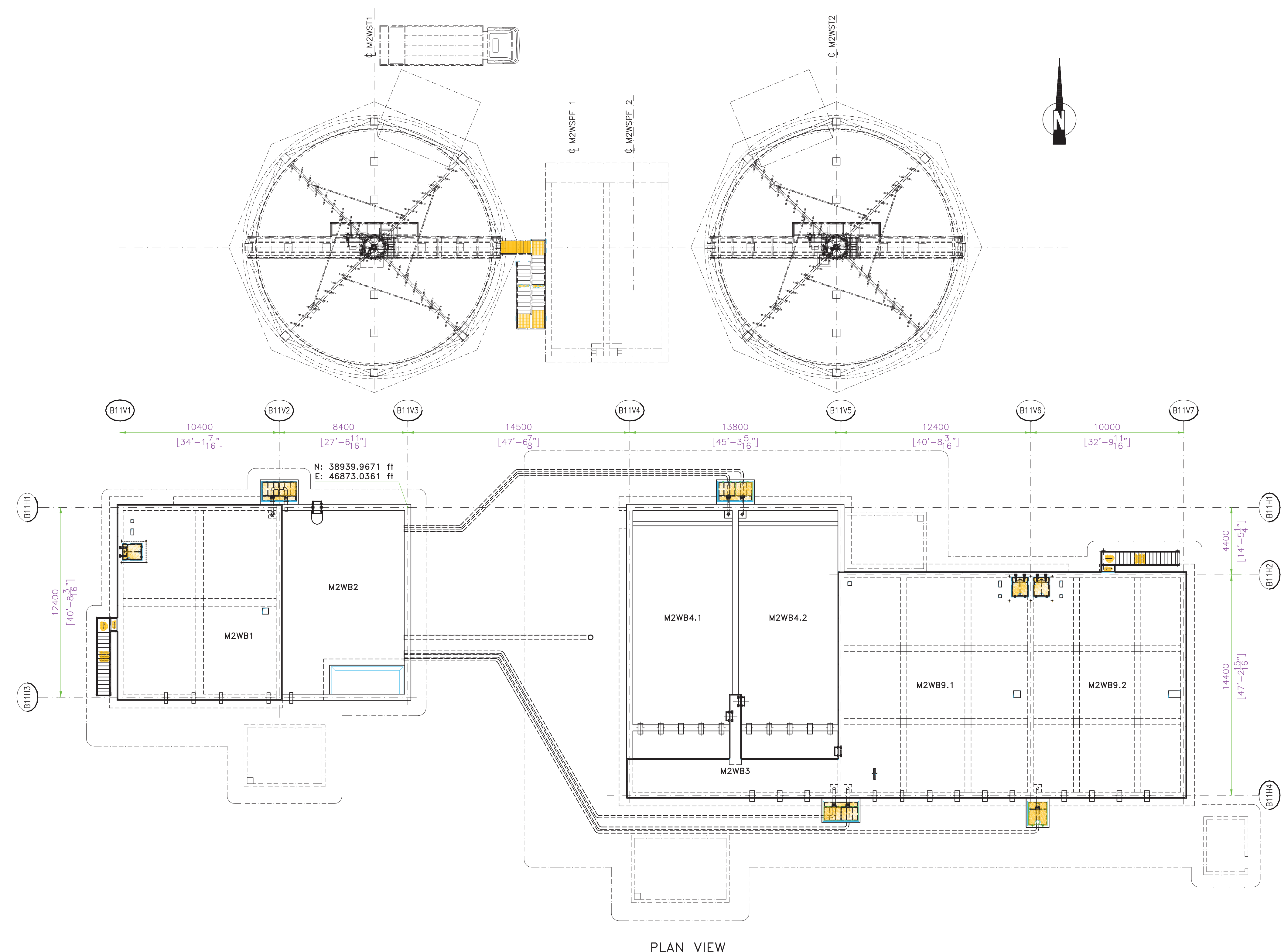




ARKANSAS

EXPLORATORY VENTURES, LLC
STEEL MANUFACTURING COMPLEX
COLLECTION BASINS

OSCEOLA



PLAN VIEW

- 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 242'.
 3. NORTH AND EAST COORDINATES NOTED ON THIS DRAWING ARE PLAN COORDINATES AND ARE EXPRESSED IN FEET.
 4. THE NORTH DIRECTION NOTED ON THIS DRAWING IS THE NORTH OF THE PROJECT.
 5. CHEMICAL ANCHOR BOLTS SHALL BE INSTALLED BY MECHANICAL CONTRACTOR.
 6. GATHERING SLOPES SHALL NOT DECREASE THE NOMINAL DIMENSIONS OF THE CIVIL WORK.
 7. CONCRETE FOR BASIN CONSTRUCTIONS SHALL BE MIXED WITH WATERPROOFING ADMIXTURES.
 8. USE AN APPROPRIATE WALL ANCHOR FITTING EMBEDDED INTO THE WALL WHERE CPVC/HDPE PIPES ENTER THE BASIN. ALTERNATIVELY, COVER PIPE WALL EMBEDDINGS WITH STICK WATERSTOP JOINT, OR SIMILAR, AVOIDING WATER SEEPAGE.
 9. STRUCTURAL CONCRETE SHALL COMPLY WITH RUSSULA PS22_01642_CTS_001: CAST-IN-PLACE STRUCTURES.
 10. EQUIPMENT AND STRUCTURES SHALL BE GROUTED AS INDICATED IN PS22_01642_CTS_002: GROUTING OF EQUIPMENT AND BASEPLATES.
 11. EXCAVATION AND BACKFILL SHALL BE CARRIED OUT AS INDICATED IN PS22_01642_CTS_003: EXCAVATION AND BACKFILL.
 12. CAST-IN ELEMENTS SHALL COMPLY WITH PS22_01642_CTS_004: EMBEDDED ELEMENTS IN CONCRETE.
 13. CONTACT SURFACE BETWEEN CONCRETE POURING STAGES MUST BE ROUGH, AND IT MUST BE CLEANED AND PRESOAKED BEFORE POURING THE NEXT STAGE. SURFACE MUST BE DAMP BUT NOT DRENCHED.
 14. CONCRETE POURING STAGES WILL BE DEFINED BY THE CONTRACTOR IN ORDER TO MINIMIZE SLAB AND WALL RETRACTION WHEN CURING.

SUPPLEMENTARY DRAWINGS:
043290 - CIVIL WORKS REINFORCING STEEL
043291 - CIVIL WORKS SIDEWALKS
042714 - ELECTRICAL CONDUITS
EL000406 - GROUND SYSTEM

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

MATERIAL	CONDITION:	FIRST ANGLE PROJECTION
UNITS: DUAL	CIVIL WORKS FORMS	
SCALE: 1:150	WASTE WATER BASINS	REV. IRI N°
DATA: 14-09-22		A
DRN: JTM		FIN WT:
CHK: JLM		SHEET 1 OF 7
APP: ALL		

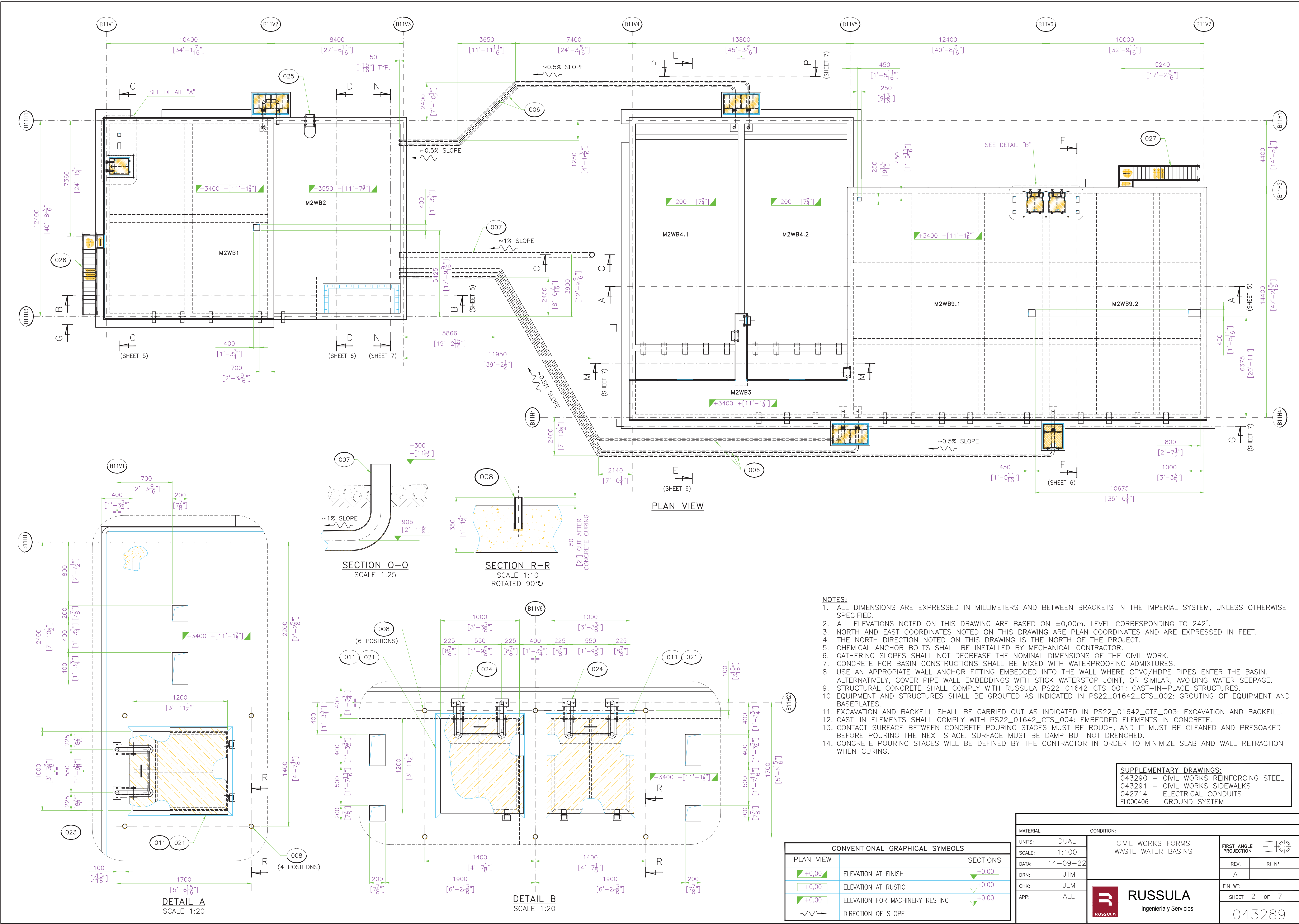
RUSSULA
Ingeniería y Servicios

043289

NO	DATE	REVISION DESCRIPTION
XX	XX-XX-XX	

Drawn By: **AES** Date: **10-19-22**
Checked By: **AHR** Scale: **24"x36" 1:150**
Project Number: **BHLP-22172**

C12A



- 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 242'.
 3. NORTH AND EAST COORDINATES NOTED ON THIS DRAWING ARE PLAN COORDINATES AND ARE EXPRESSED IN FEET.
 4. THE NORTH DIRECTION NOTED ON THIS DRAWING IS THE NORTH OF THE PROJECT.
 5. CHEMICAL ANCHOR BOLTS SHALL BE INSTALLED BY MECHANICAL CONTRACTOR.
 6. GATHERING SLOPES SHALL NOT DECREASE THE NOMINAL DIMENSIONS OF THE CIVIL WORK.
 7. CONCRETE FOR BASIN CONSTRUCTIONS SHALL BE MIXED WITH WATERPROOFING ADMIXTURES.
 8. USE AN APPROPRIATE WALL ANCHOR FITTING EMBEDDED INTO THE WALL WHERE CPVC/HDPE PIPES ENTER THE BASIN. ALTERNATIVELY, COVER PIPE WALL EMBEDDINGS WITH STICK WATERSTOP JOINT, OR SIMILAR, AVOIDING WATER SEEPAGE.
 9. STRUCTURAL CONCRETE SHALL COMPLY WITH RUSSULA PS22_01642_CTS_001: CAST-IN-PLACE STRUCTURES.
 10. EQUIPMENT AND STRUCTURES SHALL BE GROUDED AS INDICATED IN PS22_01642_CTS_002: GROUING OF EQUIPMENT AND BASEPLATES.
 11. EXCAVATION AND BACKFILL SHALL BE CARRIED OUT AS INDICATED IN PS22_01642_CTS_003: EXCAVATION AND BACKFILL.
 12. CAST-IN ELEMENTS SHALL COMPLY WITH PS22_01642_CTS_004: EMBEDDED ELEMENTS IN CONCRETE.
 13. CONTACT SURFACE BETWEEN CONCRETE POURING STAGES MUST BE ROUGH, AND IT MUST BE CLEANED AND PRESOAKED BEFORE POURING THE NEXT STAGE. SURFACE MUST BE DAMP BUT NOT DRENCHED.
 14. CONCRETE POURING STAGES WILL BE DEFINED BY THE CONTRACTOR IN ORDER TO MINIMIZE SLAB AND WALL RETRACTION WHEN CURING.

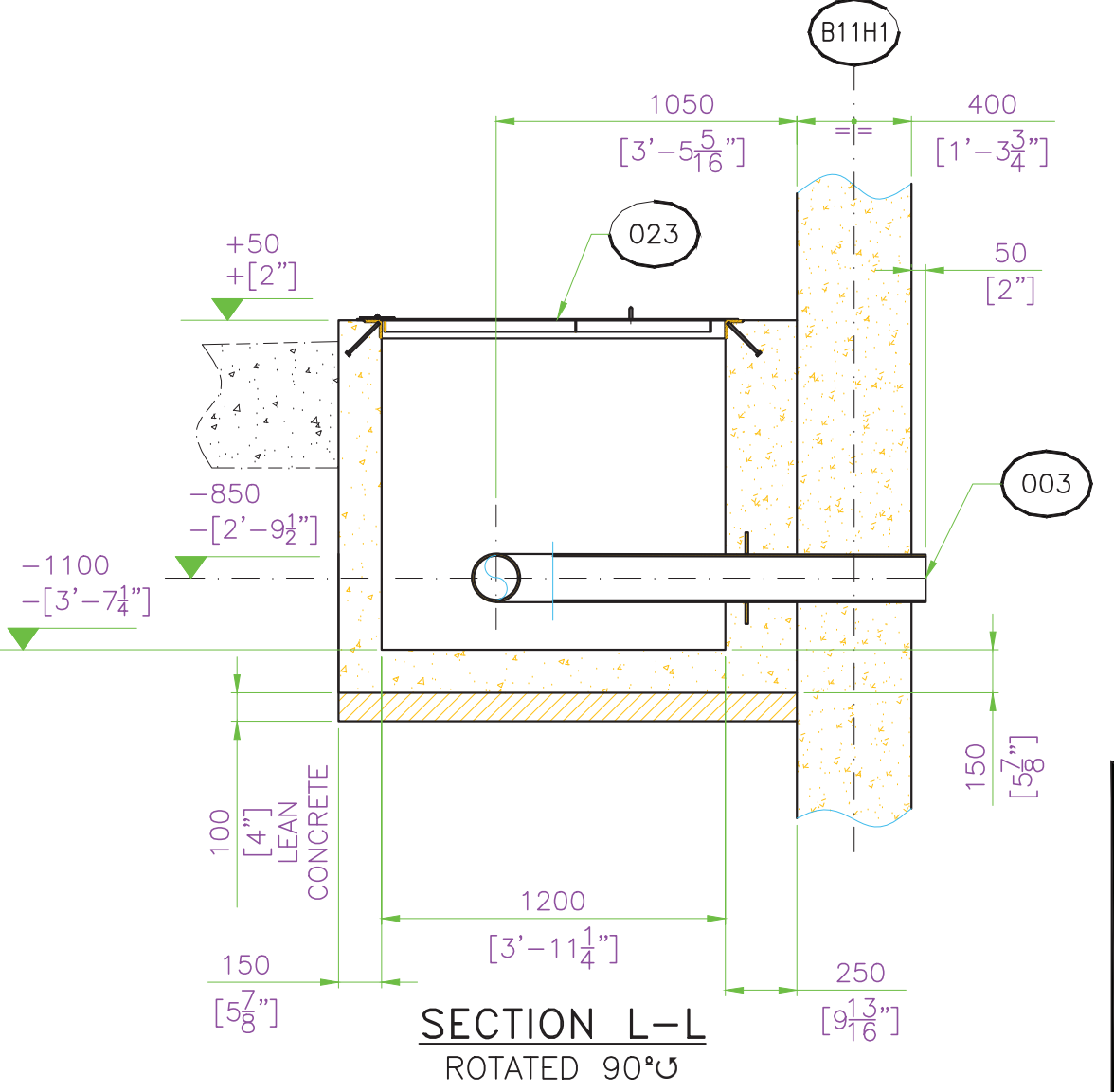
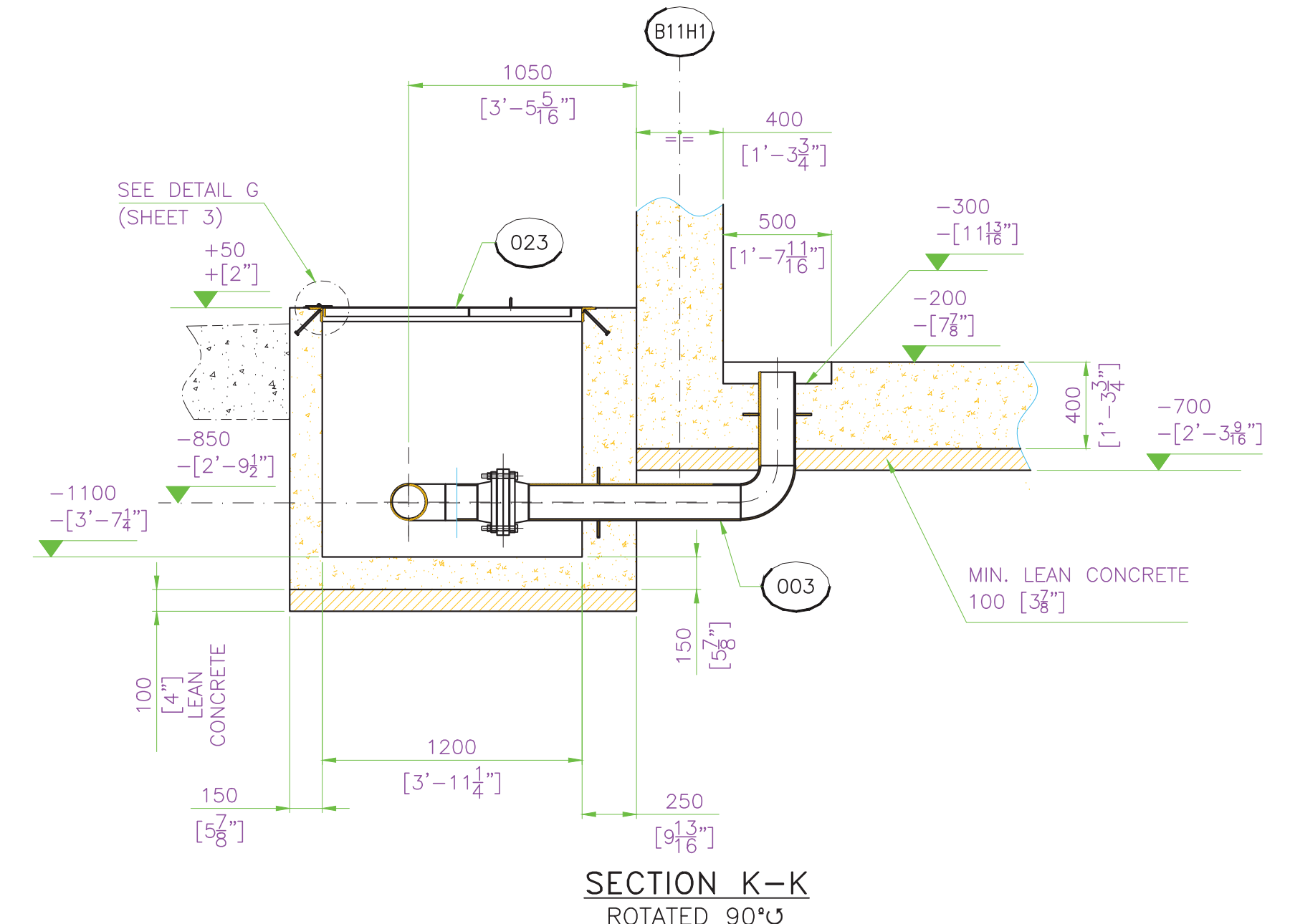
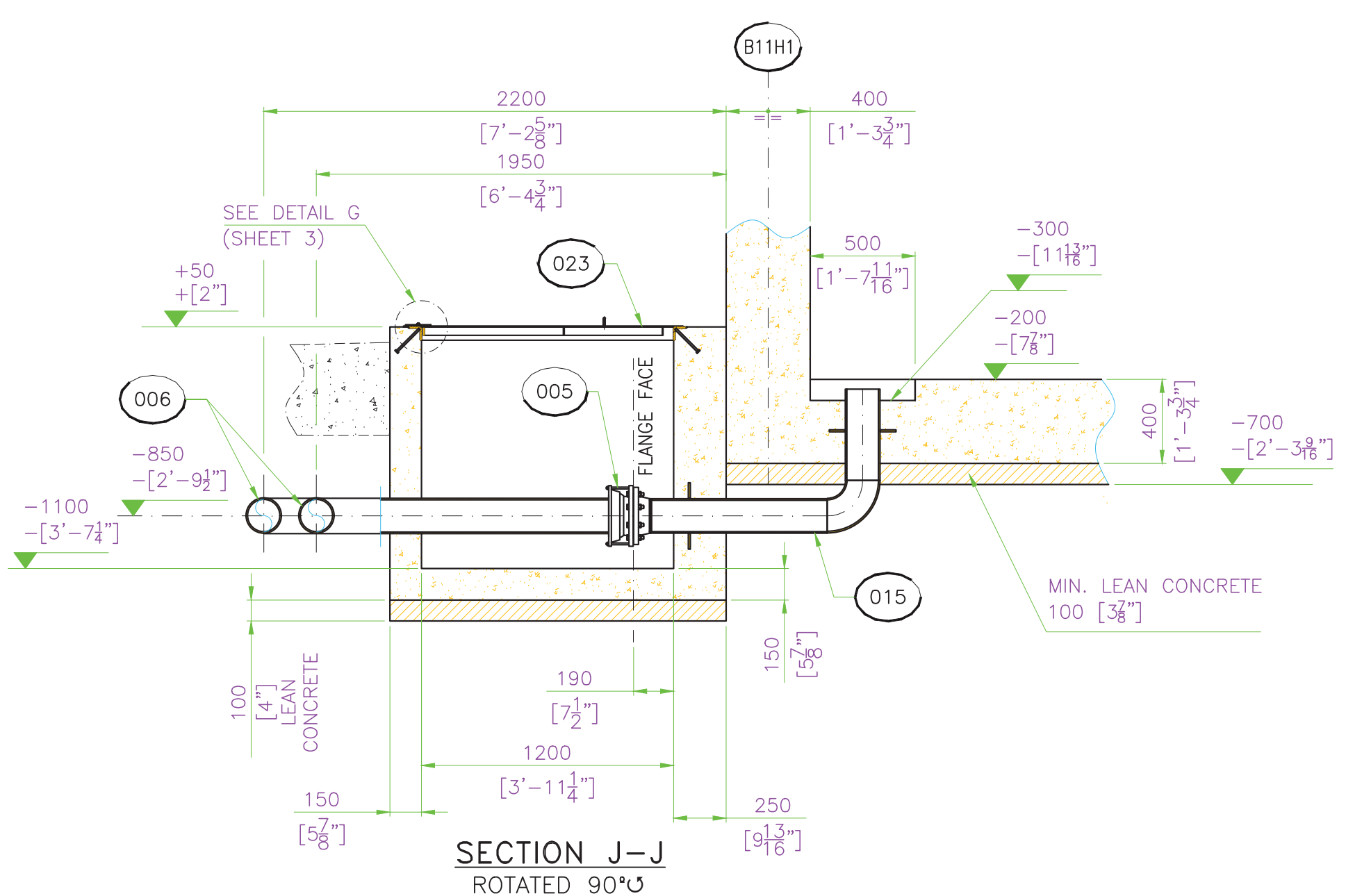
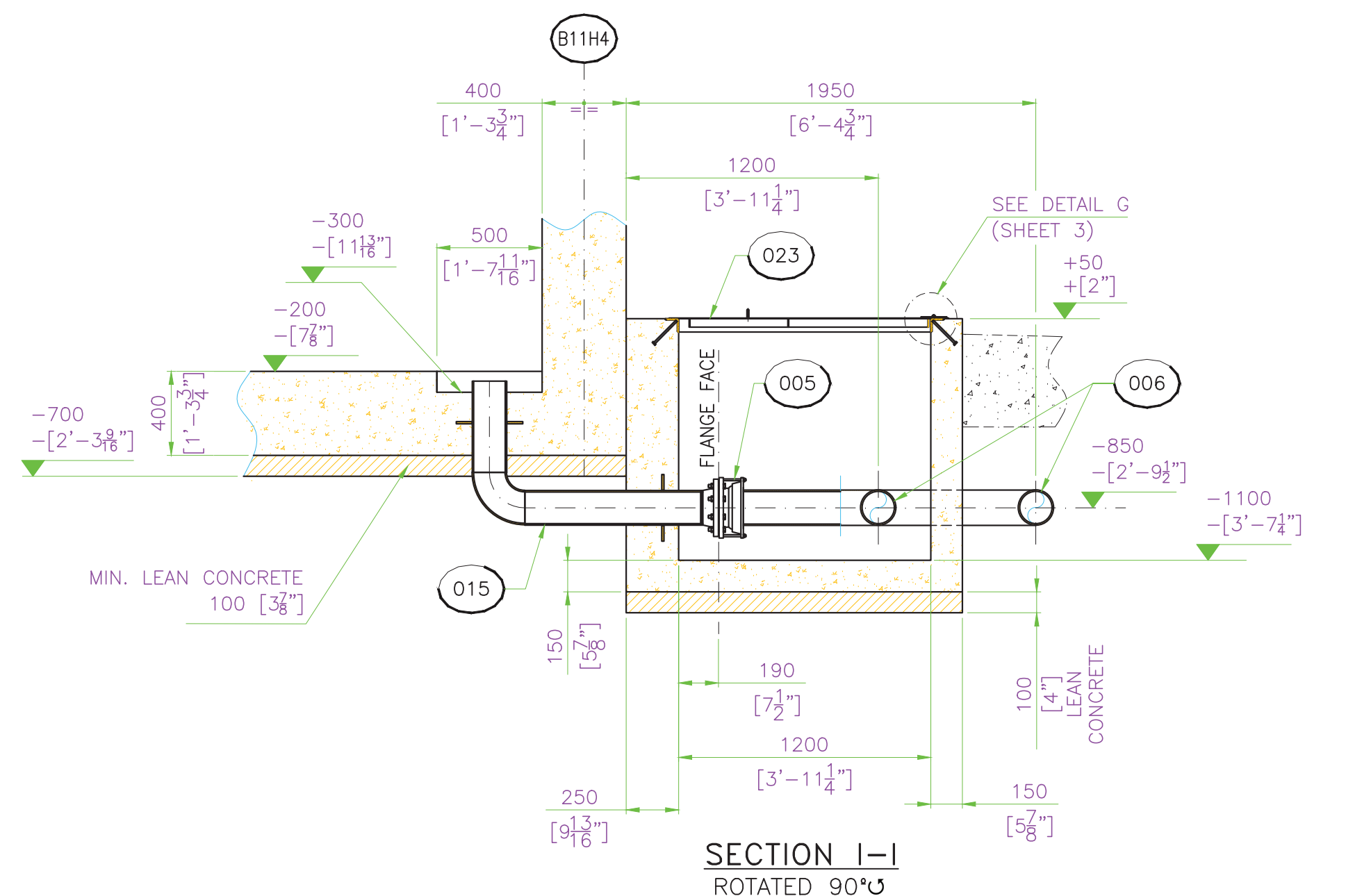
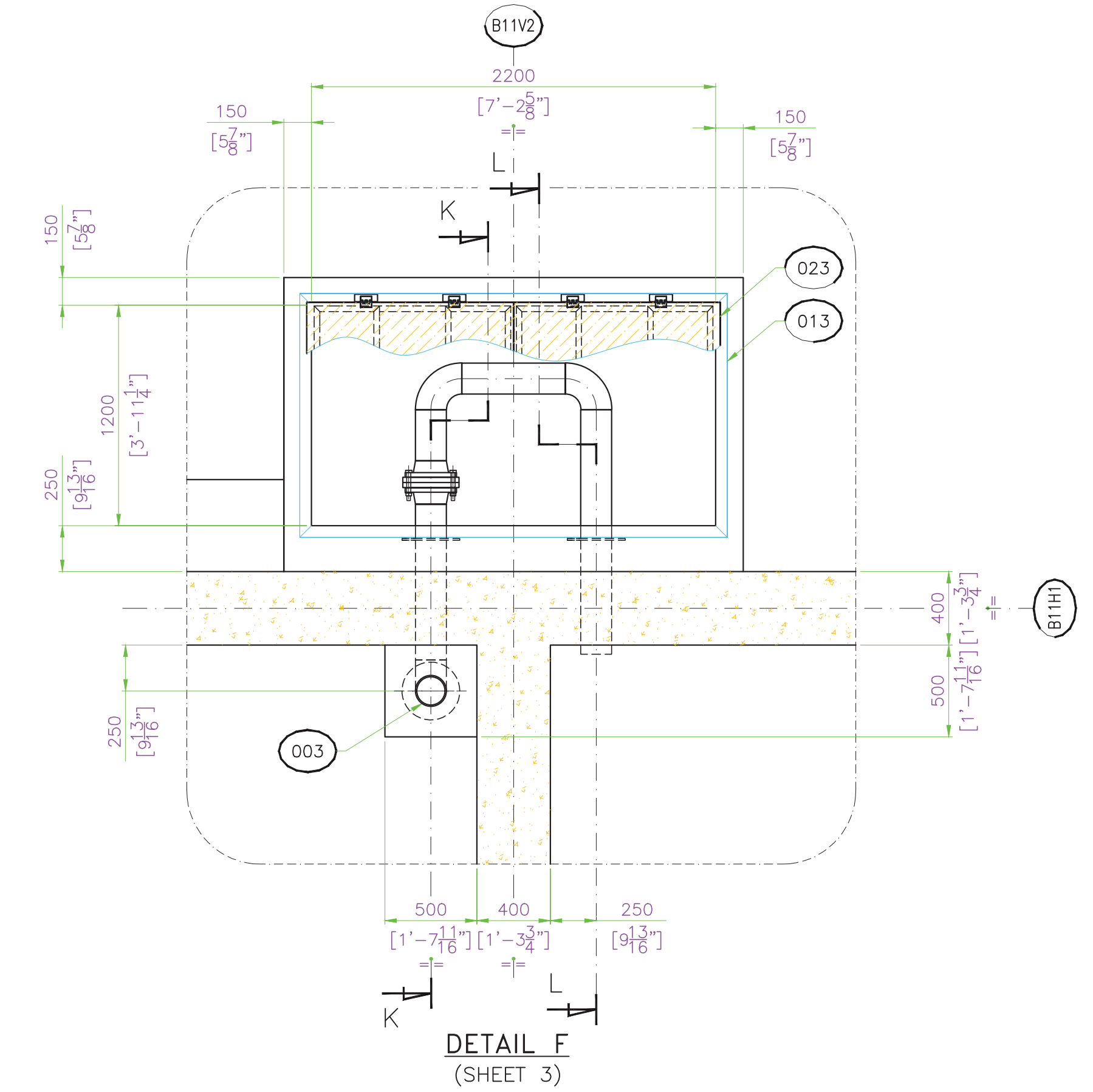
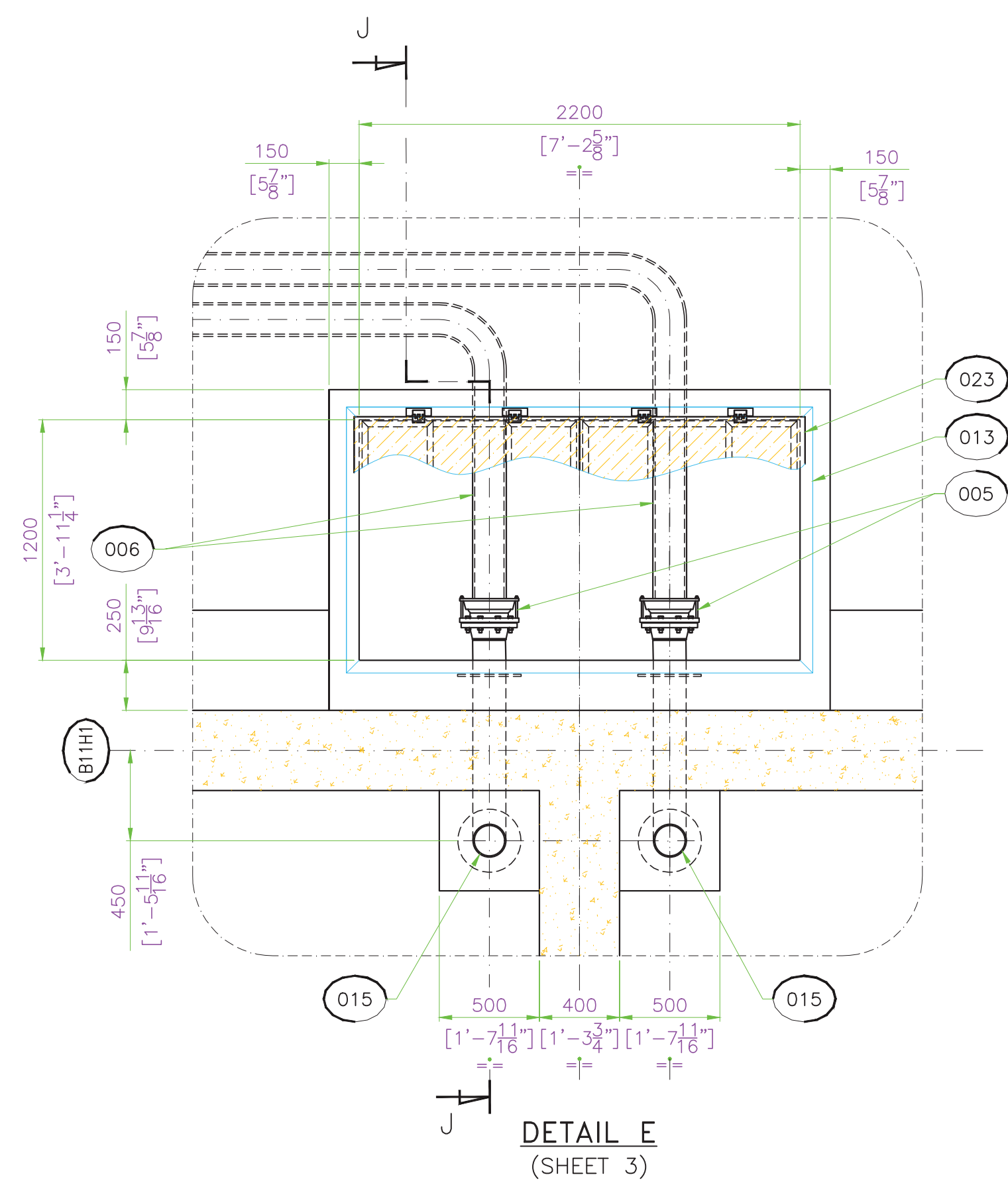
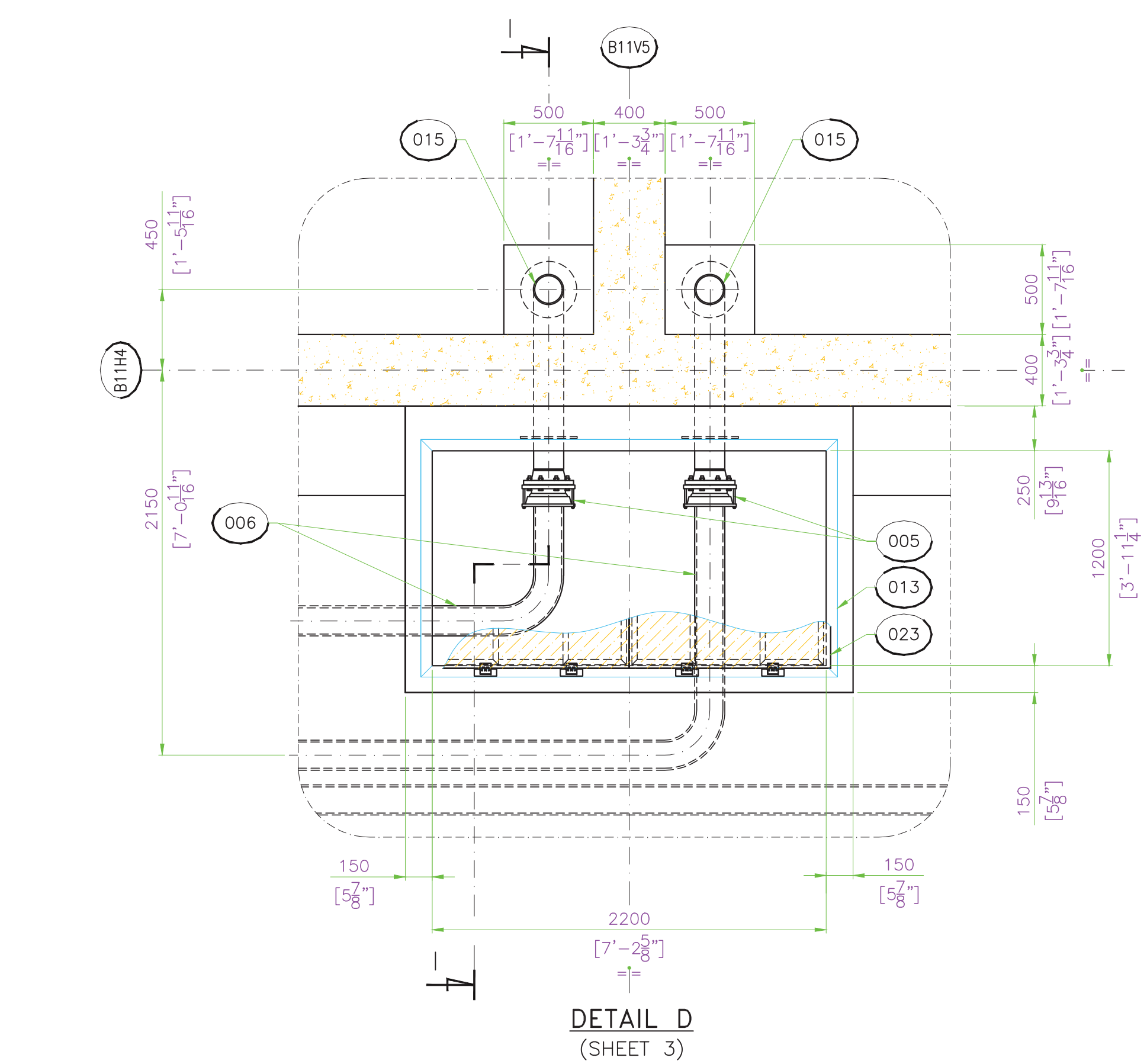
SUPPLEMENTARY DRAWINGS:
043290 - CIVIL WORKS REINFORCING STEEL
043291 - CIVIL WORKS SIDEWALKS
042714 - ELECTRICAL CONDUITS
EL000406 - GROUND SYSTEM

CONVENTIONAL GRAPHICAL SYMBOLS	
PLAN VIEW	SECTIONS
+0,00	ELEVATION AT FINISH
+0,00	ELEVATION AT RUSTIC
+0,00	ELEVATION FOR MACHINERY RESTING
	DIRECTION OF SLOPE

MATERIAL:	CONDITION:	CIVIL WORKS FORMS WASTE WATER BASINS	FIRST ANGLE PROJECTION
UNITS: DUAL	SCALE: 1:100		
DATE: 14-09-22	DRN: JTM	REV.:	IRI N°
CHK: JLM	APP: ALL	A	
FIN WT:		SHEET 2 OF 7	
APP: ALL		043289	

Drawn By: **AES** Date: **10-19-22**
Checked By: **AHR** Scale: **24"x36" 1:100**
Project Number: **BHLP-22172**

C12B



- NOTES:**
- ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS AND BETWEEN BRACKETS IN THE IMPERIAL SYSTEM, UNLESS OTHERWISE SPECIFIED.
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 - NORTH AND EAST COORDINATES NOTED ON THIS DRAWING ARE PLAN COORDINATES AND ARE EXPRESSED IN FEET.
 - THE NORTH DIRECTION NOTED ON THIS DRAWING IS THE NORTH OF THE PROJECT.
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 - GATHERING SLOPES SHALL NOT DECREASE THE NOMINAL DIMENSIONS OF THE CIVIL WORK.
 - CONCRETE FOR BASIN CONSTRUCTIONS SHALL BE MIXED WITH WATERPROOFING ADMIXTURES.
 - USE AN APPROPRIATE WALL ANCHOR FITTING EMBEDDED INTO THE WALL WHERE CPVC/HDPE PIPES ENTER THE BASIN. ALTERNATIVELY, COVER PIPE WALL EMBEDDINGS WITH STICK WATERSTOP JOINT, OR SIMILAR, AVOIDING WATER SEEPAGE.
 - STRUCTURAL CONCRETE SHALL COMPLY WITH RUSSULA PS22_01642_CTS_001: CAST-IN-PLACE STRUCTURES.
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 - CONTACT SURFACE BETWEEN CONCRETE POURING STAGES MUST BE ROUGH, AND IT MUST BE CLEANED AND PRESOAKED BEFORE POURING THE NEXT STAGE. SURFACE MUST BE DAMP BUT NOT DRENCHED.
 - CONCRETE POURING STAGES WILL BE DEFINED BY THE CONTRACTOR IN ORDER TO MINIMIZE SLAB AND WALL RETRACTION WHEN CURING.

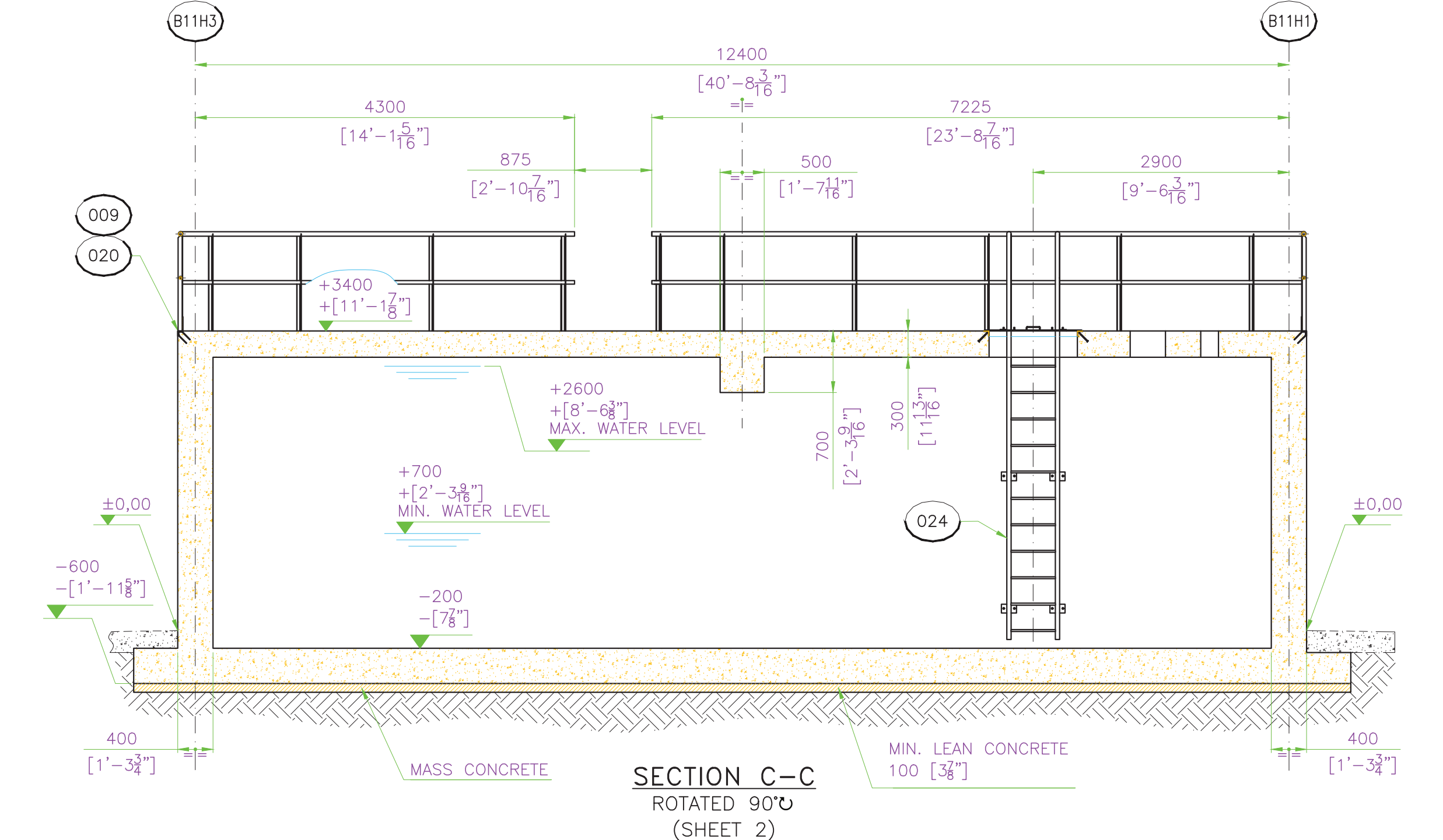
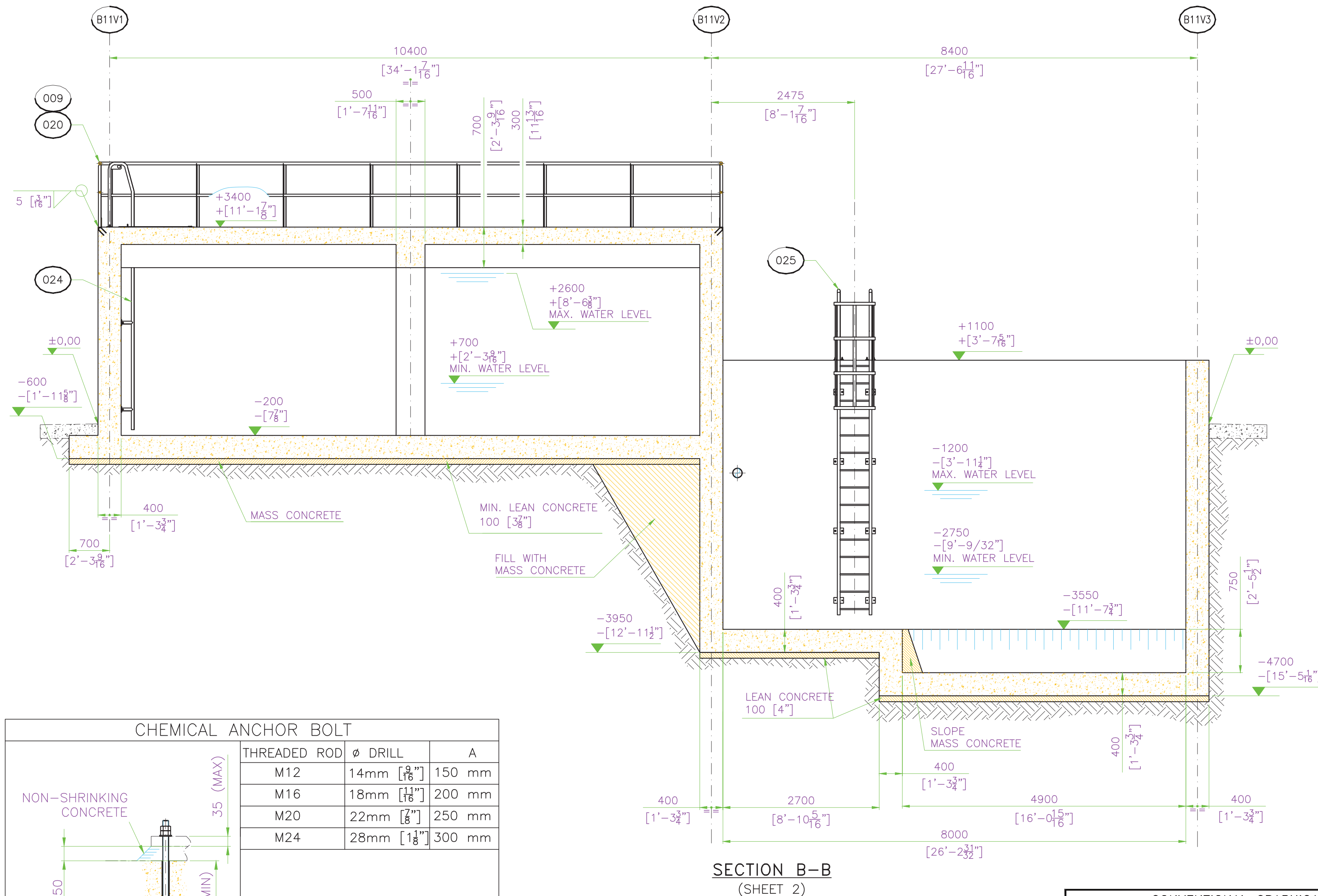
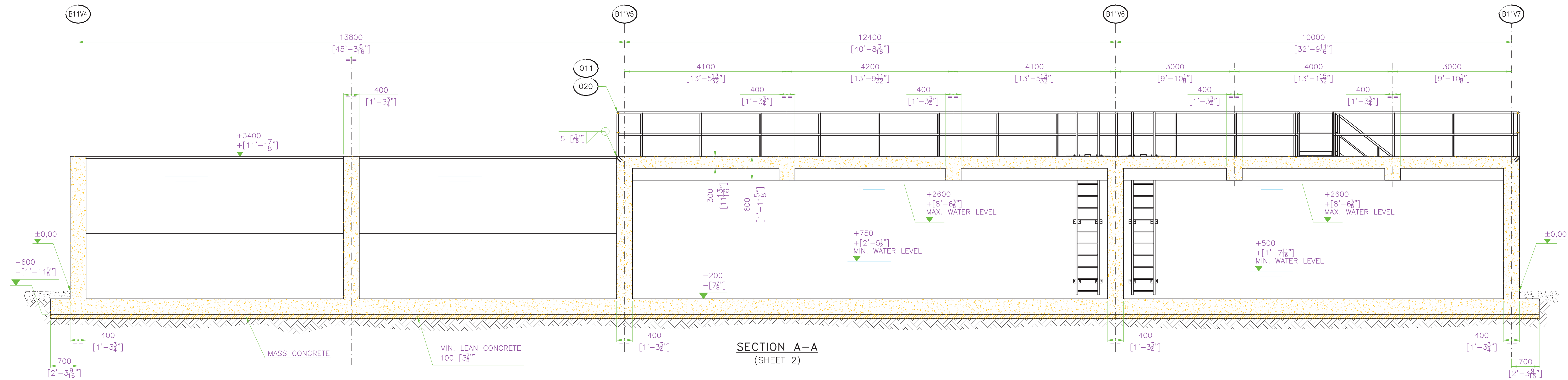
SUPPLEMENTARY DRAWINGS:
043290 - CIVIL WORKS REINFORCING STEEL
043291 - CIVIL WORKS SIDEWALKS
042714 - ELECTRICAL CONDUITS
EL000406 - GROUND SYSTEM

CONVENTIONAL GRAPHICAL SYMBOLS	
PLAN VIEW	SECTIONS
+0,00	ELEVATION AT FINISH
+0,00	ELEVATION AT RUSTIC
+0,00	ELEVATION FOR MACHINERY RESTING
	DIRECTION OF SLOPE

MATERIAL:	CONDITION:	FIRST ANGLE PROJECTION
UNITS: DUAL	CIVIL WORKS FORMS	
SCALE: 1:25	WASTE WATER BASINS	REV. IRI N°
DATA: 14-09-22		A
DRN: JTM		FIN WT:
CHK: JLM		SHEET 4 OF 7
APP: ALL		



043289



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 7. CONCRETE FOR BASIN CONSTRUCTIONS SHALL BE MIXED WITH WATERPROOFING ADMIXTURES.
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CHEMICAL ANCHOR BOLT

THREAD	ROD	Ø DRILL	A
M12	14mm	[9/16"]	150 mm
M16	18mm	[11/8"]	200 mm
M20	22mm	[7/8"]	250 mm
M24	28mm	[1 1/8"]	300 mm

NON-SHRINKING CONCRETE
EPOXY RESIN HILTI HIT-RE 500 V4
50 (MIN)
35 (MAX)
A (MIN)

READ CAREFULLY THE MANUFACTURER INSTRUCTIONS BEFORE FIXING THE ANCHOR BOLT.

CONVENTIONAL GRAPHICAL SYMBOLS

PLAN VIEW	SECTIONS
+0,00	ELEVATION AT FINISH
+0,00	ELEVATION AT RUSTIC
+0,00	ELEVATION FOR MACHINERY RESTING
	DIRECTION OF SLOPE

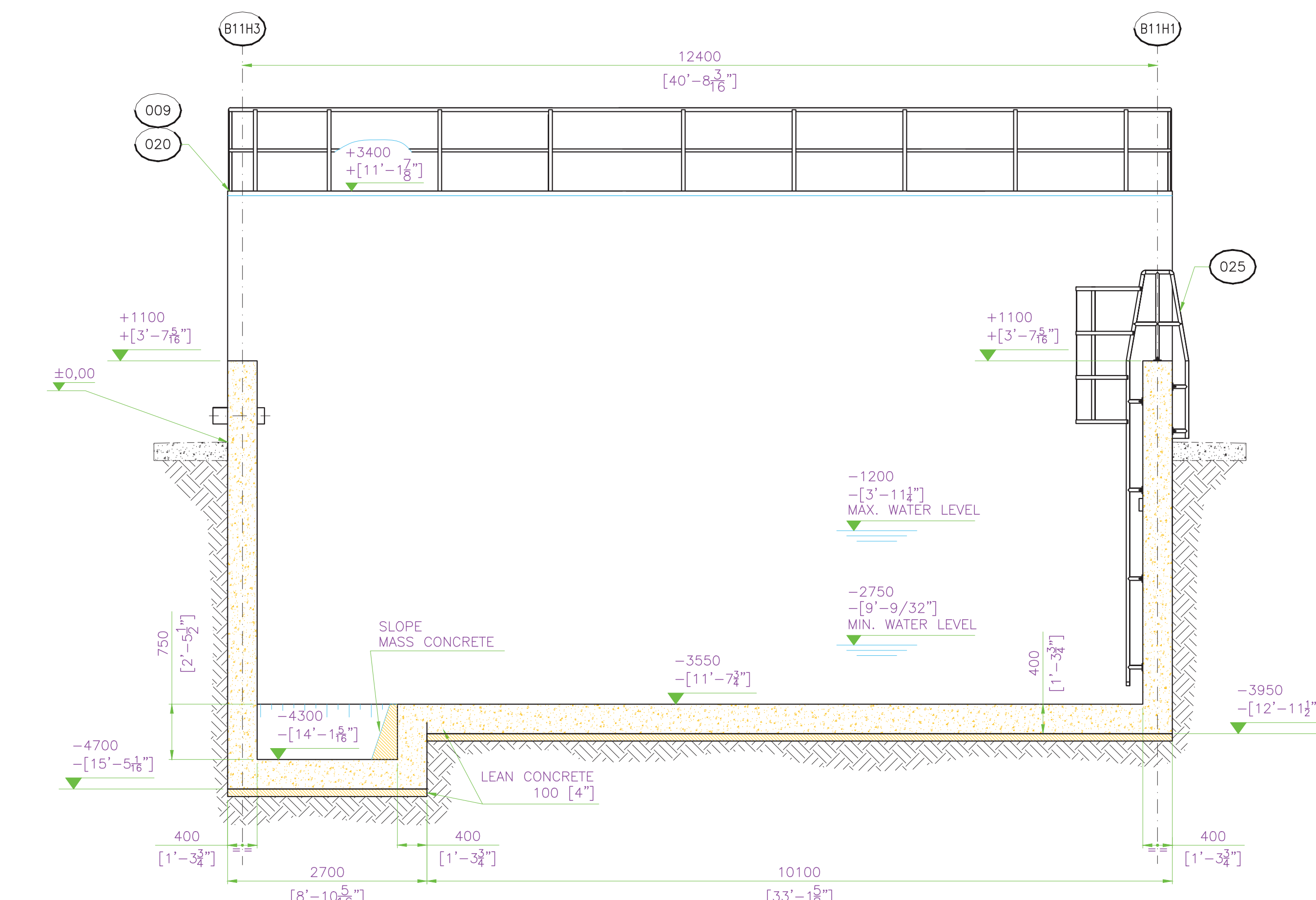
SUPPLEMENTARY DRAWINGS:

043290	- CIVIL WORKS REINFORCING STEEL
043291	- CIVIL WORKS SIDEWALKS
042714	- ELECTRICAL CONDUITS
EL000406	- GROUND SYSTEM

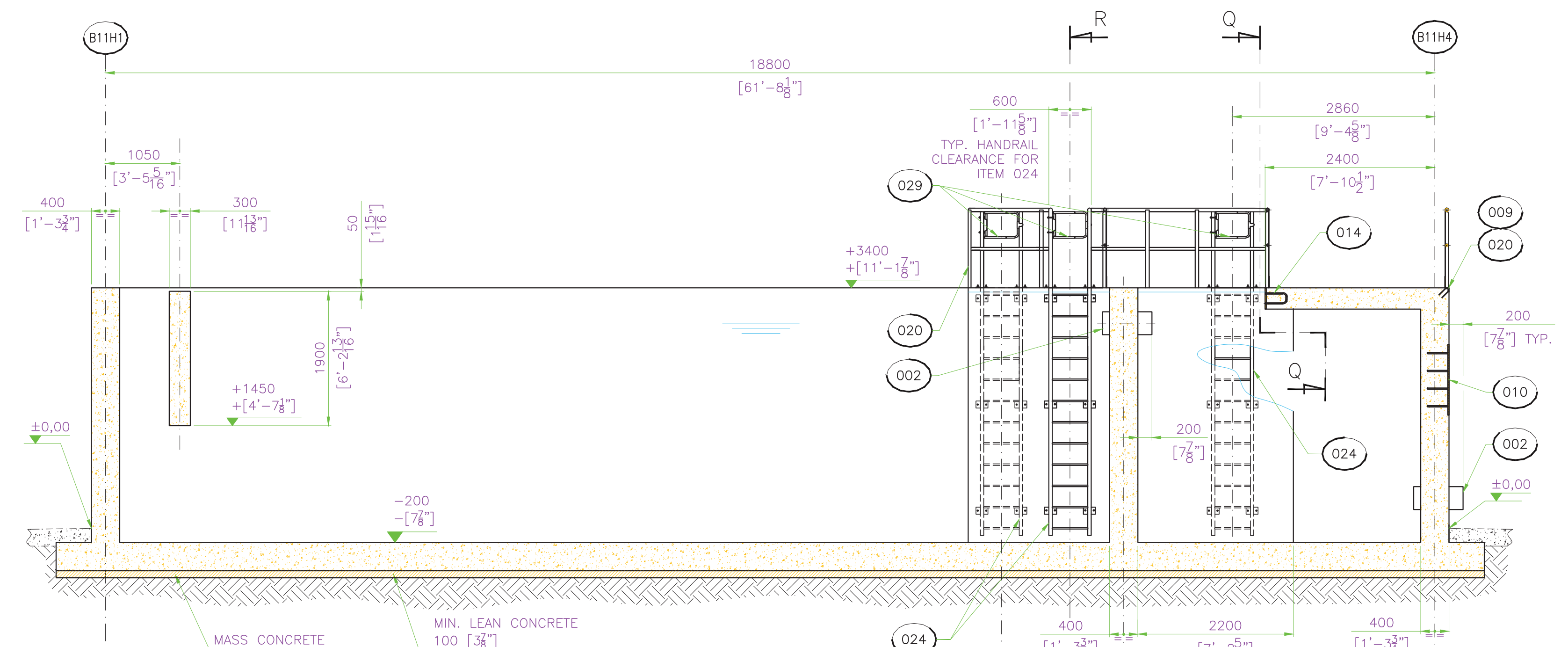
MATERIAL	CONDITION	FIRST ANGLE PROJECTION
UNITS: DUAL	CIVIL WORKS FORMS WASTE WATER BASINS	
SCALE: 1:50		
DATA: 14-09-22		
DRN: JTM		
CHK: JLM		
APP: ALL		

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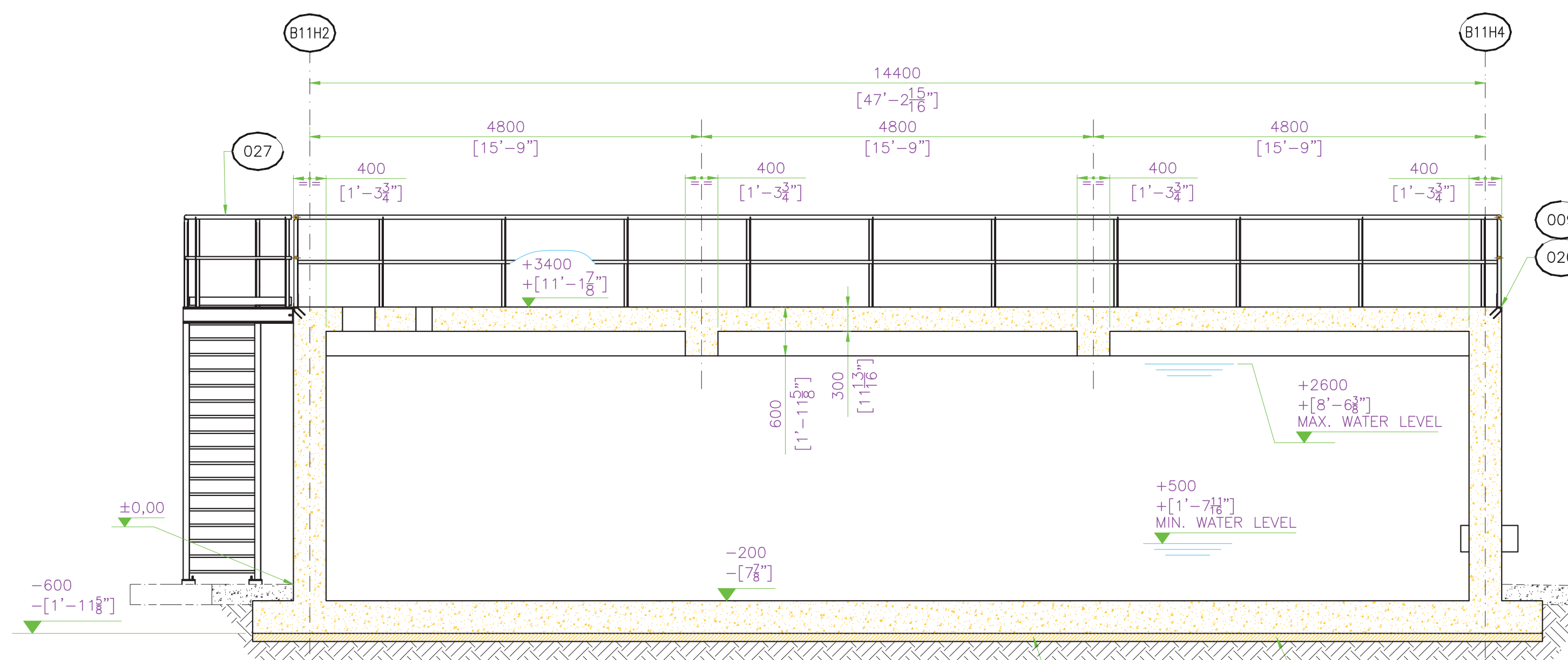
043289



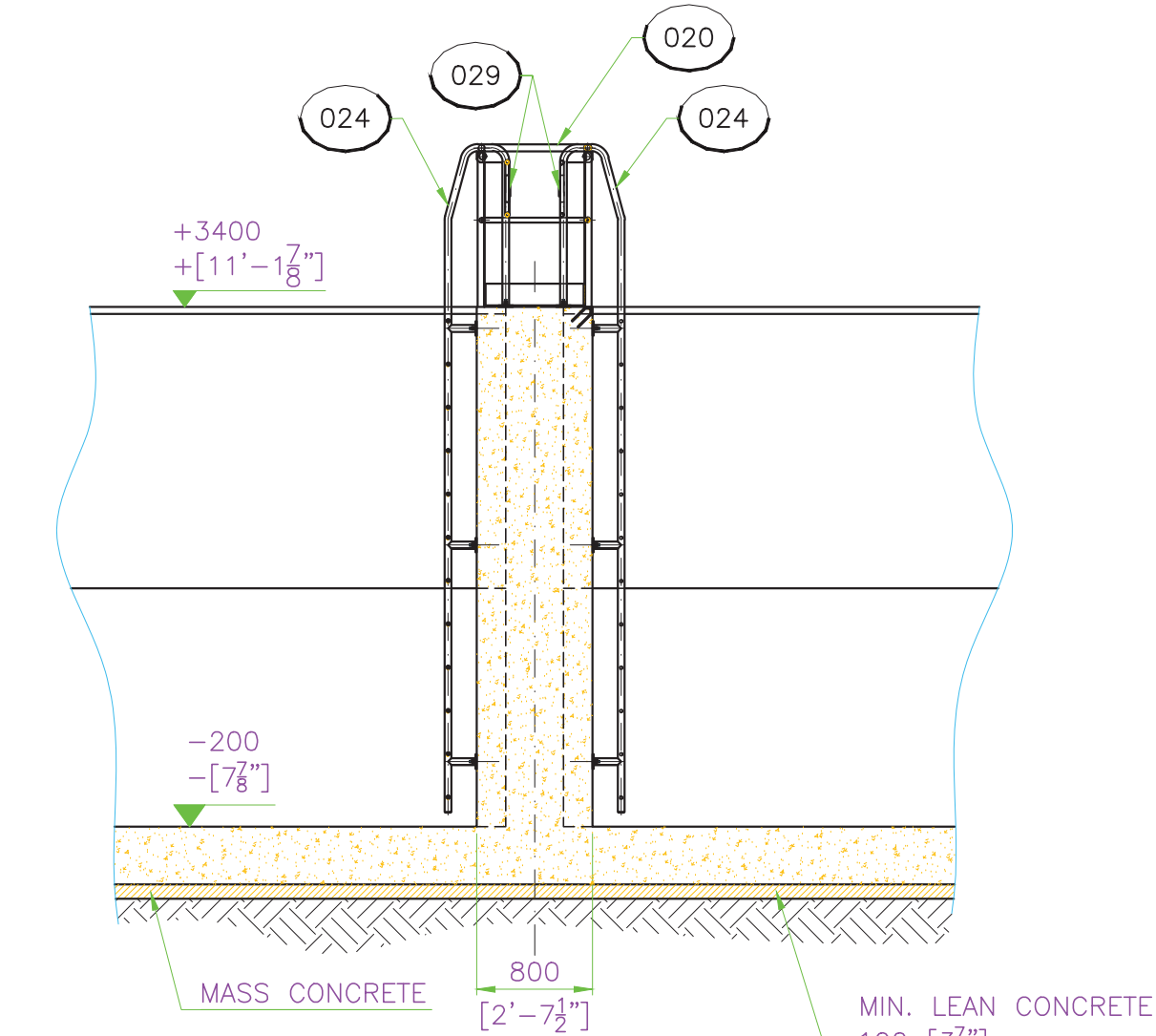
SECTION D-D
ROTATED 90°
(SHEET 2)



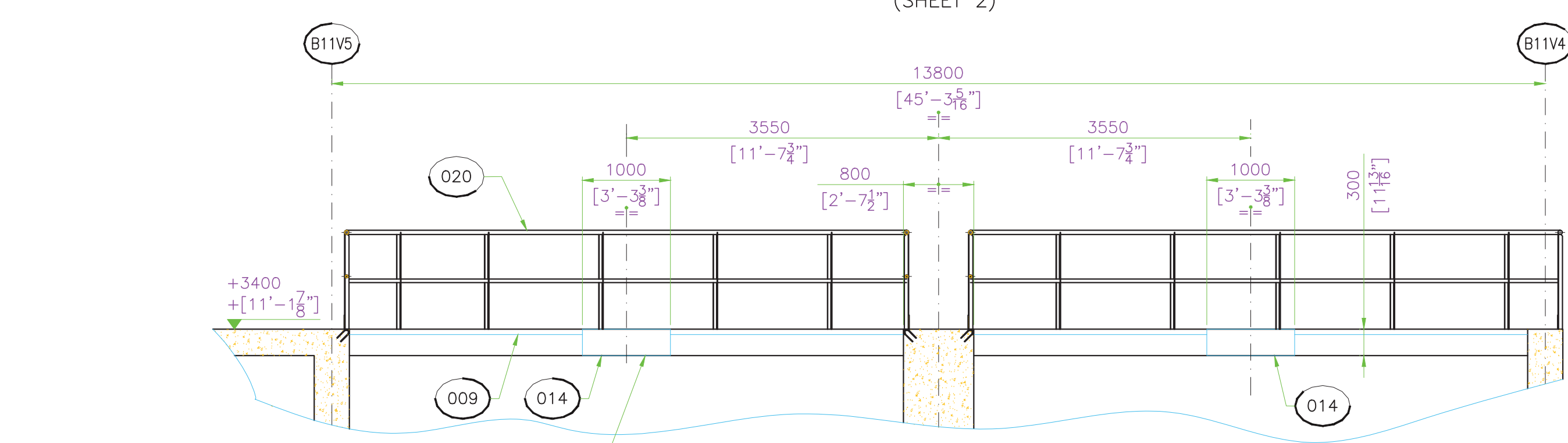
SECTION E-E
ROTATED 90°
(SHEET 2)



SECTION F-F
ROTATED 90°
(SHEET 2)



SECTION R-R



SECTION Q-Q

SUPPLEMENTARY DRAWINGS:
043290 - CIVIL WORKS REINFORCING STEEL
043291 - CIVIL WORKS SIDEWALKS
042714 - ELECTRICAL CONDUITS
EL000406 - GROUND SYSTEM

CONVENTIONAL GRAPHICAL SYMBOLS		
PLAN VIEW		SECTIONS
	+0.00	ELEVATION AT FINISH
	+0.00	ELEVATION AT RUSTIC
	+0.00	ELEVATION FOR MACHINERY RESTING
		DIRECTION OF SLOPE

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MATERIAL	CONDITION:	FIRST ANGLE PROJECTION
UNITS: DUAL	CIVIL WORKS FORMS	
SCALE: 1:50	WASTE WATER BASINS	REV. IRI #
DATA: 14-09-22		A
DRN: JTM		FIN WT:
CHK: JLM		SHEET 6 OF 7
APP: ALL		

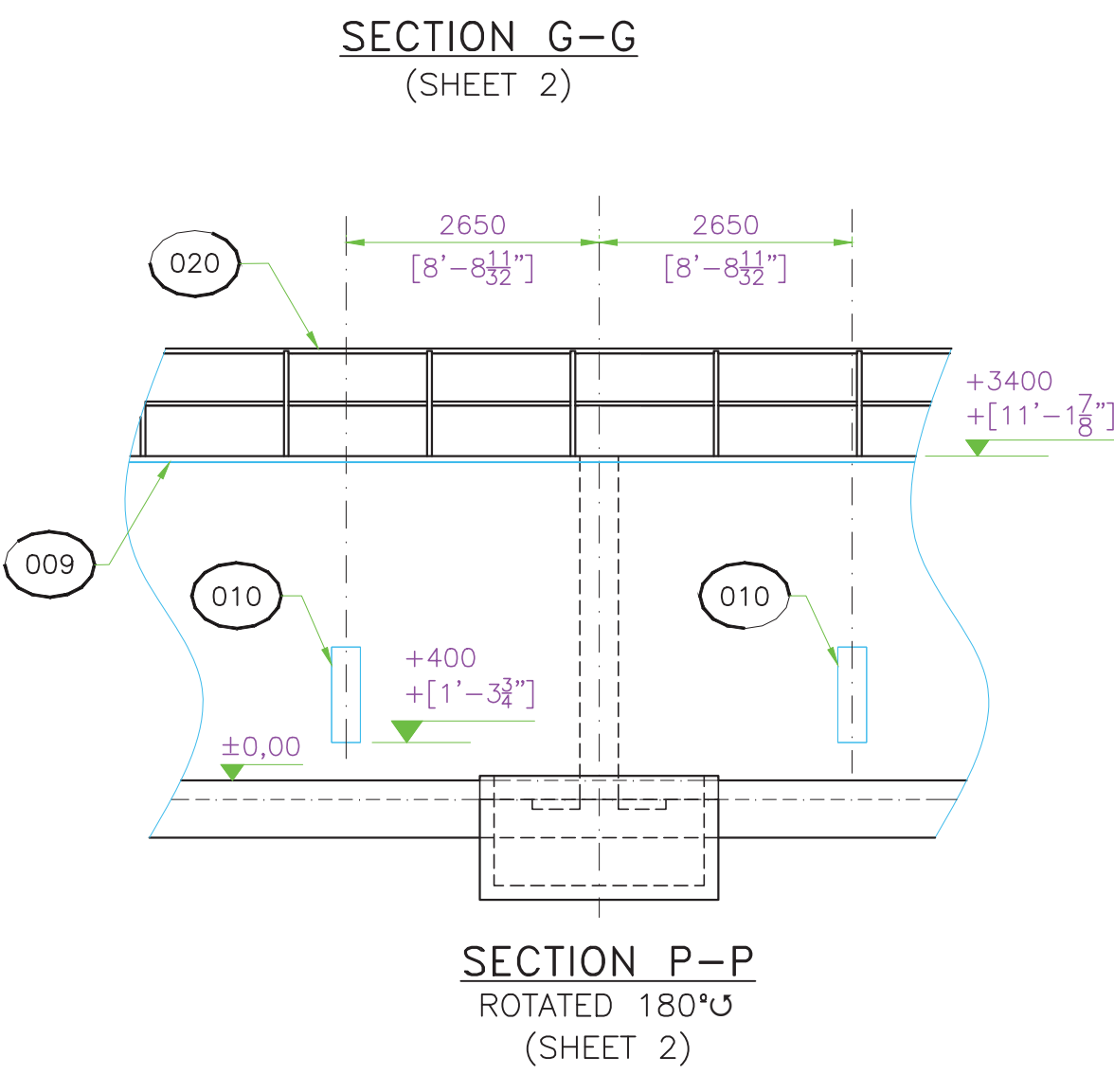
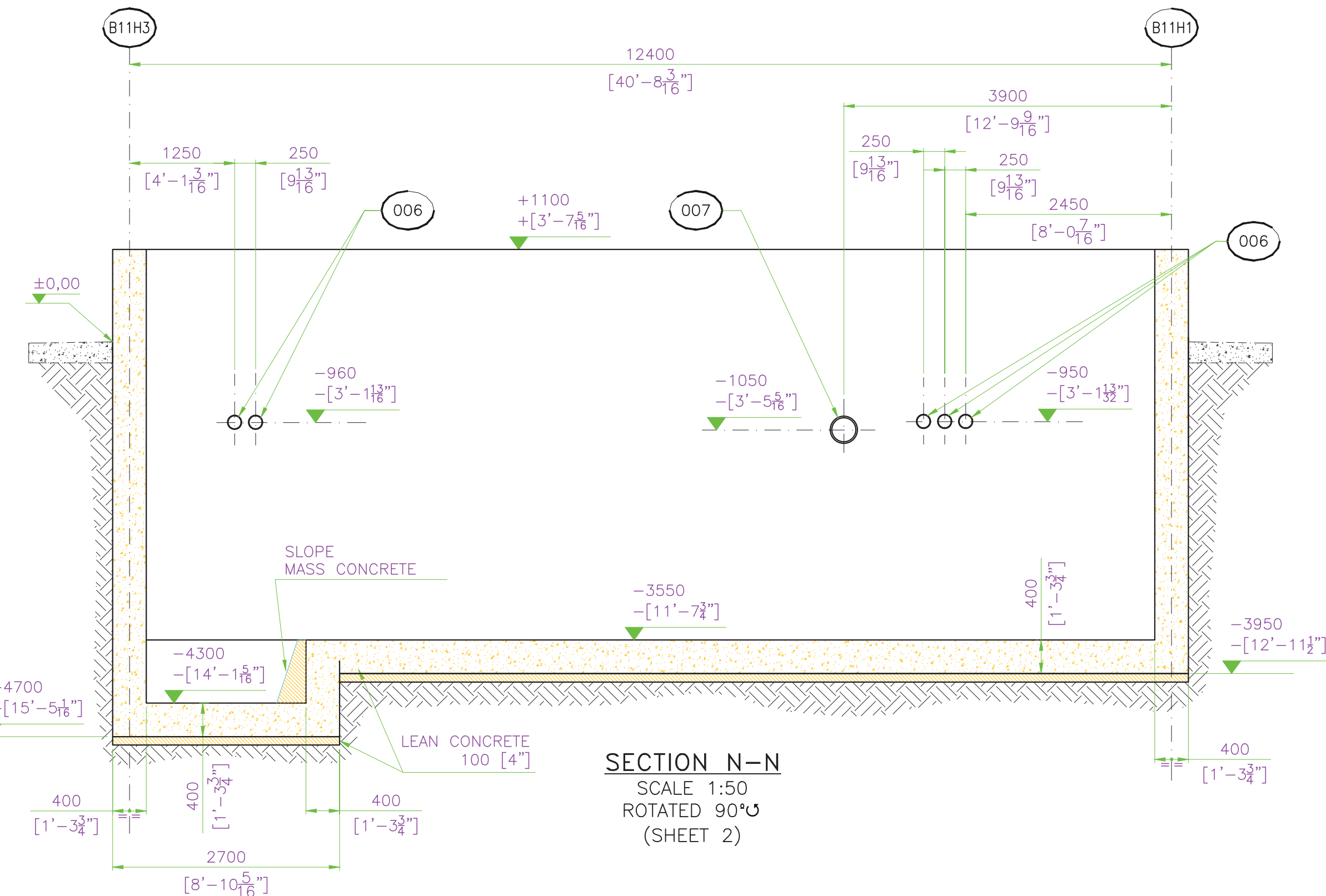
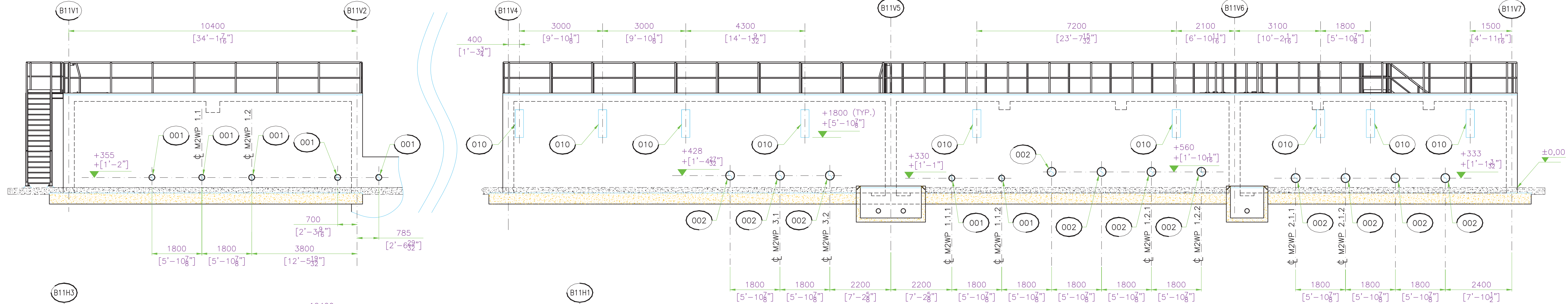
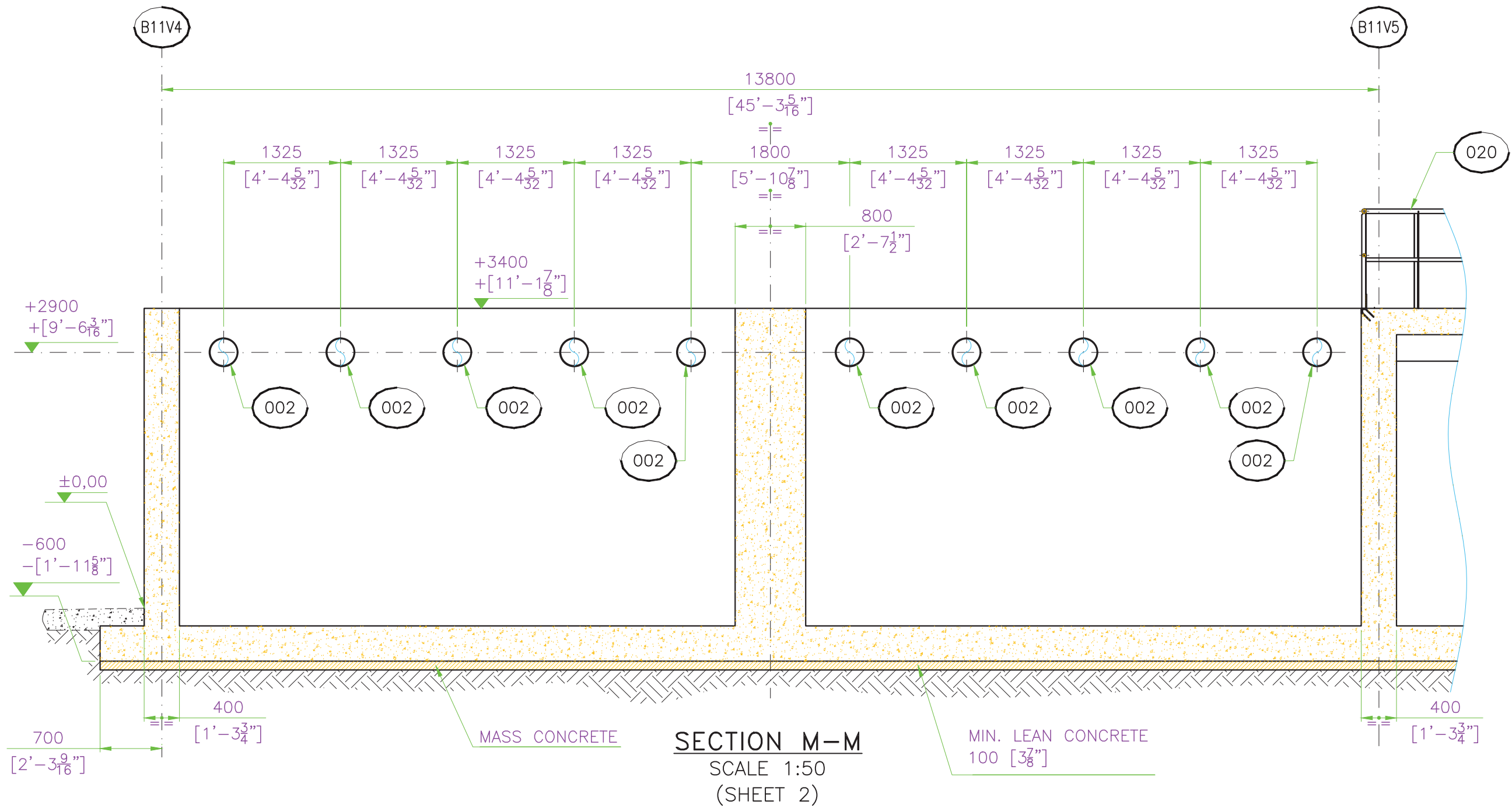


043289

DATE	XX-XX-XX	Drawn By:	AES	Date:	10-19-22
REVISION DESCRIPTION		Checked By:	AHR	Scale:	24"x36" 1:50
NO	XX X	Project Number:	BHLP-22172		

C12F

SUPPLIER	ITEM.	DRAWING	QTY.	UM	DESCRIPTION
BIG RIVER	001	020477	7	UD	EMBEDDED PIPE 8" x 700
BIG RIVER	002	009191	21	UD	EMBEDDED PIPE 12" x 700
BIG RIVER	003	043293	1	UD	EMBEDDED DRAIN PIPE 6"
BIG RIVER	004	042776	1	UD	EMBEDDED DRAIN PIPE 6"
BIG RIVER	005	-	5	UD	FLANGE ADAPTER 6" ANSI 150 Lbs "ULTRA QUICK" (SAINT GOBAIN) OR SIMILAR
BIG RIVER	006	-	171	m	CPVC DRAIN PIPE 6" Sch 80 PN6 & ACCESSORIES
BIG RIVER	007	-	13.5	m	CPVC DRAIN PIPE 12" Sch 80 PN6 & ACCESSORIES
BIG RIVER	008	042707	10	UD	EMBEDDED PIPE 1 1/2" x 200
BIG RIVER	009	030337	156.5	m	EMBEDDED ANGLE 2-1/2" x 2-1/2" x 1/4"
BIG RIVER	010	043208	11	UD	EMBEDDED PLATE 5/8" x 300 x 1000
BIG RIVER	011	042721	3	UD	EMBEDDED FRAME 1000 x 1200
BIG RIVER	012	042778	1	UD	EMBEDDED FRAME 1200 x 1500
BIG RIVER	013	042722	3	UD	EMBEDDED FRAME 1200 x 2200
BIG RIVER	014	043292	2	UD	EMBEDDED PLATE 5/8" x 300 x 1000
BIG RIVER	015	043294	4	UD	EMBEDDED DRAIN PIPE 6"
RUSSULA	020	008169	156.5	m	WELDED HANDRAIL
RUSSULA	021	043093	3	UD	HATCH DOOR
RUSSULA	022	043612	1	UD	COVER 1250 x 1550
RUSSULA	023	043611	3	UD	COVER 1240 x 2250
RUSSULA	024	043096	6	UD	LADDER 550 x 4600
RUSSULA	025	043097	1	UD	LADDER ASSEMBLY 550 x 5700
RUSSULA	026	020035	1	UD	STAIRS 800 x 3400
RUSSULA	027	020038	1	UD	STAIRS 800 x 3400
RUSSULA	028	043094	1	UD	PORTABLE HANDRAILING SET
RUSSULA	029	040494	3	UD	SAFETY SWING GATE



SECTION G-G
SCALE 1:50
(SHEET 2)

SECTION P-P
ROTATED 180°
SCALE 1:50
(SHEET 2)

CONVENTIONAL GRAPHICAL SYMBOLS		
PLAN VIEW		SECTIONS
	ELEVATION AT FINISH	+0.00
	ELEVATION AT RUSTIC	+0.00
	ELEVATION FOR MACHINERY RESTING	+0.00
	DIRECTION OF SLOPE	

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SUPPLEMENTARY DRAWINGS:

043290	- CIVIL WORKS REINFORCING STEEL
043291	- CIVIL WORKS SIDEWALKS
042714	- ELECTRICAL CONDUITS
EL000406	- GROUND SYSTEM

MATERIAL:	DUAL	CONDITION:	CIVIL WORKS FORMS WASTE WATER BASINS
UNITS:	1:75	FIRST ANGLE PROJECTION	
SCALE:	14-09-22	REV.	IRI N°
DATE:	JTM	A	
DRN:	JLM	FIN WT:	
CHK:	ALL	SHEET	7 OF 7
APP:			

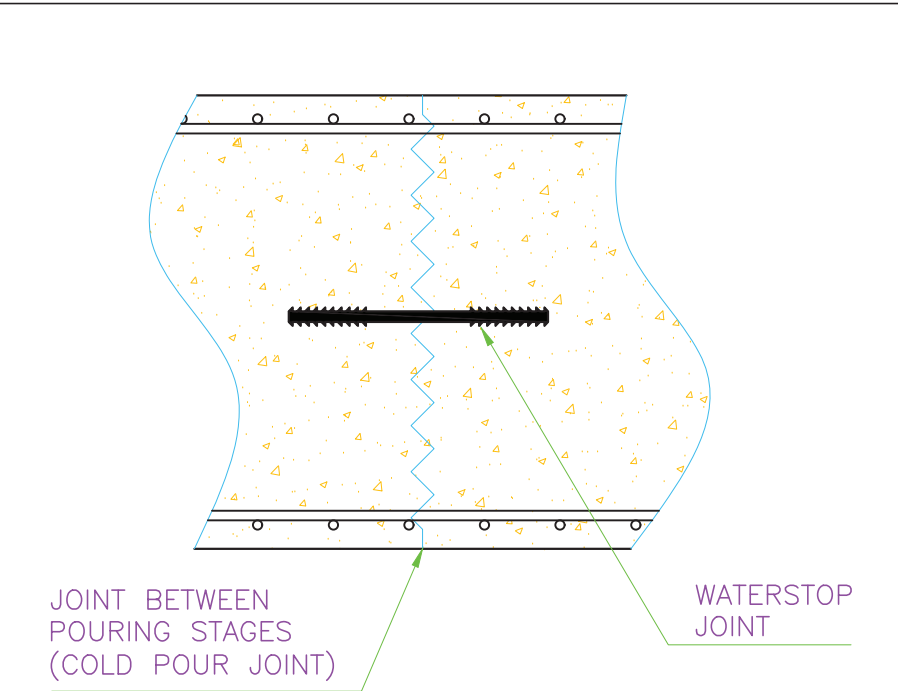
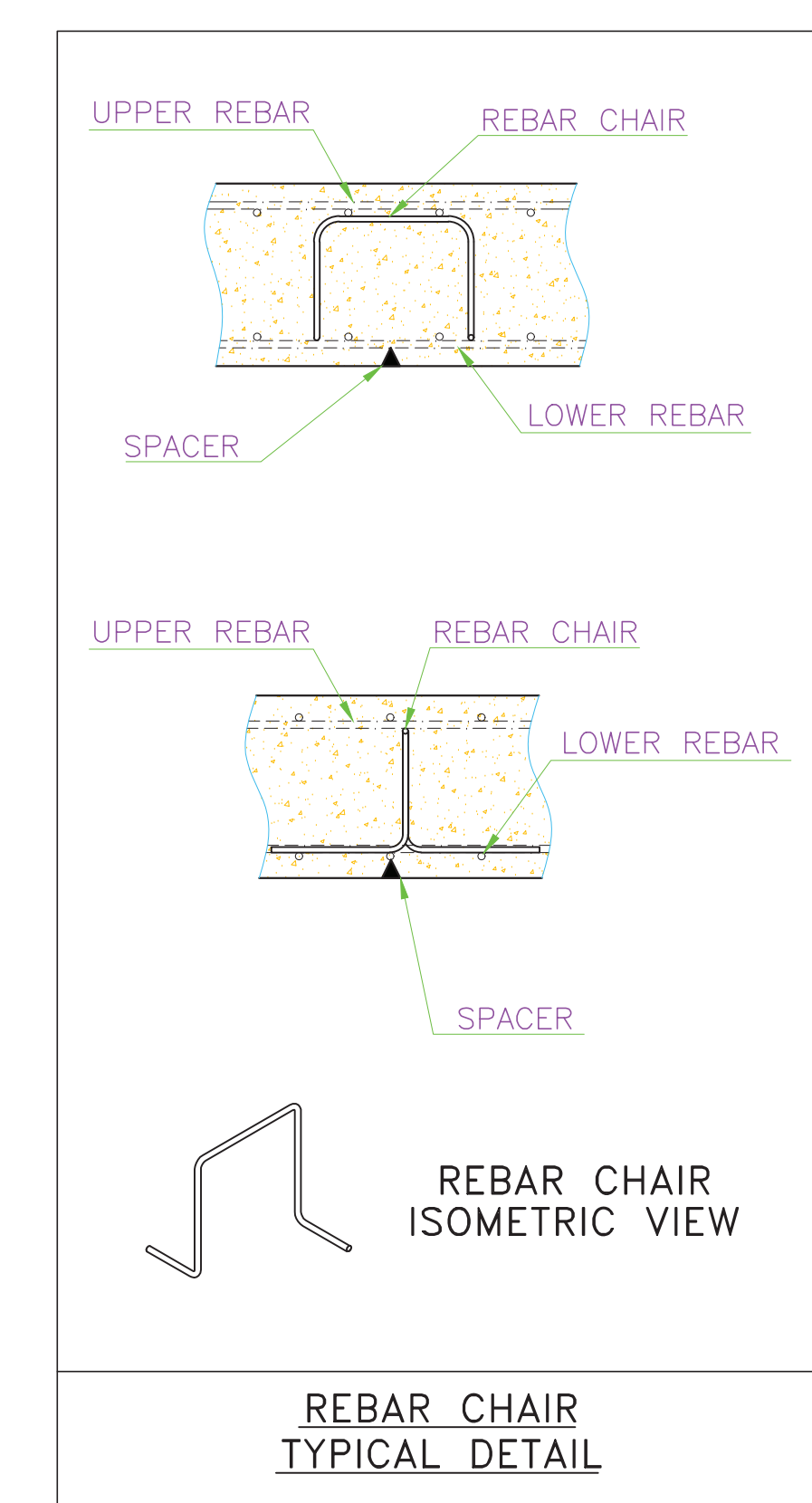
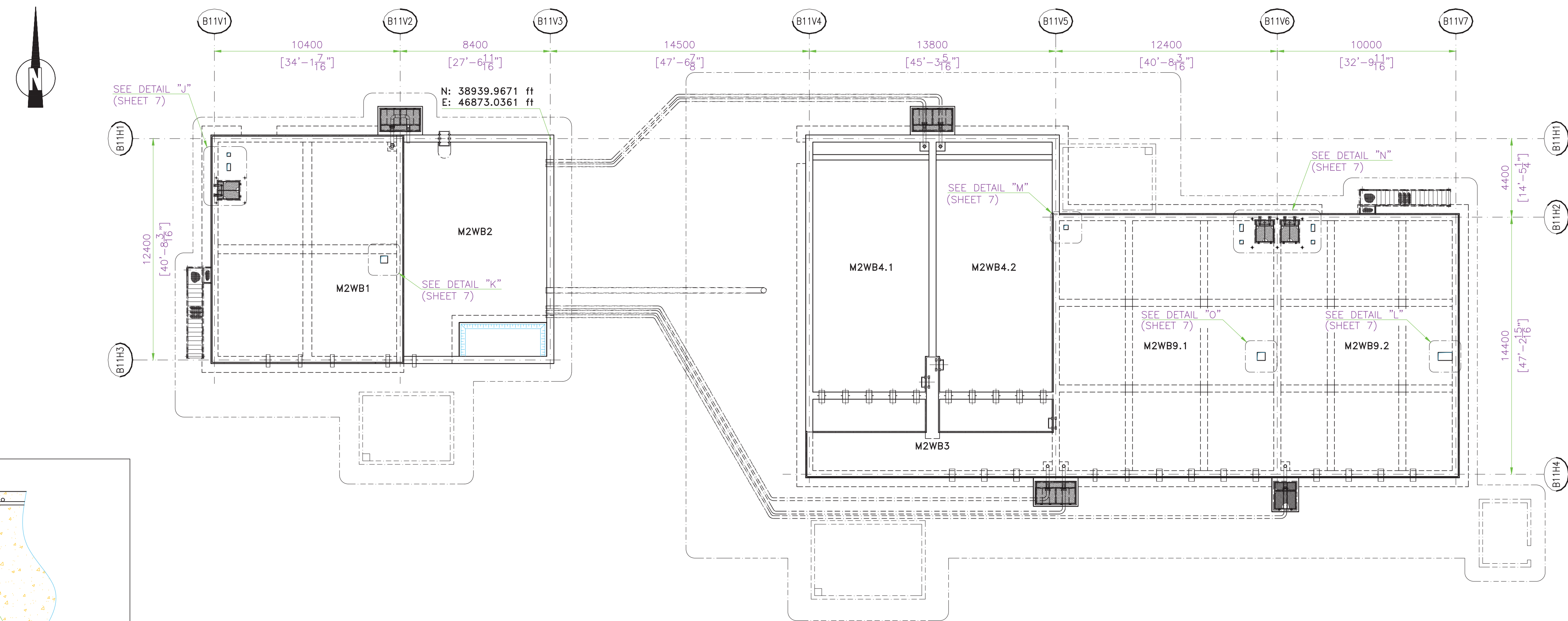
RUSSULA
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043289

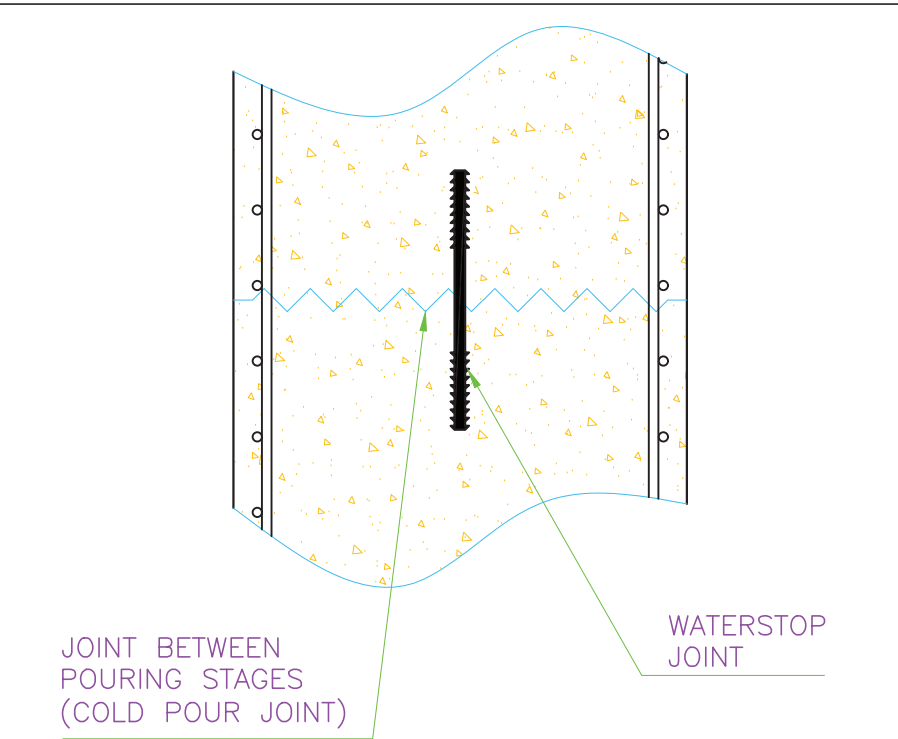
DATE	REVISION DESCRIPTION	NO.	XX
XX-XX-XX			

Drawn By: **AES** Date: **10-19-22**
Checked By: **AHR** Scale: **24"x36" 1:75**
Project Number: **BHLP-22172**

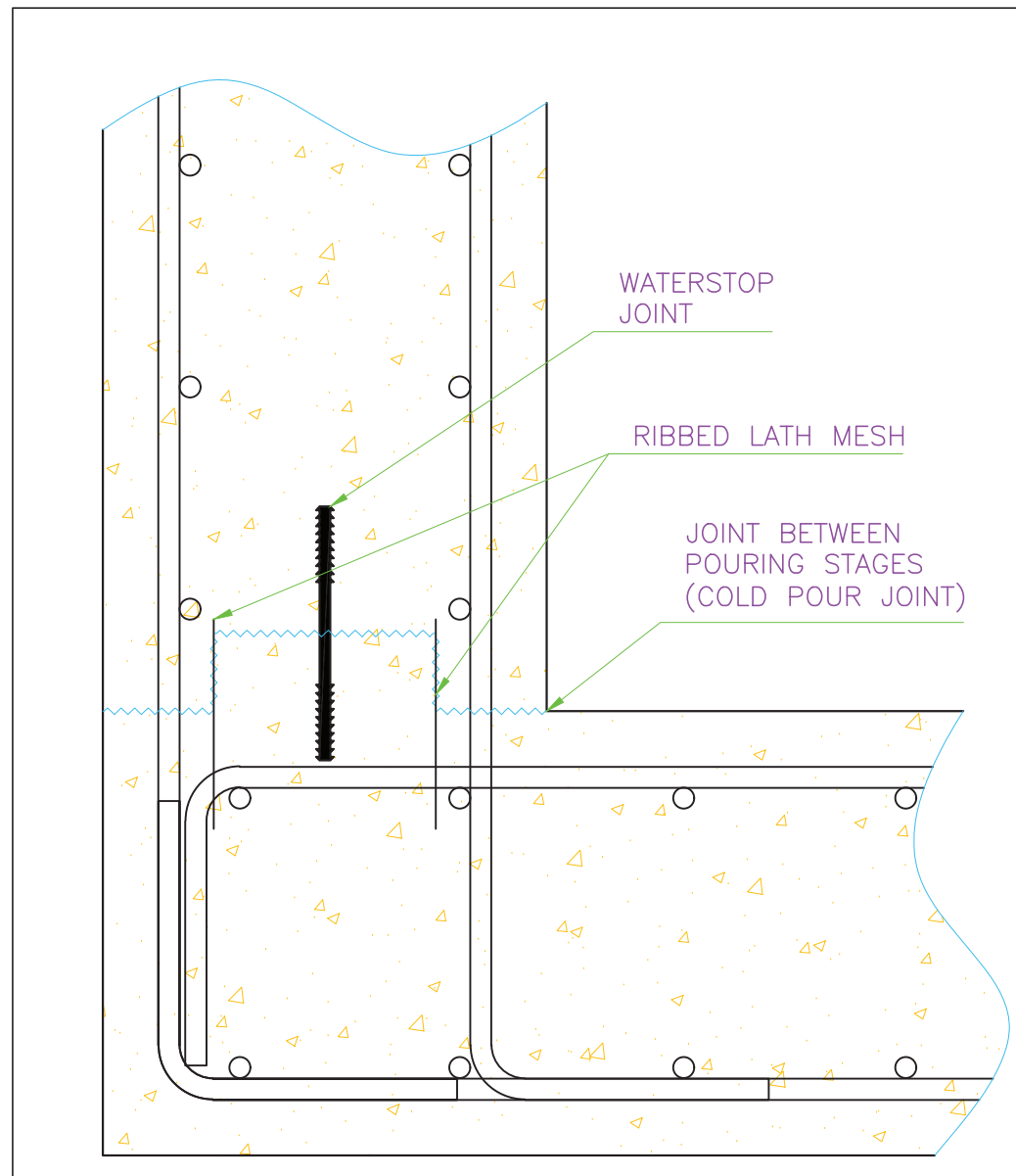
C12G



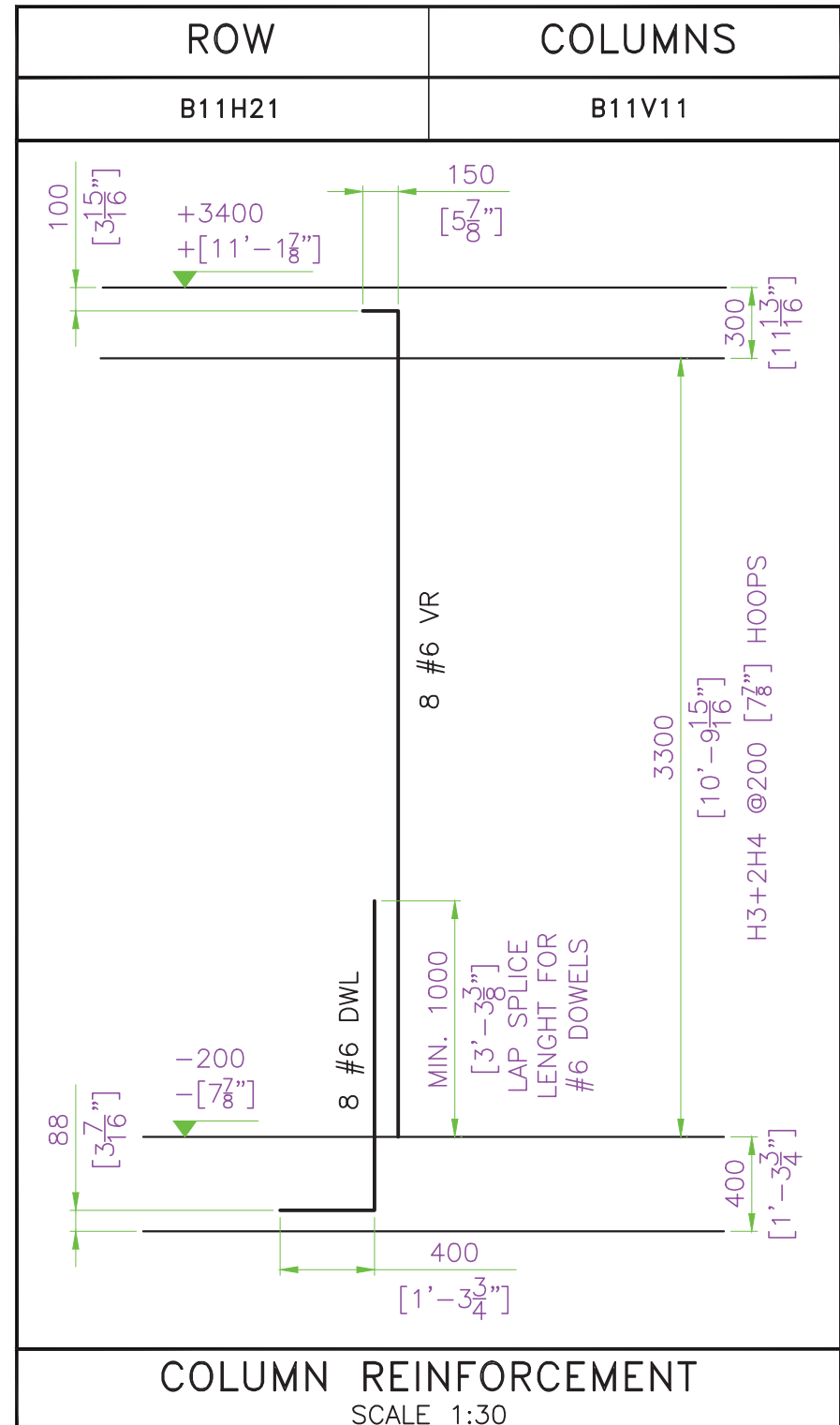
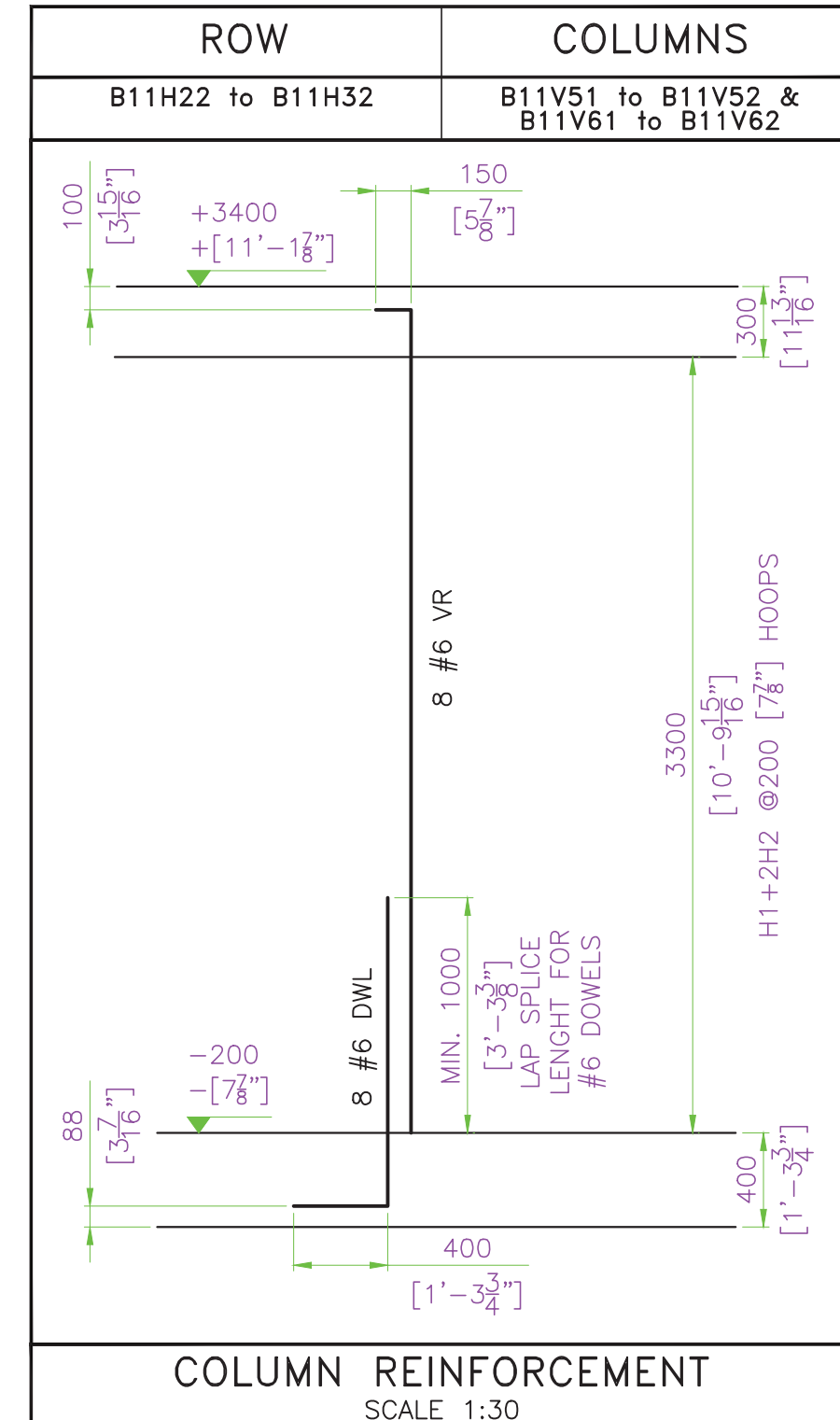
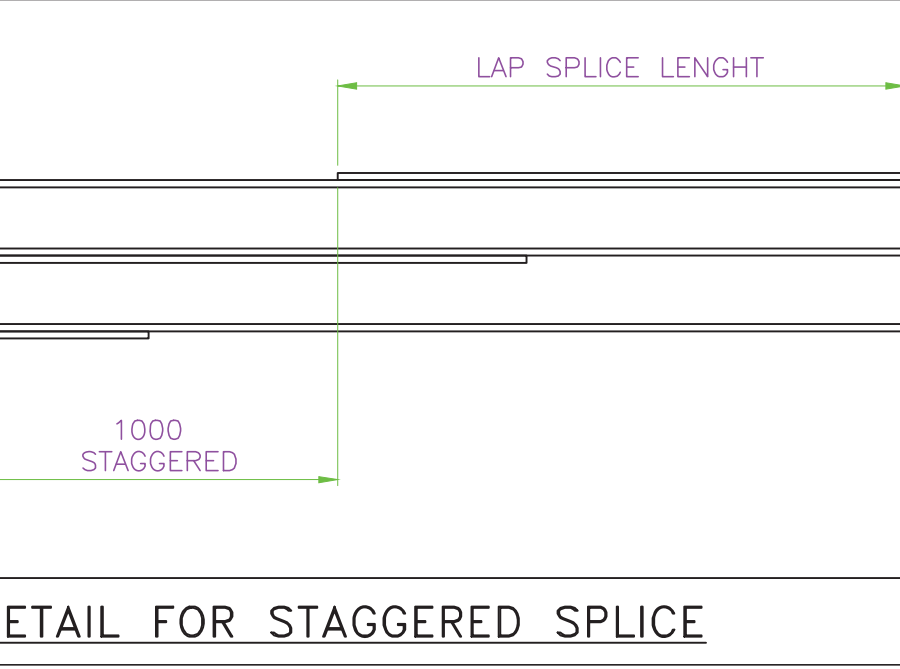
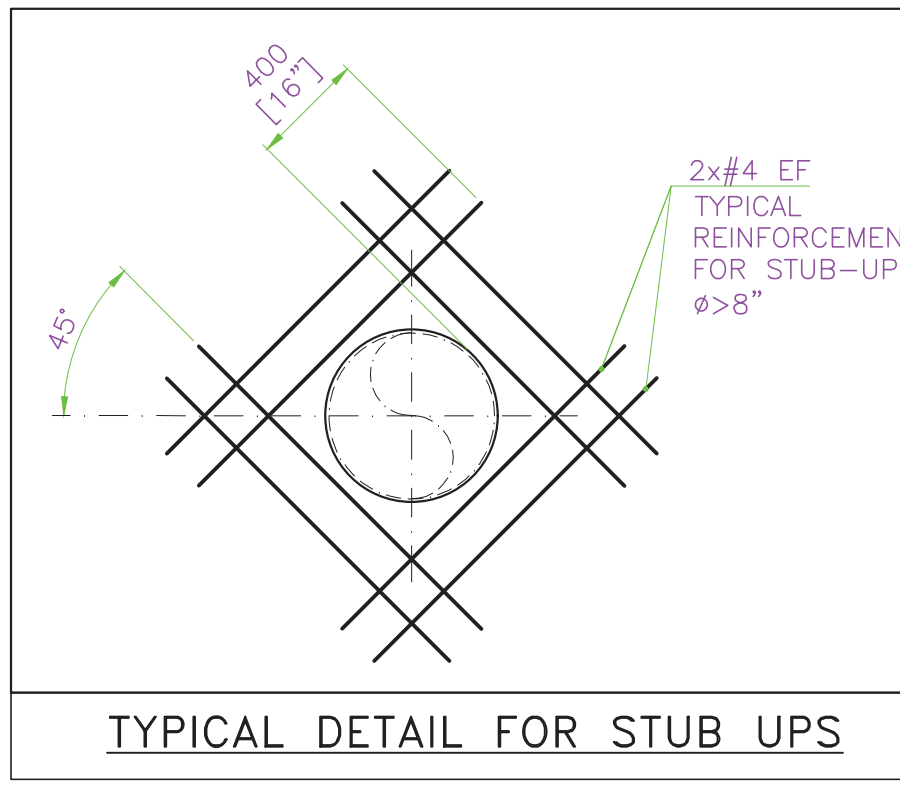
WATERSTOP JOINT DETAIL FOR VERTICAL CONSTRUCTION JOINT
 TYPE: SIKA FLAT RIBBED No. 646
 MATERIAL: PVC
 LENGTH: 9"



WATERSTOP JOINT DETAIL FOR HORIZONTAL CONSTRUCTION JOINT
 TYPE: SIKA FLAT RIBBED No. 646
 MATERIAL: PVC
 LENGTH: 9"



WATERSTOP JOINT DETAIL FOR SLAB-WALL JOINT
 TYPE: SIKA FLAT RIBBED No. 646
 MATERIAL: PVC
 LENGTH: 9"



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NOMINAL CONCRETE COVER FOR REBAR	
FOUNDATIONS	2" / 50 mm
FOUNDATIONS (CONCRETE CAST AGAINST SOIL)	3" / 75 mm
WALLS	2" / 50 mm
COLUMNS	2" / 50 mm
BEAMS	2" / 50 mm

STRUCTURAL CONCRETE DESIGN PROPERTIES	
Characteristic cylinder compressive strength [f'c] (psi/MPa)	4,500 / 31
Concrete Slump Test - Abrams Cone (in/mm)	4"-6" / 100-150
Coarse Aggregate Size (in/mm)	¾" / 19
Exposure categories	F2, S0, W2, C1
REINFORCING STEEL DESIGN PROPERTIES	
Deformed carbon-steel bars, uncoated	ASTM A615 grade 60 (60 ksi / 413 MPa)
Welded steel wire fabric	ASTM A706 grade 60 (60 ksi / 413 MPa)

SUPPLEMENTARY DRAWINGS:
 043289 - CIVIL WORKS FORMS
 043291 - CIVIL WORKS SIDEWALKS
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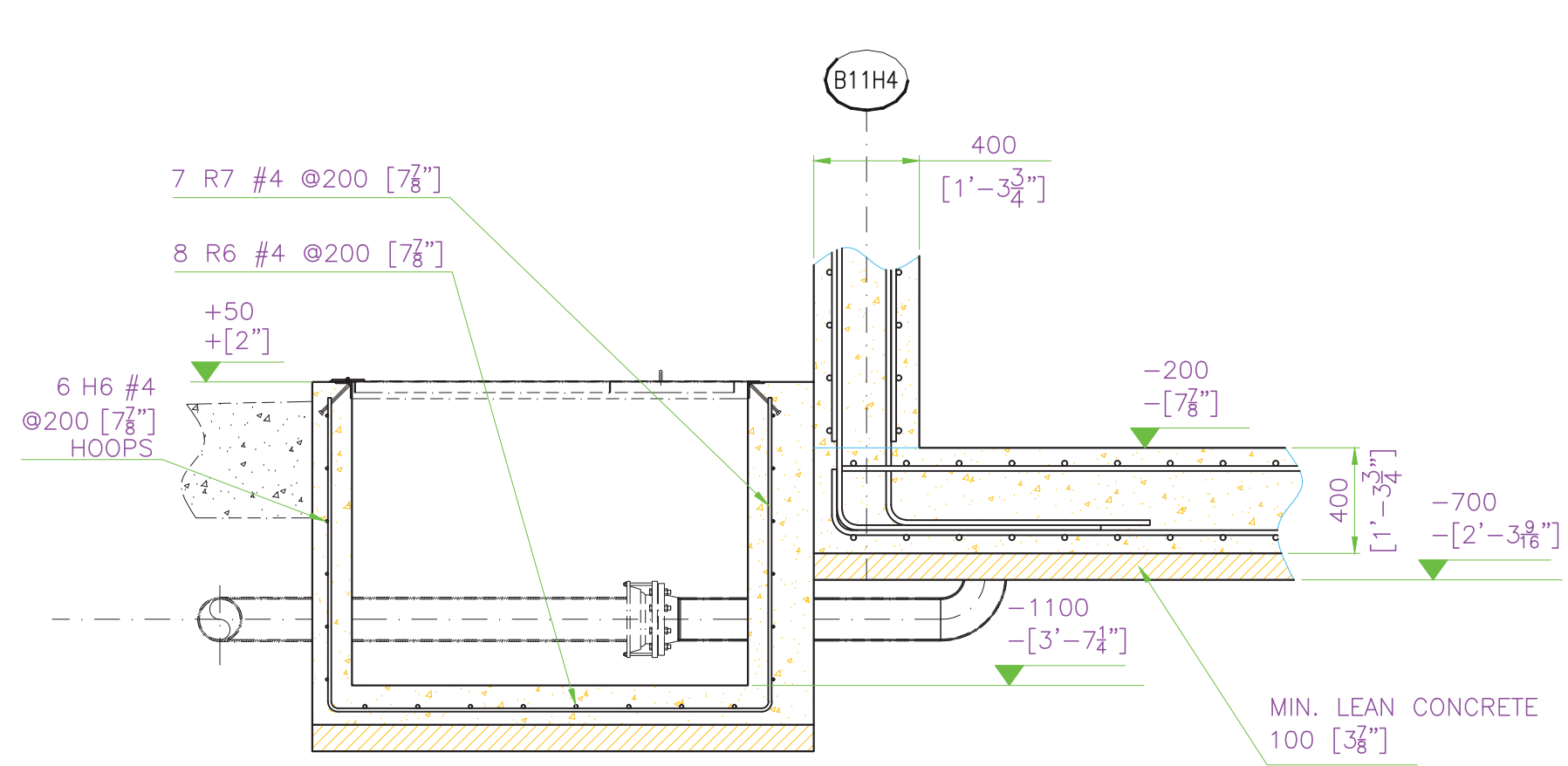
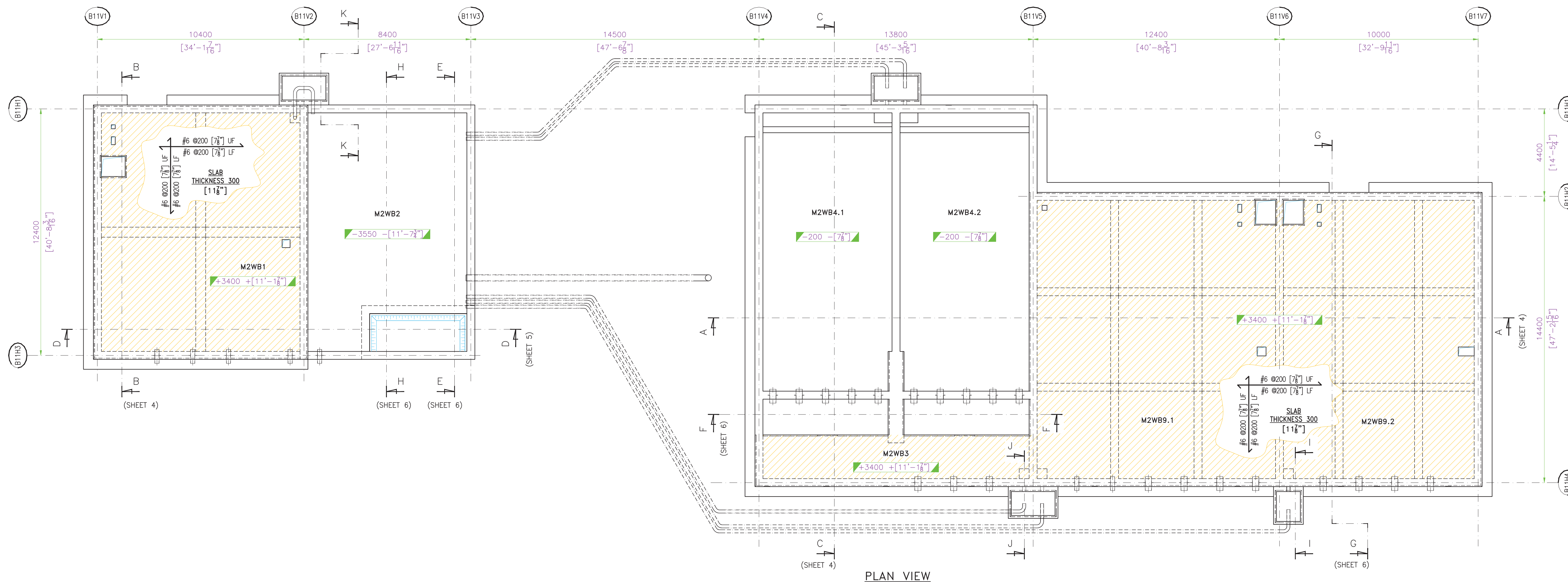
CONVENTIONAL GRAPHICAL SYMBOLS		
PLAN VIEW	ELEVATION	SECTIONS
▲ +0.00	ELEVATION AT FINISH	▲ +0.00
□ +0.00	ELEVATION AT RUSTIC	▼ +0.00
▲ +0.00	ELEVATION FOR MACHINERY RESTING	▼ +0.00
↘	DIRECTION OF SLOPE	

KEY TO ABBREVIATIONS		SYMBOLS	
VR = VERTICAL REBAR	UF = UPPER FACE	⊙	HOOK END TOWARDS INSIDE OF PAPER
HR = HORIZONTAL REBAR	LF = LOWER FACE	⊙	HOOK END TOWARDS OUTSIDE OF PAPER
DWL = DOWEL REBAR	NF = NEAR FACE	—	REBAR WITHOUT HOOK
CR = CROSS REBAR	FF = FAR FACE		
AR = ADDITIONAL REINFORCEMENT	EF = EACH WAY		
	EW = EACH WAY		

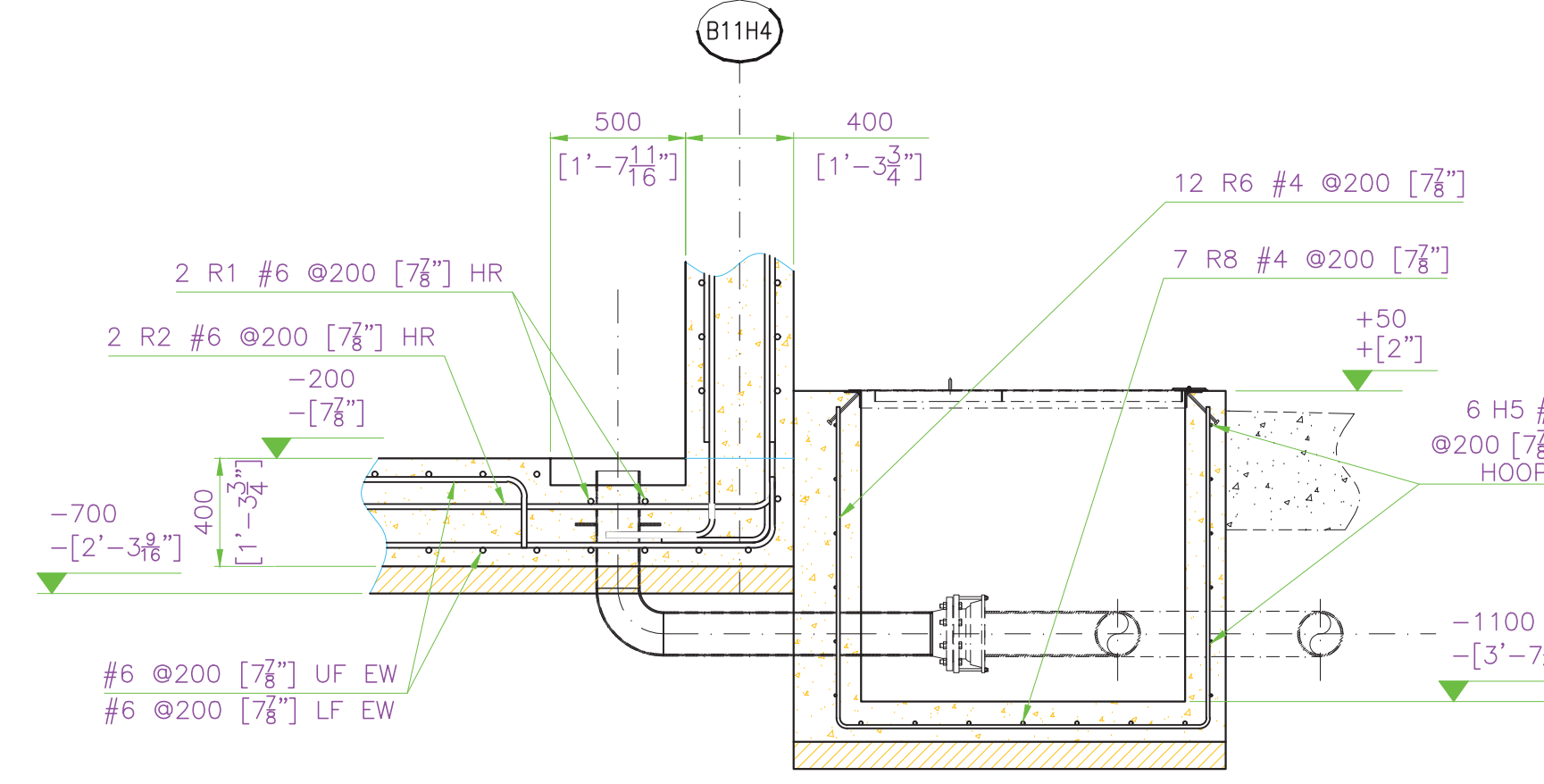
MATERIAL		CONDITION:	
UNITS:	DUAL	CIVIL WORKS REINFORCING STEEL	FIRST ANGLE PROJECTION
SCALE:	1:150	WASTE WATER BASINS	
DATA:	21-09-22		
DRN:	INY		
CHK:	JLM		
APP:	ALL		
RUSSULA Ingeniería y Servicios		SHEET 1 OF 8	
		043290	

DATE	REVISION DESCRIPTION	NO.	BY	DATE
XX-XX-XX		XX	X	

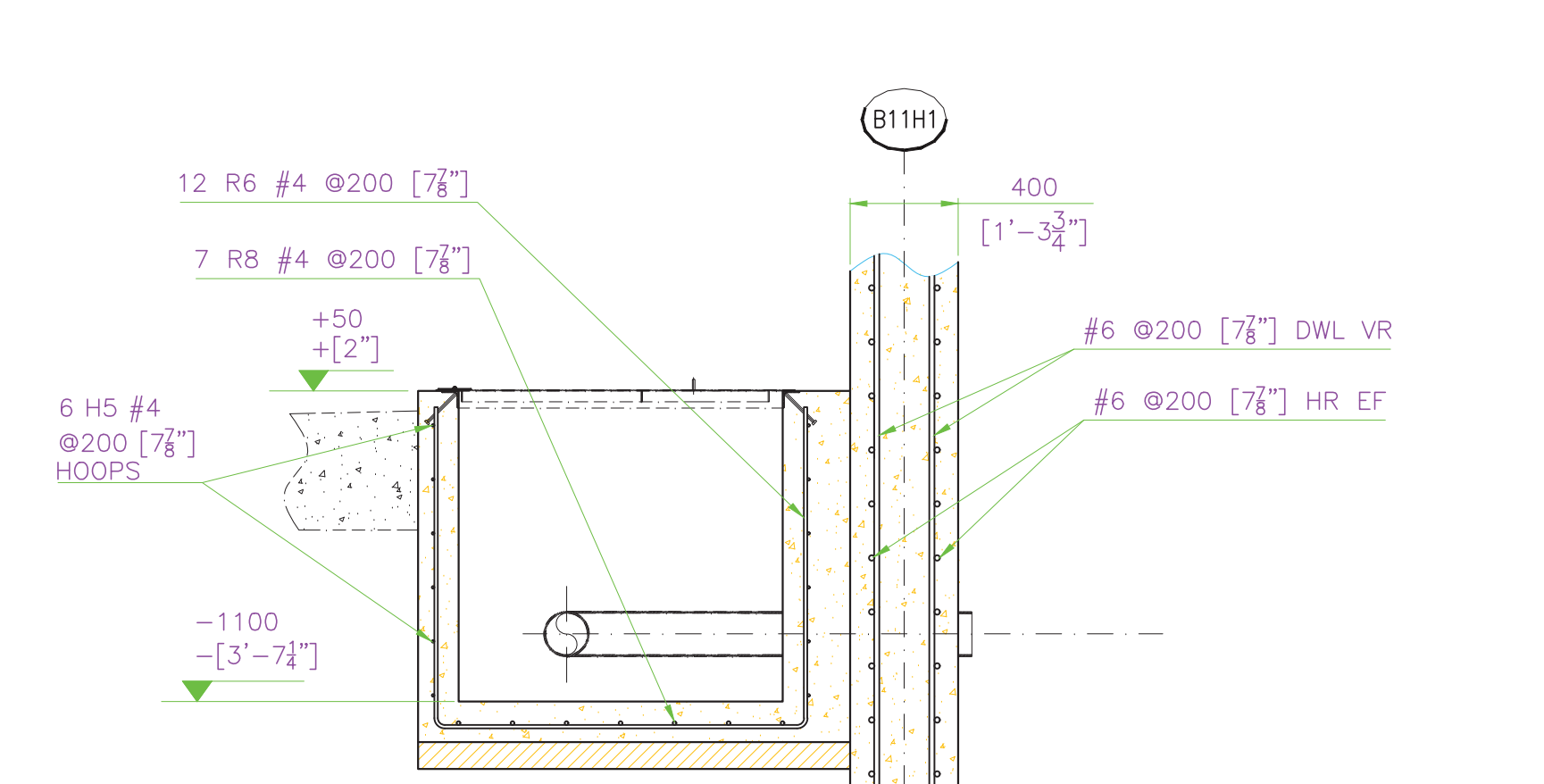
Drawn By: **AES** Date: **10-19-22**
 Checked By: **AHR** Scale: **24"x36" 1:150**
 Project Number: **BHLP-22172**



SECTION I-I
SCALE 1:25
ROTATED 90°



SECTION J-J
SCALE 1:25
ROTATED 90°



SECTION K-K
SCALE 1:25
ROTATED 90°

NOTES:

- ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS AND BETWEEN BRACKETS IN THE IMPERIAL SYSTEM, UNLESS OTHERWISE SPECIFIED.
- ALL ELEVATIONS NOTED ON THIS DRAWING ARE BASED ON ±0,00m. LEVEL CORRESPONDING TO 242'.
- NORTH AND EAST COORDINATES NOTED ON THIS DRAWING ARE PLAN COORDINATES AND ARE EXPRESSED IN FEET.
- THE NORTH DIRECTION NOTED ON THIS DRAWING IS THE NORTH OF THE PROJECT.
- CHEMICAL ANCHOR BOLTS SHALL BE INSTALLED BY MECHANICAL CONTRACTOR.
- GATHERING SLOPES SHALL NOT DECREASE THE NOMINAL DIMENSIONS OF THE CIVIL WORK.
- CONCRETE FOR BASIN CONSTRUCTIONS SHALL BE MIXED WITH WATERPROOFING ADMIXTURES.
- USE AN APPROPRIATE WALL ANCHOR FITTING EMBEDDED INTO THE WALL WHERE CPVC/HDPE PIPES ENTER THE BASIN. ALTERNATIVELY, COVER PIPE WALL EMBEDDINGS WITH STICK WATERSTOP JOINT, OR SIMILAR, AVOIDING WATER SEEPAGE.
- STRUCTURAL CONCRETE SHALL COMPLY WITH RUSSULA PS22_01642_CTS_001: CAST-IN-PLACE STRUCTURES.
- EQUIPMENT AND STRUCTURES SHALL BE GROUTED AS INDICATED IN PS22_01642_CTS_002: GROUTING OF EQUIPMENT AND BASEPLATES.
- EXCAVATION AND BACKFILL SHALL BE CARRIED OUT AS INDICATED IN PS22_01642_CTS_003: EXCAVATION AND BACKFILL.
- CAST-IN ELEMENTS SHALL COMPLY WITH PS22_01642_CTS_004: EMBEDDED ELEMENTS IN CONCRETE.
- CONTACT SURFACE BETWEEN CONCRETE POURING STAGES MUST BE ROUGH, AND IT MUST BE CLEANED AND PRESOAKED BEFORE POURING THE NEXT STAGE. SURFACE MUST BE DAMP BUT NOT DRENCHED.
- CONCRETE POURING STAGES WILL BE DEFINED BY THE CONTRACTOR IN ORDER TO MINIMIZE SLAB AND WALL RETRACTION WHEN CURING.

NOMINAL CONCRETE COVER FOR REBAR	
FOUNDATIONS	2" / 50 mm
FOUNDATIONS (CONCRETE CAST AGAINST SOIL)	3" / 75 mm
WALLS	2" / 50 mm
COLUMNS	2" / 50 mm
BEAMS	2" / 50 mm

STRUCTURAL CONCRETE DESIGN PROPERTIES	
Characteristic cylinder compressive strength [f'c] (psi/MPa)	4,500 / 31
Concrete Slump Test - Abrams Cone (in/mm)	4"-6" / 100-150
Coarse Aggregate Size (in/mm)	3" / 19
Exposure categories	F2, S0, W2, C1
REINFORCING STEEL DESIGN PROPERTIES	
Deformed carbon-steel bars, uncoated	ASTM A615 grade 60 (60 ksi / 413 MPa)
Welded steel wire fabric	ASTM A706 grade 60 (60 ksi / 413 MPa)

SUPPLEMENTARY DRAWINGS:
043289 - CIVIL WORKS FORMS
043291 - CIVIL WORKS SIDEWALKS
042714 - ELECTRICAL CONDUITS
EL000406 - GROUND SYSTEM

CONVENTIONAL GRAPHICAL SYMBOLS		
PLAN VIEW	ELEVATION AT FINISH	SECTIONS
	ELEVATION AT FINISH	+0.00
	ELEVATION AT RUSTIC	+0.00
	ELEVATION FOR MACHINERY RESTING	+0.00
	DIRECTION OF SLOPE	

KEY TO ABBREVIATIONS		SYMBOLS	
VR = VERTICAL REBAR	UF = UPPER FACE		HOOK END TOWARDS INSIDE OF PAPER
HR = HORIZONTAL REBAR	LF = LOWER FACE		HOOK END TOWARDS OUTSIDE OF PAPER
DWL = DWEL REBAR	NF = NEAR FACE		
CR = CROSS REBAR	FF = FAR FACE		
AR = ADDITIONAL REINFORCEMENT	EF = EACH FACE		
	EW = EACH WAY		
			REBAR WITHOUT HOOK

MATERIAL		CONDITION:	
UNITS: DUAL	CIVIL WORKS REINFORCING STEEL	FIRST ANGLE PROJECTION	
SCALE: 1:100	WASTE WATER BASINS	REV.	IRI N°
DATA: 21-09-22		A	
DRN: INY		FIN WT:	
CHK: JLM		SHEET 2 OF 8	
APP: ALL			

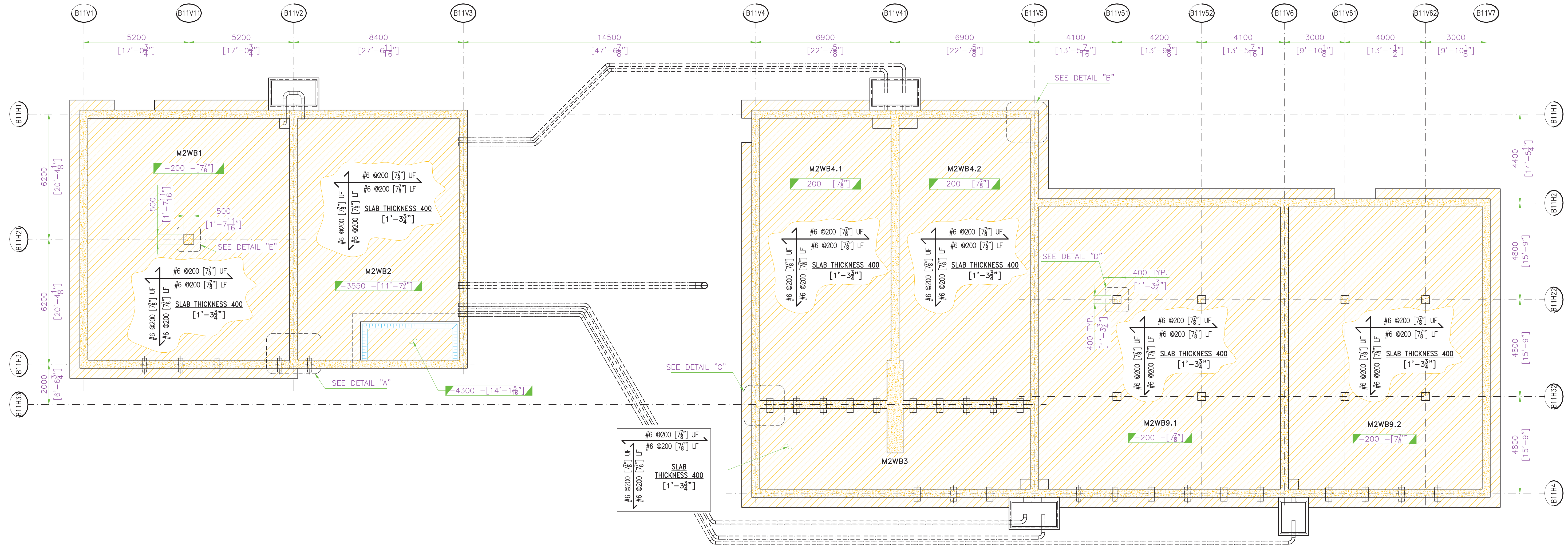


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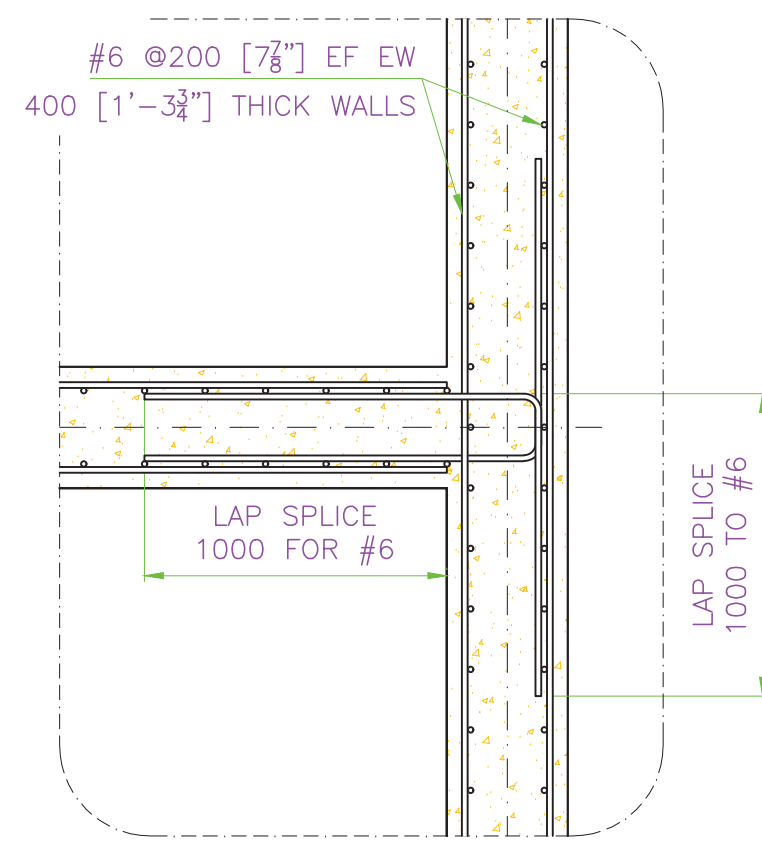
DATE	REVISION DESCRIPTION	NO	XX
XX-XX-XX		XX	XX

Drawn By: **AES** Date: **10-19-22**
Checked By: **AHR** Scale: **24"x36" 1:100**
Project Number: **BHLP-22172**

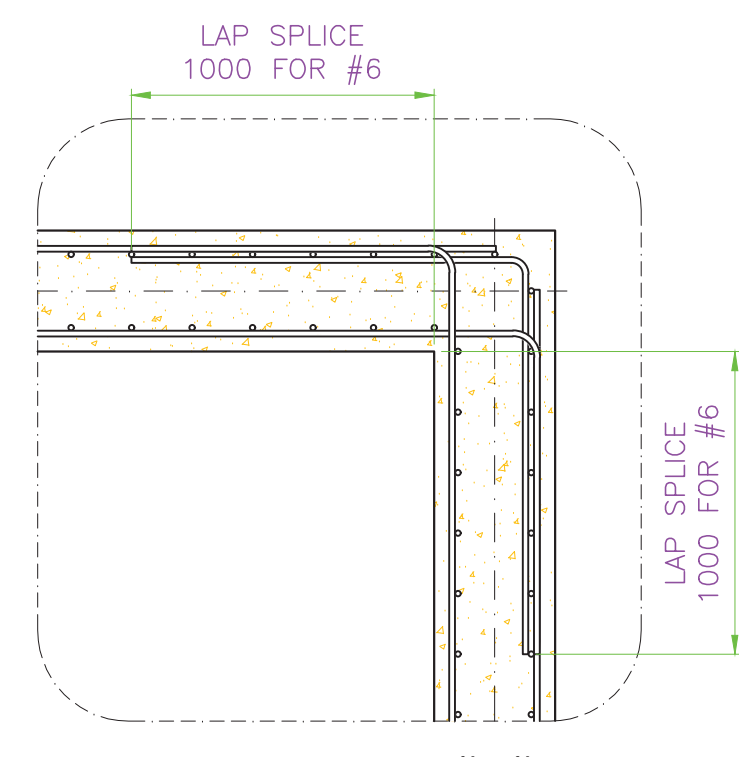
C13B



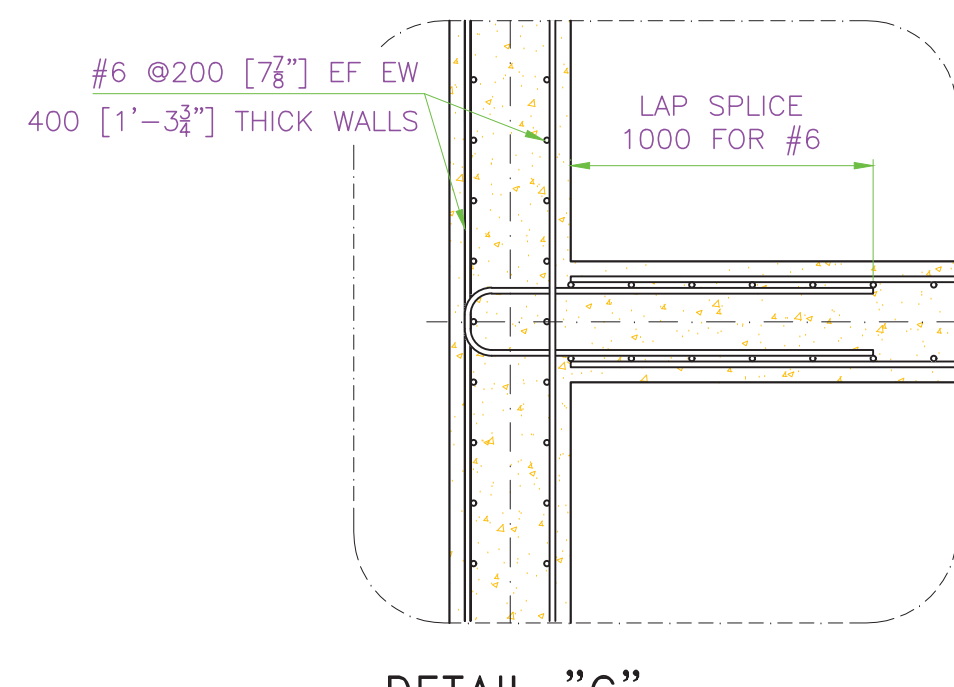
PLAN VIEW
ELEVATION +200 +[7/8"]



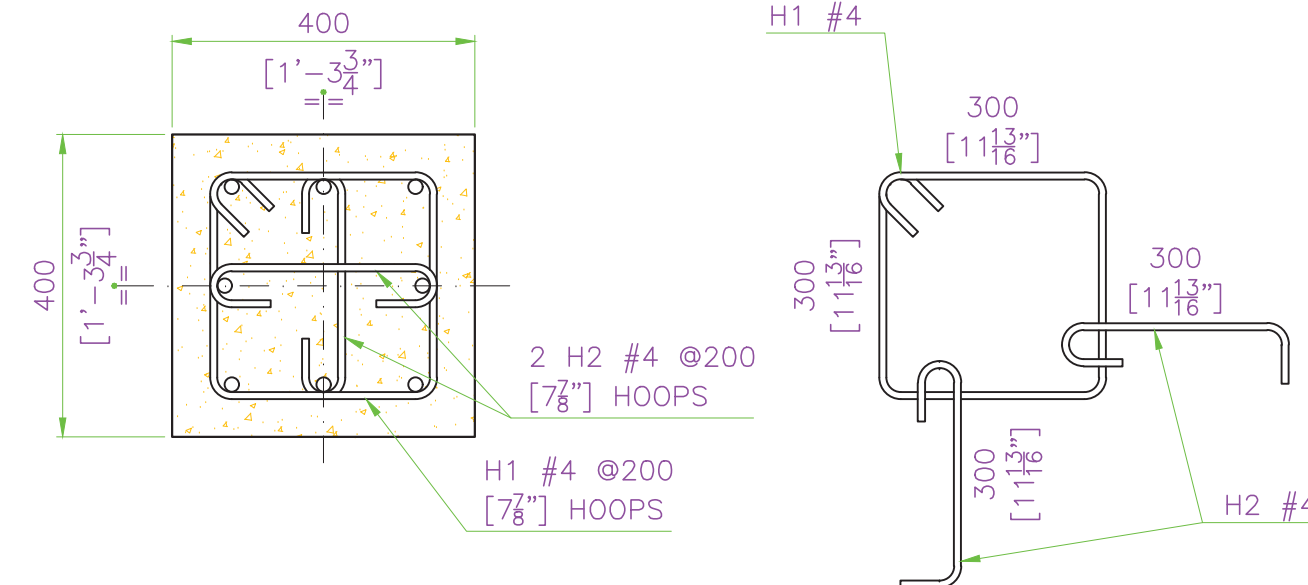
DETAIL "A"
TYPICAL WALL TO WALL JOINT DETAIL
SCALE 1:20
ROTATED 90°



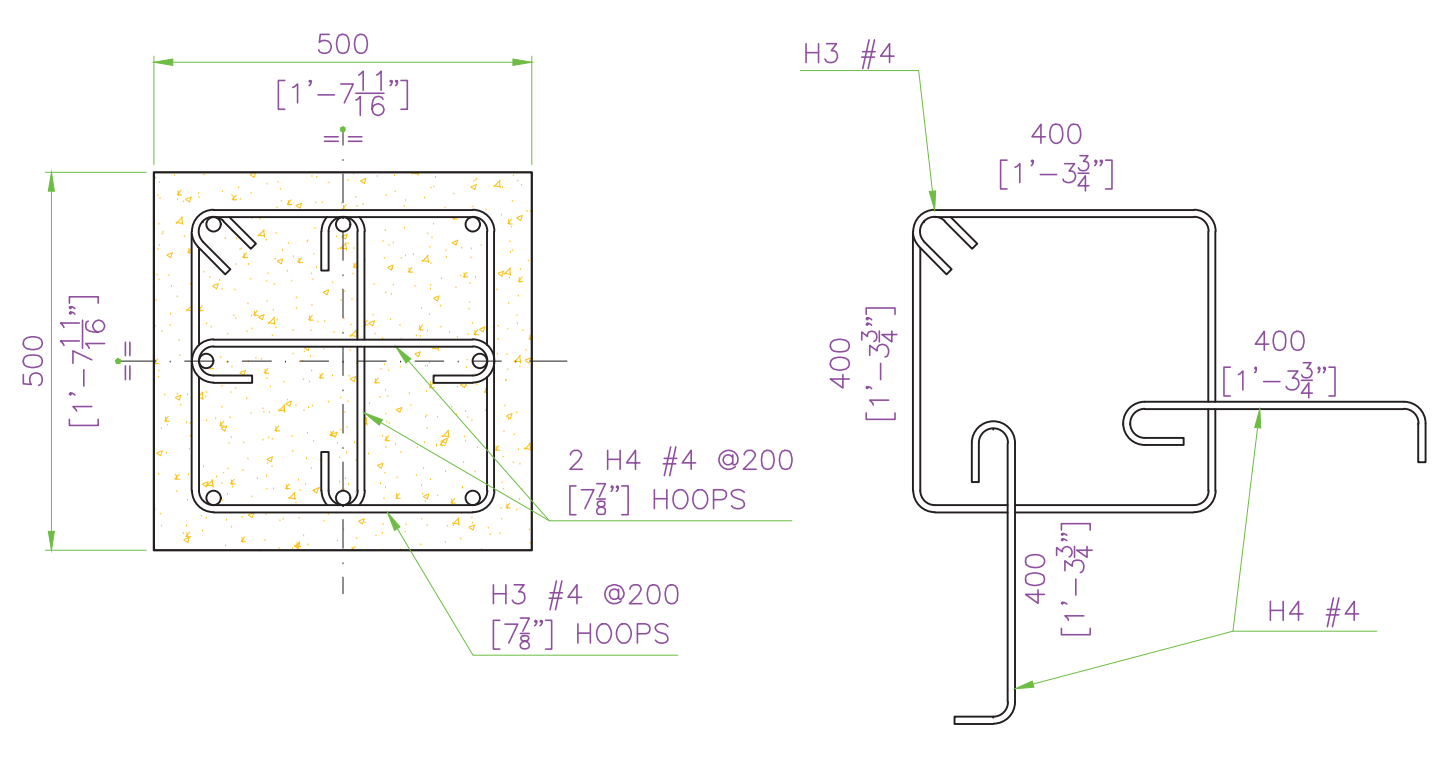
DETAIL "B"
TYPICAL CORNER DETAIL
SCALE 1:20



DETAIL "C"
WALL TO WALL JOINT DETAIL
- TWO SYMMETRICAL POSITIONS -
SCALE 1:20



DETAIL "D"
COLUMN HOOPS (TYP.)
COLUMN REINFORCEMENT
SCALE 1:10



DETAIL "E"
COLUMN HOOPS (TYP.)
COLUMN REINFORCEMENT
SCALE 1:10

NOTES:

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- CONCRETE POURING STAGES WILL BE DEFINED BY THE CONTRACTOR IN ORDER TO MINIMIZE SLAB AND WALL RETRACTION WHEN CURING.

NOMINAL CONCRETE COVER FOR REBAR	
FOUNDATIONS	2" / 50 mm
FOUNDATIONS (CONCRETE CAST AGAINST SOIL)	3" / 75 mm
WALLS	2" / 50 mm
COLUMNS	2" / 50 mm
BEAMS	2" / 50 mm

STRUCTURAL CONCRETE DESIGN PROPERTIES	
Characteristic cylinder compressive strength [f'c] (psi/MPa)	4,500 / 31
Concrete Slump Test - Abrams Cone (in/mm)	4"-6" / 100-150
Coarse Aggregate Size (in/mm)	3" / 19
Exposure categories	F2, S0, W2, C1
REINFORCING STEEL DESIGN PROPERTIES	
Deformed carbon-steel bars, uncoated	ASTM A615 grade 60 (60 ksi / 413 MPa)
Welded steel wire fabric	ASTM A706 grade 60 (60 ksi / 413 MPa)

SUPPLEMENTARY DRAWINGS:
043289 - CIVIL WORKS FORMS
043291 - CIVIL WORKS SIDEWALKS
042714 - ELECTRICAL CONDUITS
EL000406 - GROUND SYSTEM

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

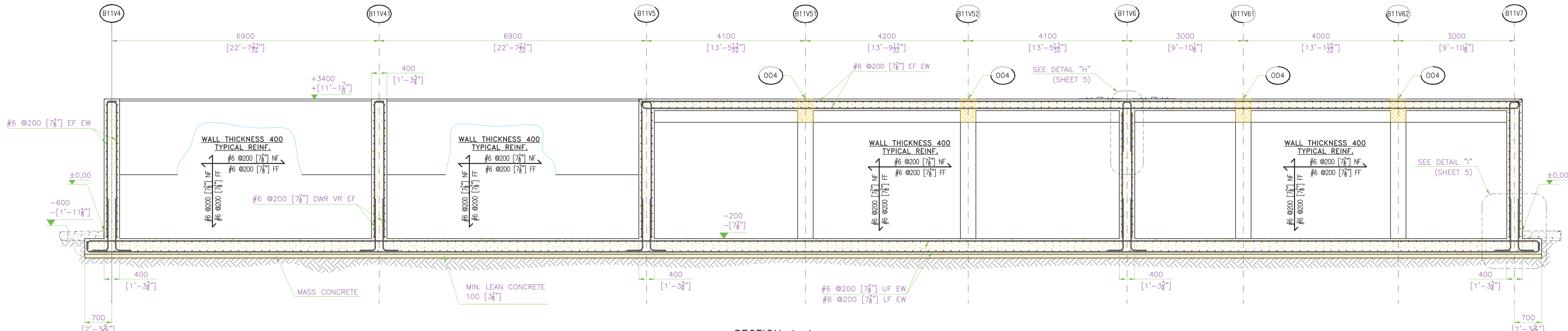
KEY TO ABBREVIATIONS		SYMBOLS	
VR = VERTICAL REBAR	UF = UPPER FACE		HOOK END TOWARDS INSIDE OF PAPER
HR = HORIZONTAL REBAR	LF = LOWER FACE		HOOK END TOWARDS OUTSIDE OF PAPER
DWL = DWEL REBAR	NF = NEAR FACE		REBAR WITHOUT HOOK
CR = CROSS REBAR	FF = FAR FACE		
AR = ADDITIONAL REINFORCEMENT	EF = EACH FACE		
	EW = EACH WAY		

MATERIAL		CONDITION:	
UNITS: DUAL	CIVIL WORKS REINFORCING STEEL	FIRST ANGLE PROJECTION	
SCALE: 1:100	WASTE WATER BASINS	REV.	IRI N°
DATA: 21-09-22		A	
DRN: INY		FIN WT:	
CHK: JLM		SHEET 3 OF 8	
APP: ALL			

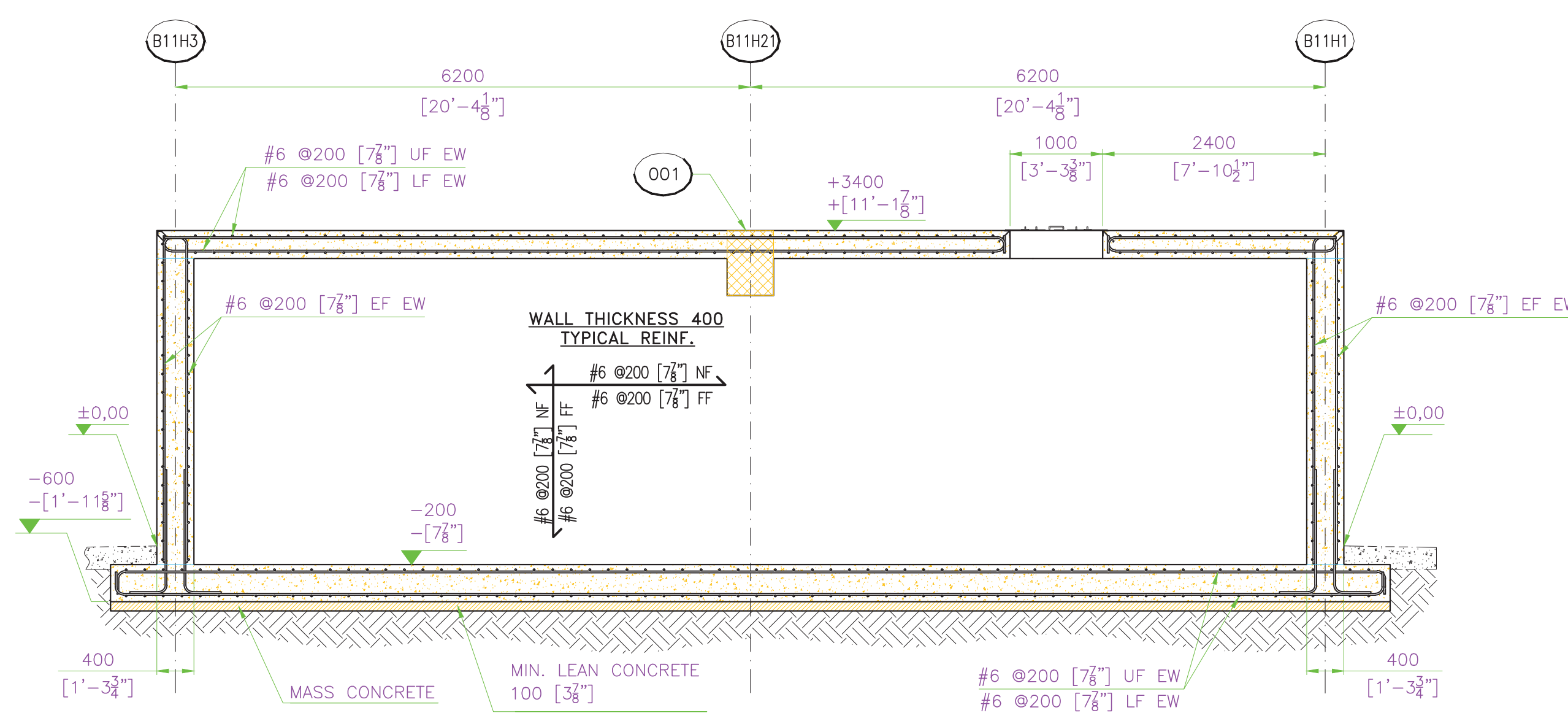
	RUSSULA Ingeniería y Servicios
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DATE	REVISION DESCRIPTION	NO.	XX	XX	XX
XX-XX-XX					

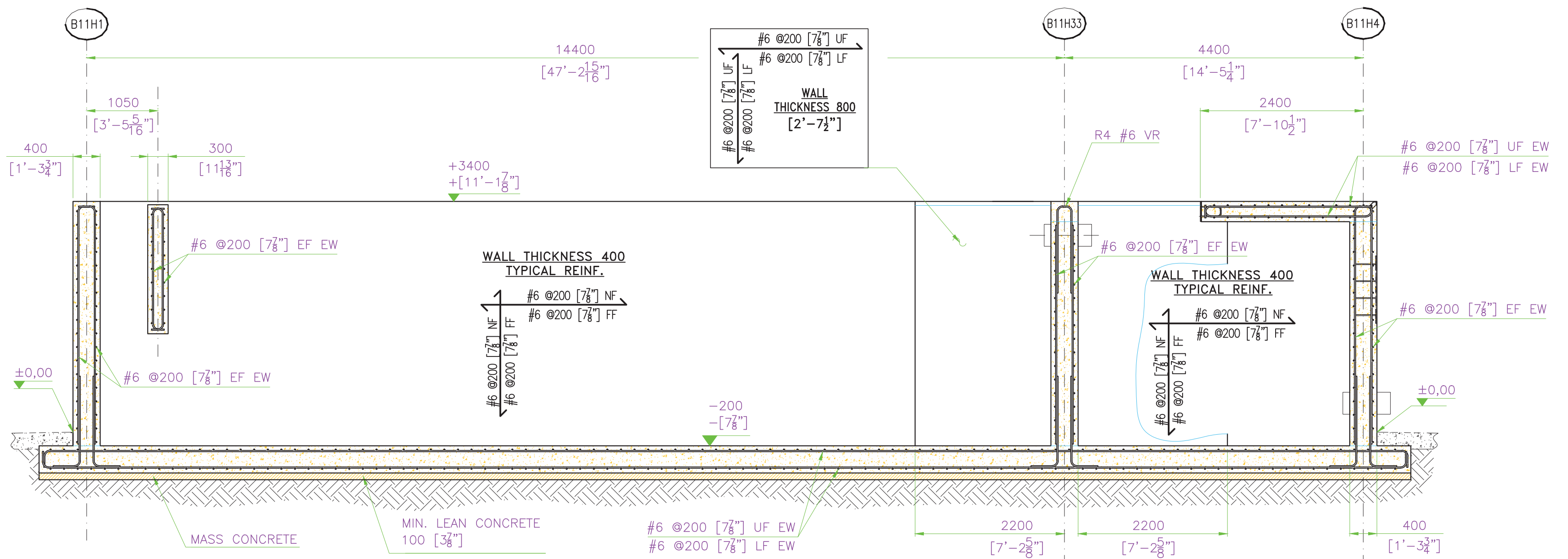
Drawn By: AES	Date: 10-19-22
Checked By: AHR	Scale: 24"x36" 1:100
Project Number: BHLP-22172	



SECTION A-A
(SHEET 2)



SECTION B-B
ROTATED 90°
(SHEET 2)



SECTION C-C
ROTATED 90°
(SHEET 2)

- 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 242'.
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 5. CHEMICAL ANCHOR BOLTS SHALL BE INSTALLED BY MECHANICAL CONTRACTOR.
 6. GATHERING SLOPES SHALL NOT DECREASE THE NOMINAL DIMENSIONS OF THE CIVIL WORK.
 7. CONCRETE FOR BASIN CONSTRUCTIONS SHALL BE MIXED WITH WATERPROOFING ADMIXTURES.
 8. USE AN APPROPRIATE WALL ANCHOR FITTING EMBEDDED INTO THE WALL WHERE CPVC/HDPE PIPES ENTER THE BASIN. ALTERNATIVELY, COVER PIPE WALL EMBEDDINGS WITH STICK WATERSTOP JOINT, OR SIMILAR, AVOIDING WATER SEEPAGE.
 9. STRUCTURAL CONCRETE SHALL COMPLY WITH RUSSULA PS22_01642_CTS_001: CAST-IN-PLACE STRUCTURES.
 10. EQUIPMENT AND STRUCTURES SHALL BE GROUTED AS INDICATED IN PS22_01642_CTS_002: GROUTING OF EQUIPMENT AND BASEPLATES.
 11. EXCAVATION AND BACKFILL SHALL BE CARRIED OUT AS INDICATED IN PS22_01642_CTS_003: EXCAVATION AND BACKFILL.
 12. CAST-IN ELEMENTS SHALL COMPLY WITH PS22_01642_CTS_004: EMBEDDED ELEMENTS IN CONCRETE.
 13. CONTACT SURFACE BETWEEN CONCRETE POURING STAGES MUST BE ROUGH, AND IT MUST BE CLEANED AND PROSOAKED BEFORE POURING THE NEXT STAGE. SURFACE SHOULD BE DAMP BUT NOT DRENCHED.
 14. CONCRETE POURING STAGES WILL BE DEFINED BY THE CONTRACTOR IN ORDER TO MINIMIZE SLAB AND WALL RETRACTION WHEN CURING.

NOMINAL CONCRETE COVER FOR REBAR	
FOUNDATIONS	2" / 50 mm
FOUNDATIONS (CONCRETE CAST AGAINST SOIL)	3" / 75 mm
WALLS	2" / 50 mm
COLUMNS	2" / 50 mm
BEAMS	2" / 50 mm

STRUCTURAL CONCRETE DESIGN PROPERTIES	
Characteristic cylinder compressive strength [f'c] (psi/MPa)	4,500 / 31
Concrete Slump Test - Abrams Cone (in/mm)	4"-6" / 100-150
Coarse Aggregate Size (in/mm)	3/4" / 19
Exposure categories	F2, S0, W2, C1
REINFORCING STEEL DESIGN PROPERTIES	
Deformed carbon-steel bars, uncoated	ASTM A615 grade 60 (60 ksi / 413 MPa)
Welded steel wire fabric	ASTM A706 grade 60 (60 ksi / 413 MPa)

SUPPLEMENTARY DRAWINGS:
043289 - CIVIL WORKS FORMS
043291 - CIVIL WORKS SIDEWALKS
042714 - ELECTRICAL CONDUITS
EL000406 - GROUND SYSTEM

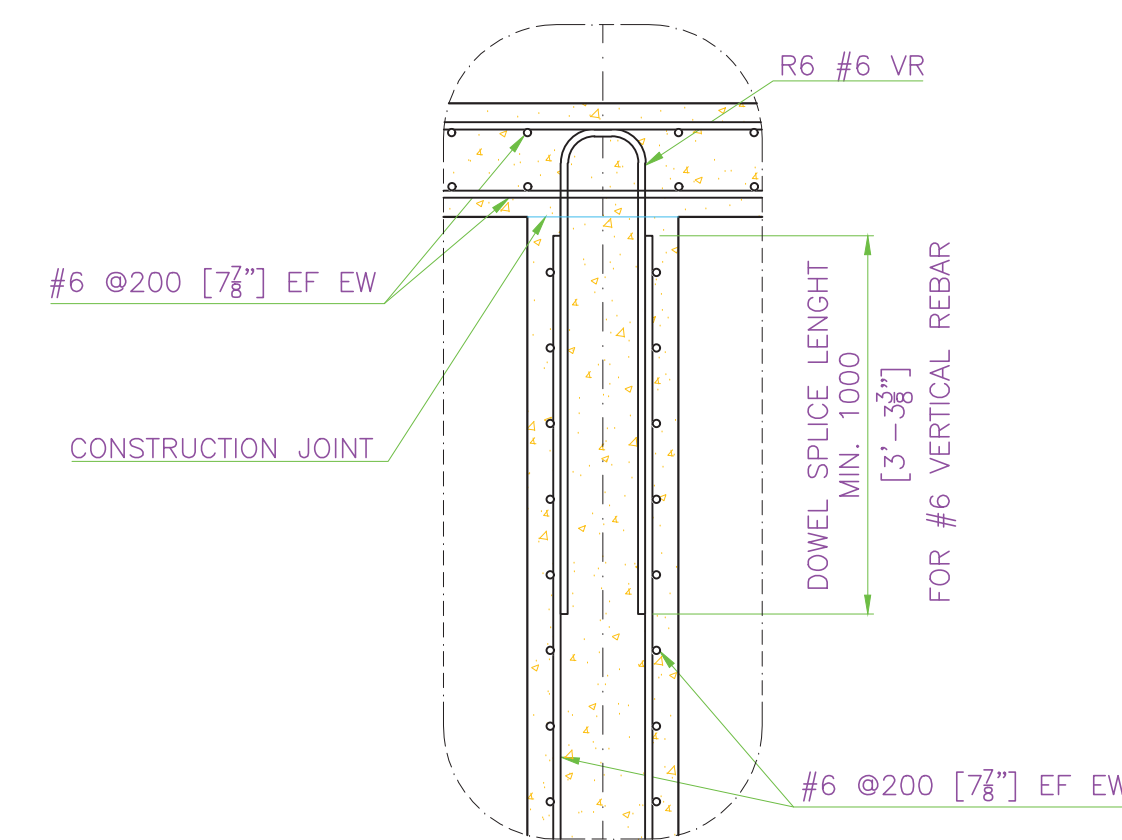
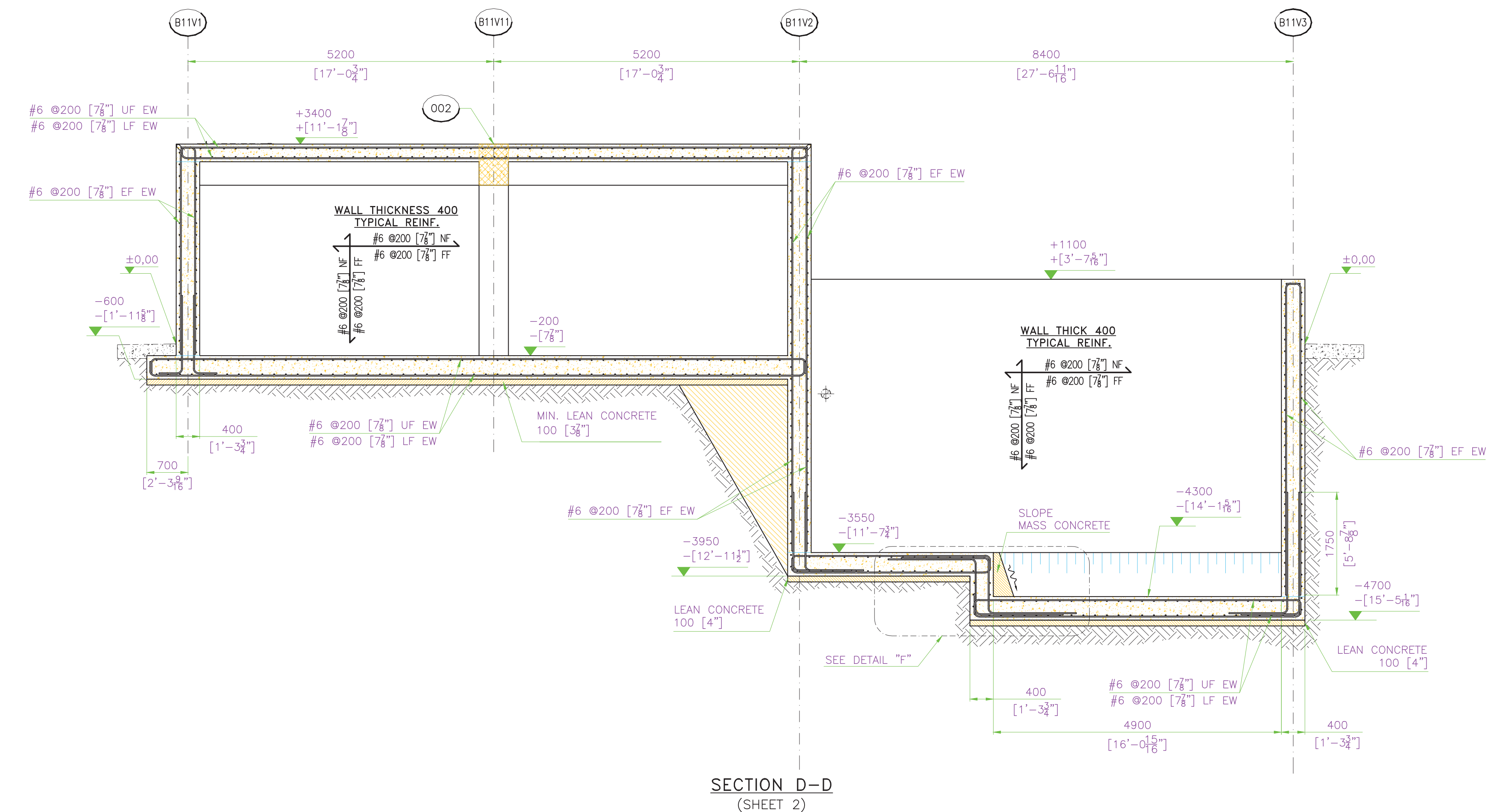
CONVENTIONAL GRAPHICAL SYMBOLS		
PLAN VIEW	SECTIONS	
▲ +0.00	ELEVATION AT FINISH	▼ +0.00
□ +0.00	ELEVATION AT RUSTIC	▽ +0.00
■ +0.00	ELEVATION FOR MACHINERY RESTING	▽ +0.00
~	DIRECTION OF SLOPE	

KEY TO ABBREVIATIONS		SYMBOLS	
VR = VERTICAL REBAR	UF = UPPER FACE	⊗	HOOK END TOWARDS INSIDE OF PAPER
HR = HORIZONTAL REBAR	LF = LOWER FACE	⊙	HOOK END TOWARDS OUTSIDE OF PAPER
DWL = DWEL REBAR	NF = NEAR FACE	—	REBAR WITHOUT HOOK
CR = CROSS REBAR	FF = FAR FACE		
AR = ADDITIONAL REINFORCEMENT	EW = EACH WAY		

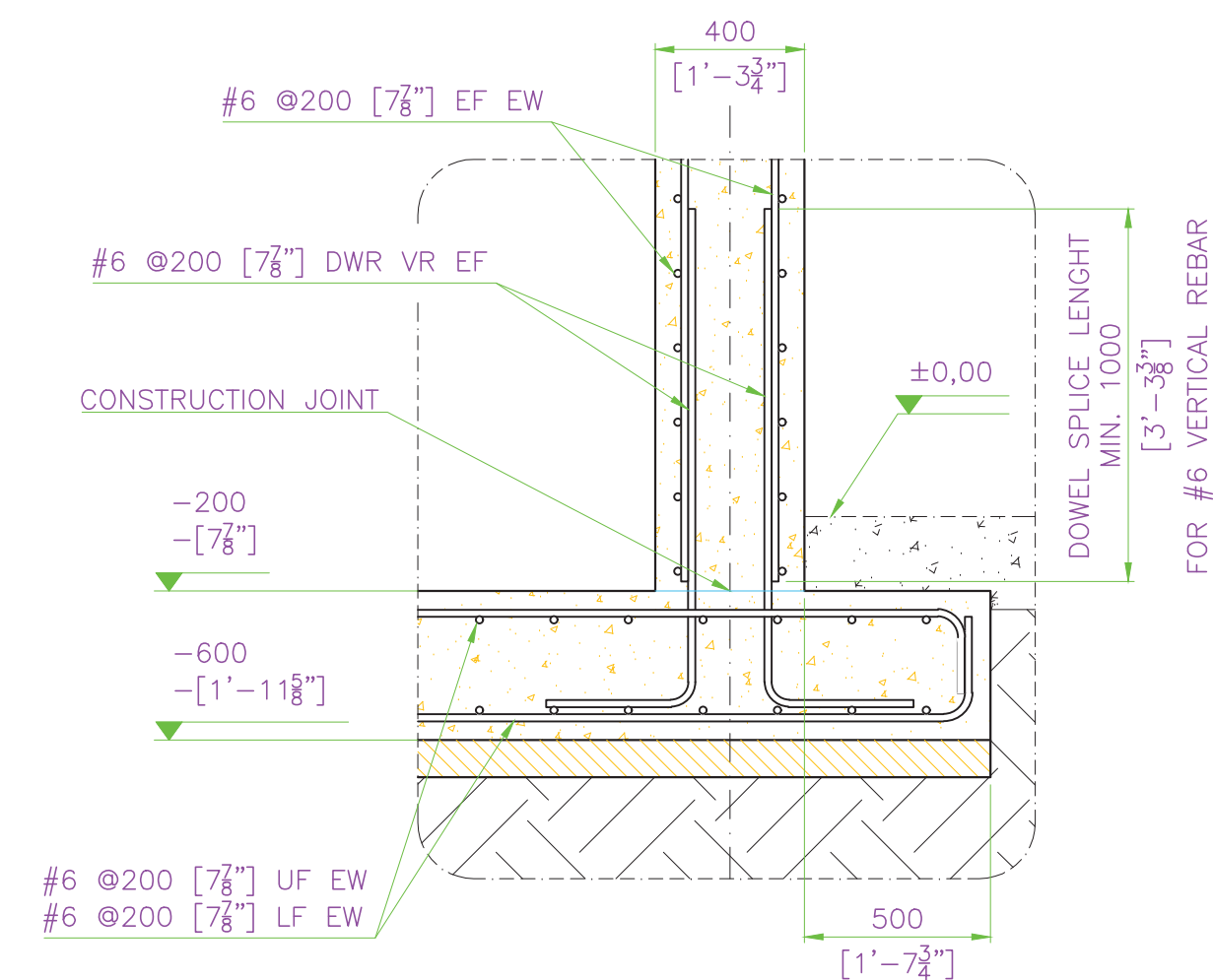
MATERIAL	CONDITION:	CIVIL WORKS REINFORCING STEEL WASTE WATER BASINS	
UNITS: DUAL	SCALE: 1:50	DATA: 21-09-22	DRN: INY
CHK: JLM	APP: ALL	REV. A	IRI N°
FIN WT:		SHEET 4 OF 8	
RUSSULA Ingeniería y Servicios		043290	

DATE	REVISION DESCRIPTION	NO.	XX	XX	XX	XX	XX
XX-XX-XX							

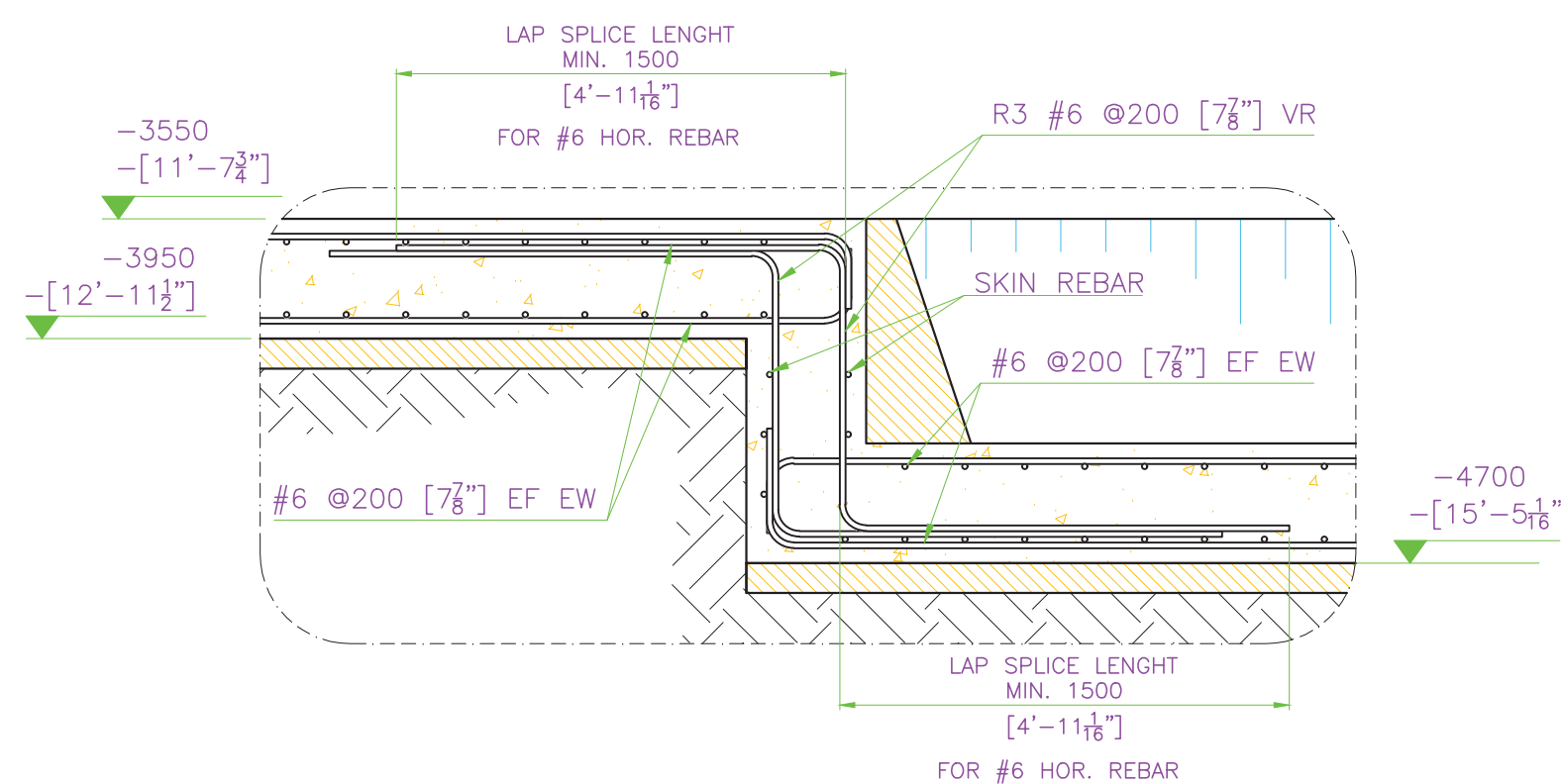
Drawn By: **AES** Date: **10-19-22**
Checked By: **AHR** Scale: **24"x36" 1:50**
Project Number: **BHLP-22172**



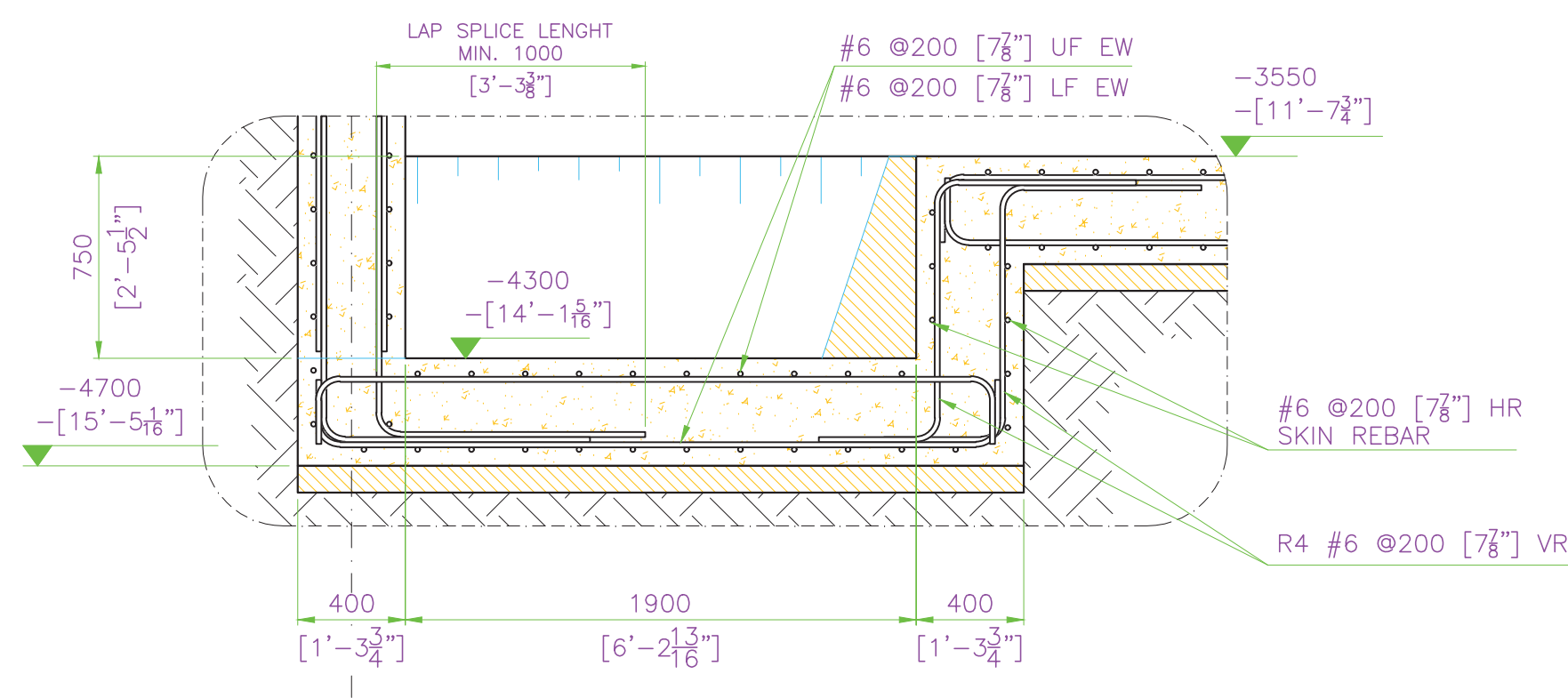
DETAIL H
-TYPICAL BOND TO ROOF SLAB-
SCALE 1:20
(SHEET 4)



DETAIL I
-TYPICAL FOOTING SPRINGLINE-
SCALE 1:20
(SHEET 4)



DETAIL F
SCALE 1:25



DETAIL G
SCALE 1:25
(SHEET 6)

NOTES:

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FOUNDATIONS (CONCRETE CAST AGAINST SOIL)	3" / 75 mm
WALLS	2" / 50 mm
COLUMNS	2" / 50 mm
BEAMS	2" / 50 mm

STRUCTURAL CONCRETE DESIGN PROPERTIES	
Characteristic cylinder compressive strength [f'c] (psi/MPa)	4,500 / 31
Concrete Slump Test - Abrams Cone (in/mm)	4"-6" / 100-150
Coarse Aggregate Size (in/mm)	¾" / 19
Exposure categories	F2, S0, W2, C1
REINFORCING STEEL DESIGN PROPERTIES	
Deformed carbon-steel bars, uncoated	ASTM A615 grade 60 (60 ksi / 413 MPa)
Welded steel wire fabric	ASTM A706 grade 60 (60 ksi / 413 MPa)

SUPPLEMENTARY DRAWINGS:
043289 - CIVIL WORKS FORMS
043291 - CIVIL WORKS SIDEWALKS
042714 - ELECTRICAL CONDUITS
EL000406 - GROUND SYSTEM

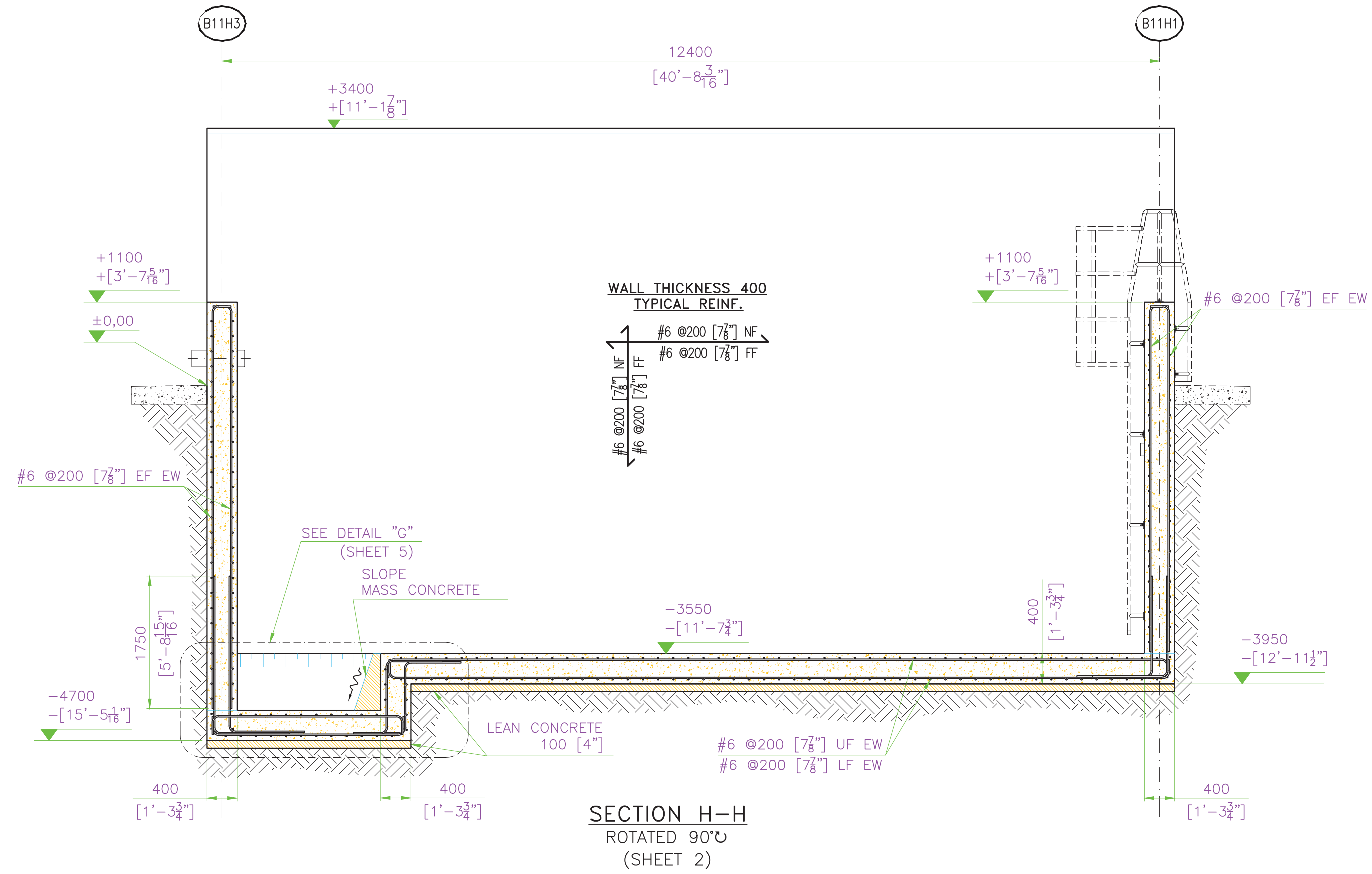
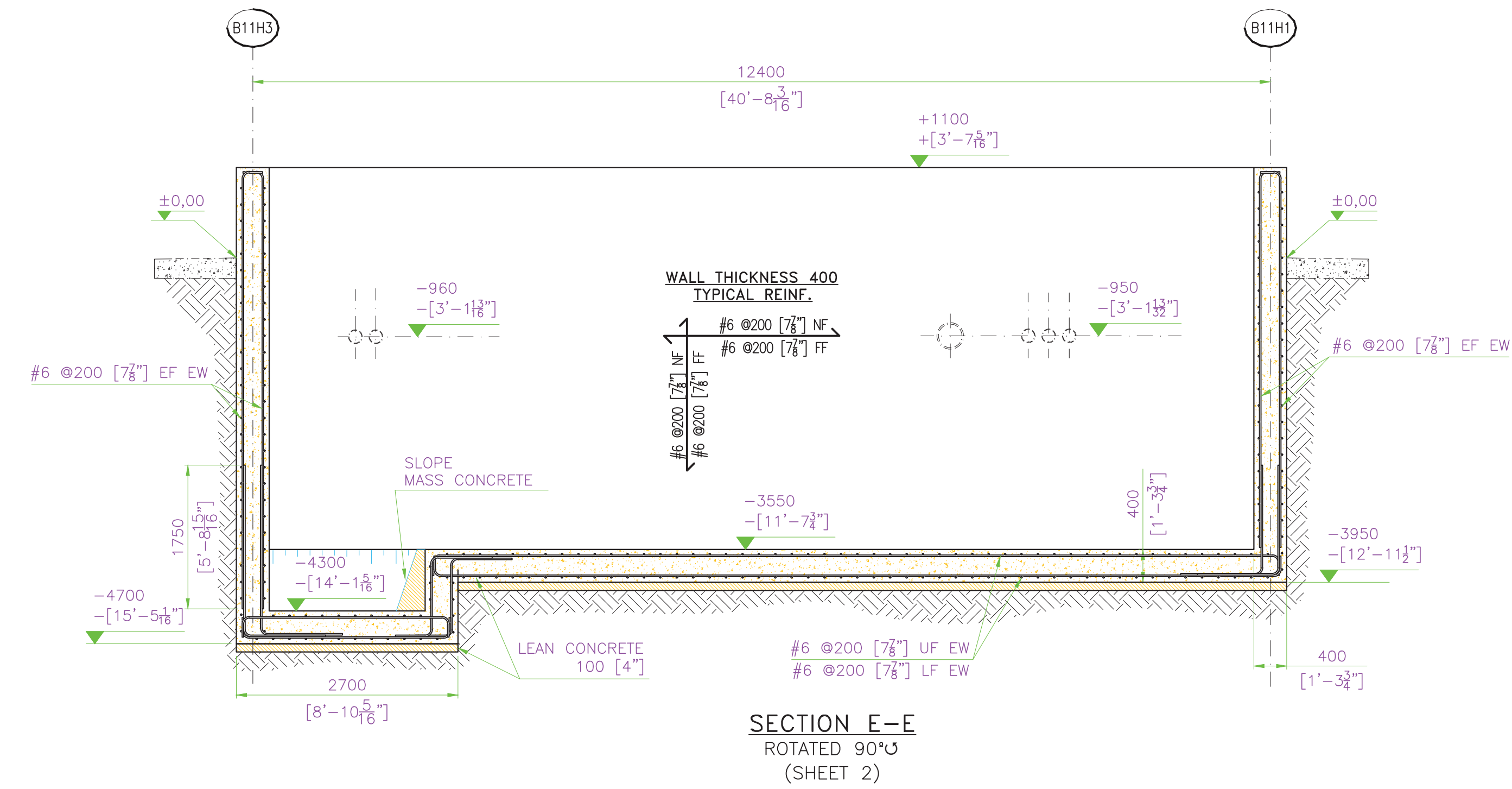
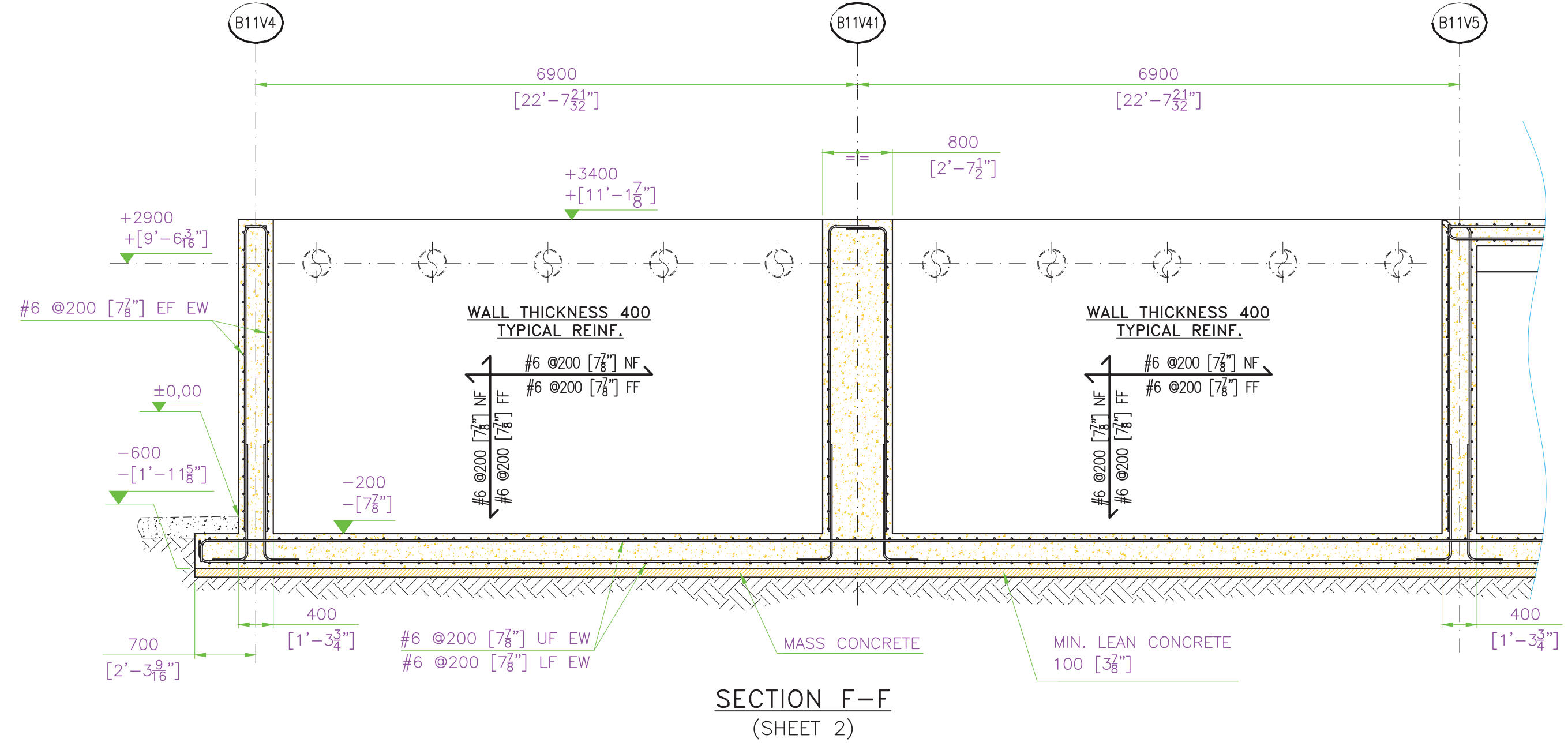
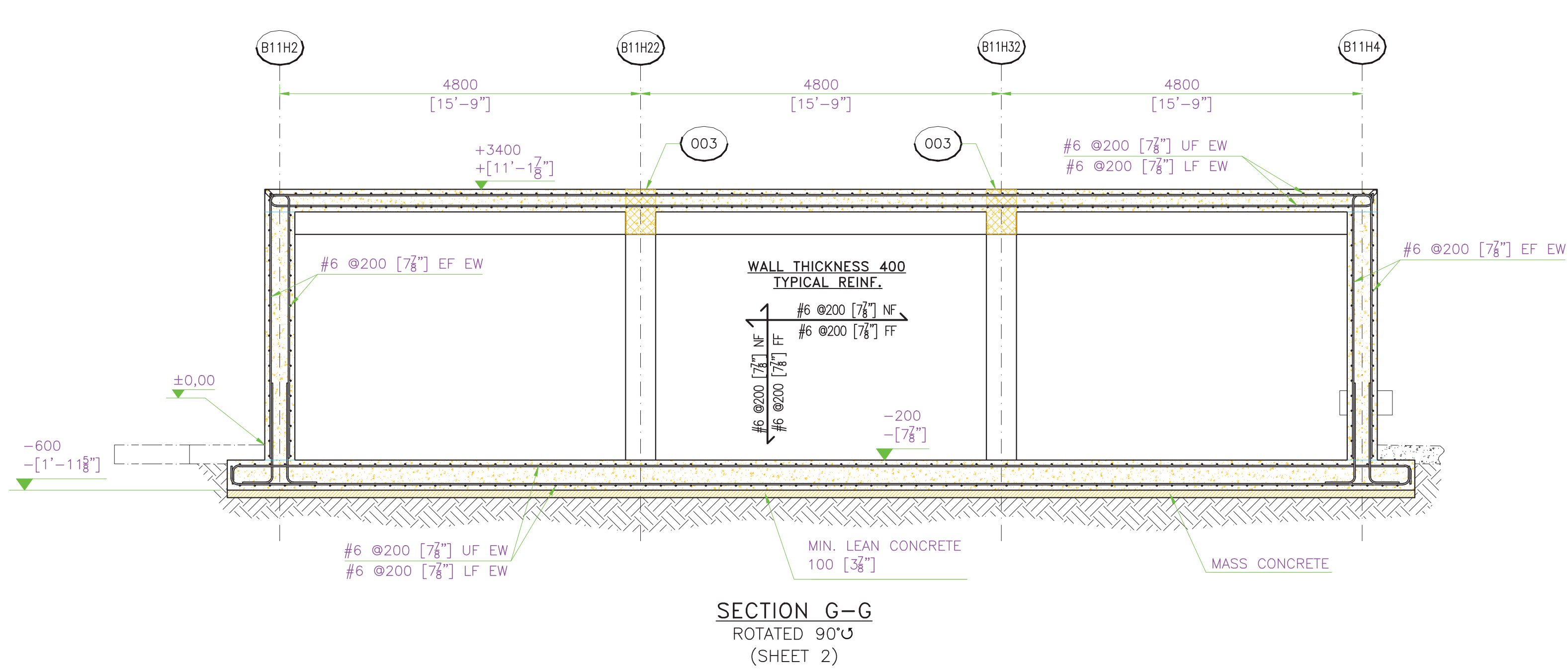
CONVENTIONAL GRAPHICAL SYMBOLS		
PLAN VIEW		SECTIONS
▲ +0.00	ELEVATION AT FINISH	▼ +0.00
■ +0.00	ELEVATION AT RUSTIC	▽ +0.00
■ +0.00	ELEVATION FOR MACHINERY RESTING	▽ +0.00
↗	DIRECTION OF SLOPE	

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MATERIAL	CONDITION:	FIRST ANGLE PROJECTION
UNITS: DUAL	CIVIL WORKS REINFORCING STEEL	
SCALE: 1:50	WASTE WATER BASINS	
DATE: 21-09-22		REV. IRI N°
DRN: INY		A
CHK: JLM		FIN WT:
APP: ALL		SHEET 5 OF 8

RUSSULA
Ingeniería y Servicios

043290



- NOTES:**
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FOUNDATIONS (CONCRETE CAST AGAINST SOIL)	3" / 75 mm
WALLS	2" / 50 mm
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BEAMS	2" / 50 mm

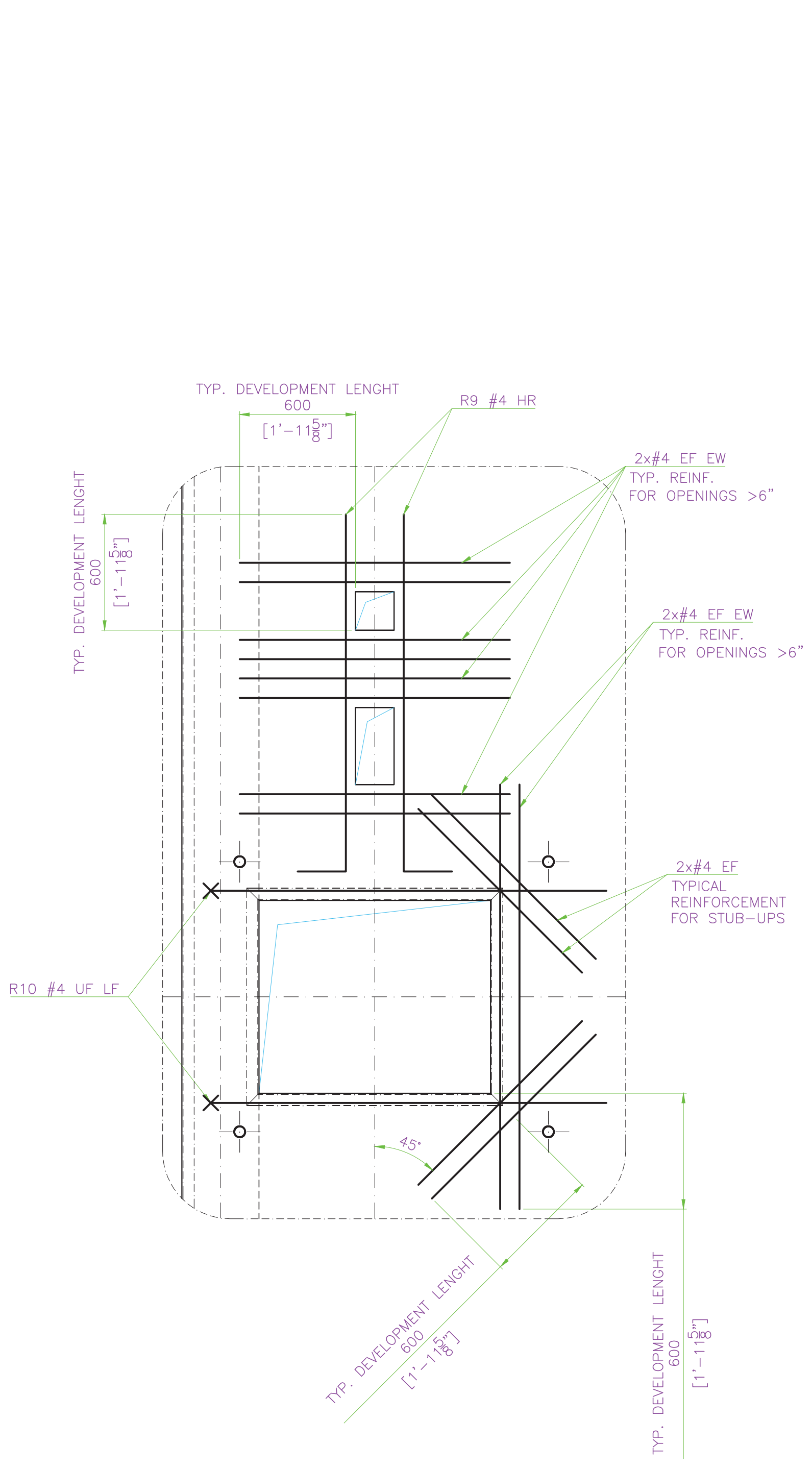
STRUCTURAL CONCRETE DESIGN PROPERTIES	
Characteristic cylinder compressive strength [f'c] (psi/MPa)	4,500 / 31
Concrete Slump Test - Abrams Cone (in/mm)	4"-6" / 100-150
Coarse Aggregate Size (in/mm)	3/4" / 19
Exposure categories	F2, S0, W2, C1
REINFORCING STEEL DESIGN PROPERTIES	
Deformed carbon-steel bars, uncoated	ASTM A615 grade 60 (60 ksi / 413 MPa)
Welded steel wire fabric	ASTM A706 grade 60 (60 ksi / 413 MPa)

SUPPLEMENTARY DRAWINGS:
043289 - CIVIL WORKS FORMS
043291 - CIVIL WORKS SIDEWALKS
042714 - ELECTRICAL CONDUITS
EL000406 - GROUND SYSTEM

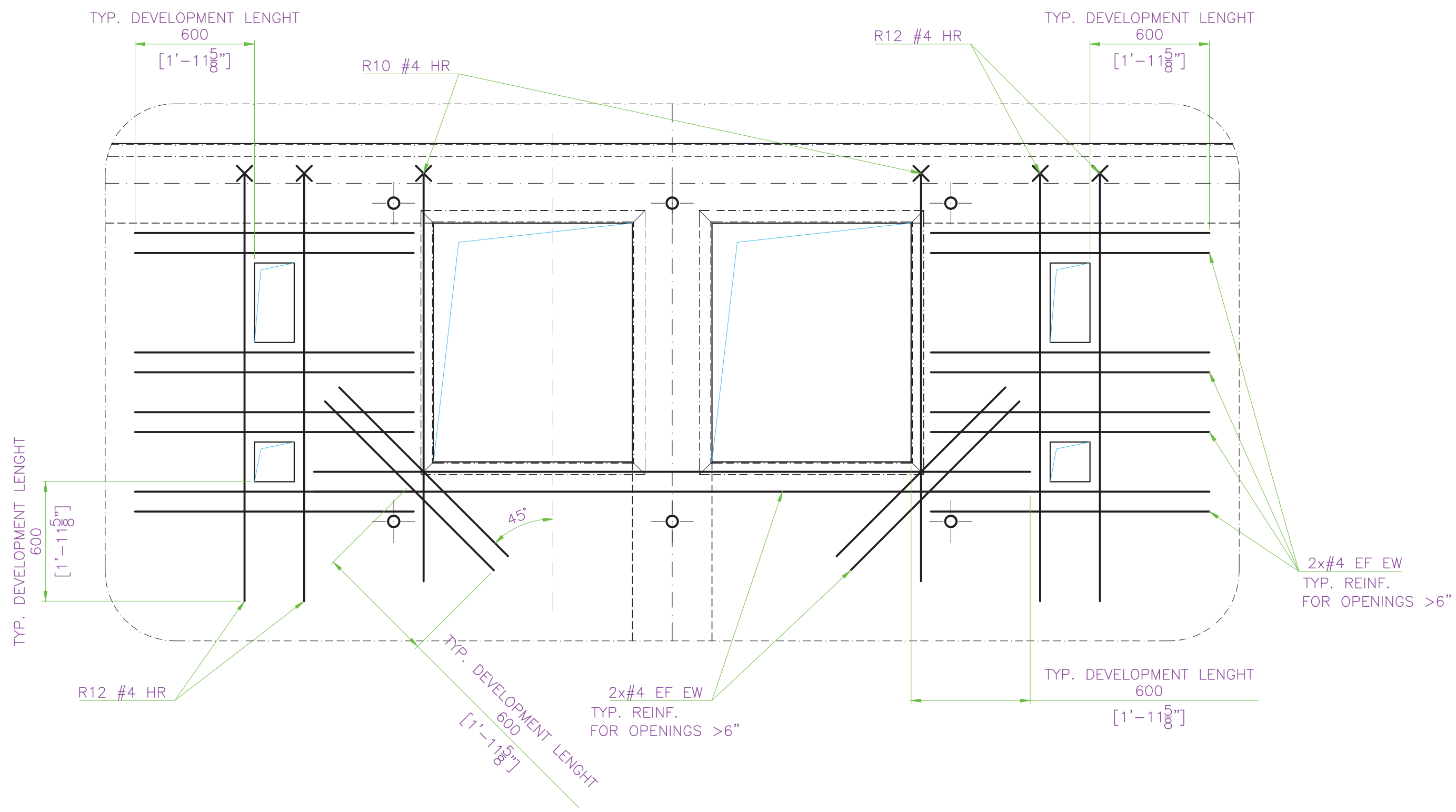
CONVENTIONAL GRAPHICAL SYMBOLS		
PLAN VIEW	SECTIONS	
▲ +0.00	ELEVATION AT FINISH	▼ +0.00
■ +0.00	ELEVATION AT RUSTIC	▽ +0.00
■ +0.00	ELEVATION FOR MACHINERY RESTING	▽ +0.00
~	DIRECTION OF SLOPE	

KEY TO ABBREVIATIONS		SYMBOLS	
VR = VERTICAL REBAR	UF = UPPER FACE	⊗	HOOK END TOWARDS INSIDE OF PAPER
HR = HORIZONTAL REBAR	LF = LOWER FACE	⊙	HOOK END TOWARDS OUTSIDE OF PAPER
DWL = DWEL REBAR	NF = NEAR FACE	—	REBAR WITHOUT HOOK
CR = CROSS REBAR	FF = FAR FACE		
AR = ADDITIONAL REINFORCEMENT	EF = EACH FACE		
	EW = EACH WAY		

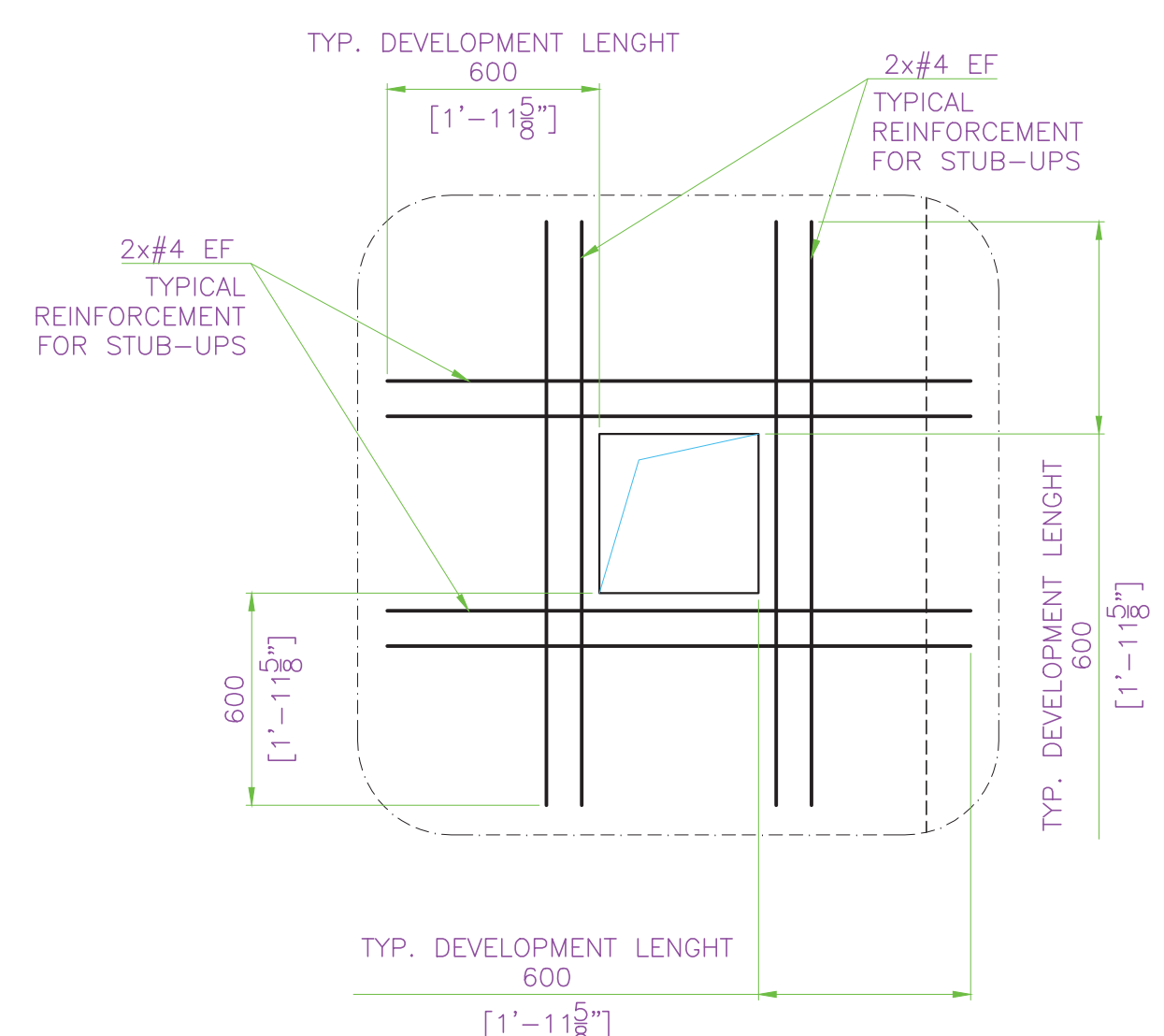
MATERIAL		CONDITION:	
UNITS: DUAL	CIVIL WORKS REINFORCING STEEL	FIRST ANGLE PROJECTION	
SCALE: 1:50	WASTE WATER BASINS	REV.	IRI N°
DATA: 21-09-22		A	
DRN: INY		FIN WT:	
CHR: JLM		SHEET 6 OF 8	
APP: ALL		043290	



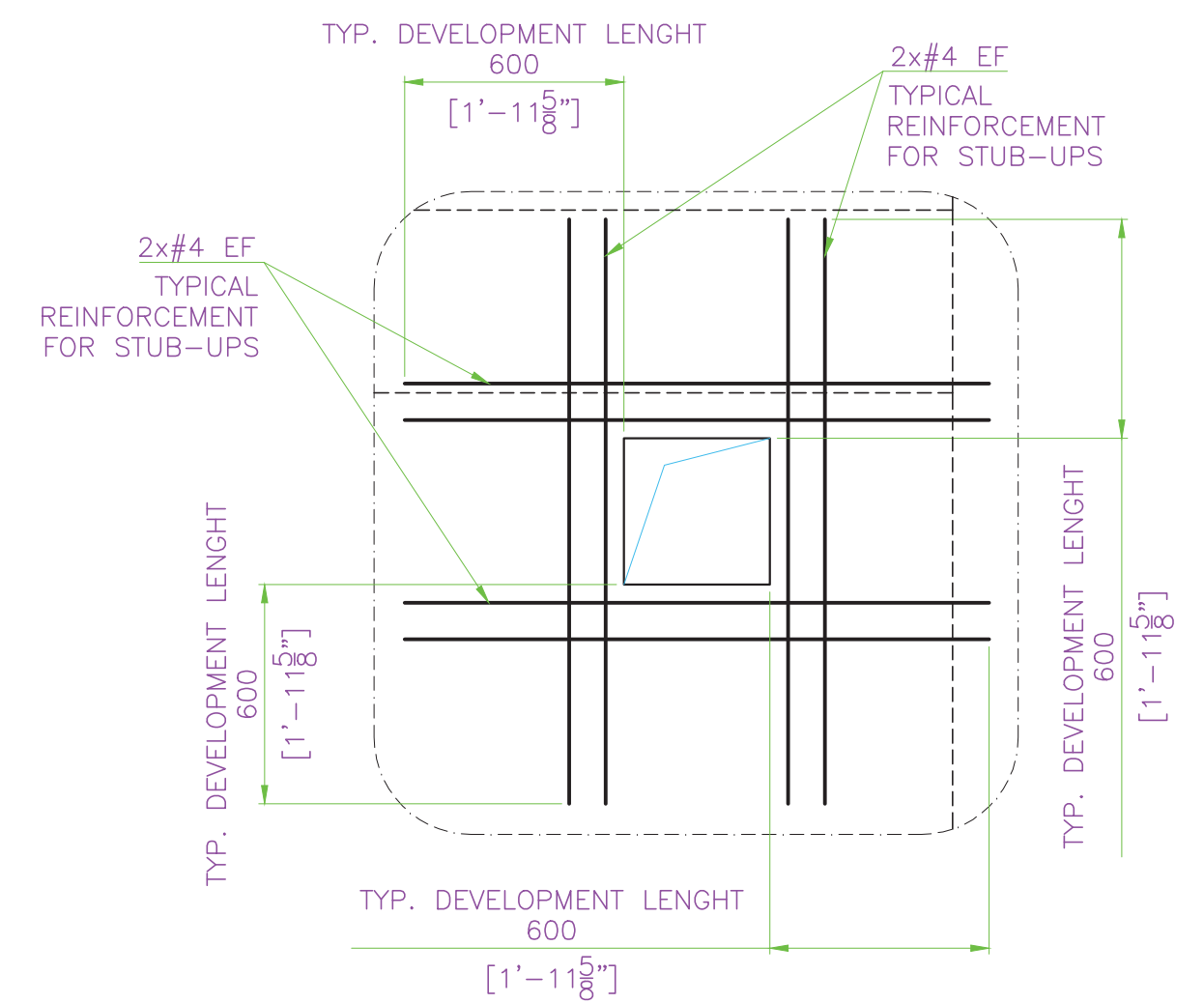
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(SHEET 1)



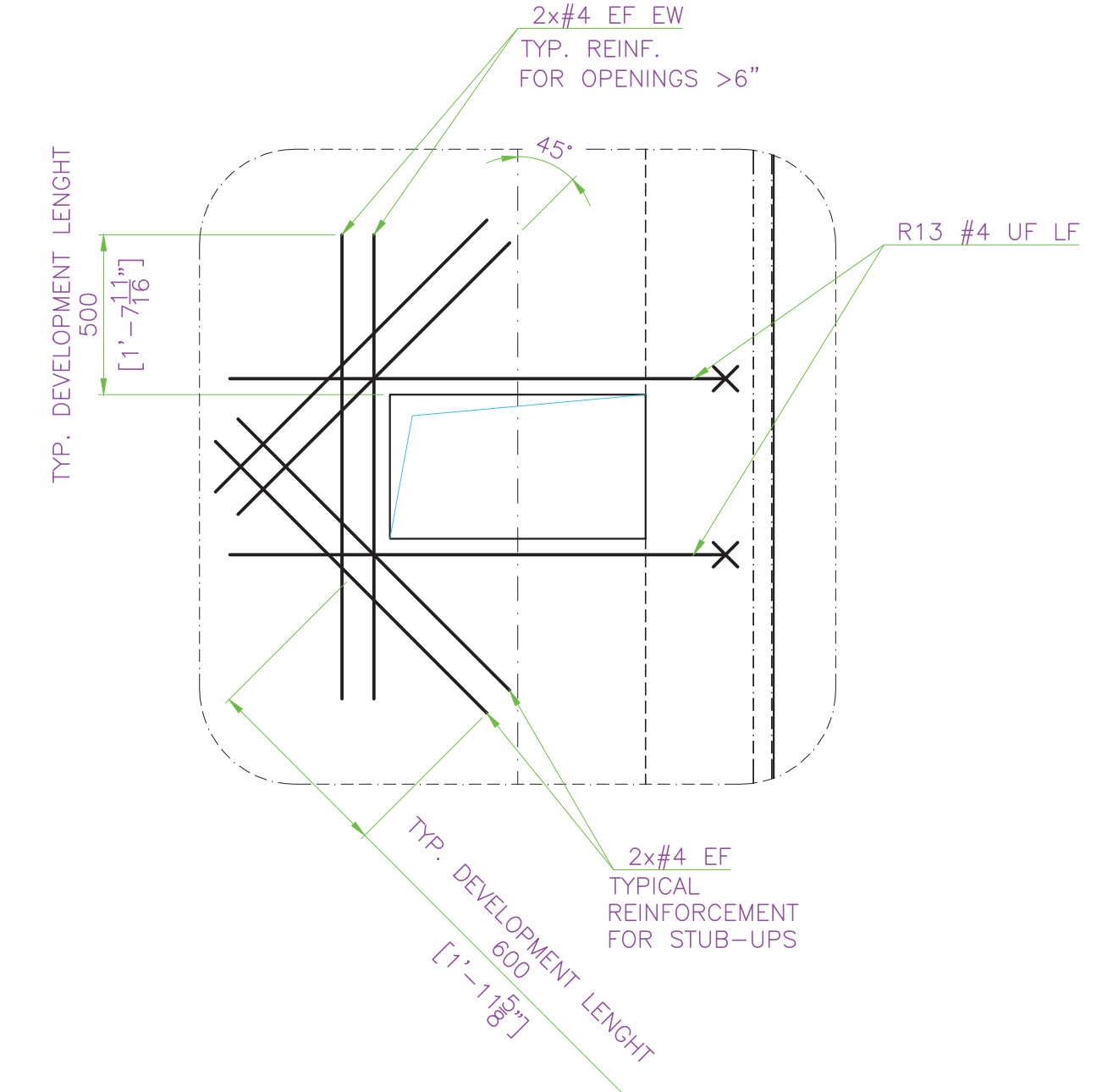
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(SHEET 1)



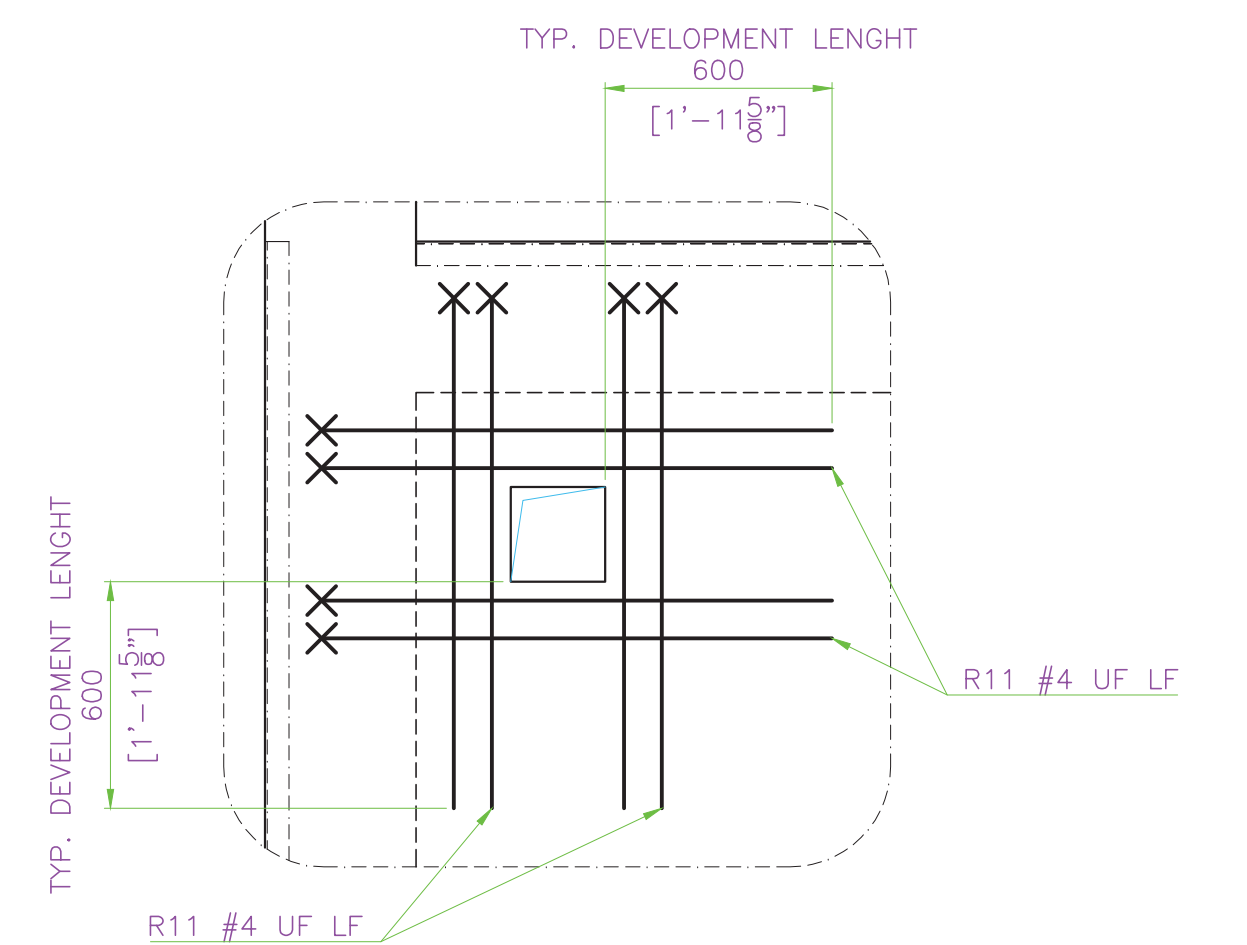
DETAIL "O"
(SHEET 1)



DETAIL "K"
(SHEET 1)



DETAIL "L"
(SHEET 1)



DETAIL "M"
(SHEET 1)

- NOTES:**
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 - CONCRETE POURING STAGES WILL BE DEFINED BY THE CONTRACTOR IN ORDER TO MINIMIZE SLAB AND WALL RETRACTION WHEN CURING.

NOMINAL CONCRETE COVER FOR REBAR	
FOUNDATIONS	2" / 50 mm
FOUNDATIONS (CONCRETE CAST AGAINST SOIL)	3" / 75 mm
WALLS	2" / 50 mm
COLUMNS	2" / 50 mm
BEAMS	2" / 50 mm

STRUCTURAL CONCRETE DESIGN PROPERTIES	
Characteristic cylinder compressive strength [f'c] (psi/MPa)	4,500 / 31
Concrete Slump Test - Abrams Cone (in/mm)	4"-6" / 100-150
Coarse Aggregate Size (in/mm)	3" / 19
Exposure categories	F2, S0, W2, C1
REINFORCING STEEL DESIGN PROPERTIES	
Deformed carbon-steel bars, uncoated	ASTM A615 grade 60 (60 ksi / 413 MPa)
Welded steel wire fabric	ASTM A706 grade 60 (60 ksi / 413 MPa)

SUPPLEMENTARY DRAWINGS:	
043289	- CIVIL WORKS FORMS
043291	- CIVIL WORKS SIDEWALKS
042714	- ELECTRICAL CONDUITS
EL000406	- GROUND SYSTEM

CONVENTIONAL GRAPHICAL SYMBOLS		
PLAN VIEW		SECTIONS
▲+0.00	ELEVATION AT FINISH	▼+0.00
□+0.00	ELEVATION AT RUSTIC	▽+0.00
■+0.00	ELEVATION FOR MACHINERY RESTING	▲+0.00
~	DIRECTION OF SLOPE	

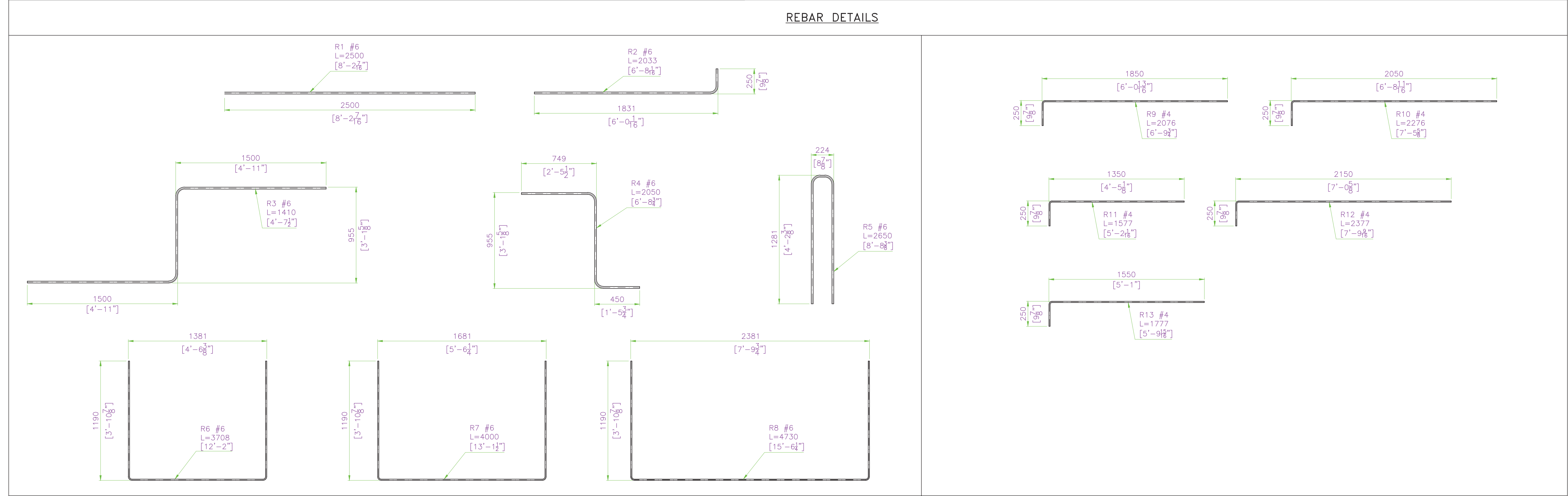
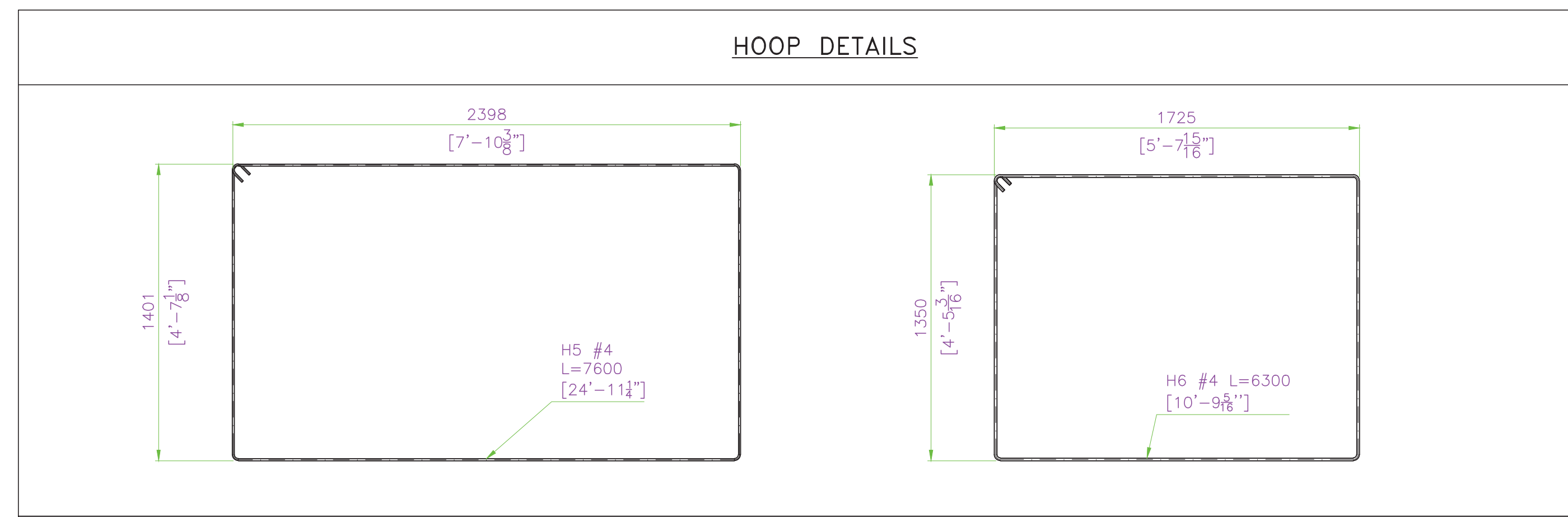
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CR = CROSS REBAR	FF = FAR FACE		
AR = ADDITIONAL REINFORCEMENT	EW = EACH WAY		

MATERIAL	CONDITION:	FIRST ANGLE PROJECTION
UNITS: DUAL	CIVIL WORKS REINFORCING STEEL	
SCALE: 1:20	WASTE WATER BASINS	
DATE: 21-09-22		REV. IRI N°
DRN: INY		A
CHK: JLM		FIN WT:
APP: ALL		SHEET 7 OF 8
	RUSSULA Ingeniería y Servicios	043290

ITEM.	DRAWING	QTY.	UM	DESCRIPTION
001	043670	1	U	BEAM 500 x 700 REINFORCING STEEL
002	043671	2	U	BEAM 500 x 700 REINFORCING STEEL
003	043672	2	U	BEAM 400 x 600 REINFORCING STEEL
004	043673	12	U	BEAM 400 x 600 REINFORCING STEEL

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

STATE OF ARKANSAS
 REGISTERED PROFESSIONAL ENGINEER
 No. 10622
 ANDREW H. RIVE



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FOUNDATIONS (CONCRETE CAST AGAINST SOIL)	3" / 75 mm
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Coarse Aggregate Size (in/mm)	3/4" / 19
Exposure categories	F2, S0, W2, C1
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Welded steel wire fabric	ASTM A706 grade 60 (60 ksi / 413 MPa)

SUPPLEMENTARY DRAWINGS:
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CONVENTIONAL GRAPHICAL SYMBOLS		
PLAN VIEW		SECTIONS
▲ +0.00	ELEVATION AT FINISH	▼ +0.00
■ +0.00	ELEVATION AT RUSTIC	▽ +0.00
■ +0.00	ELEVATION FOR MACHINERY RESTING	▽ +0.00
~	DIRECTION OF SLOPE	

KEY TO ABBREVIATIONS		SYMBOLS	
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DWL = DWEL REBAR	NF = NEAR FACE	⊙	REBAR WITHOUT HOOK
CR = CROSS REBAR	FF = FAR FACE		
AR = ADDITIONAL REINFORCEMENT	EF = EACH FACE		
	EW = EACH WAY		

MATERIAL:	CONDITION:	FIRST ANGLE PROJECTION
UNITS: DUAL	CIVIL WORKS REINFORCING STEEL	
SCALE: 1:20	WASTE WATER BASINS	
DATA: 21-09-22		REV. IRI N°
DRN: INY		A
CHK: JLM		FIN WT:
APP: ALL		SHEET 8 OF 8

RUSSULA
 Ingeniería y Servicios

043290

EXPLORATORY VENTURES, LLC
 STEEL MANUFACTURING COMPLEX
 COLLECTION BASINS

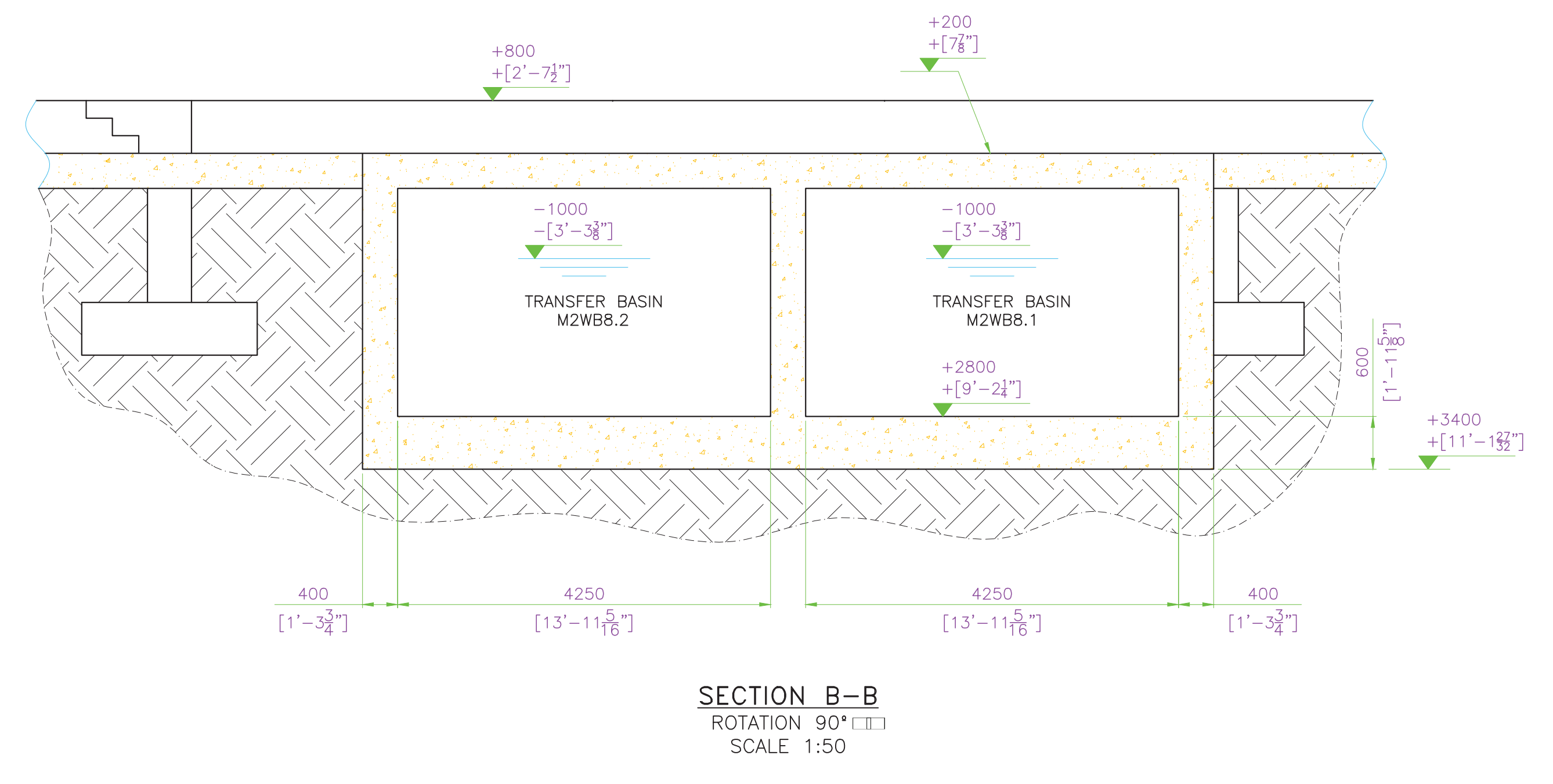
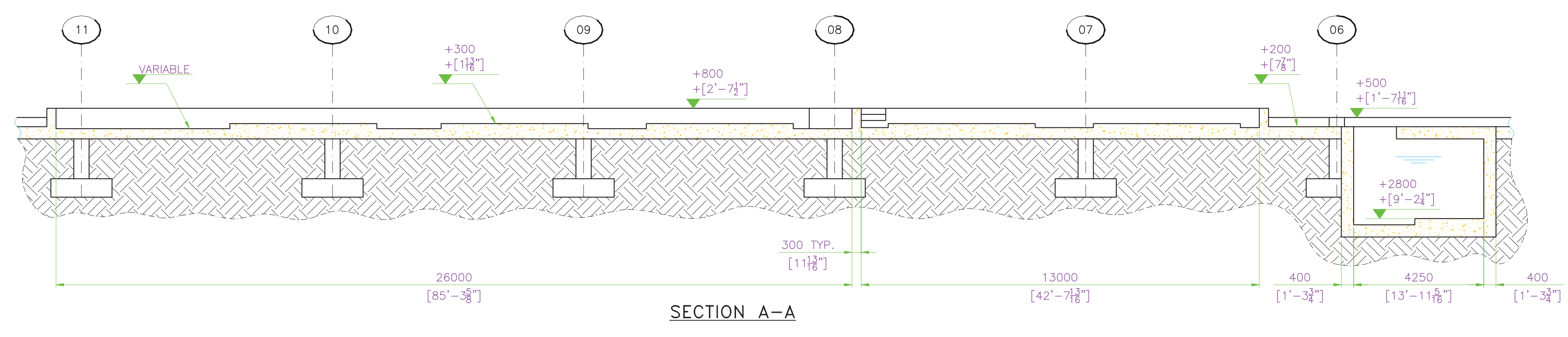
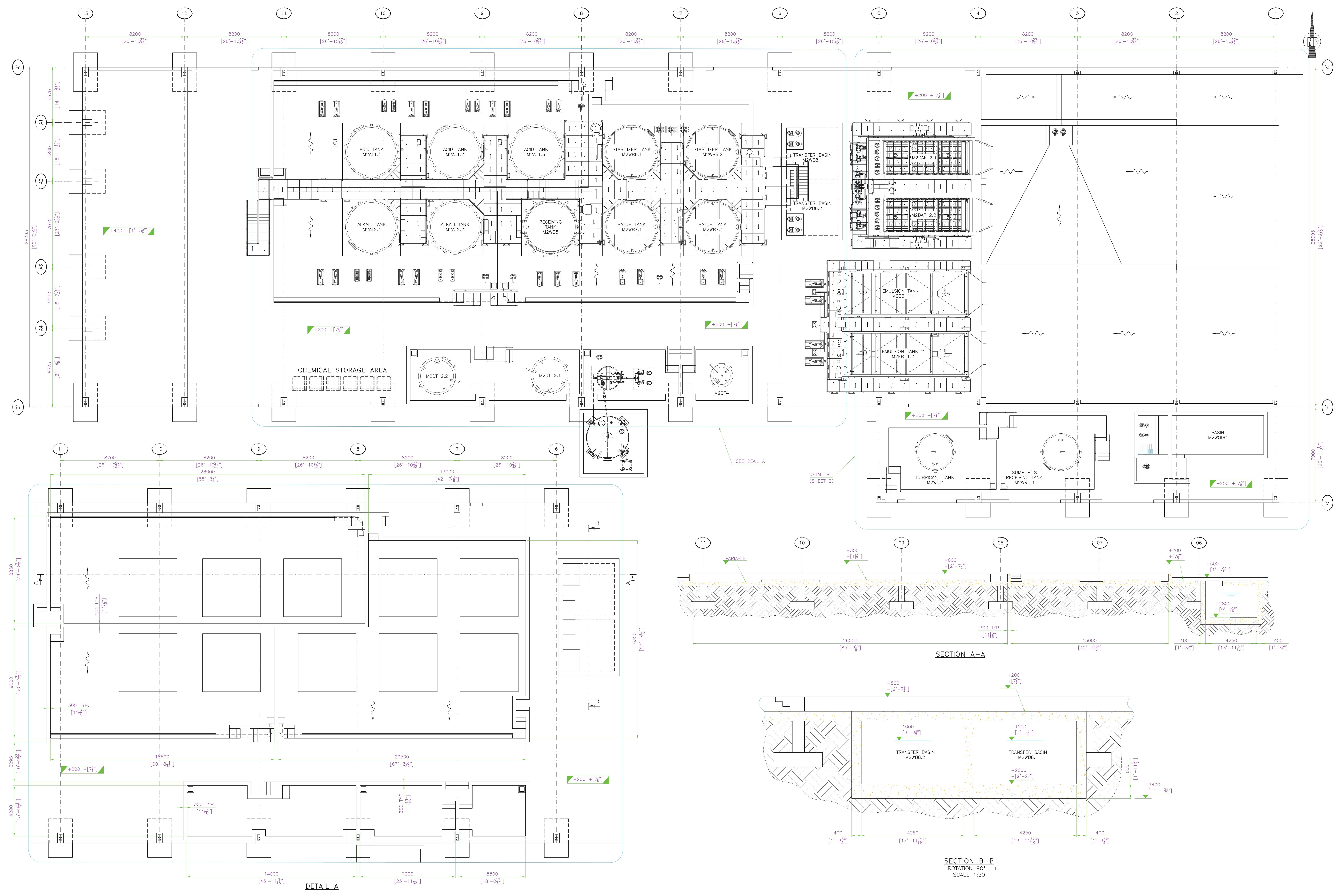
OSCEOLA ARKANSAS

DATE: XX-XX-XX	NO: XX	Drawn By: AES	Date: 10-19-22
REVISION DESCRIPTION		Checked By: AHR	Scale: 24"x36" 1:20
		Project Number: BHLP-22172	

C13H

DATE	REVISION DESCRIPTION
10-19-22	XXX

Drawn By:	AES	Date:	10-19-22
Scale:	1:100	Scale:	36"=48"
Checked By:	AHR	Project Number:	BHL-P-22172
APP:	JLM		



- NOTES:**
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CONVENTIONAL GRAPHICAL SYMBOLS	
PLAN VIEW	SECTIONS
▲ ±0.00	ELEVATION AT FINISH
▼ ±0.00	ELEVATION AT RUSTIC
▲ ±0.00	ELEVATION FOR MACHINERY RESTING
~	DIRECTION OF SLOPE

RUSSULA
 Ingeniería y Servicios

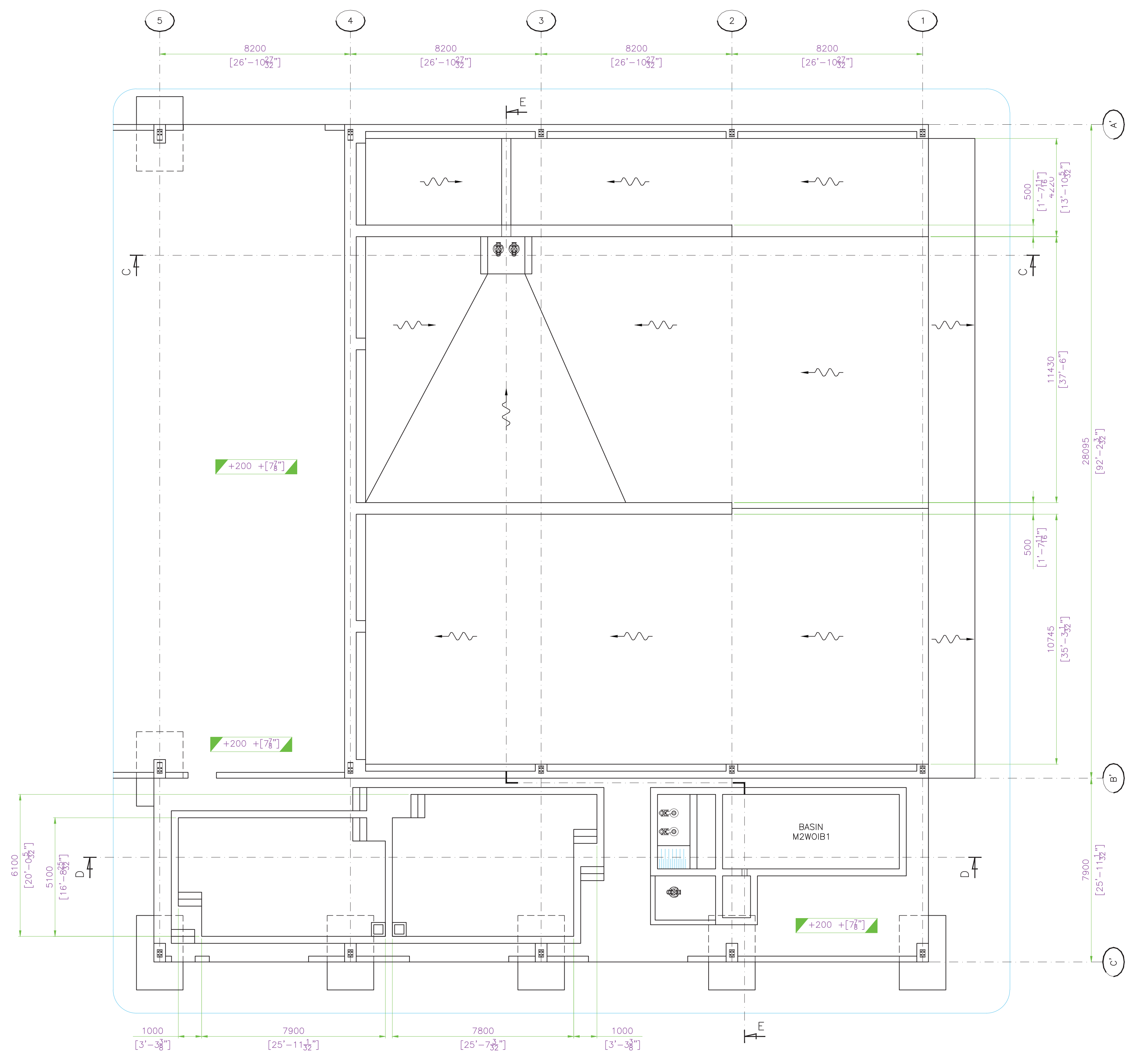
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DRAWING IN PROGRESS

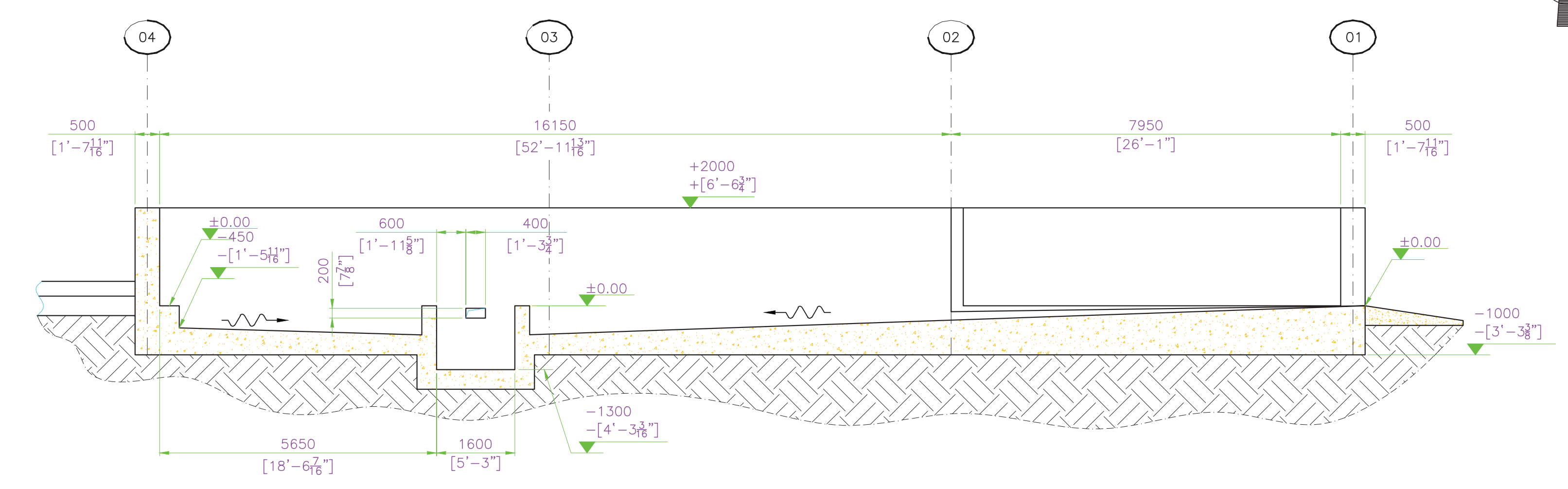
DATE	REVISION	DESCRIPTION
10-19-22	01	ISSUE FOR PERMIT

Drawn By: **AES** Date: **10-19-22**
 Checked By: **AHR** Scale: **3/8"=1'-0"**
 Project Number: **BHL-P-22172**

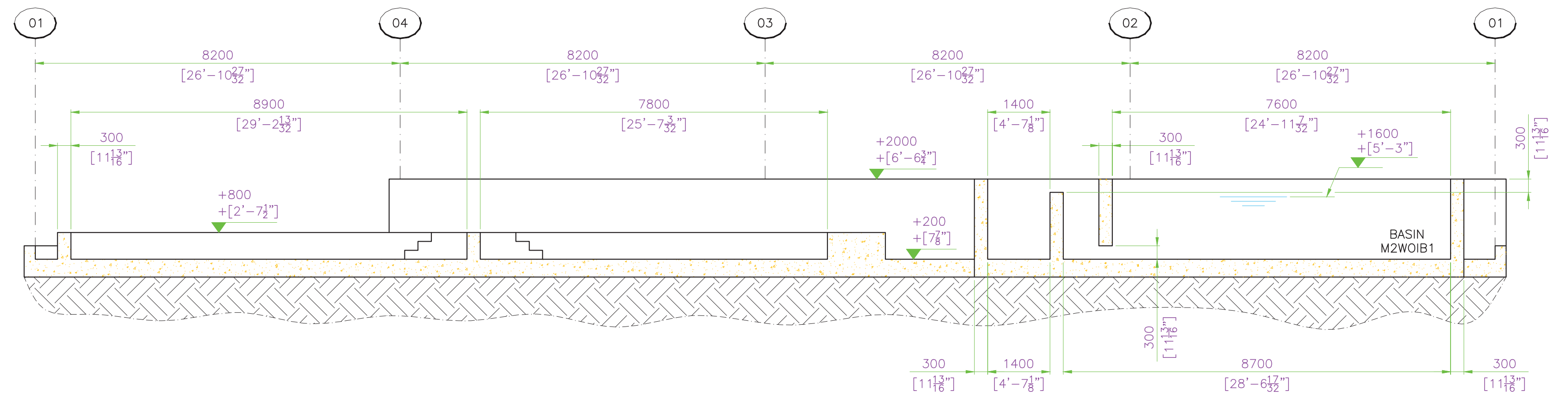
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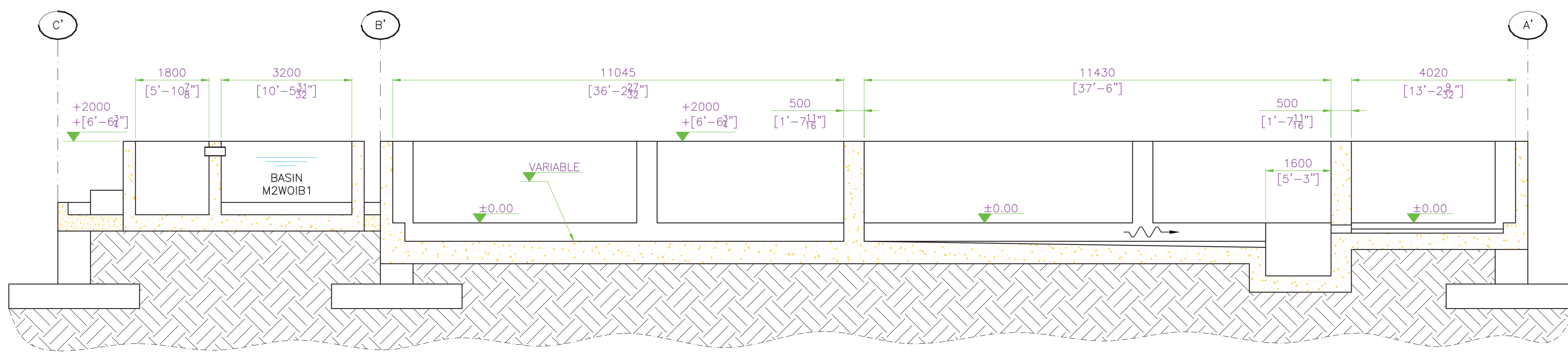
DETAIL B
(SHEET 1)



SECTION C-C
SCALE 1:75



SECTION D-D
SCALE 1:75



SECTION E-E
ROTATION 90°
SCALE 1:75

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CONVENTIONAL GRAPHICAL SYMBOLS	
PLAN VIEW	SECTIONS
▲+0.00	ELEVATION AT FINISH
□+0.00	ELEVATION AT RUSTIC
▲+0.00	ELEVATION FOR MACHINERY RESTING
↘	DIRECTION OF SLOPE

MATERIAL	CONDITION	FIRST ANGLE PROJECTION
UNITS: DUAL	CIVIL WORKS FORMS	REV. IRI #
SCALE: 1:100	INSIDE AREA WASTE WATER	01
DATE: 30-09-22	DRN: DCT	CHK: JLM
APP: JLM	FIN WT: 2 of 2	APP: JLM

RUSSULA
 Ingeniería y Servicios

043716

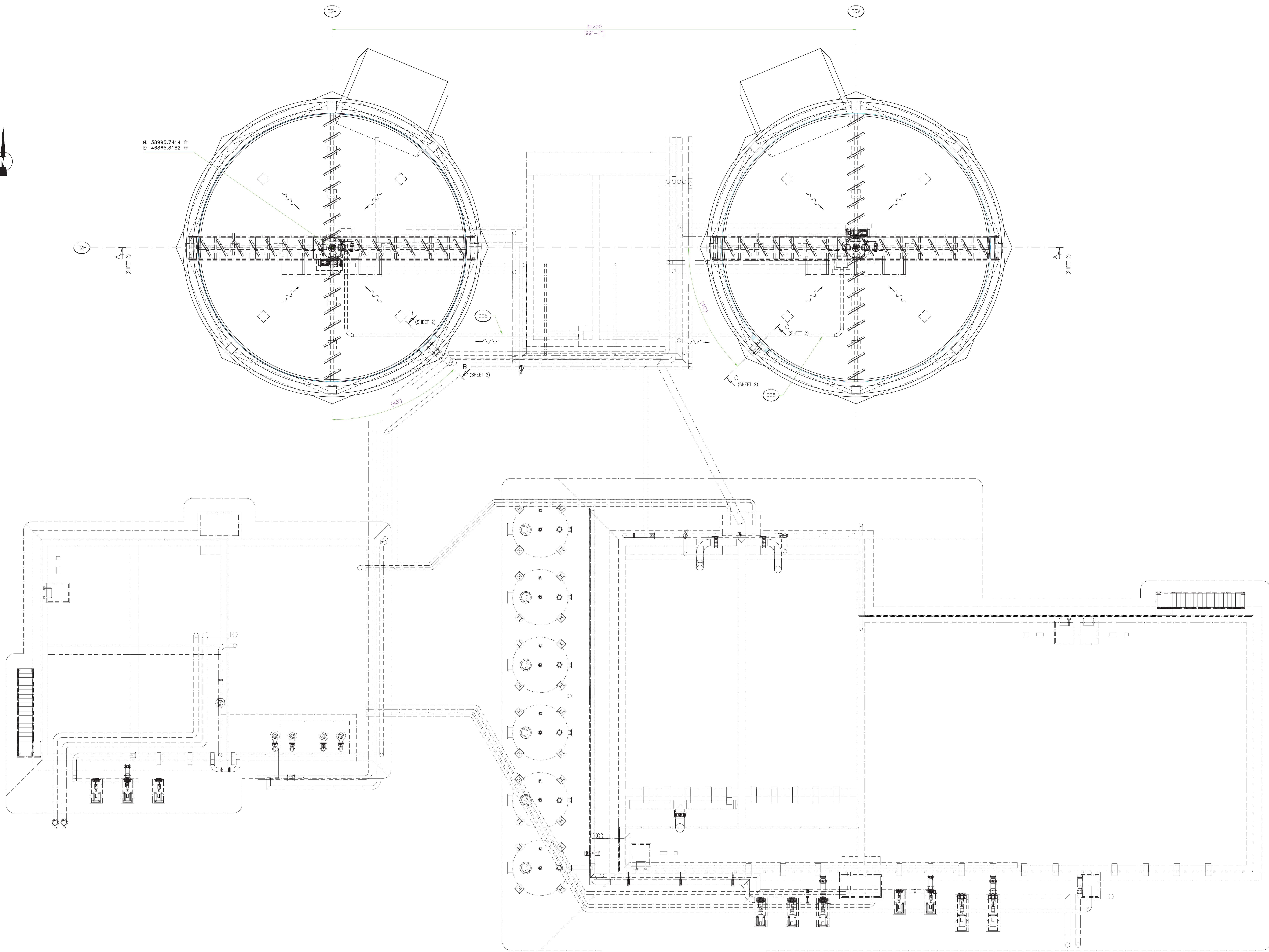
DRAWING IN PROGRESS

MATERIAL	CONDITION	FIRST ANGLE PROJECTION
UNITS: DUAL	CIVIL WORKS FORMS	
SCALE: 1:75	WASTE WATER THICKENER	
DATE: 05-09-22	REV. A	REV. IRI #
DRN: DFG	FIN. WT.	SHEET 1 OF 3
CHK: JLM	APP: ALL	043279

SUPPLEMENTARY DRAWINGS:
 043280 - REINFORCING STEEL
 042714 - ELECTRICAL CONDUITS
 EL000406 - GROUND SYSTEM

CONVENTIONAL GRAPHICAL SYMBOLS		
PLAN VIEW		SECTIONS
	ELEVATION AT FINISH	+0.00
	ELEVATION AT RUSTIC	+0.00
	ELEVATION FOR MACHINERY RESTING	+0.00
	DIRECTION OF SLOPE	

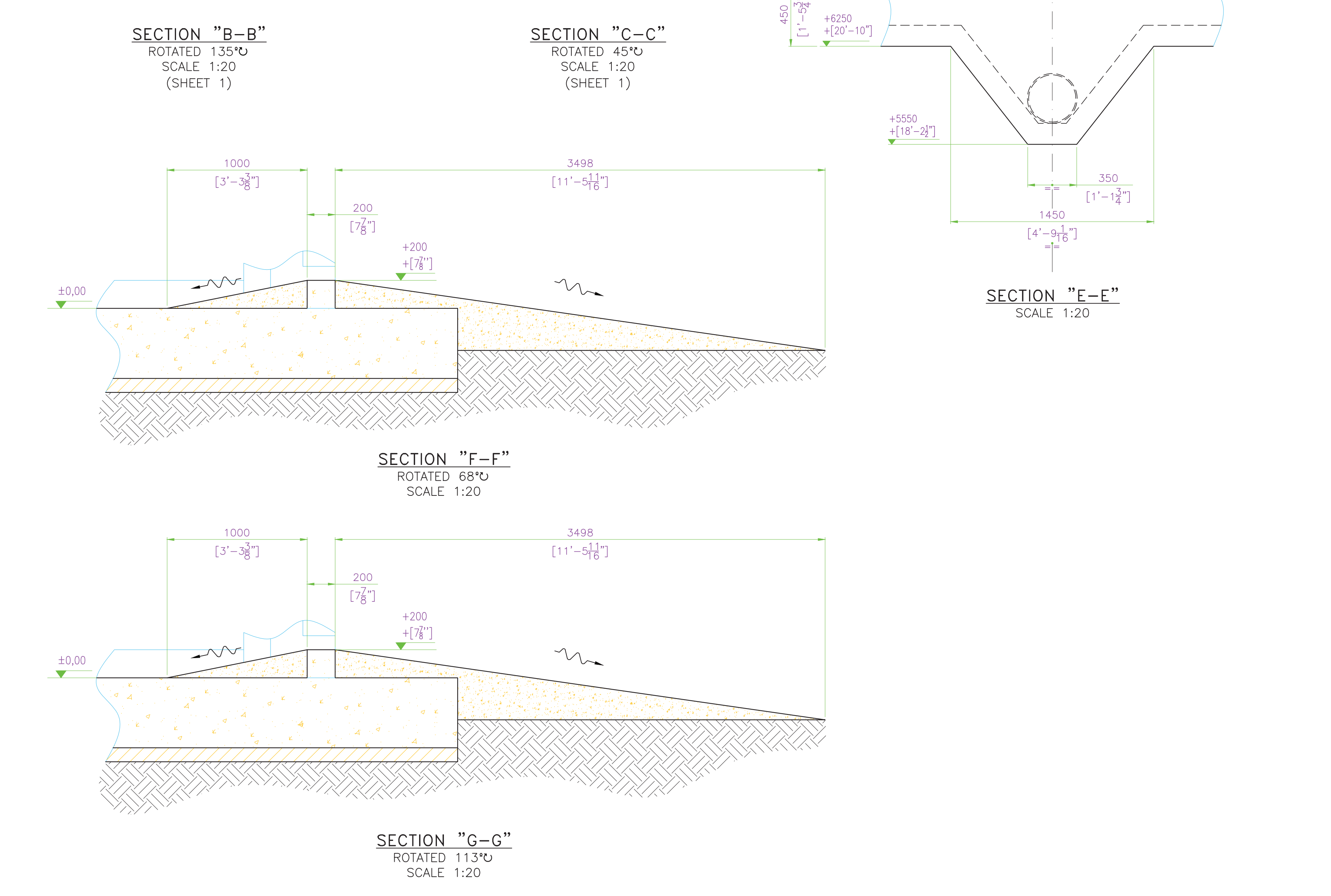
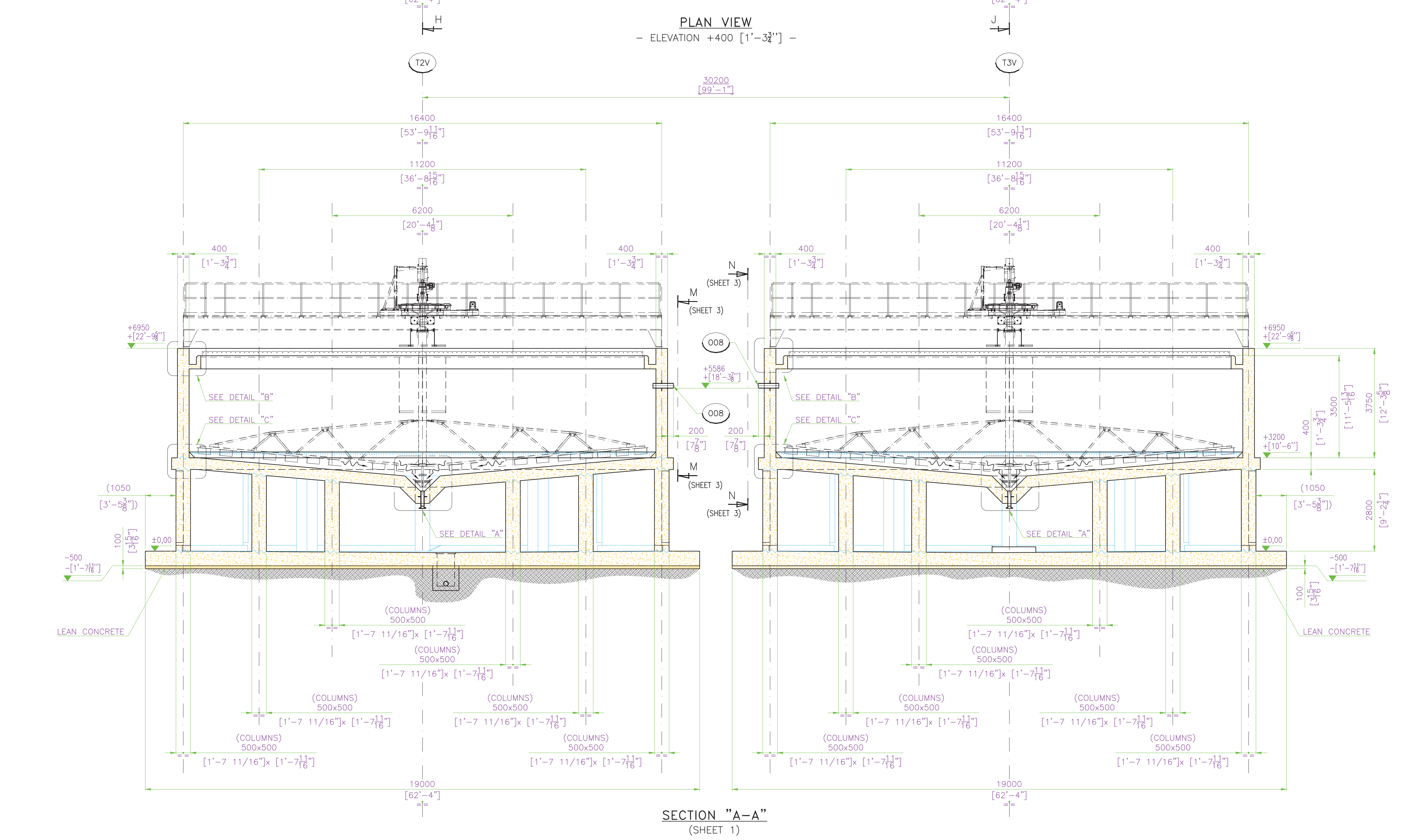
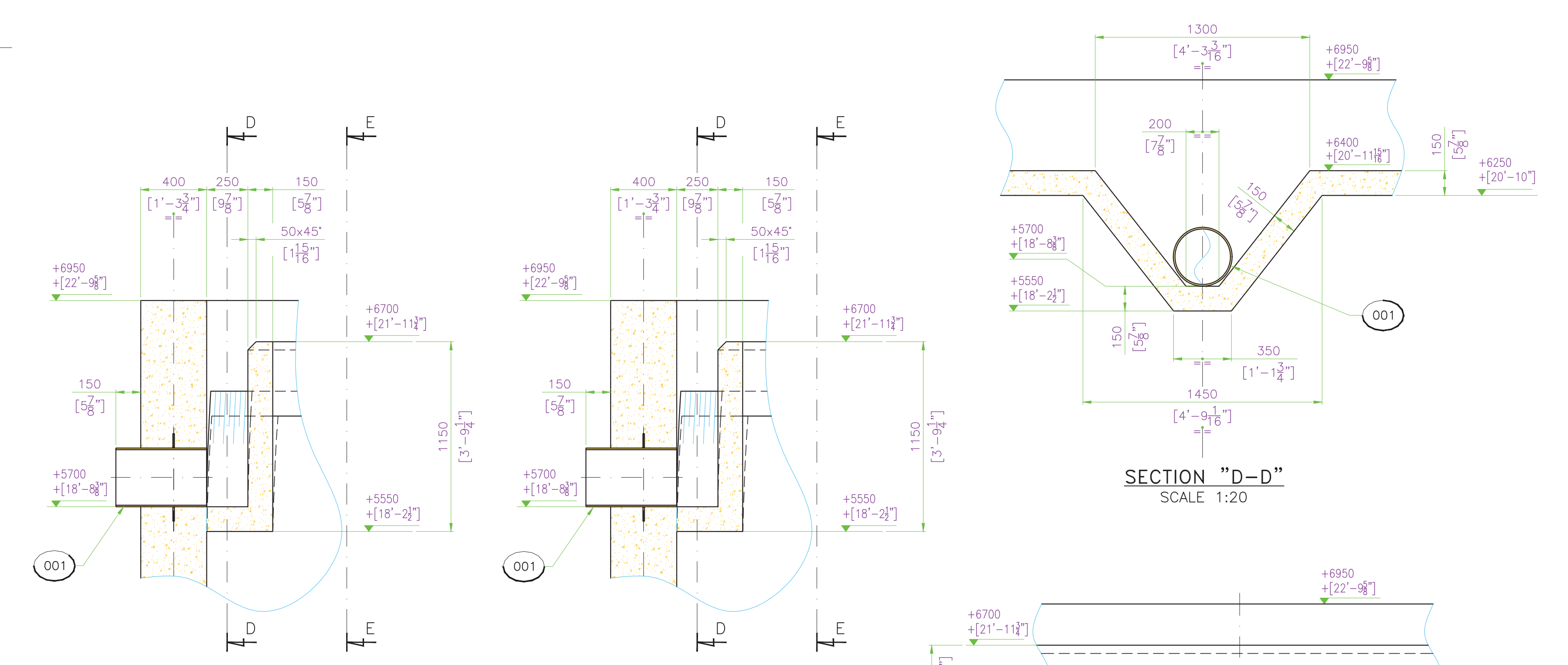
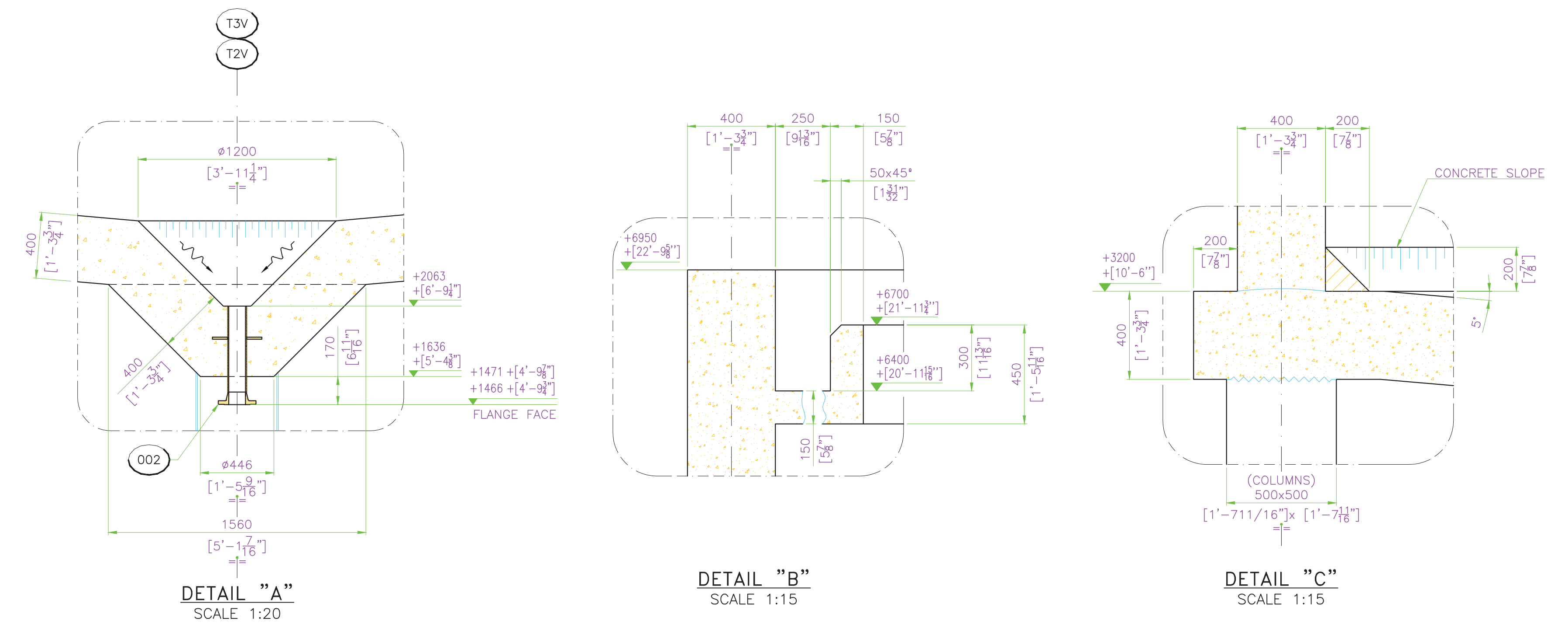
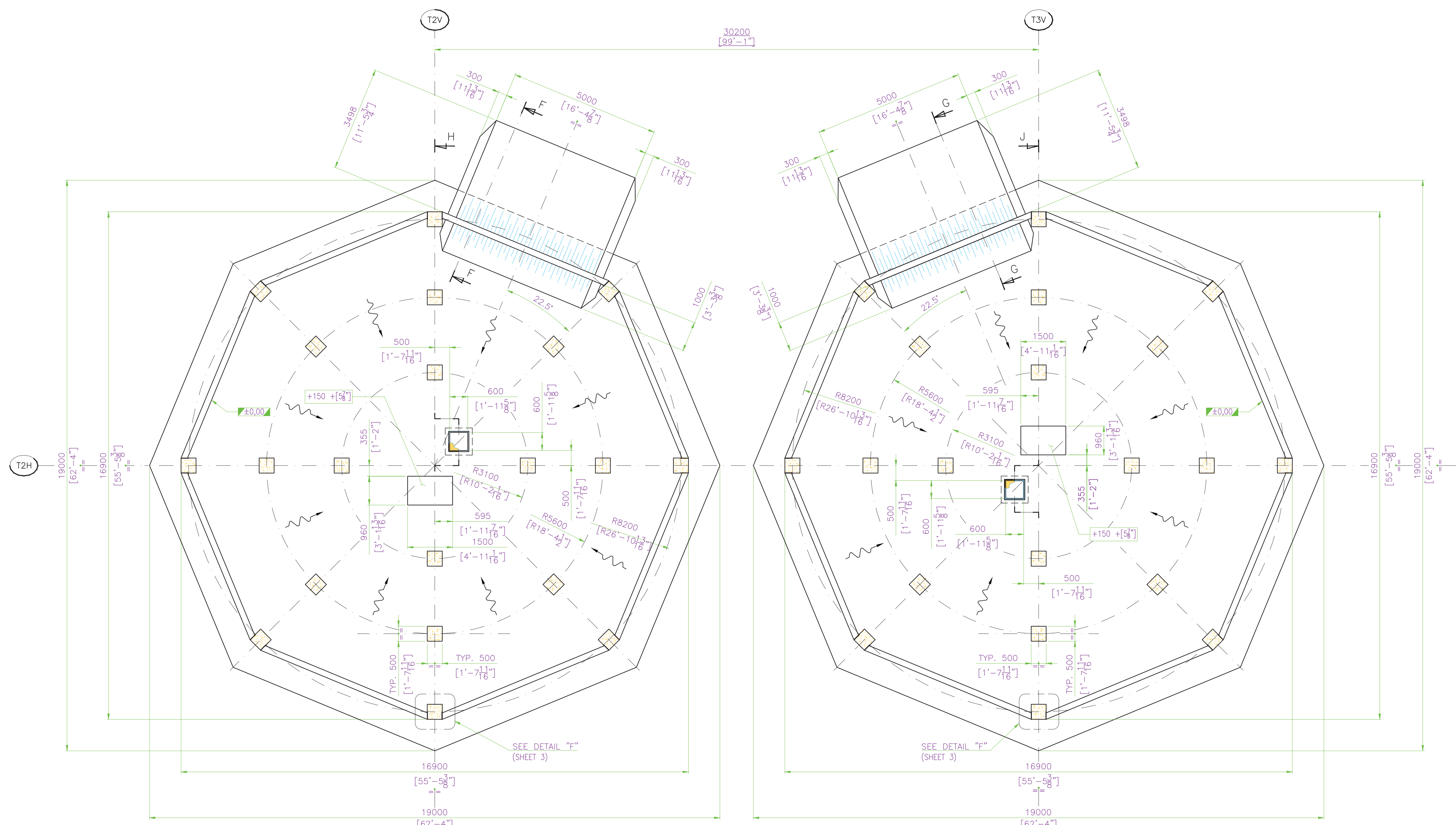
PLAN VIEW -LOCATION-



N: 38995.7414 ft
 E: 46865.8182 ft

30200
 [99'-1"]

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SUPPLEMENTARY DRAWINGS:
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 042714 - ELECTRICAL CONDUITS
 ELO00406 - GROUND SYSTEM

CONVENTIONAL GRAPHICAL SYMBOLS		
PLAN VIEW	SECTIONS	
▲+0.00	ELEVATION AT FINISH	▽+0.00
□+0.00	ELEVATION AT RUSTIC	▽+0.00
▲+0.00	ELEVATION FOR MACHINERY RESTING	▽+0.00
~	DIRECTION OF SLOPE	

MATERIAL	CONDITION	FIRST ANGLE PROJECTION
UNITS: DUAL	CIVIL WORKS FORMS	
SCALE: 1:75	WASTE WATER THICKENER	
DATE: 05-09-22		REV. A
DRN: DFG		FIN. WT.
CHK: JLM		SHEET 2 OF 3
APP: ALL		043279

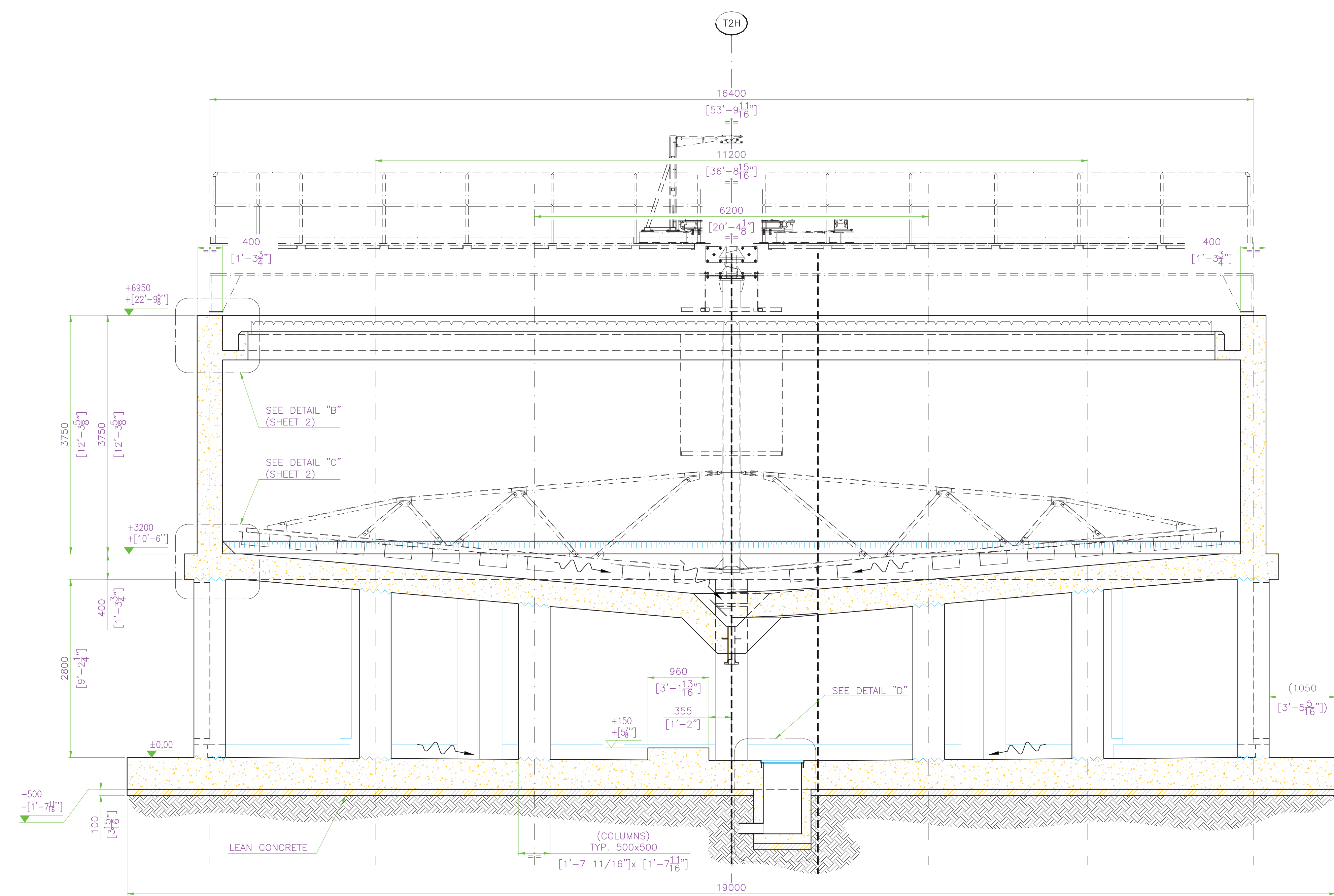
Drawn By: **AES** Date: **10-19-22**
 Checked By: **AHR** Scale: **3/8"=1'-0"**
 Project Number: **BHLP-22172**
C15B

NO.	DATE	REVISION DESCRIPTION
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3		
4		
5		
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11		

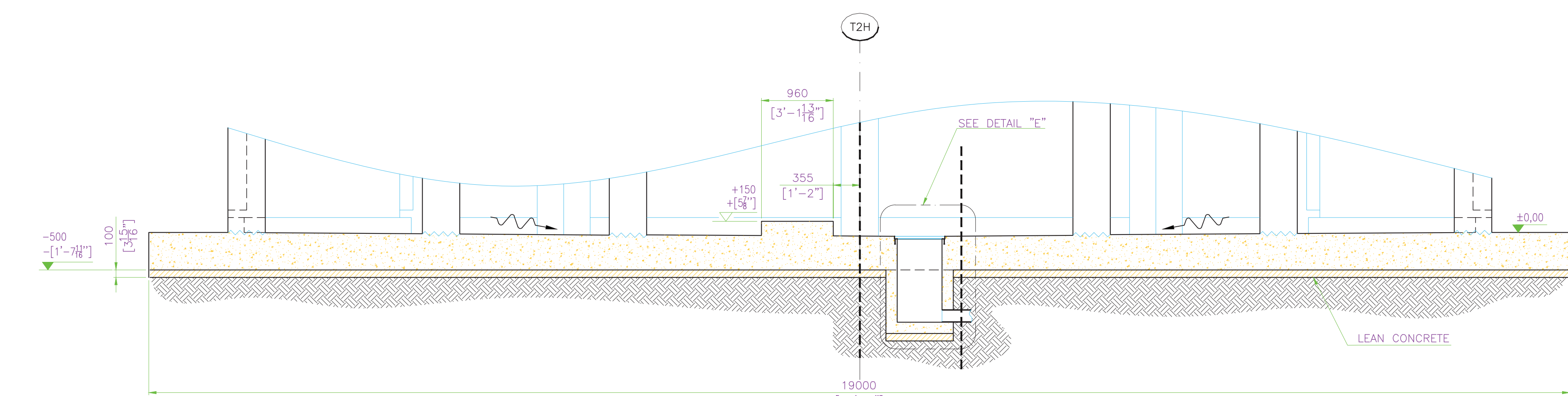
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Checked By:	AHR	Scale:	36" x 48" = 1" = 40'
Project Number:	BHLP-22172		

C15C

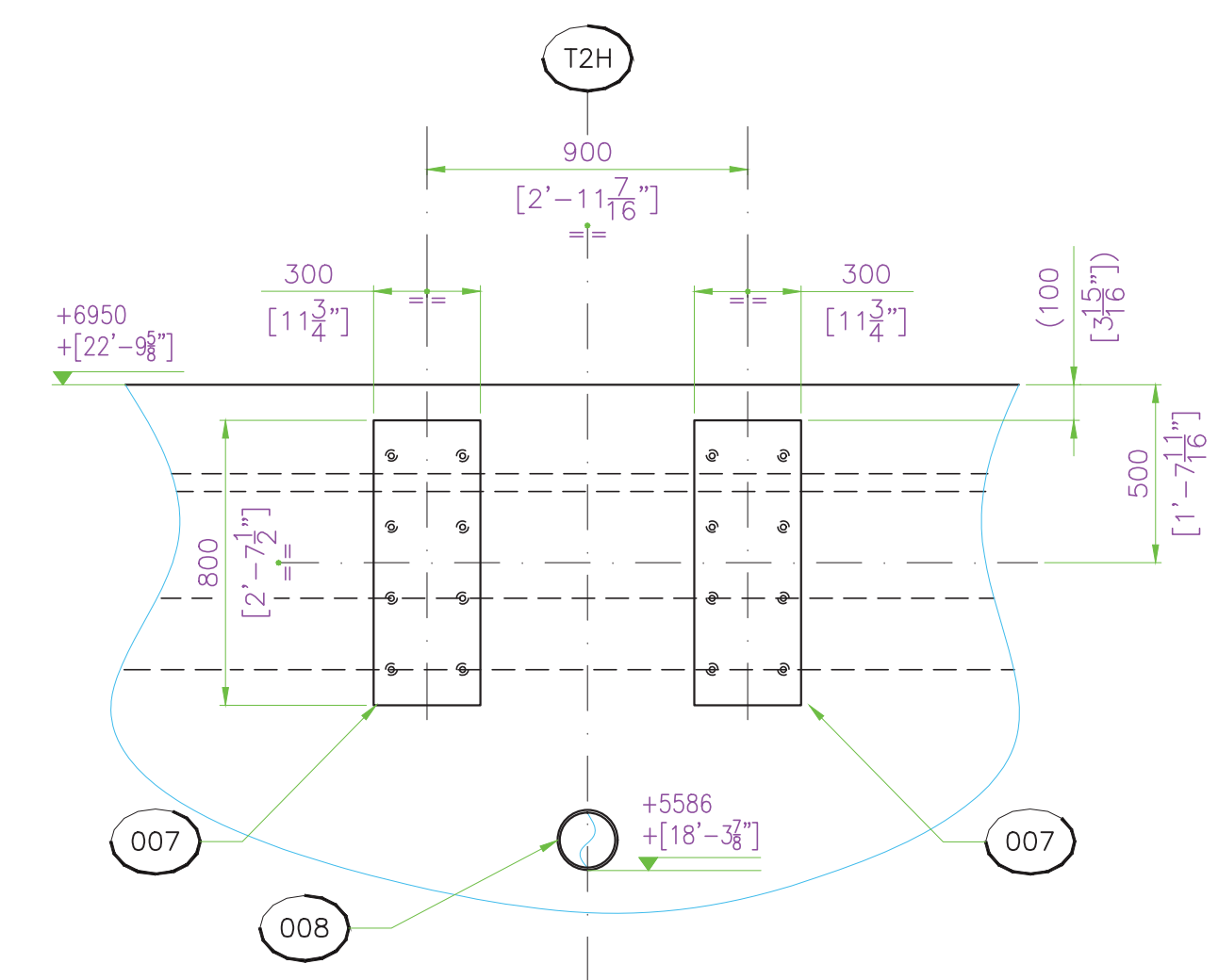
SUPPLIER	ITEM	DRAWING	QTY.	UM	DESCRIPTION
BIG RIVER	001	043569	2	U	EMBEDDED PIPE 14" x 550
BIG RIVER	002	043276	2	U	EMBEDDED PIPE 4" x 597
BIG RIVER	003	031507	2	U	FRAME 600 x 600
RUSSULA	004	008162	2	U	BAR GRATING 600 x 600
BIG RIVER	005	-	35	m	CPVC DRAIN PIPE 6" Sch80
BIG RIVER	006	043570	32	U	EMBEDDED PLATE 3/8" x 250 x 2500
BIG RIVER	007	043365	4	U	EMBEDDED PLATE 5/8" x 300 x 800
BIG RIVER	008	010649	2	U	EMBEDDED PIPE 6" x 700



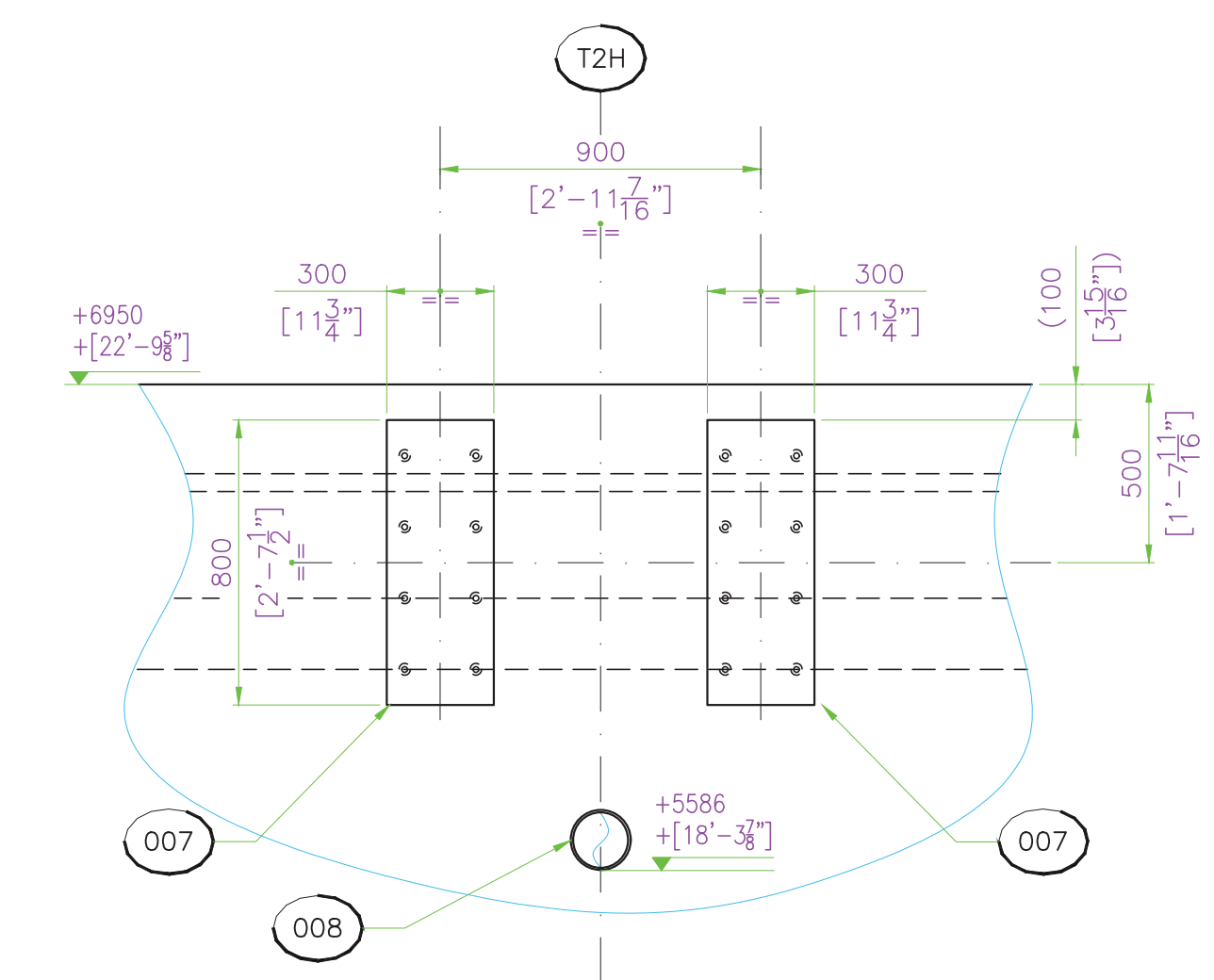
SECTION H-H
 ROTATED 90°
 (SHEET 2)



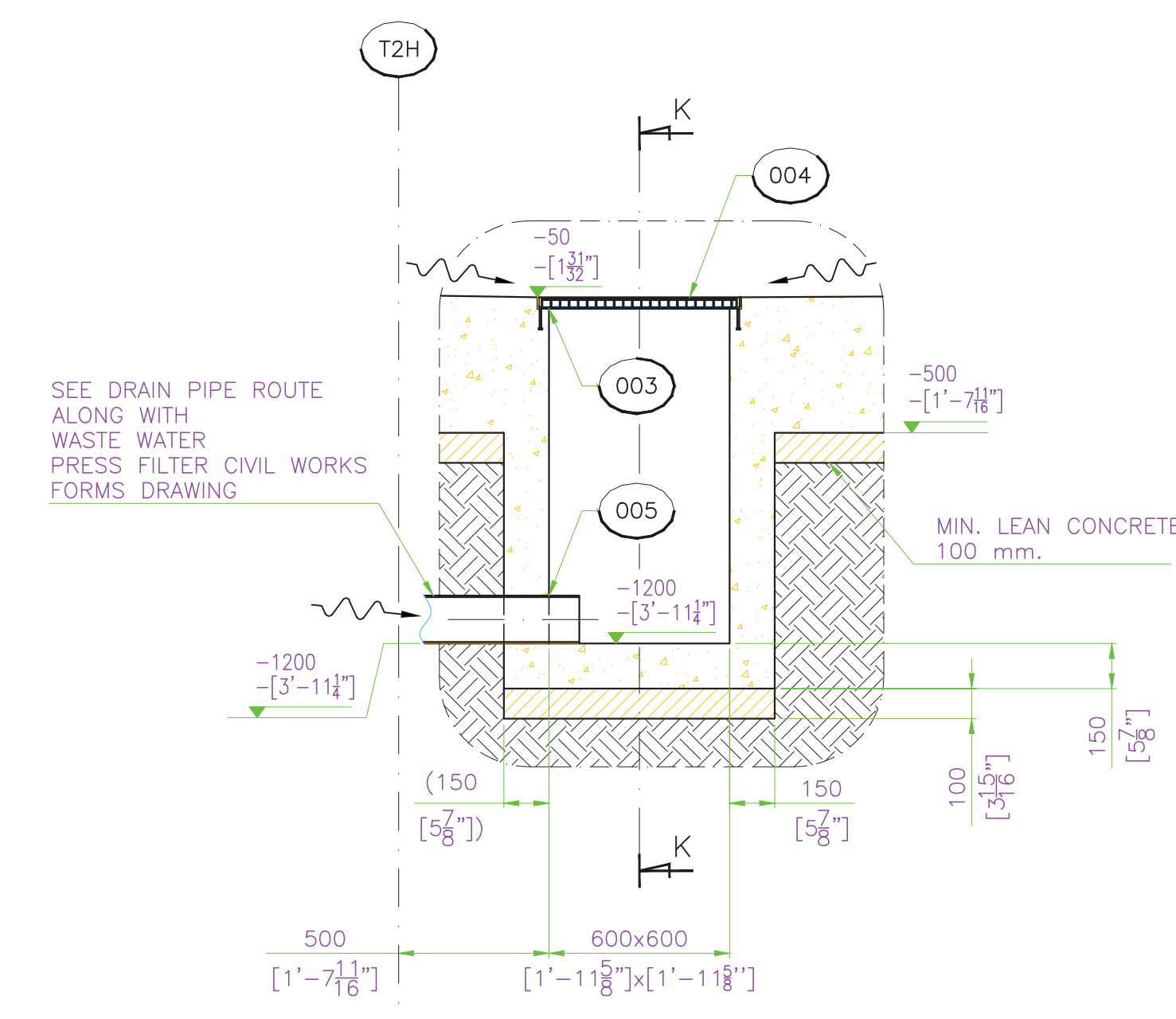
SECTION J-J
 ROTATED 90°
 (SHEET 2)



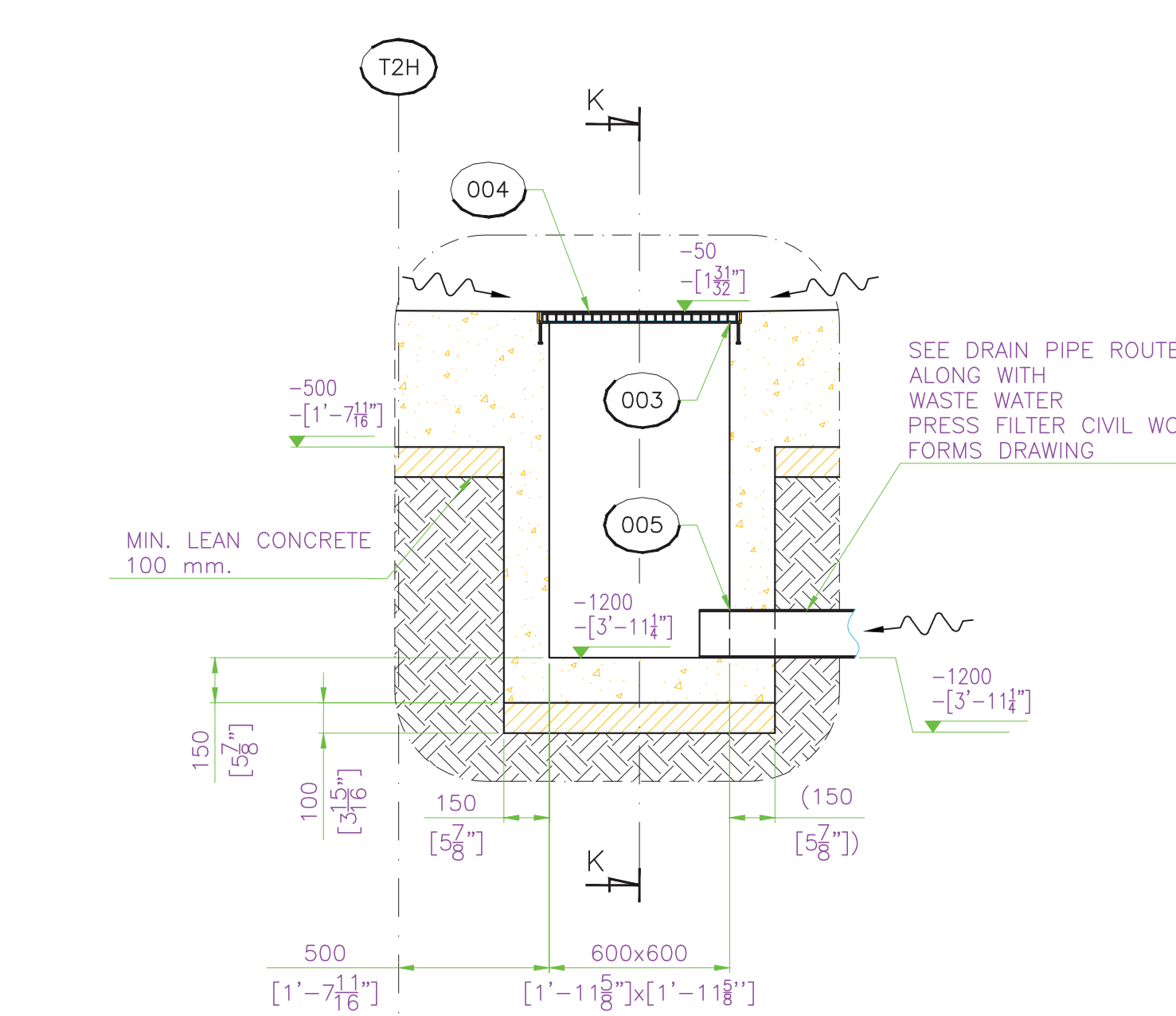
SECTION M-M
 ROTATED 90°
 SCALE 1:20
 (SHEET 2)



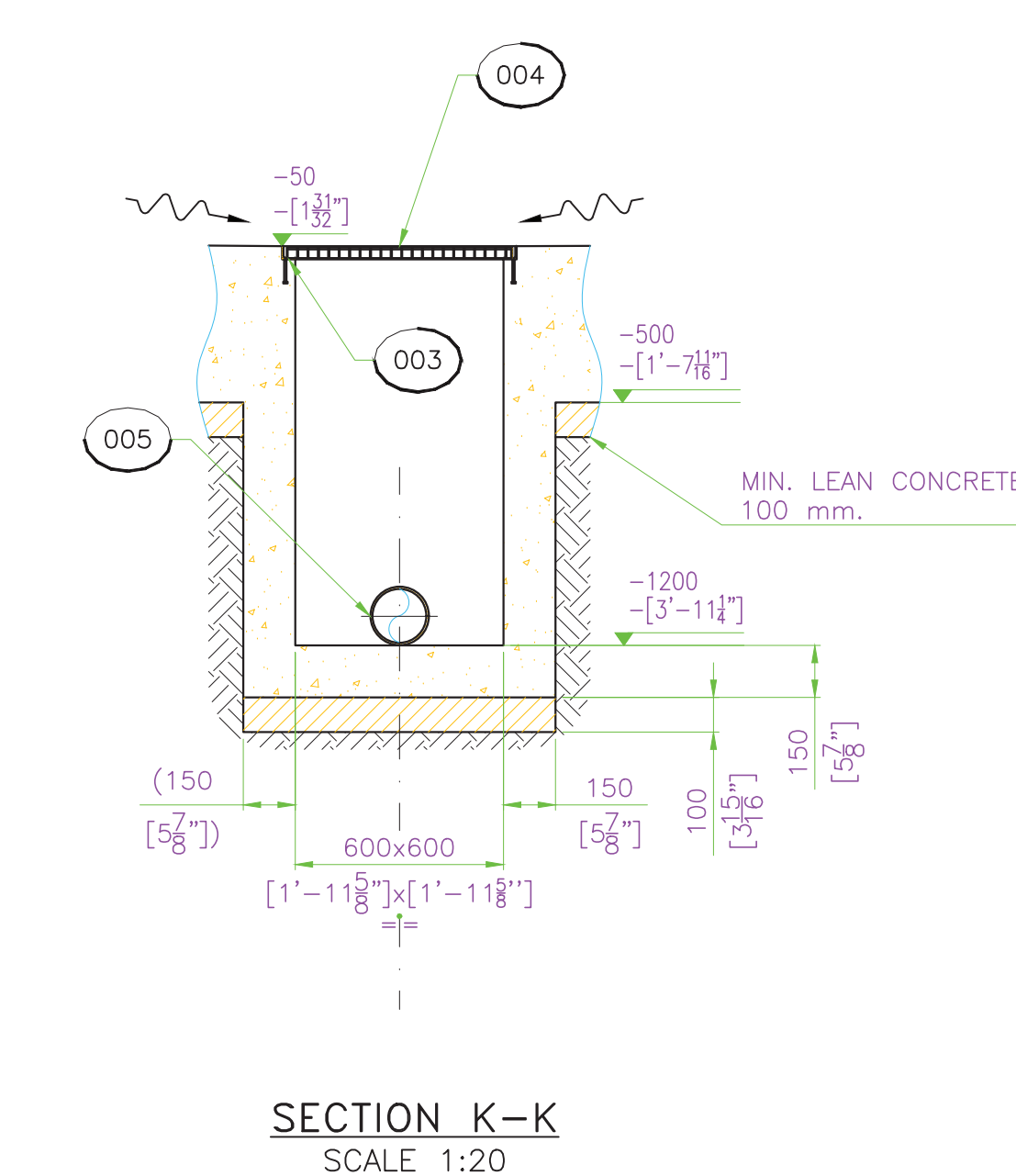
SECTION N-N
 ROTATED 90°
 SCALE 1:20
 (SHEET 2)



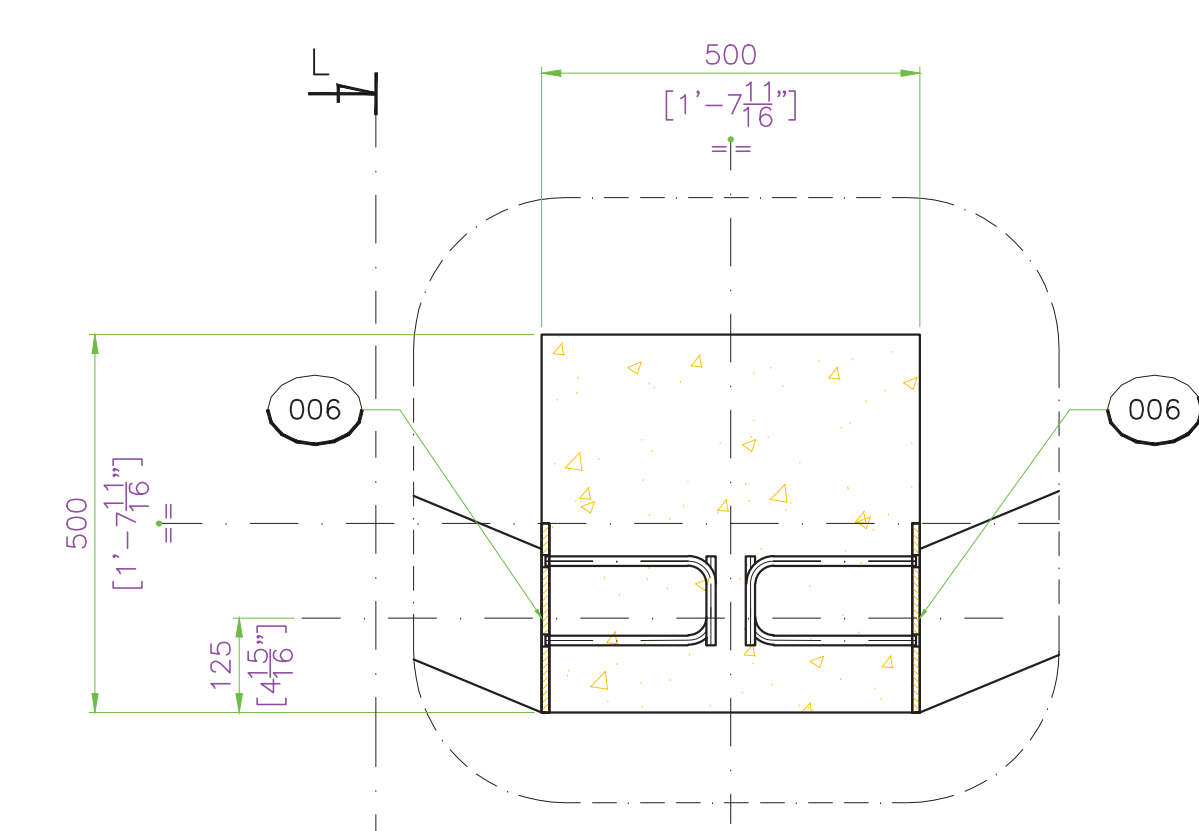
DETAIL "D"
 SCALE 1:20



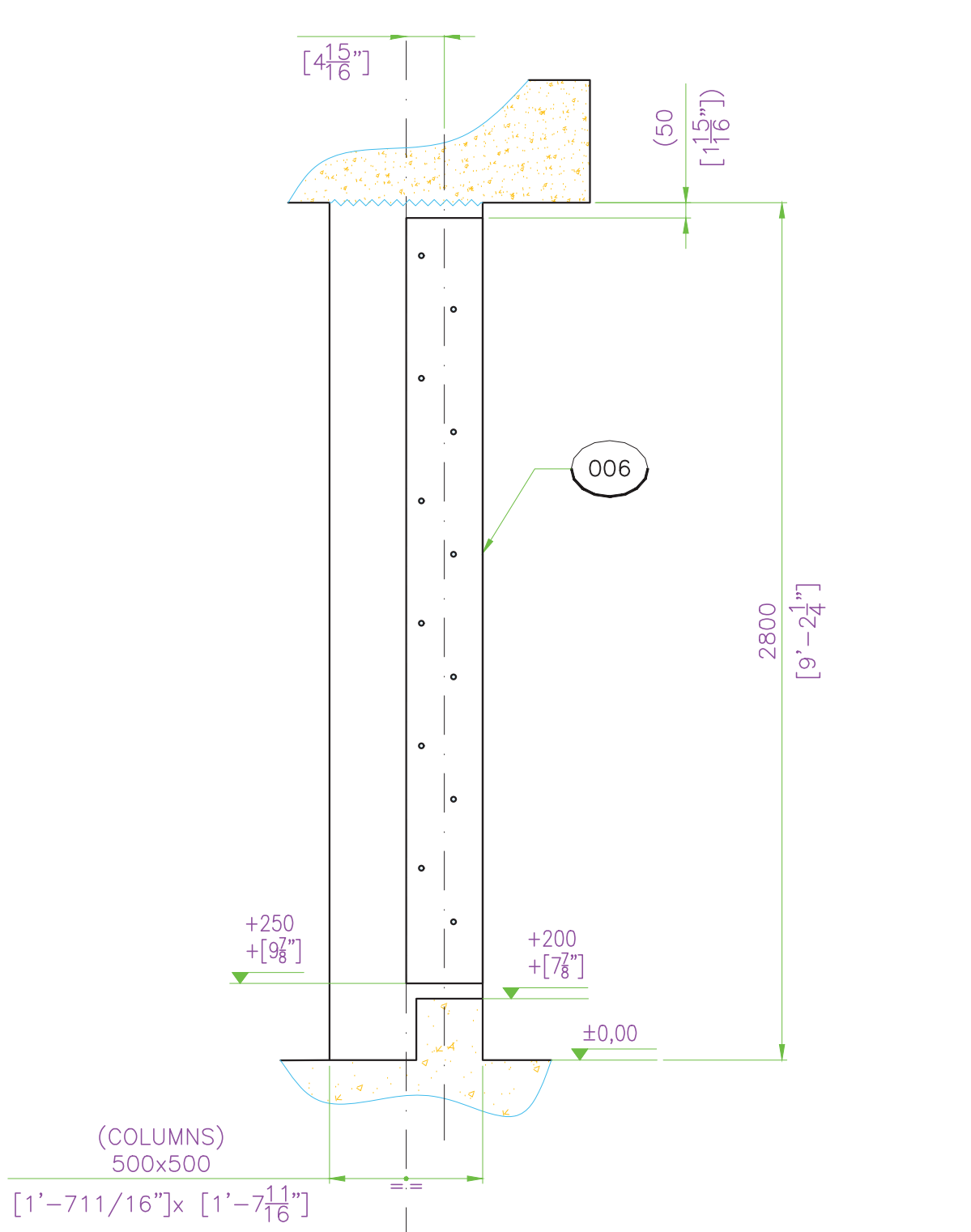
DETAIL "E"
 SCALE 1:20



SECTION K-K
 SCALE 1:20



DETAIL "F"
 -TYPICAL POSITION OF EMBEDDED PLATES (ITEM 006)-
 SCALE 1:10
 (SHEET 2)



SECTION L-L
 -TYPICAL POSITION OF EMBEDDED PLATES (ITEM 006)-
 ROTATED 90°
 (SHEET 2)

- NOTES:**
- ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS AND BETWEEN BRACKETS IN THE IMPERIAL SYSTEM, UNLESS OTHERWISE SPECIFIED.
 - ALL ELEVATIONS NOTED ON THIS DRAWING ARE BASED ON ±0.00m. LEVEL CORRESPONDING TO 242'.
 - NORTH AND EAST COORDINATES NOTED ON THIS DRAWING ARE PLAN COORDINATES AND ARE EXPRESSED IN FEET.
 - THE NORTH DIRECTION NOTED ON THIS DRAWING IS THE NORTH OF THE PROJECT.
 - CONCRETE FOR BASIN CONSTRUCTIONS SHALL BE MIXED WITH WATERPROOFING ADMIXTURES.
 - ITEM POSITION 002 WILL BE PLACED WITH DRILLS OF FLANGES STRADLE TO BOTH SIDES OF MAIN AXLE.
 - STRUCTURAL CONCRETE SHALL COMPLY WITH RUSSULA PS22_01642_CTS_001; CAST-IN-PLACE STRUCTURES.
 - EQUIPMENT AND STRUCTURES SHALL BE GROUTED AS INDICATED IN PS22_01642_CTS_002; GROUTING OF EQUIPMENT AND BASEPLATES.
 - EXCAVATION AND BACKFILL SHALL BE CARRIED OUT AS INDICATED IN PS22_01642_CTS_003; EXCAVATION AND BACKFILL.
 - CAST-IN ELEMENTS SHALL COMPLY WITH PS22_01642_CTS_004; EMBEDDED ELEMENTS IN CONCRETE.
 - CONCRETE POURING STAGES WILL BE DEFINED BY THE CONTRACTOR IN ORDER TO MINIMIZE SLAB AND WALL SHRINKAGE WHEN CURING.

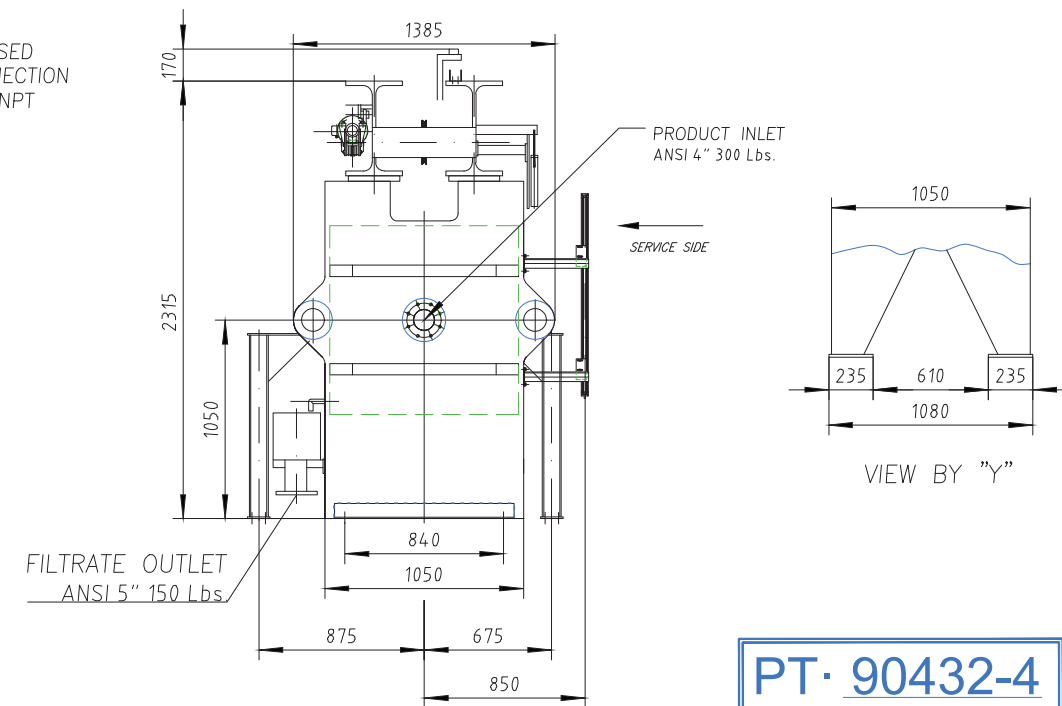
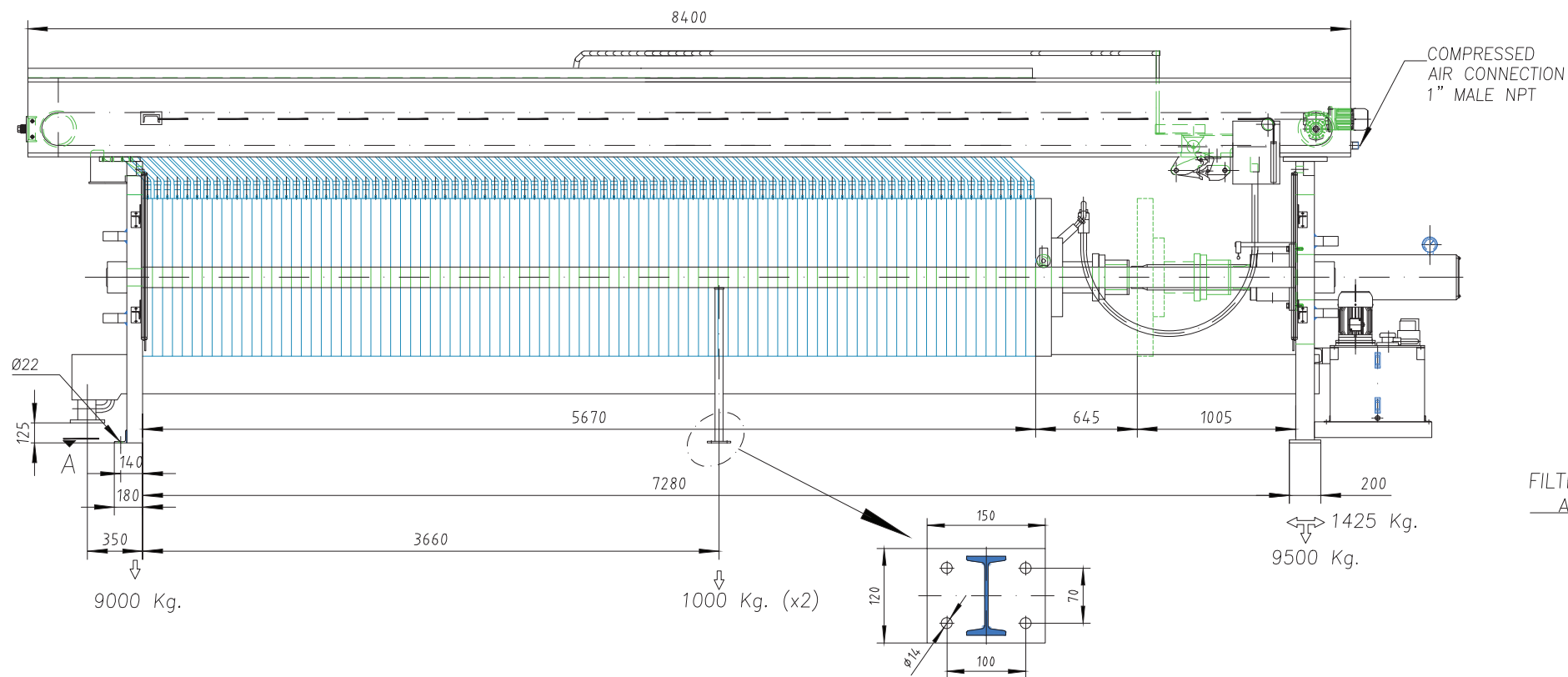
CONVENTIONAL GRAPHICAL SYMBOLS	
PLAN VIEW	SECTIONS
▲ +0.00	ELEVATION AT FINISH
■ +0.00	ELEVATION AT RUSTIC
■ +0.00	ELEVATION FOR MACHINERY RESTING
~	DIRECTION OF SLOPE

SUPPLEMENTARY DRAWINGS:
 043280 = REINFORCING STEEL
 042714 = ELECTRICAL CONDUITS
 ELO00406 = GROUND SYSTEM

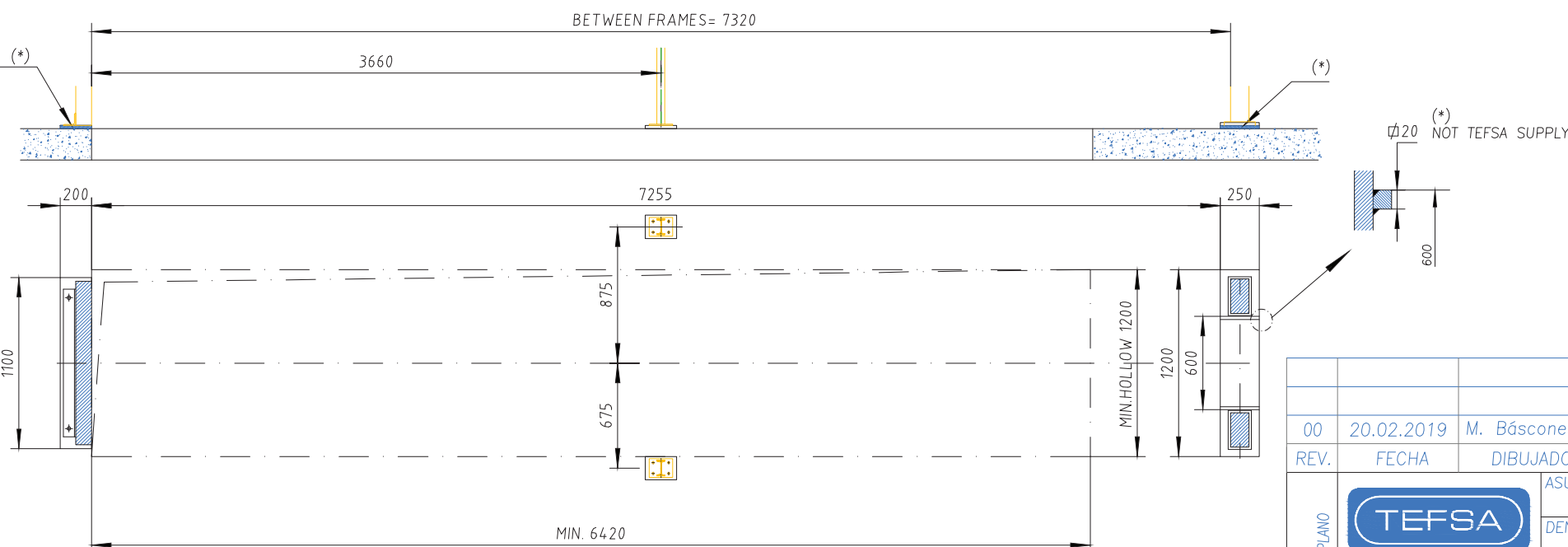
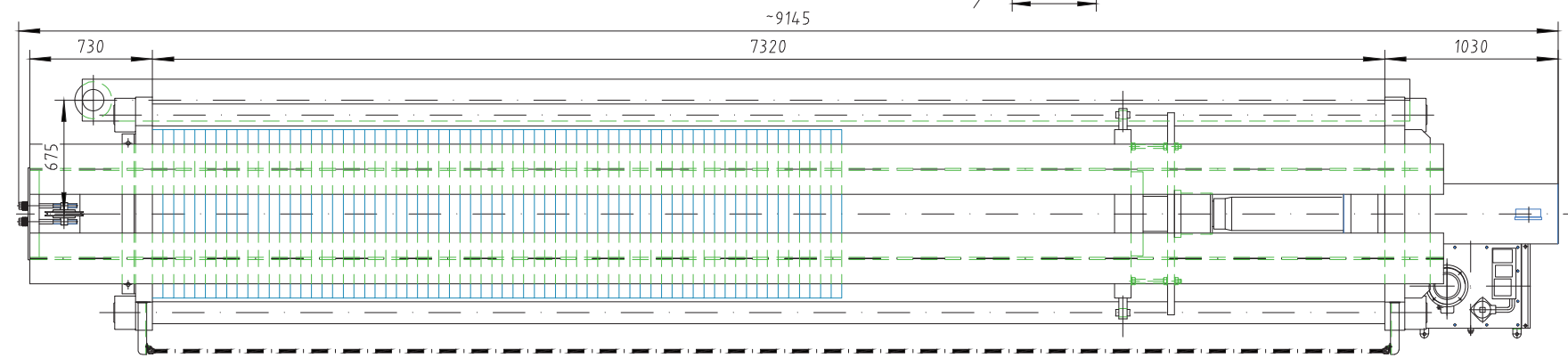
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UNITS: DUAL	CIVIL WORKS FORMS	WASTE WATER THICKENER
SCALE: 1:40		
DATE: 05-09-22		
DRN: DFG		
CHK: JLM		
APP: ALL		

RUSSULA
 Ingeniería y Servicios

043279



PT- 90432-4
 2 Piezas.
 Material: _____
 Fecha: 25.07.22

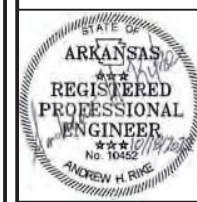


FOUNDATION DETAILS
SECTION A-A'

ESPEJOR TORTA CAKE THICKNESS	30 mm.
CAPACIDAD TOTAL PLACAS TOTAL PLATES	90
CILINDRO CYLINDER	Ø220-160 mm.
CARRERA STROKE	850 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	350 bar

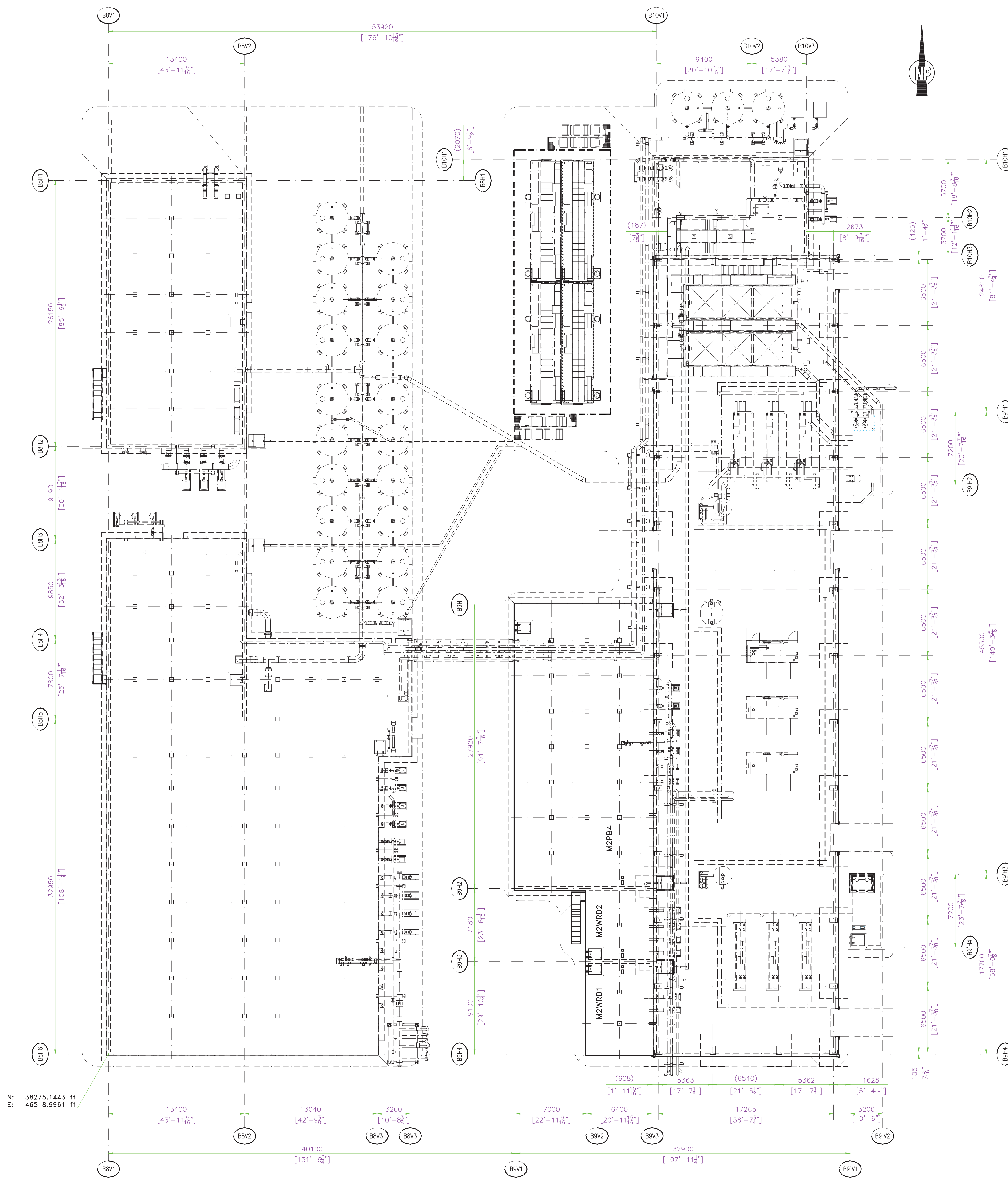
00	20.02.2019	M. Báscones	J. Valcarce	EMISION PLANO
REV.	FECHA	DIBUJADO	COMPROBADO	DENOMINACION REVISION
CLAVE CAD: = Nº PLANO	ASUNTO: PSEH-SL 1000/12			
FORMATO: DIN-A 3	ESCALA: 1:35	Nº PLANO: PSEH1000SL.12A30-90.RU		REVISION: 00

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

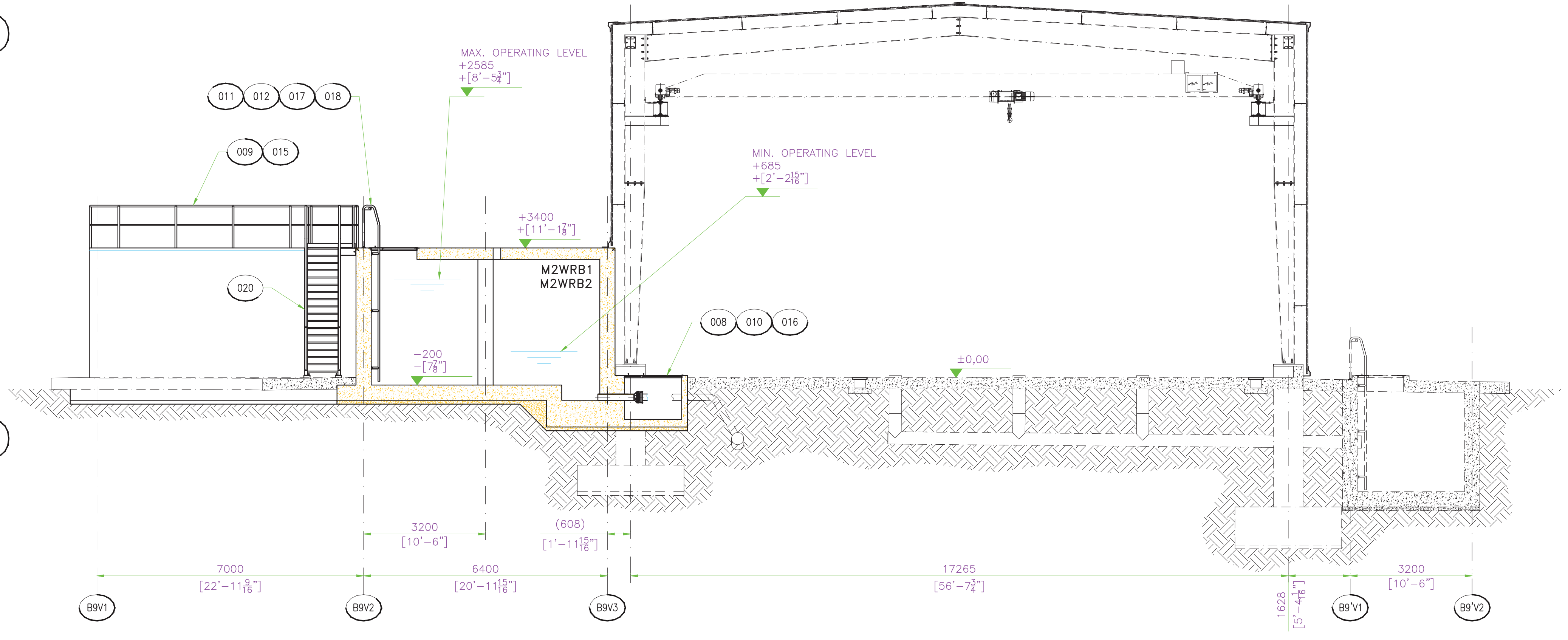


EXPLOATORY VENTURES, LLC
 STEEL MANUFACTURING COMPLEX
 ARKANSAS
 OSCEOLA
 PRESS PLATE FILTERS M2WSPF1 AND 2

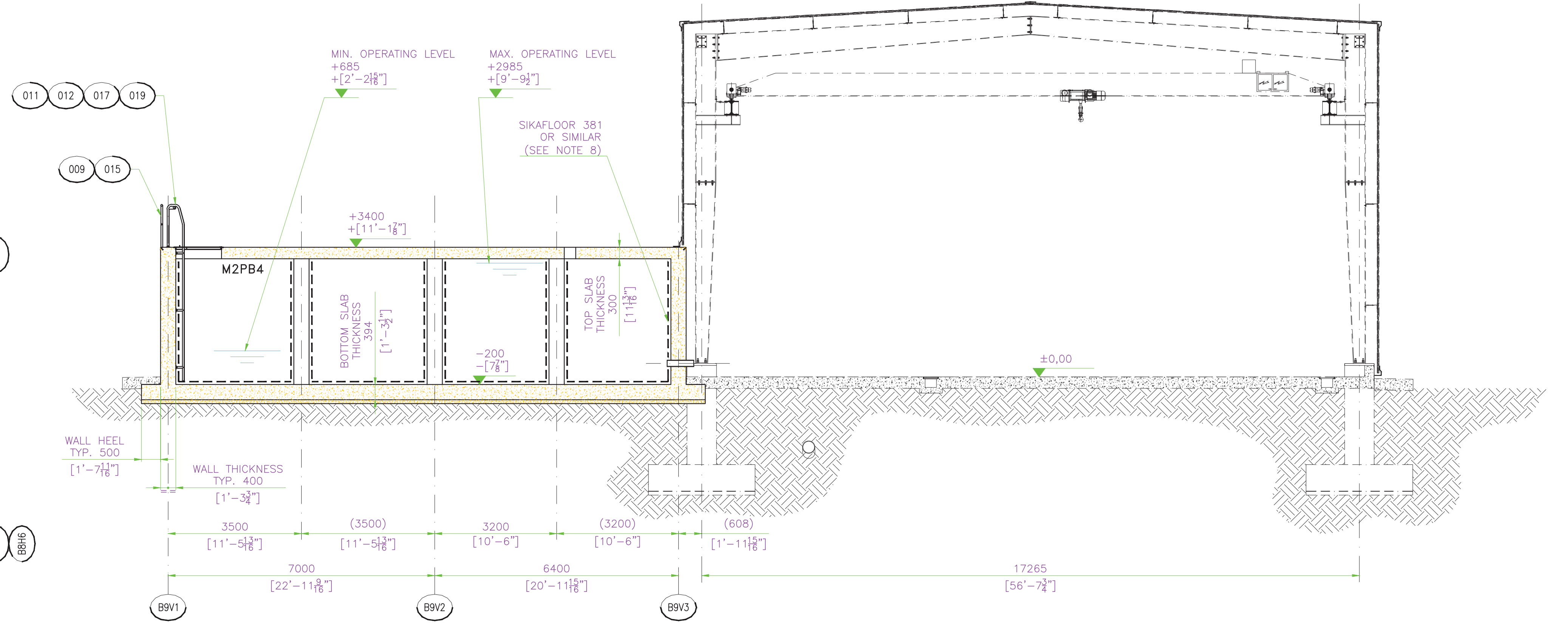
DATE	XX-XX-XX			
REVISION DESCRIPTION				
NO	XX			
Drawn By:	AES	Date:	10-19-22	
Checked By:	AHR	Scale:	11"x17" 1:40	
Project Number:				BHLP-22172
				C16



M2PB4, M2WRB1 & M2WRB2 - GENERAL PLAN VIEW



M2WRB1 & M2WRB2 - TYPICAL SECTION
 SCALE 1:75



M2PB4 - TYPICAL SECTION
 SCALE 1:75

- NOTES:**
- ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS AND BETWEEN BRACKETS IN THE IMPERIAL SYSTEM, UNLESS OTHERWISE SPECIFIED.
 - ALL ELEVATIONS NOTED ON THIS DRAWING ARE BASED ON ±0.00m, LEVEL CORRESPONDING TO +243'-6".
 - NORTH AND EAST COORDINATES NOTED ON THIS DRAWING ARE PLAN COORDINATES AND ARE EXPRESSED IN FEET.
 - THE NORTH DIRECTION NOTED ON THIS DRAWING IS THE NORTH OF THE PROJECT.
 - CHEMICAL ANCHOR BOLTS SHALL BE INSTALLED BY MECHANICAL CONTRACTOR.
 - GATHERING SLOPES SHALL NOT DECREASE THE NOMINAL DIMENSIONS OF THE CIVIL WORK.
 - AN APPROPRIATE COATING SHALL BE APPLIED TO BASIN M2PB4.
 - STRUCTURAL CONCRETE SHALL COMPLY WITH RUSSULA PS22_01642_CTS_001: CAST-IN-PLACE STRUCTURES.
 - EQUIPMENT AND STRUCTURES SHALL BE GROUDED AS INDICATED IN PS22_01642_CTS_002: GROUDED OF EQUIPMENT AND BASEPLATES.
 - EXCAVATION AND BACKFILL SHALL BE CARRIED OUT AS INDICATED IN PS22_01642_CTS_003: EXCAVATION AND BACKFILL.
 - CAST-IN ELEMENTS SHALL COMPLY WITH PS22_01642_004: EMBEDDED ELEMENTS IN CONCRETE.

NOMINAL CONCRETE COVER FOR REBAR	
FOUNDATIONS	2" / 50 mm
FOUNDATIONS (CONCRETE CAST AGAINST SOIL)	3" / 75 mm
WALLS	2" / 50 mm
COLUMNS	2" / 50 mm
BEAMS	2" / 50 mm

STRUCTURAL CONCRETE DESIGN PROPERTIES	
Characteristic cylinder compressive strength [<i>f</i> 'c] (psi/MPa)	4,500 / 31
Concrete Slump Test - Abrams Cone (in/mm)	4"-6" / 100-150
Coarse Aggregate Size (in/mm)	¾" / 19
Exposure categories	F2, S0, W2, C1
REINFORCING STEEL DESIGN PROPERTIES	
Deformed carbon-steel bars, uncoated	ASTM A615 grade 60 (60 ksi / 413 MPa)
Welded steel wire fabric	ASTM A706 grade 60 (60 ksi / 413 MPa)

CONVENTIONAL GRAPHICAL SYMBOLS	
PLAN VIEW	SECTIONS
▲ +0.00	ELEVATION AT FINISH
▲ +0.00	ELEVATION AT RUSTIC
▲ +0.00	ELEVATION FOR MACHINERY RESTING
↘	DIRECTION OF SLOPE

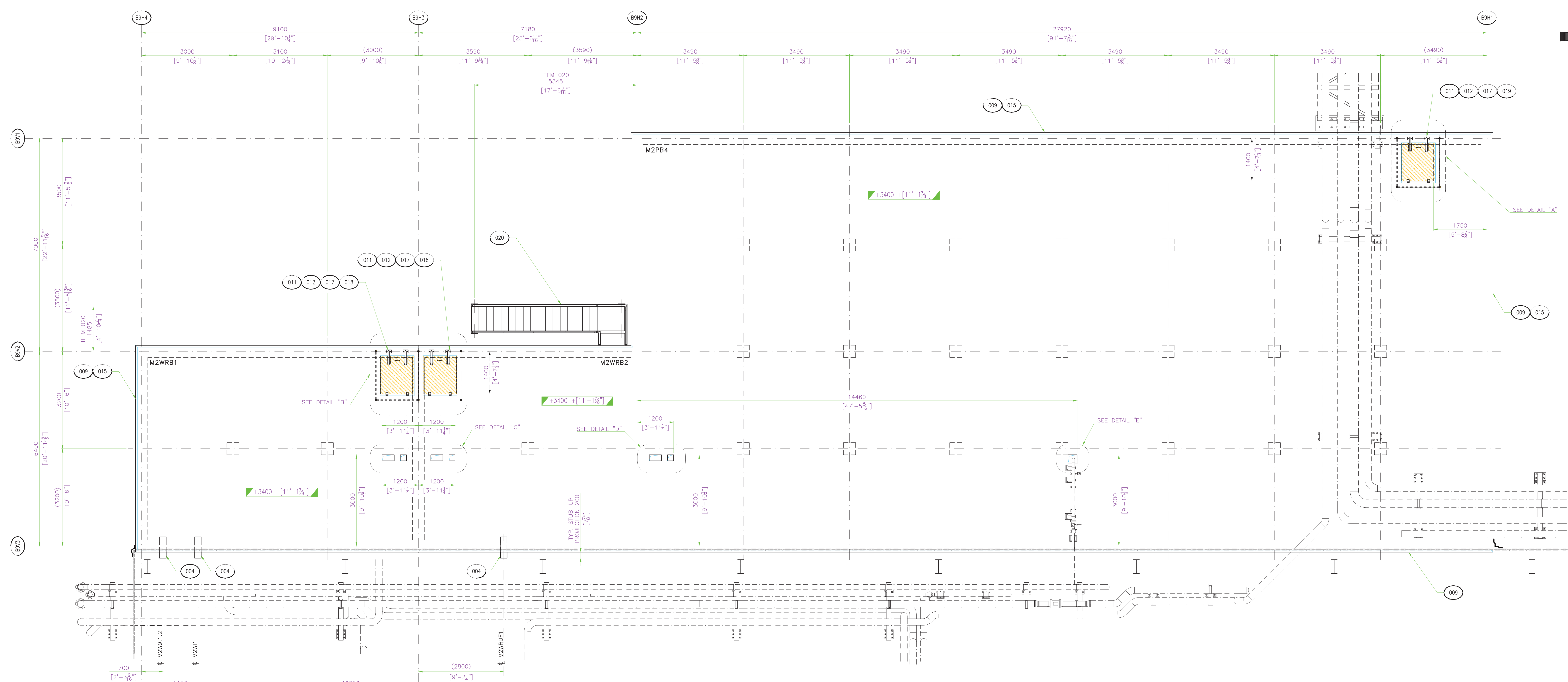
- SUPPLEMENTARY DRAWINGS:**
- 043302 - REINFORCING STEEL
 - 043288 - MAKE UP BUILDING BASIC ENG.
 - 043297 - SIDEWALKS
 - 043298 - UNDERGROUND CPVC PIPES
 - 043299 - MAKE UP BUILDING FOUNDATIONS
 - 043300 - MAKE UP BUILDING FLOOR SLAB
 - 042712 - ELECTRICAL CONDUITS

MATERIAL	CONDITION	FIRST ANGLE PROJECTION
UNITS: DUAL	CIVIL WORKS FORMS	REV. 01
SCALE: 1:175	M2PB4, M2WRB1 & M2WRB2	FIN WT:
DATE: 04-10-22		APP: JILM

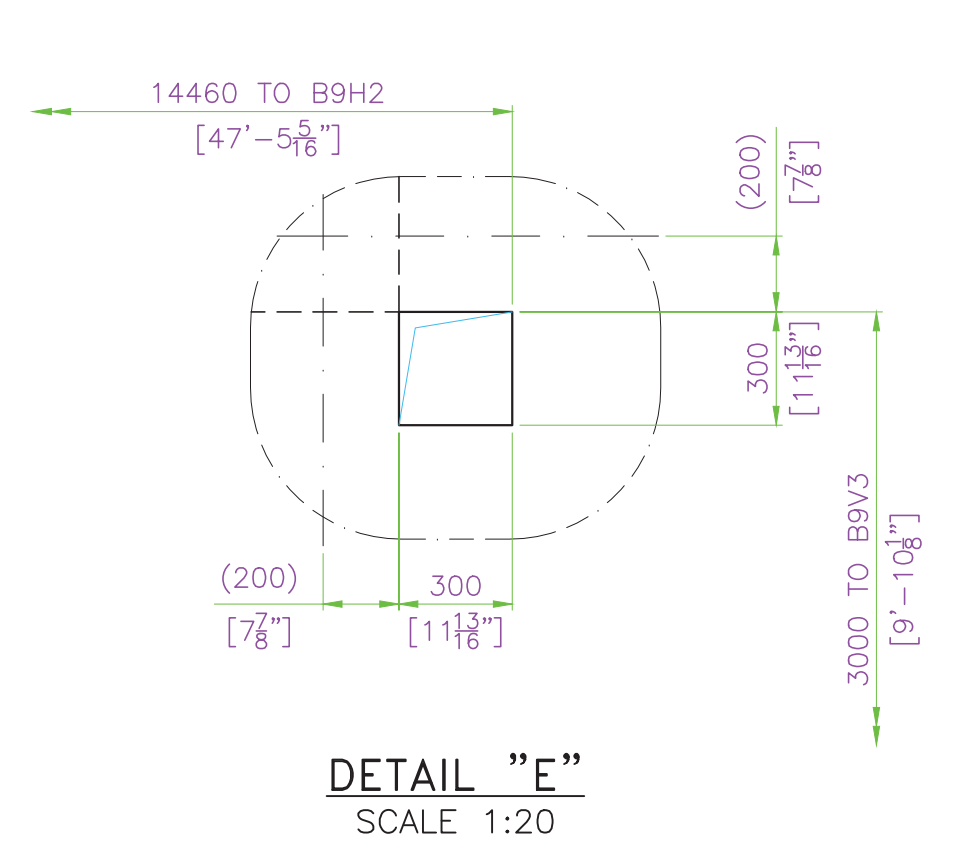
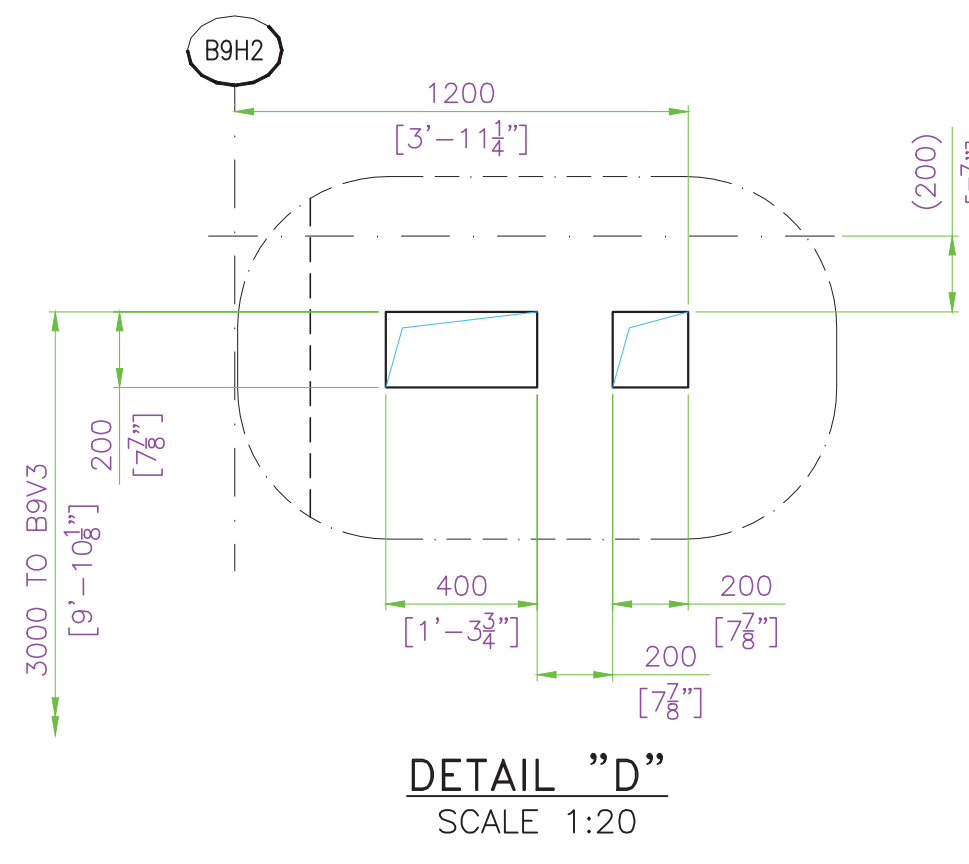
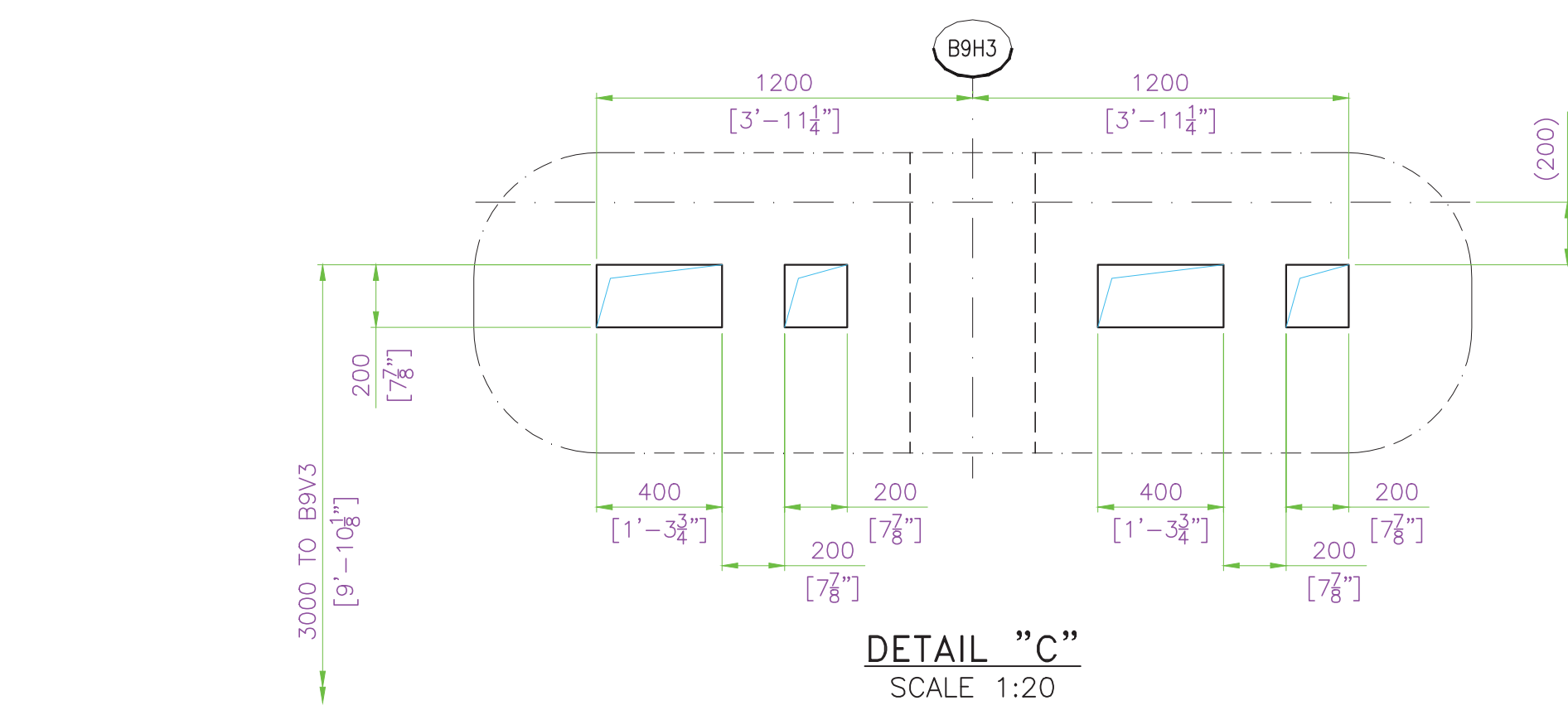
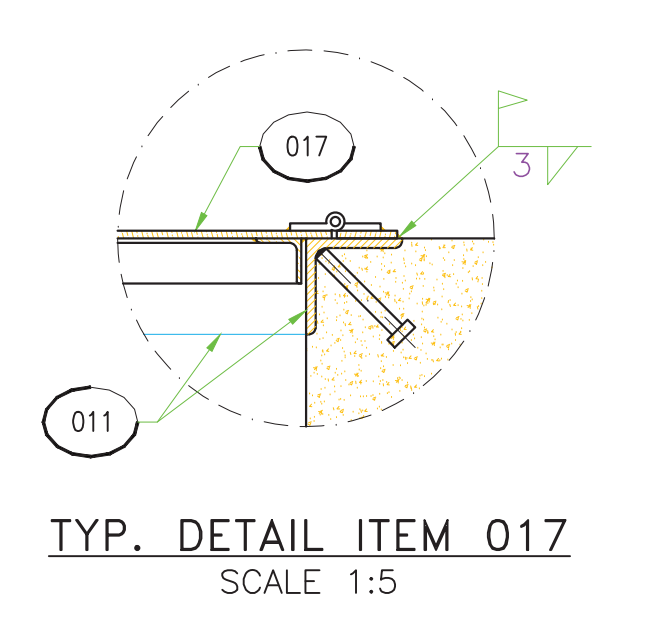
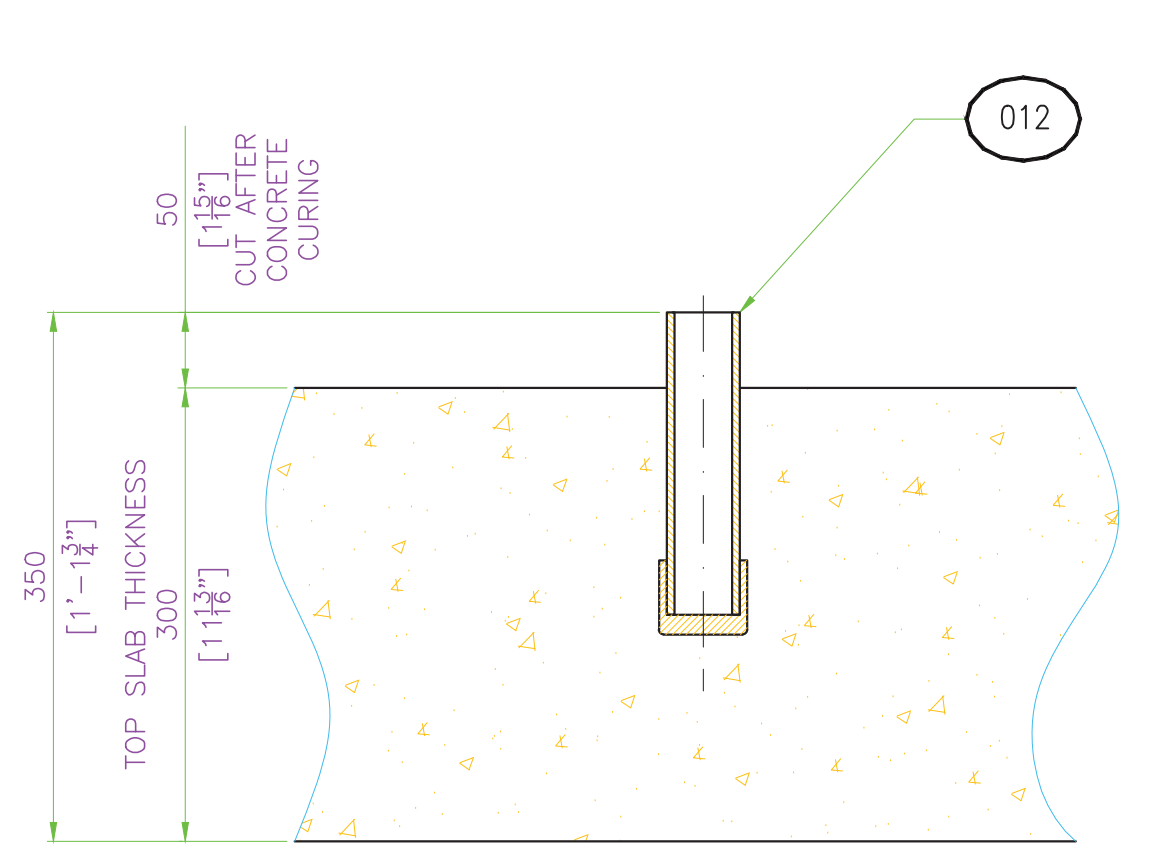
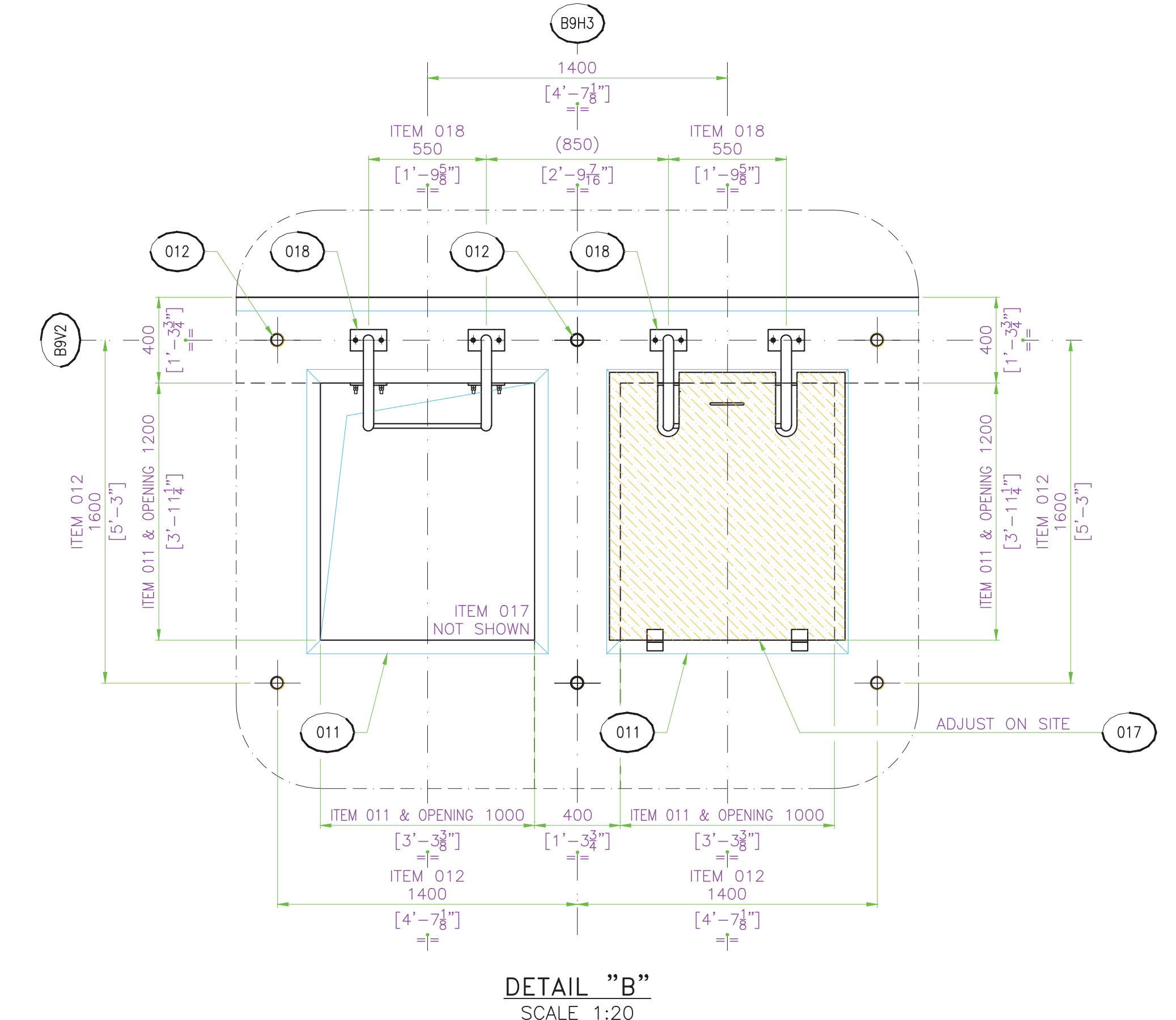
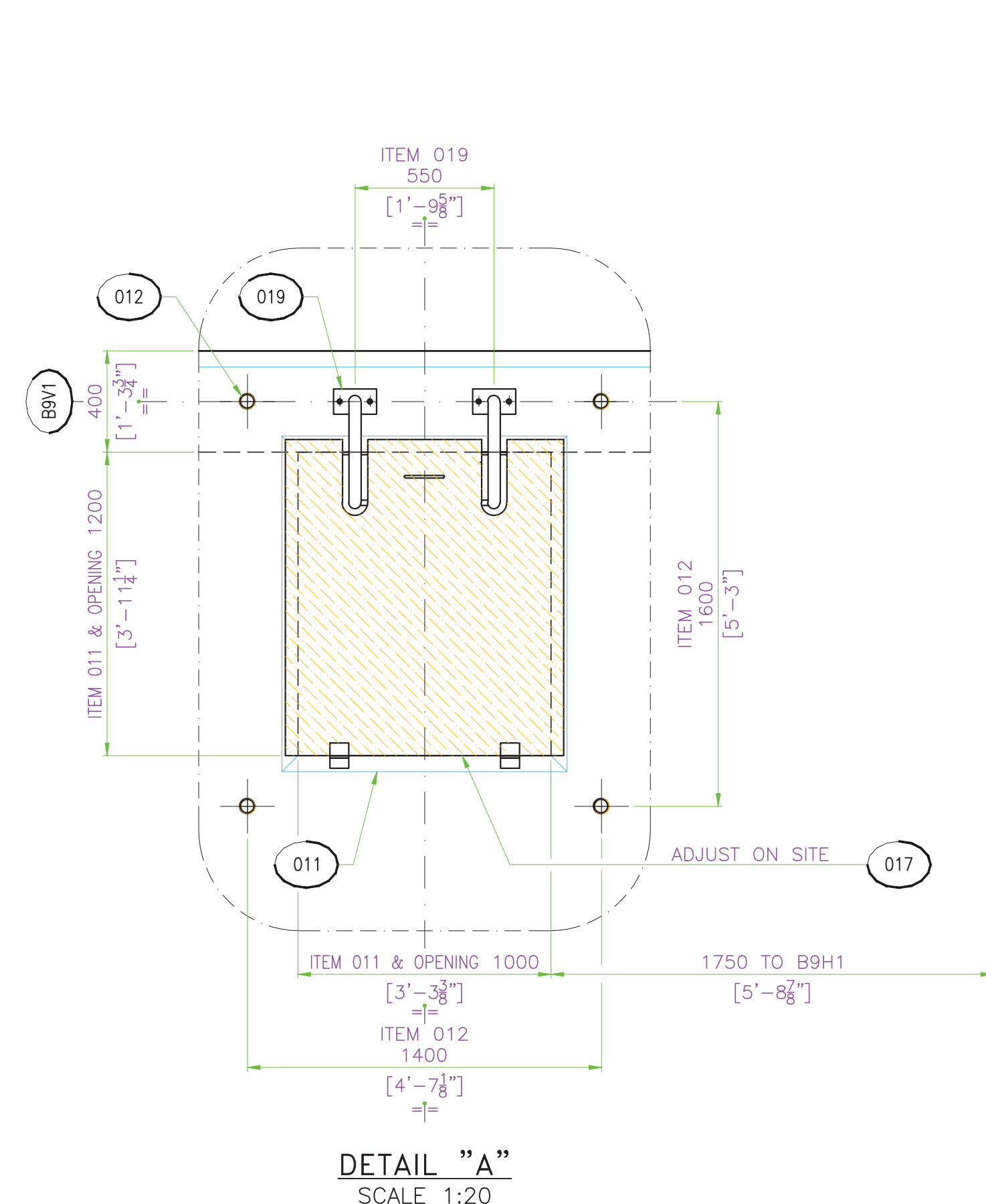


043301

C18A



M2PB4, M2WRB1 & M2WRB2 - PLAN VIEW
 ELEV. +3400



- NOTES:**
- ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS AND BETWEEN BRACKETS IN THE IMPERIAL SYSTEM, UNLESS OTHERWISE SPECIFIED.
 - ALL ELEVATIONS NOTED ON THIS DRAWING ARE BASED ON ±0.00m. LEVEL CORRESPONDING TO +243'-6".
 - NORTH AND EAST COORDINATES NOTED ON THIS DRAWING ARE PLAN COORDINATES AND ARE EXPRESSED IN FEET.
 - THE NORTH DIRECTION NOTED ON THIS DRAWING IS THE NORTH OF THE PROJECT.
 - CHEMICAL ANCHOR BOLTS SHALL BE INSTALLED BY MECHANICAL CONTRACTOR.
 - GATHERING SLOPES SHALL NOT DECREASE THE NOMINAL DIMENSIONS OF THE CIVIL WORK.
 - AN APPROPRIATE COATING SHALL BE APPLIED TO BASIN M2PB4.
 - STRUCTURAL CONCRETE SHALL COMPLY WITH RUSSELLA PS22_01642_CTS_001: CAST-IN-PLACE STRUCTURES.
 - EQUIPMENT AND STRUCTURES SHALL BE GROUDED AS INDICATED IN PS22_01642_CTS_002: GROUDED EQUIPMENT AND BASEPLATES.
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 - CAST-IN ELEMENTS SHALL COMPLY WITH PS22_01642_004: EMBEDDED ELEMENTS IN CONCRETE.

NOMINAL CONCRETE COVER FOR REBAR	
FOUNDATIONS	2" / 50 mm
FOUNDATIONS (CONCRETE CAST AGAINST SOIL)	3" / 75 mm
WALLS	2" / 50 mm
COLUMNS	2" / 50 mm
BEAMS	2" / 50 mm

STRUCTURAL CONCRETE DESIGN PROPERTIES	
Characteristic cylinder compressive strength [f'c] (psi/MPa)	4,500 / 31
Concrete Slump Test - Abrams Cone (in/mm)	4"-6" / 100-150
Coarse Aggregate Size (in/mm)	¾" / 19
Exposure categories	F2, SO, W2, C1
REINFORCING STEEL DESIGN PROPERTIES	
Deformed carbon-steel bars, uncoated	ASTM A615 grade 60 (60 ksi / 413 MPa)
Welded steel wire fabric	ASTM A706 grade 60 (60 ksi / 413 MPa)

CONVENTIONAL GRAPHICAL SYMBOLS	
PLAN VIEW	SECTIONS
▲ +0.00	ELEVATION AT FINISH
▼ +0.00	ELEVATION AT RUSTIC
▲ +0.00	ELEVATION FOR MACHINERY RESTING
↘	DIRECTION OF SLOPE

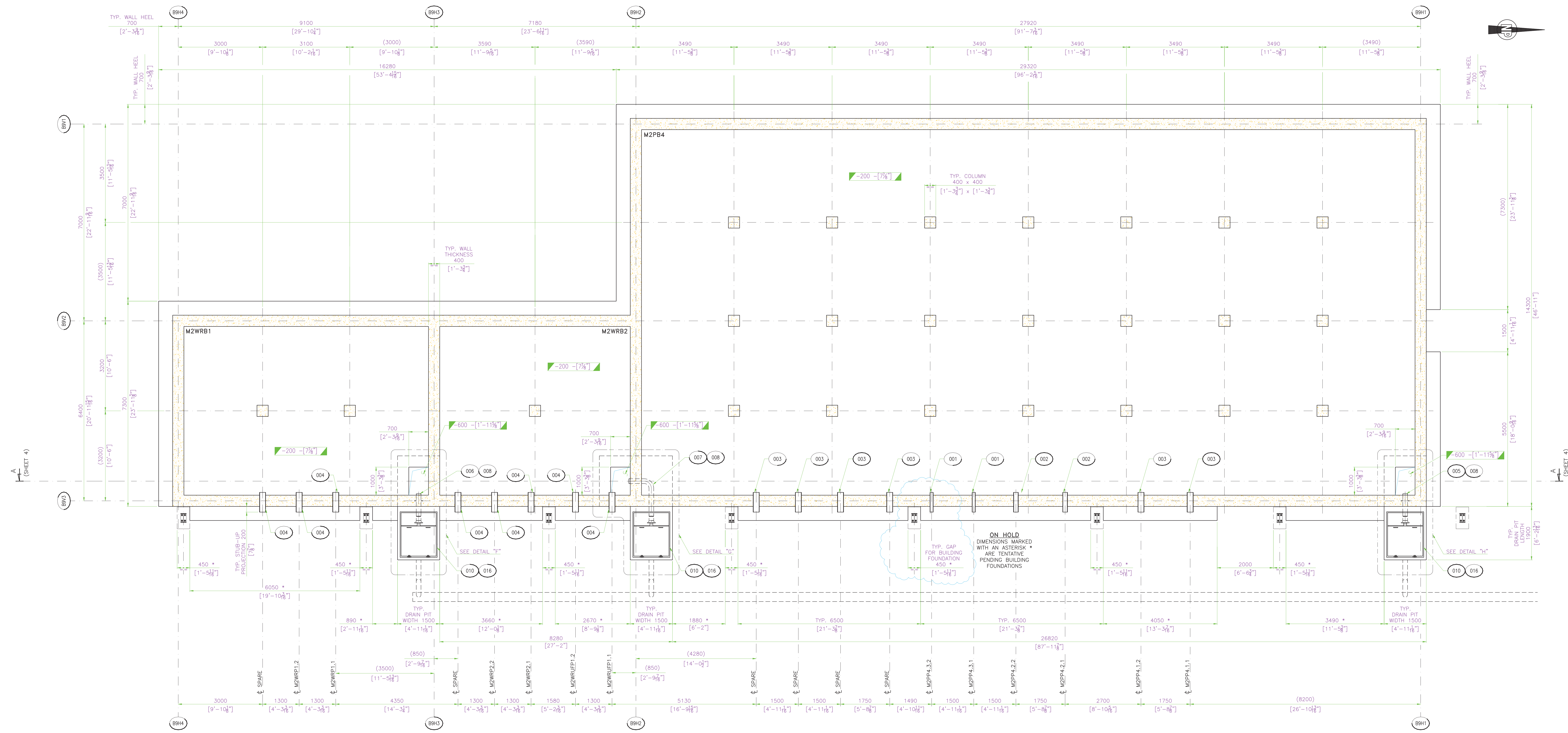
- SUPPLEMENTARY DRAWINGS:**
- 043302 - REINFORCING STEEL
 - 043288 - MAKE UP BUILDING BASIC ENG.
 - 043297 - SIDEWALKS
 - 043298 - UNDERGROUND CPVC PIPES
 - 043299 - MAKE UP BUILDING FOUNDATIONS
 - 043300 - MAKE UP BUILDING FLOOR SLAB
 - 042712 - ELECTRICAL CONDUITS

MATERIAL		CONDITION	
UNITS:	DUAL	M2PB4, M2WRB1 & M2WRB2	CIVIL WORKS FORMS
SCALE:	1:50		
DATE:	04-10-22		
DRN:	JRF		
CHK:	JLM		
APP:	JLM		

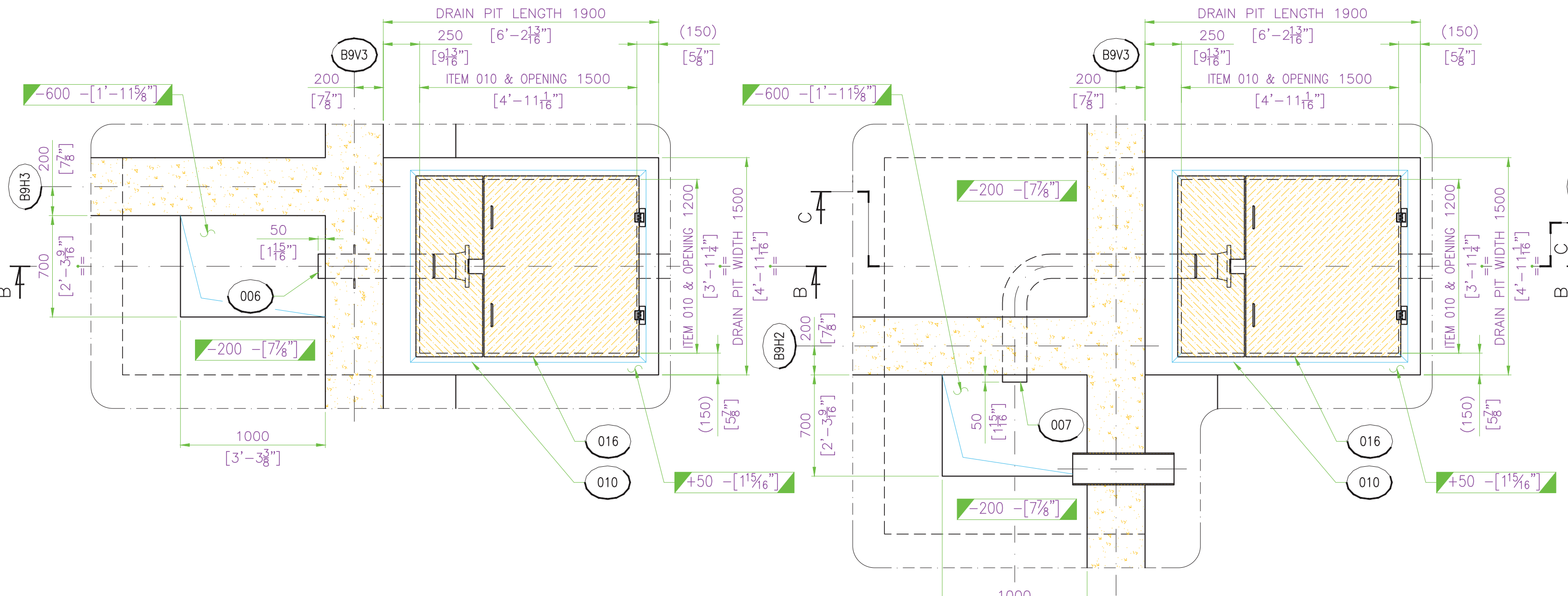
RUSSELLA
 Ingeniería y Servicios
 043301

DATE	REVISION DESCRIPTION
10-19-22	XX

Drawn By: **AES** Date: **10-19-22**
 Checked By: **AHR** Scale: **3/8"=1'-0"**
 Project Number: **BHP-22172**
C18B



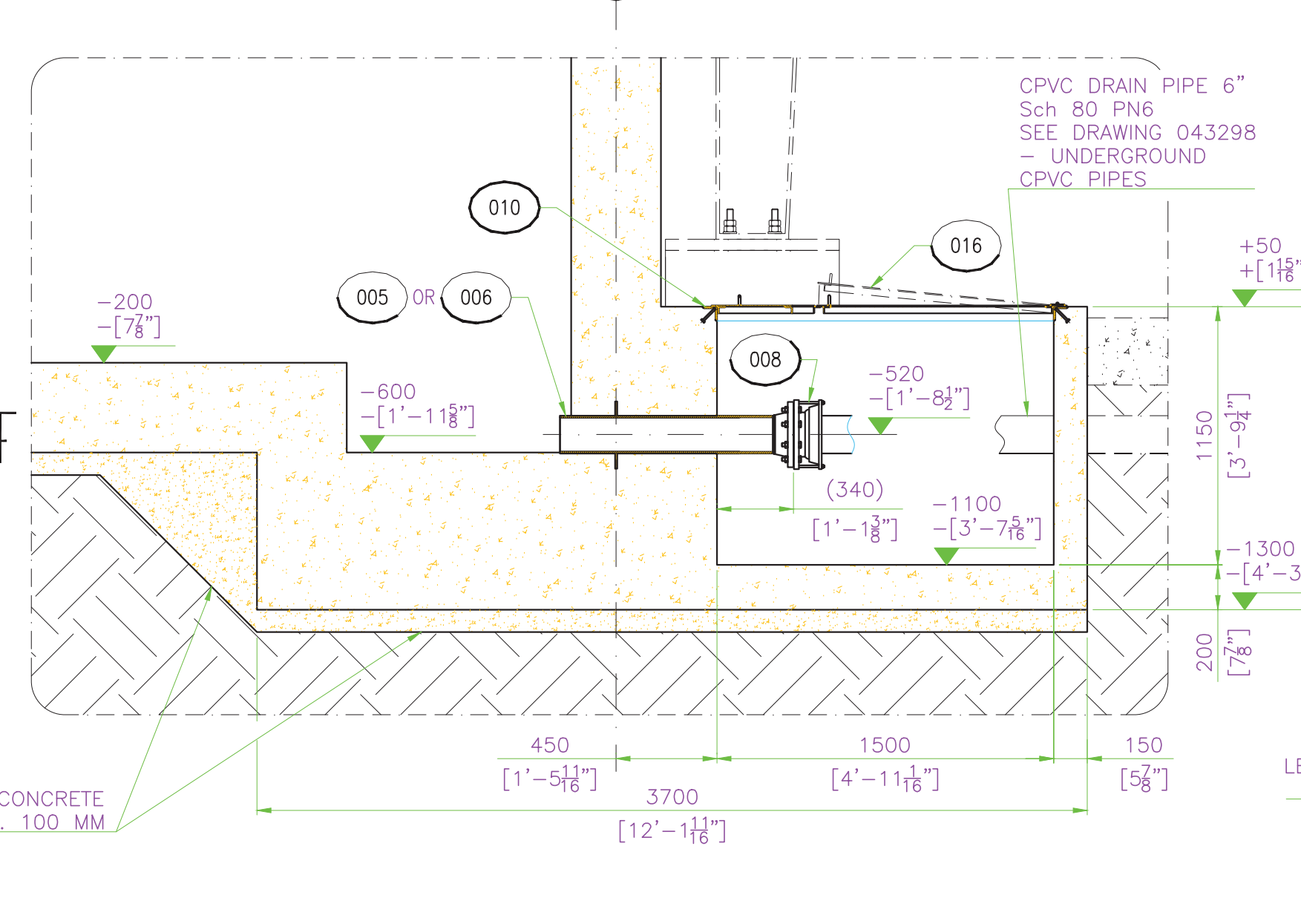
M2PB4, M2WRB1 & M2WRB2 - PLAN VIEW
 ELEV. ±0.00



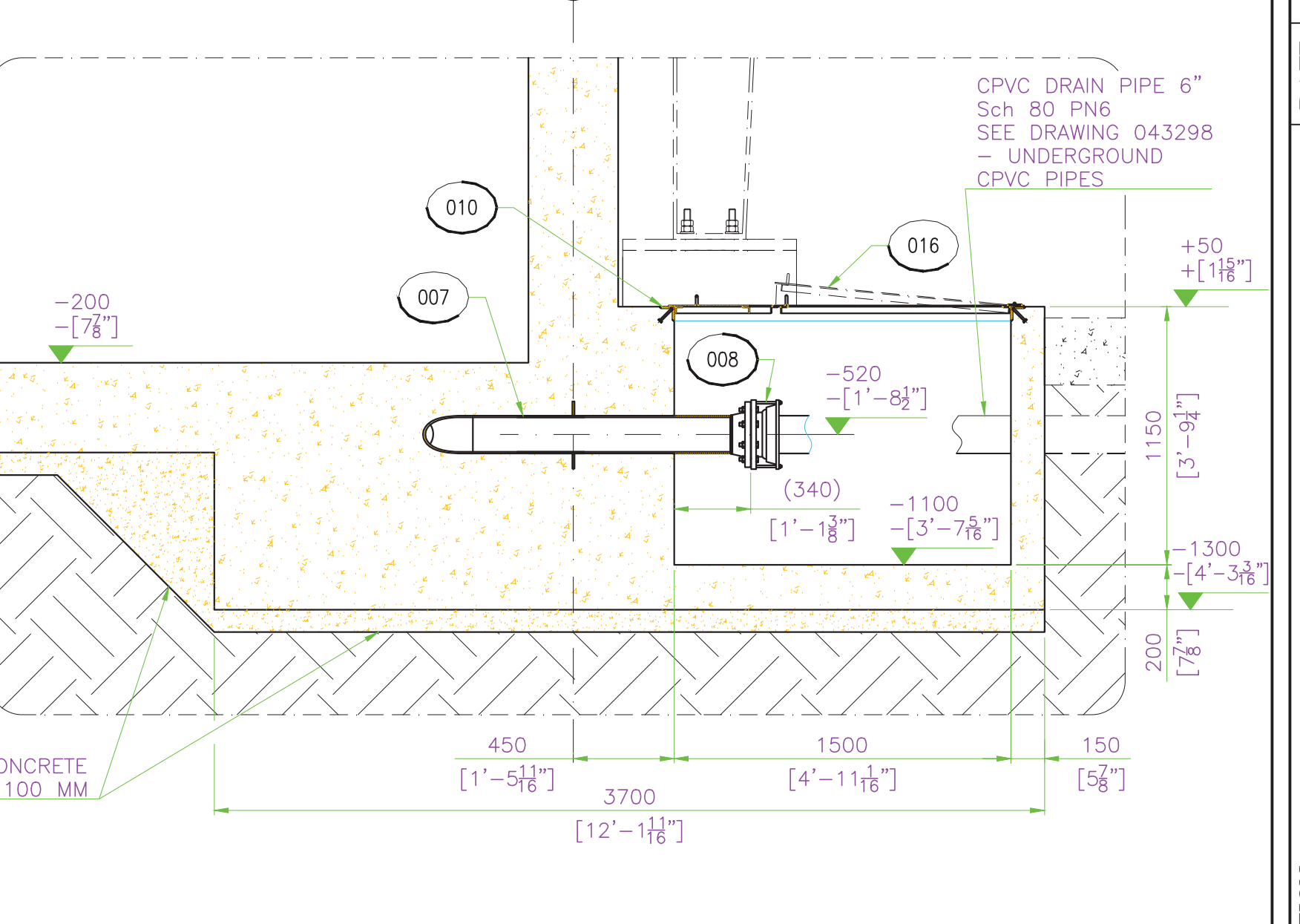
DETAIL "F"
 ROTATED 90°
 SCALE 1:25

DETAIL "G"
 ROTATED 90°
 SCALE 1:25

DETAIL "H"
 ROTATED 90°
 SCALE 1:25



SECTION B-B
 SCALE 1:25



SECTION C-C
 SCALE 1:25

- NOTES:**
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 - NORTH AND EAST COORDINATES NOTED ON THIS DRAWING ARE PLAN COORDINATES AND ARE EXPRESSED IN FEET.
 - THE NORTH DIRECTION NOTED ON THIS DRAWING IS THE NORTH OF THE PROJECT.
 - EQUIPMENT AND STRUCTURES SHALL BE GROUNDED AS INDICATED IN PS22_01642_CTS_002; GROUNTING OF EQUIPMENT AND BASEPLATES.
 - CHEMICAL ANCHOR BOLTS SHALL BE INSTALLED BY MECHANICAL CONTRACTOR.
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 - EQUIPMENT AND STRUCTURES SHALL BE GROUNDED AS INDICATED IN PS22_01642_CTS_002; GROUNTING OF EQUIPMENT AND BASEPLATES.
 - EXCAVATION AND BACKFILL SHALL BE CARRIED OUT AS INDICATED IN PS22_01642_CTS_003; EXCAVATION AND BACKFILL.
 - CAST-IN ELEMENTS SHALL COMPLY WITH PS22_01642_004; EMBEDDED ELEMENTS IN CONCRETE.

NOMINAL CONCRETE COVER FOR REBAR	
FOUNDATIONS	2" / 50 mm
FOUNDATIONS (CONCRETE CAST AGAINST SOIL)	3" / 75 mm
WALLS	2" / 50 mm
COLUMNS	2" / 50 mm
BEAMS	2" / 50 mm

STRUCTURAL CONCRETE DESIGN PROPERTIES	
Characteristic cylinder compressive strength [f'c] (psi/MPa)	4,500 / 31
Concrete Slump Test - Abrams Cone (in/mm)	4"-6" / 100-150
Coarse Aggregate Size (in/mm)	3" / 19
Exposure categories	F2, S0, W2, C1
REINFORCING STEEL DESIGN PROPERTIES	
Deformed carbon-steel bars, uncoated	ASTM A615 grade 60 (60 ksi / 413 MPa)
Welded steel wire fabric	ASTM A706 grade 60 (60 ksi / 413 MPa)

CONVENTIONAL GRAPHICAL SYMBOLS		
PLAN VIEW	SECTIONS	
▲+0.00	ELEVATION AT FINISH	▲+0.00
■+0.00	ELEVATION AT RUSTIC	■+0.00
▲+0.00	ELEVATION FOR MACHINERY RESTING	▲+0.00
↘	DIRECTION OF SLOPE	

- SUPPLEMENTARY DRAWINGS:**
- 043302 - REINFORCING STEEL
 - 043288 - MAKE UP BUILDING BASIC ENG.
 - 043297 - SIDEWALKS
 - 043298 - UNDERGROUND CPVC PIPES
 - 043299 - MAKE UP BUILDING FOUNDATIONS
 - 043300 - MAKE UP BUILDING FLOOR SLAB
 - 042712 - ELECTRICAL CONDUITS

MATERIAL		CONDITION	
UNITS:	DUAL		
SCALE:	1:50		
DATE:	04-10-22		
DRN:	JRF		
CHK:	JLM		
APP:	JLM		

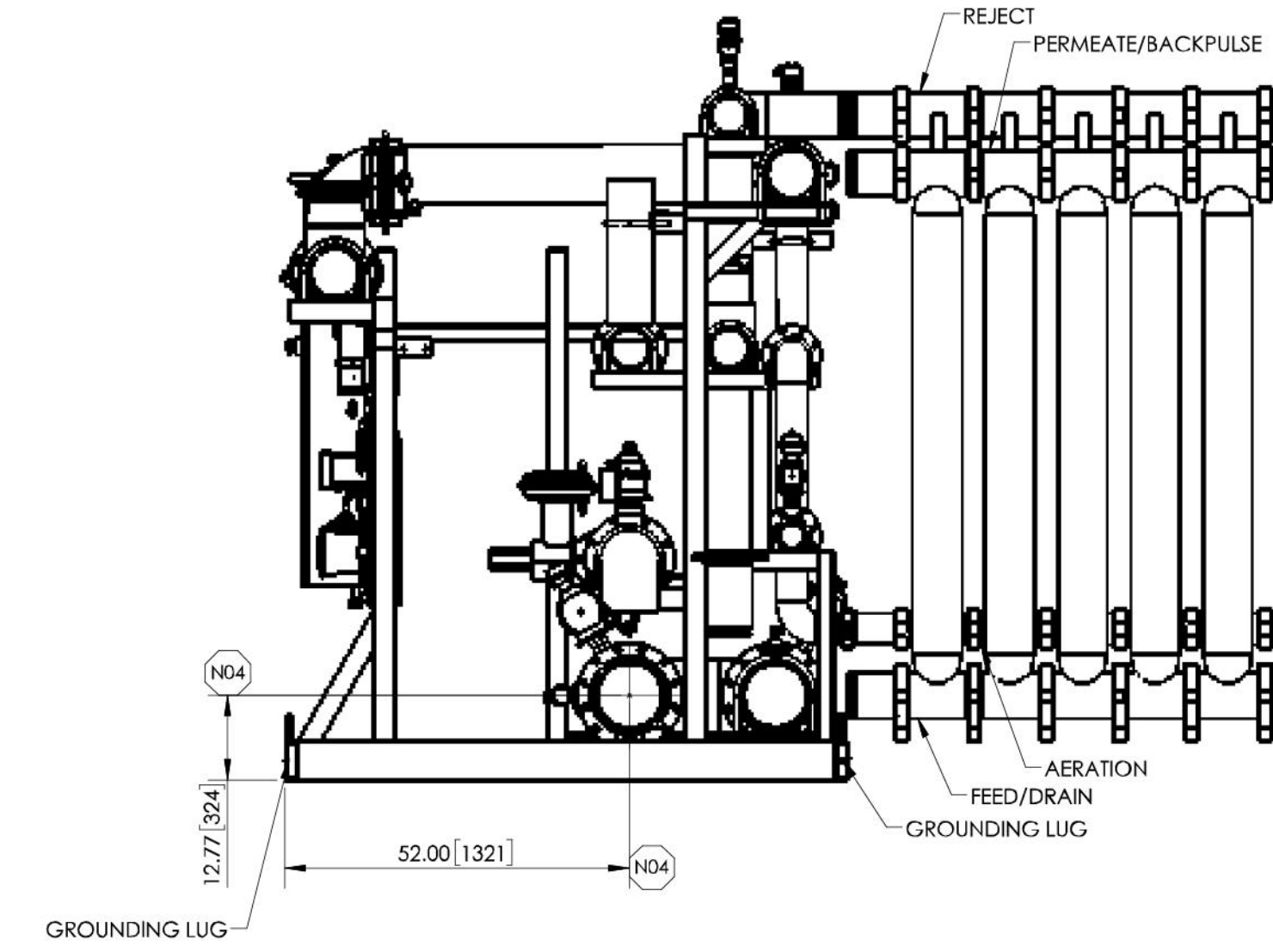
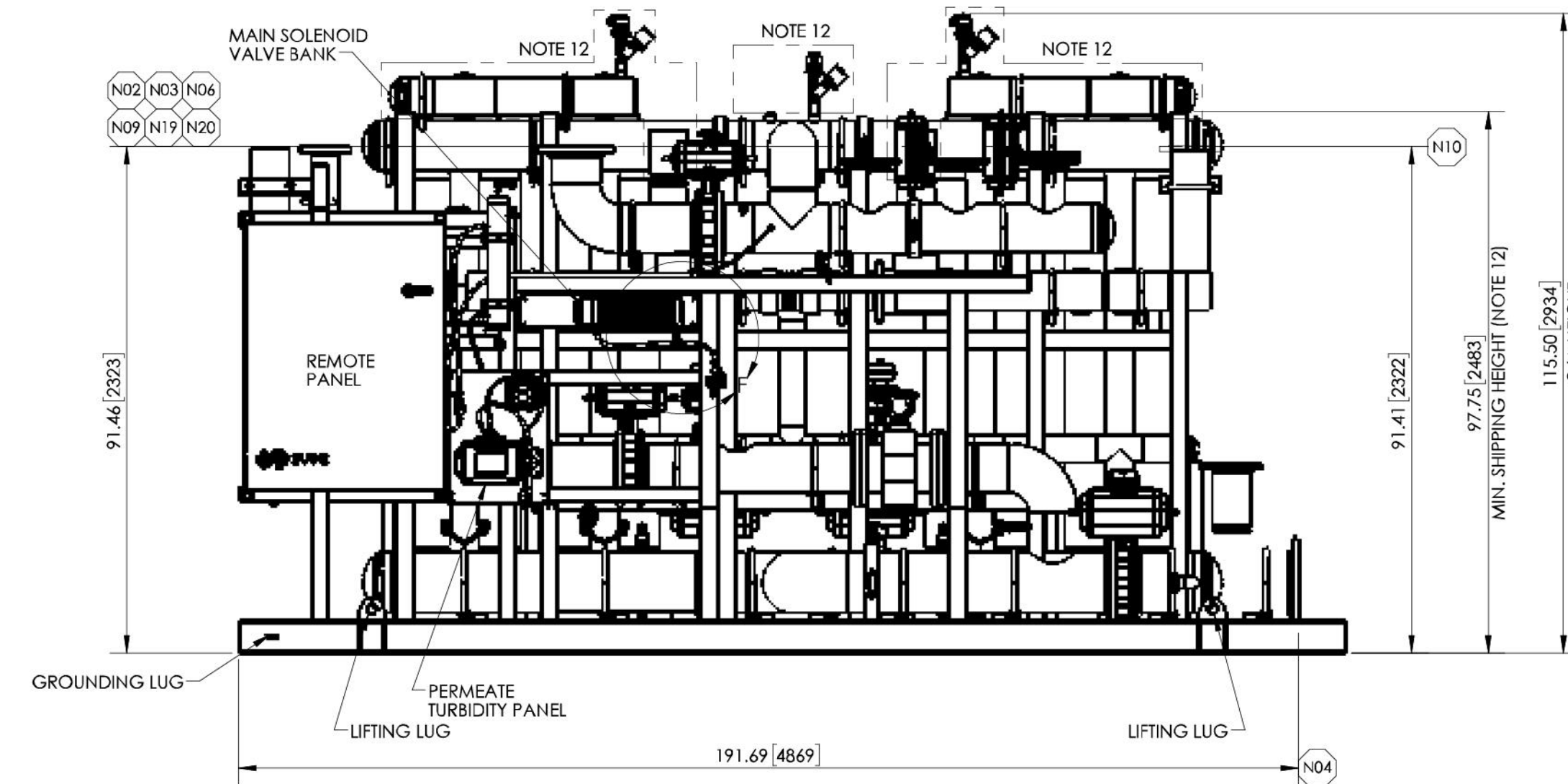
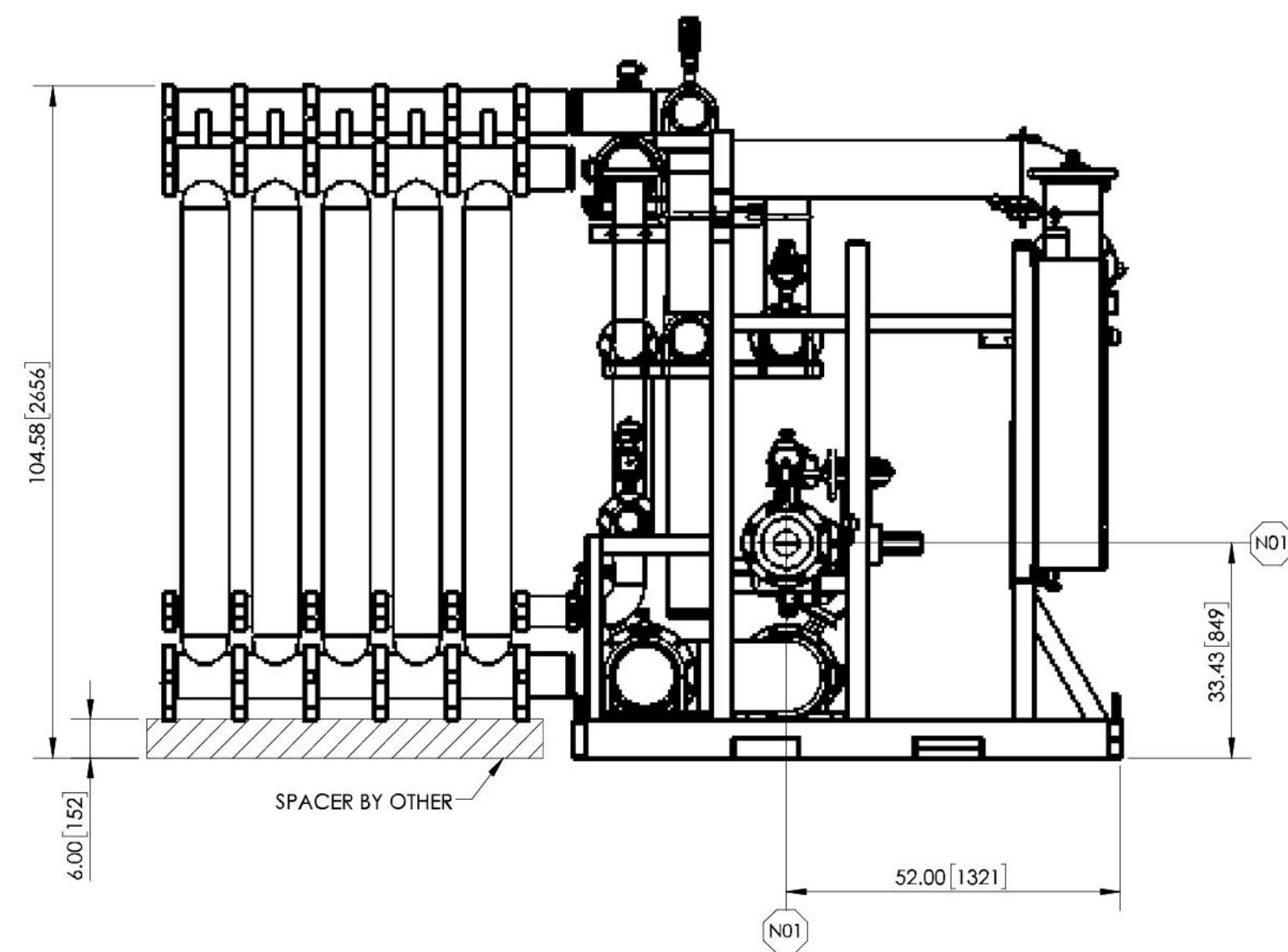
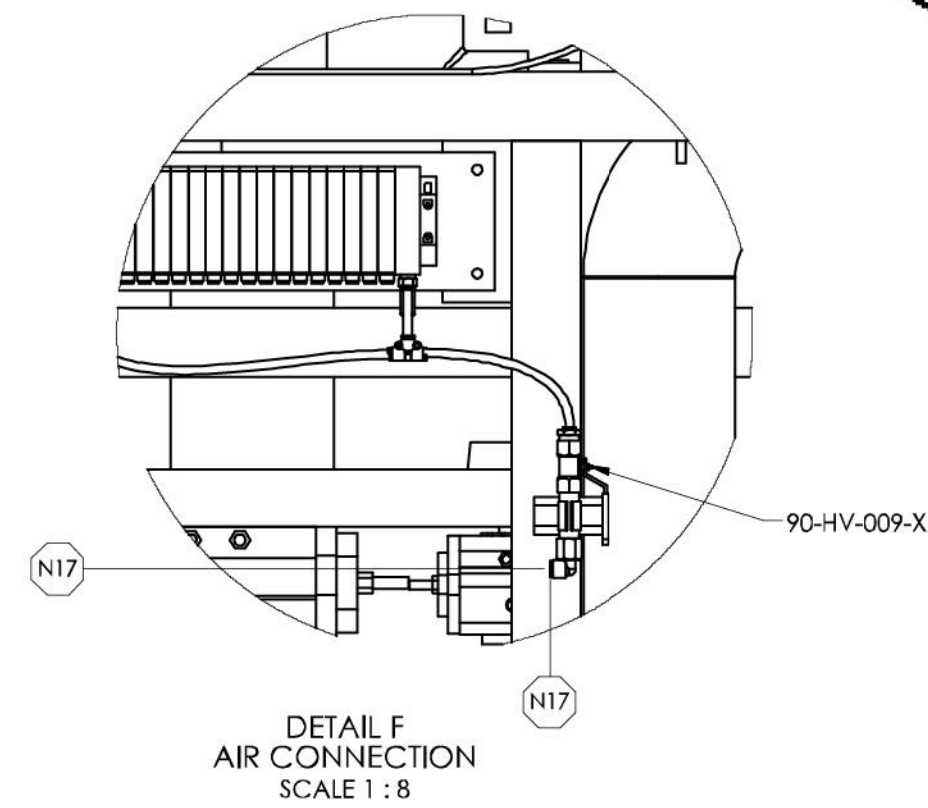
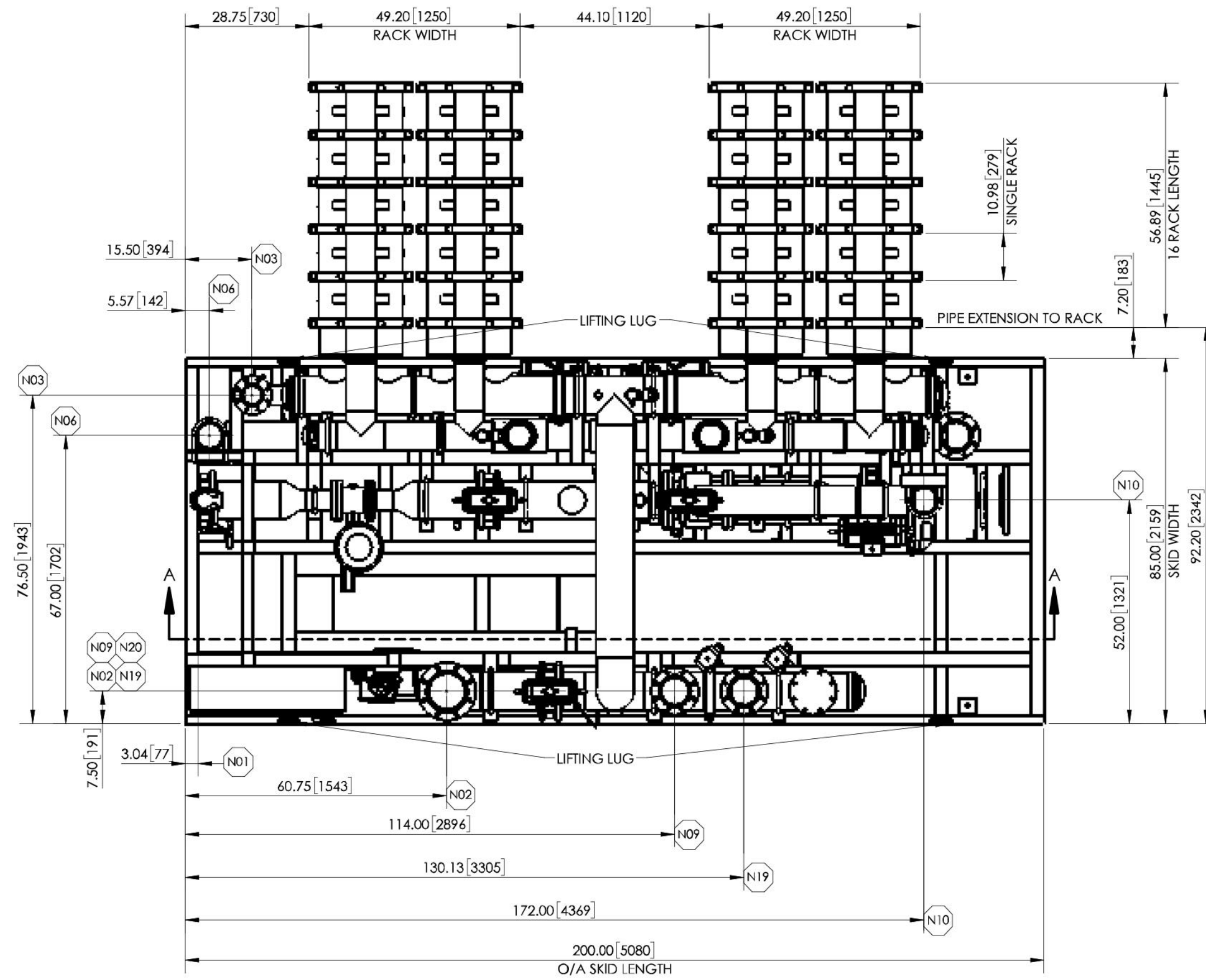
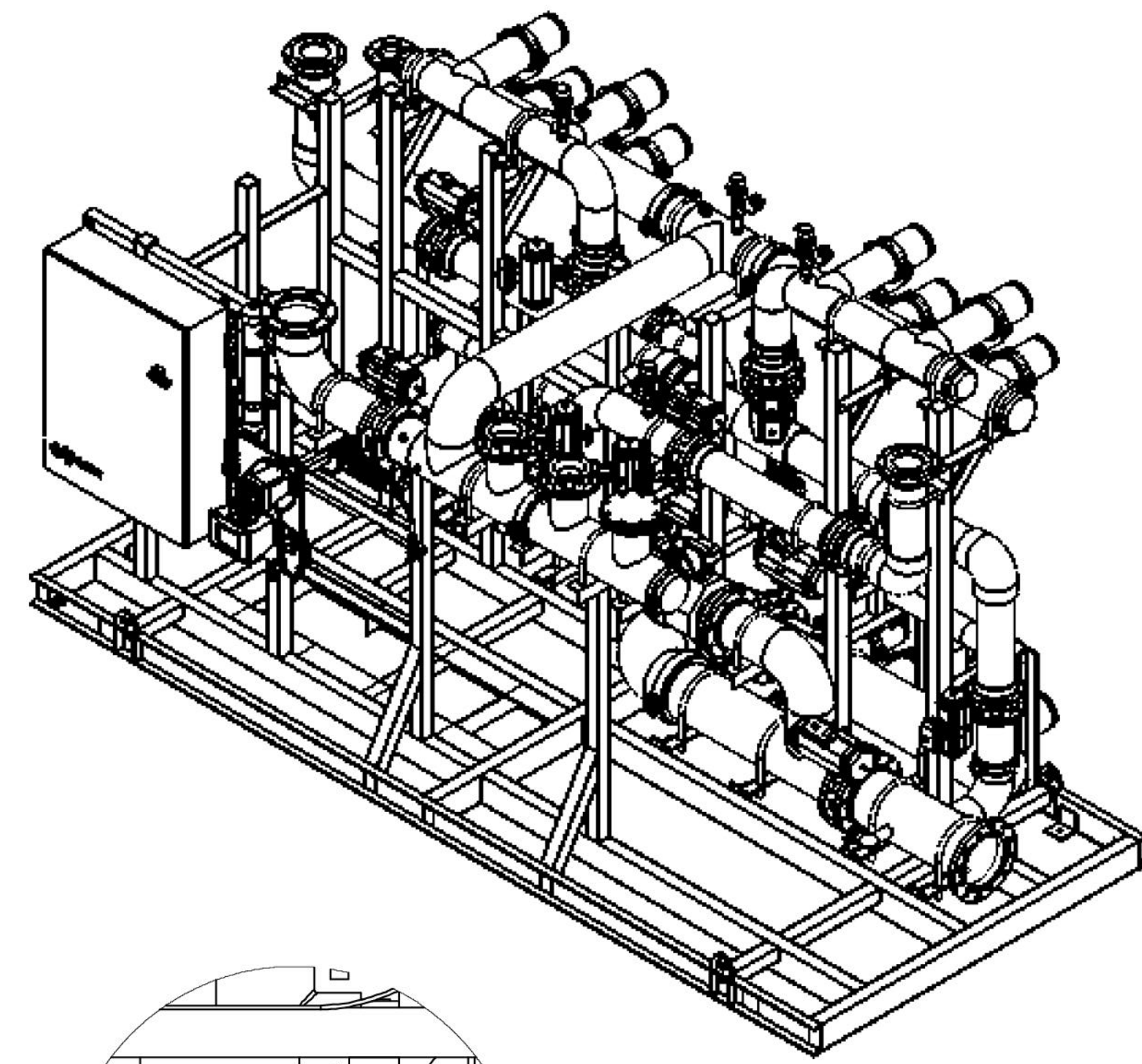
Drawn By: **AES** Date: **10-19-22**
 Checked By: **AHR** Scale: **3/4"=1'-0"**
 Project Number: **BHL-P-22172**

RUSSULA
 Ingeniería y Servicios

C18C



OSCEOLA ARKANSAS
EXPLORATORY VENTURES, LLC
 STEEL MANUFACTURING COMPLEX
 ULTRAFILTRATION SYSTEM M2WRUF1.X



NO	REVISION DESCRIPTION	DATE
XX		XX-XX-XX

Drawn By: **AES** Date: **10-19-22**
 Checked By: **AHR** Scale: **24"x36" 1:25**

Project Number: **BHLP-22172**

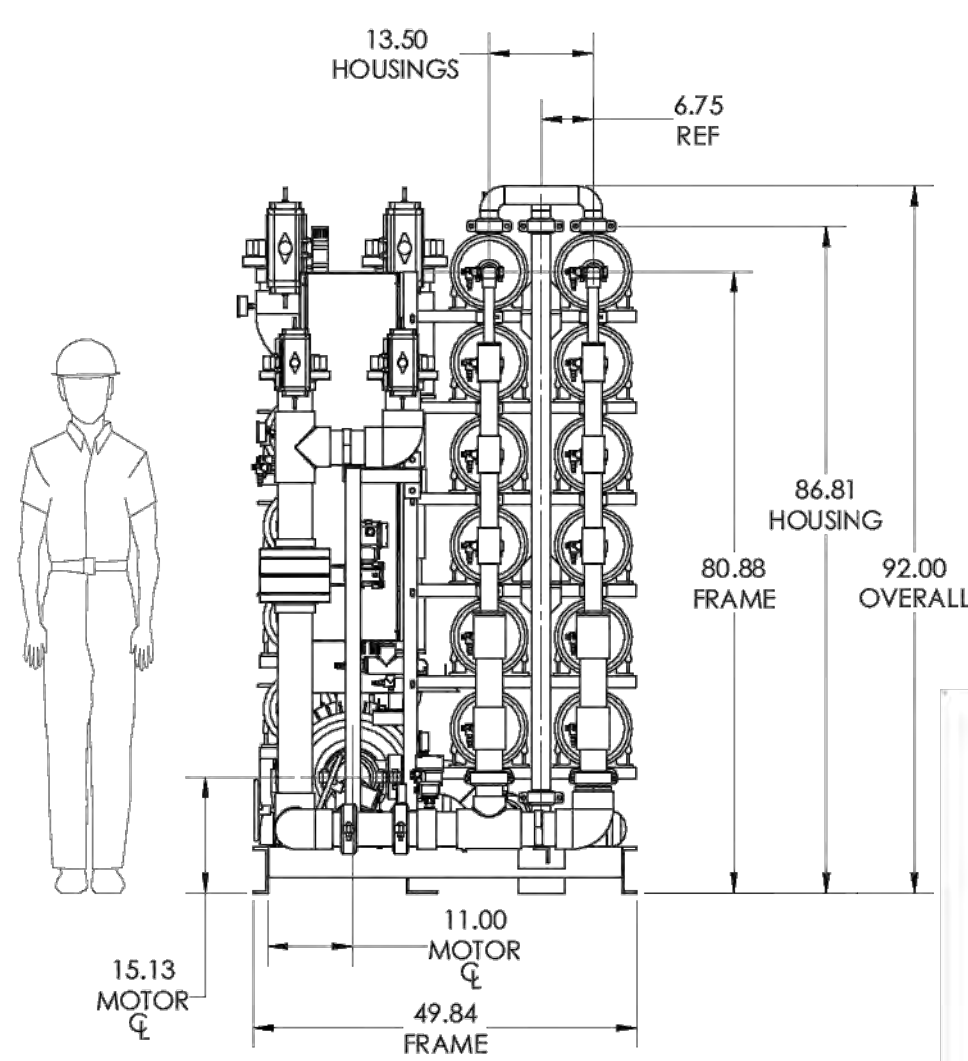
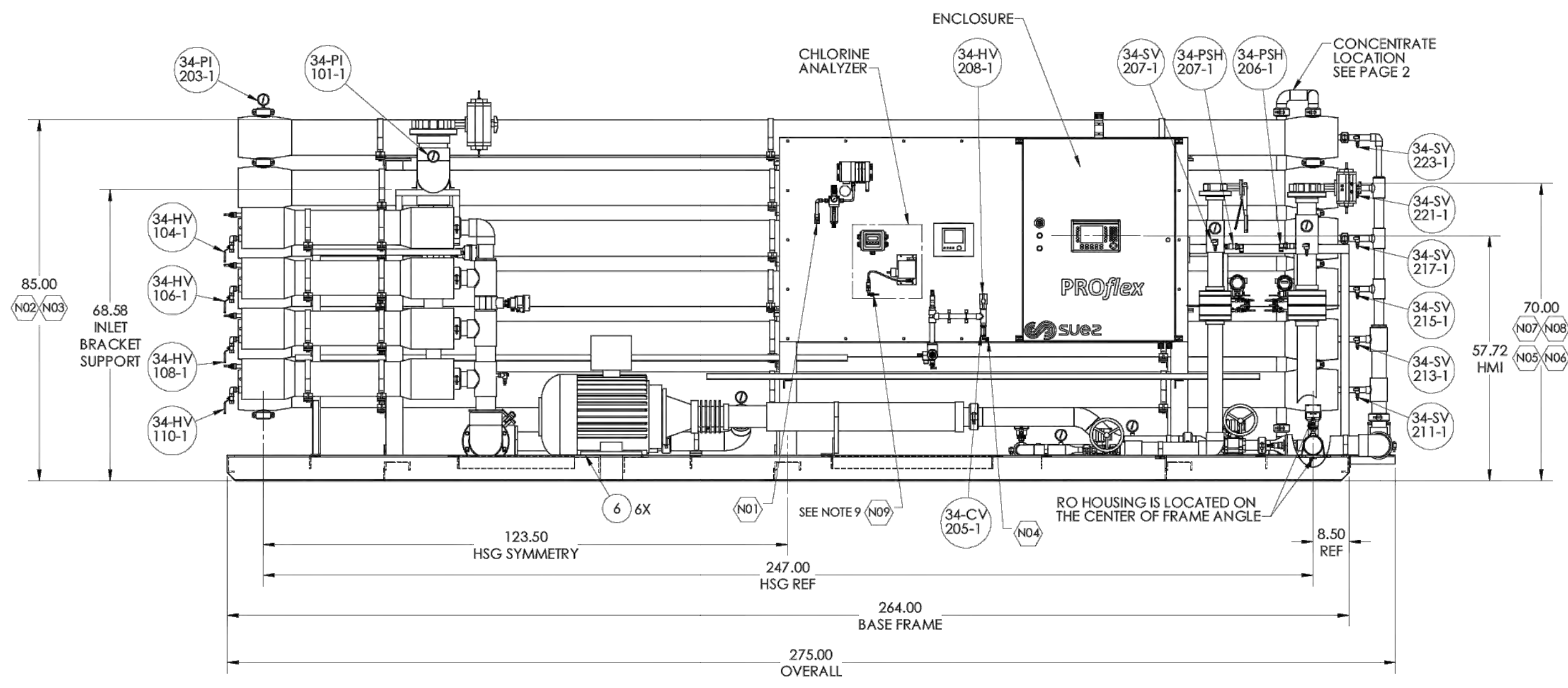
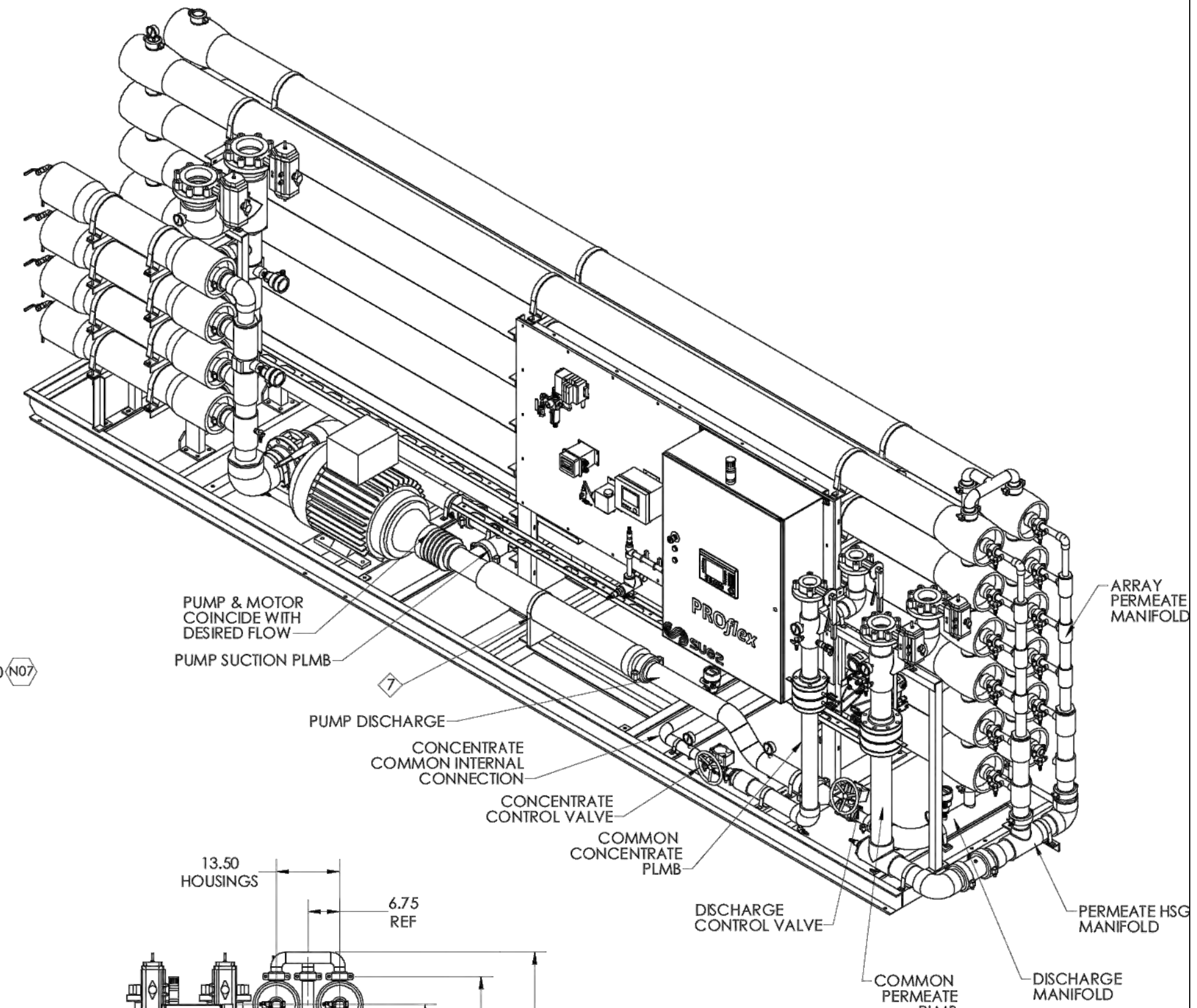
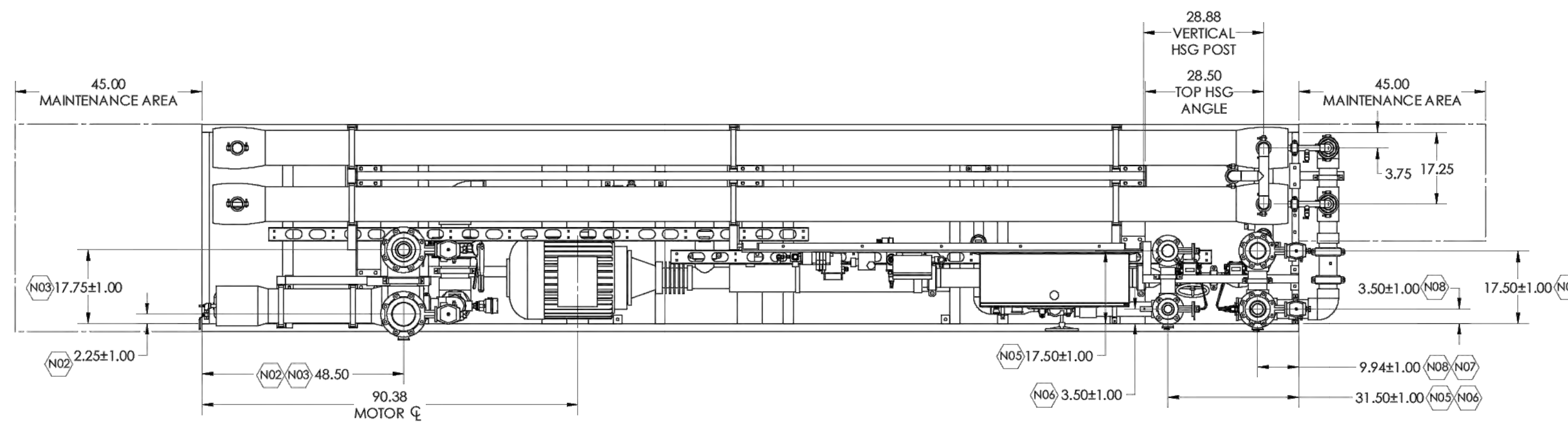


ARKANSAS
 REGISTERED
 PROFESSIONAL
 ENGINEER
 No. 10662
 ANDREW H. RIVE

OSCEOLA

EXPLOATORY VENTURES, LLC
 STEEL MANUFACTURING COMPLEX

REVERSE OSMOSIS UNIT M2WRO1.X

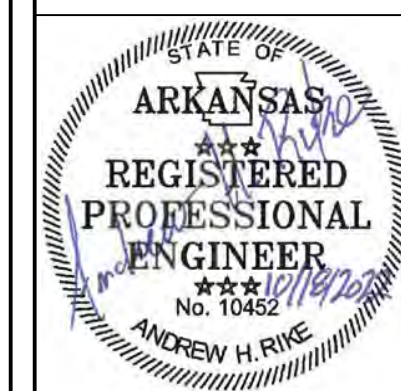


NO	REVISION DESCRIPTION	DATE
XX	X	XX-XX-XX

Drawn By: **AES** Date: **10-19-22**
 Checked By: **AHR** Scale: **24"x36" 1:25**

Project Number: **BHLP-22172**

C20



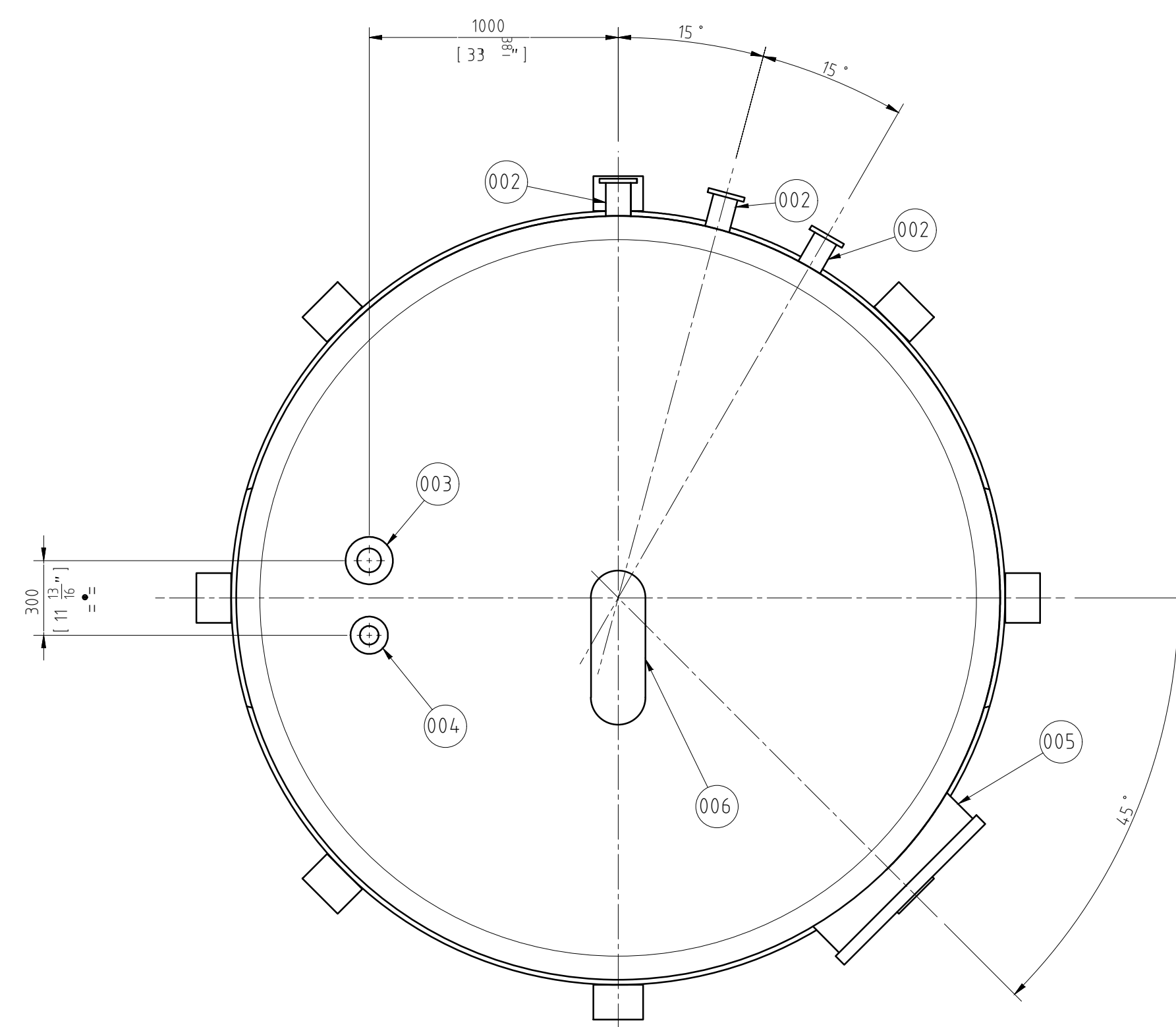
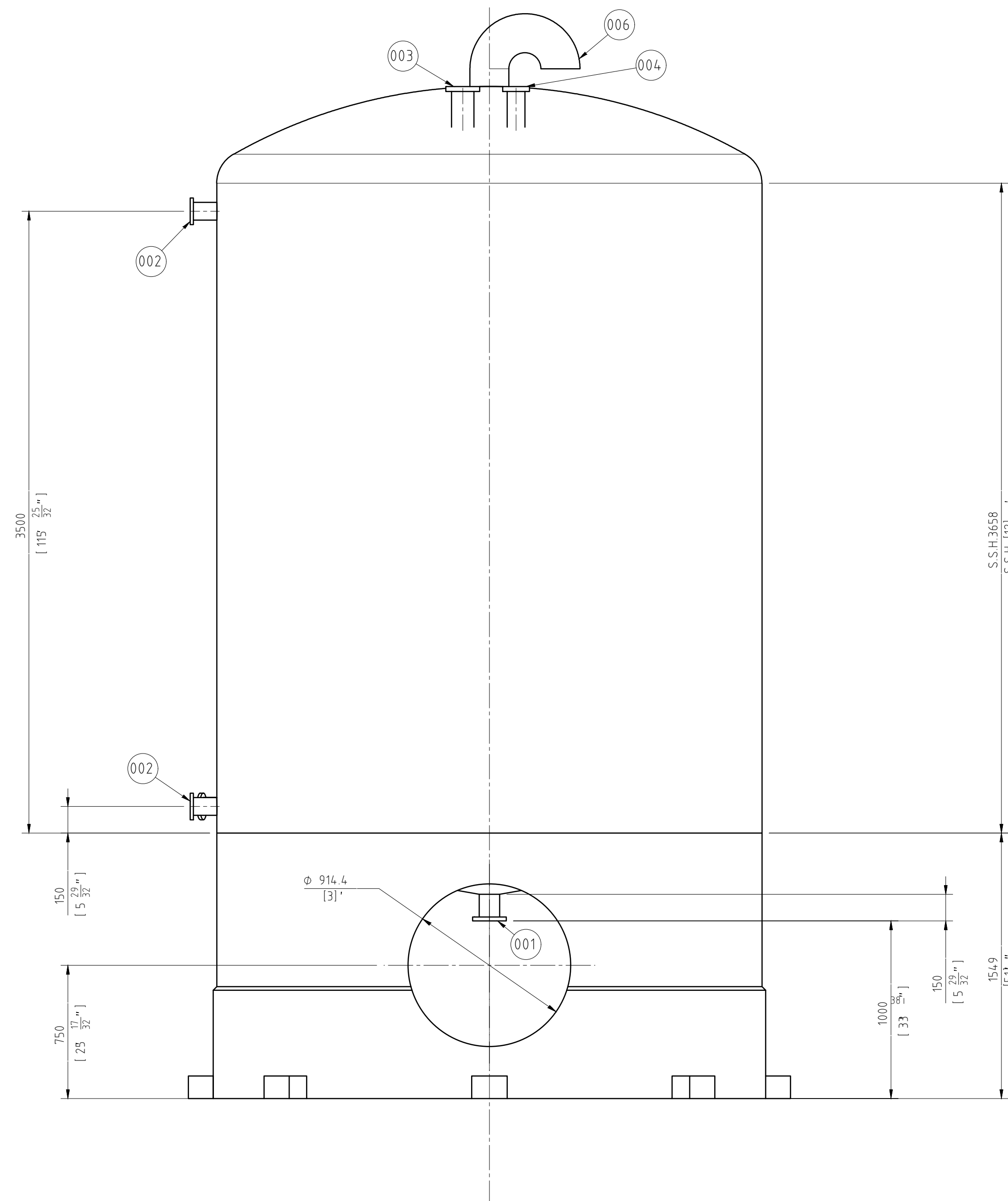
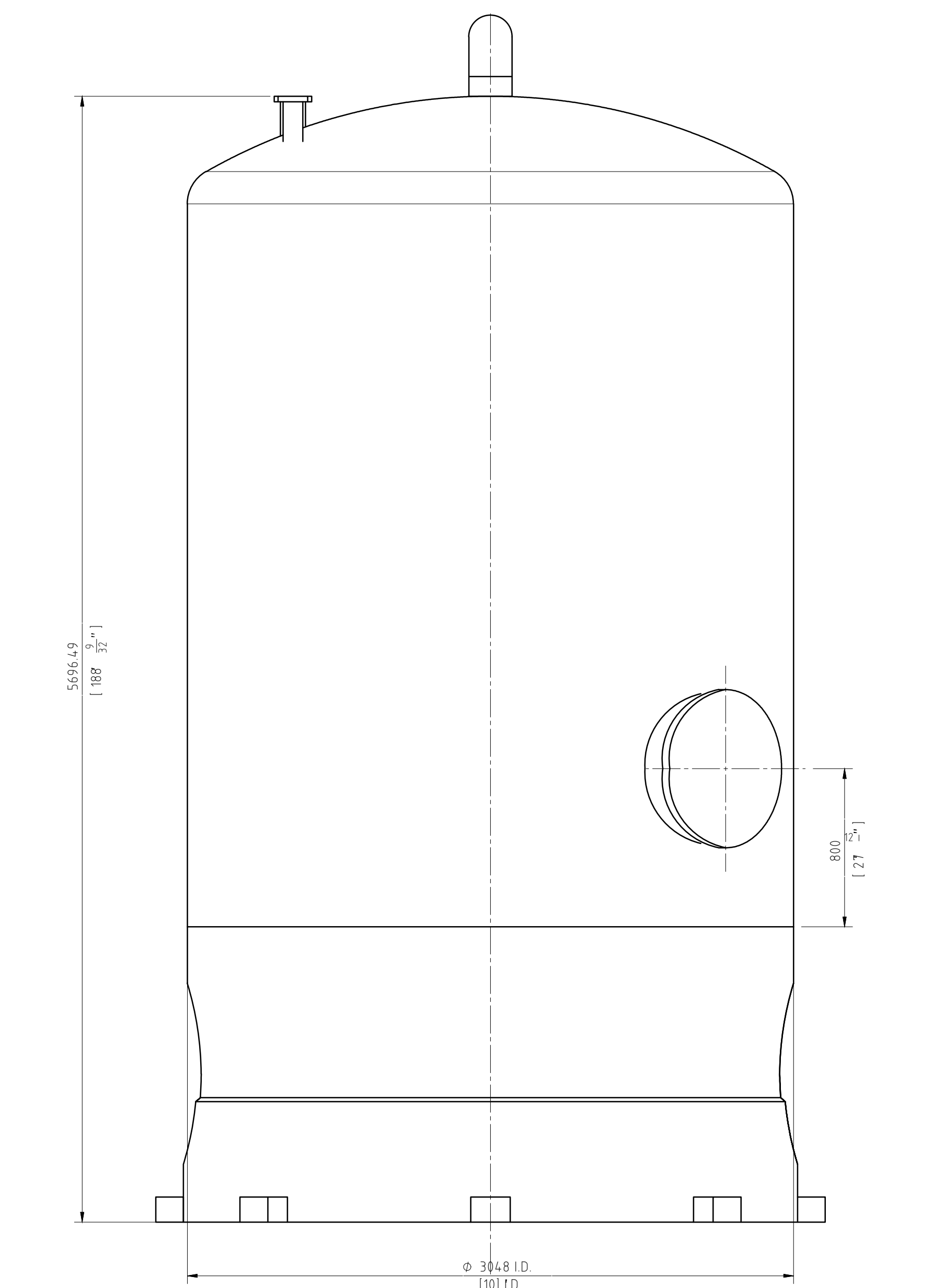
ARKANSAS

EXPLORATORY VENTURES, LLC
STEEL MANUFACTURING COMPLEX

ROLL SHOP RECEIVING TANK M2WRLT1

OSCEOLA

REFERENCE LIST FOR ONE UNIT	
ITEM QTY	DESCRIPTION
001	1 PUMP SUCTION FLANGE 3" 150 lbs
002	4 INSTRUMENTATION FLANGE 2" 150 lbs
003	1 INLET FLANGE 3" 150 lbs
004	1 INLET FLANGE 2" 150 lbs
005	1 MANWAY
006	1 GOOSENECK VENT 8"



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. TEMPERATURE: 5°- 30°C
5. THE DIMENSIONS MAY BE MODIFIED TO ADJUST TO A STANDARD SIZE.
6. FLANGES DRILLS WILL BE STRADDLE TO BOTH SIDES OF MAIN AXLE.

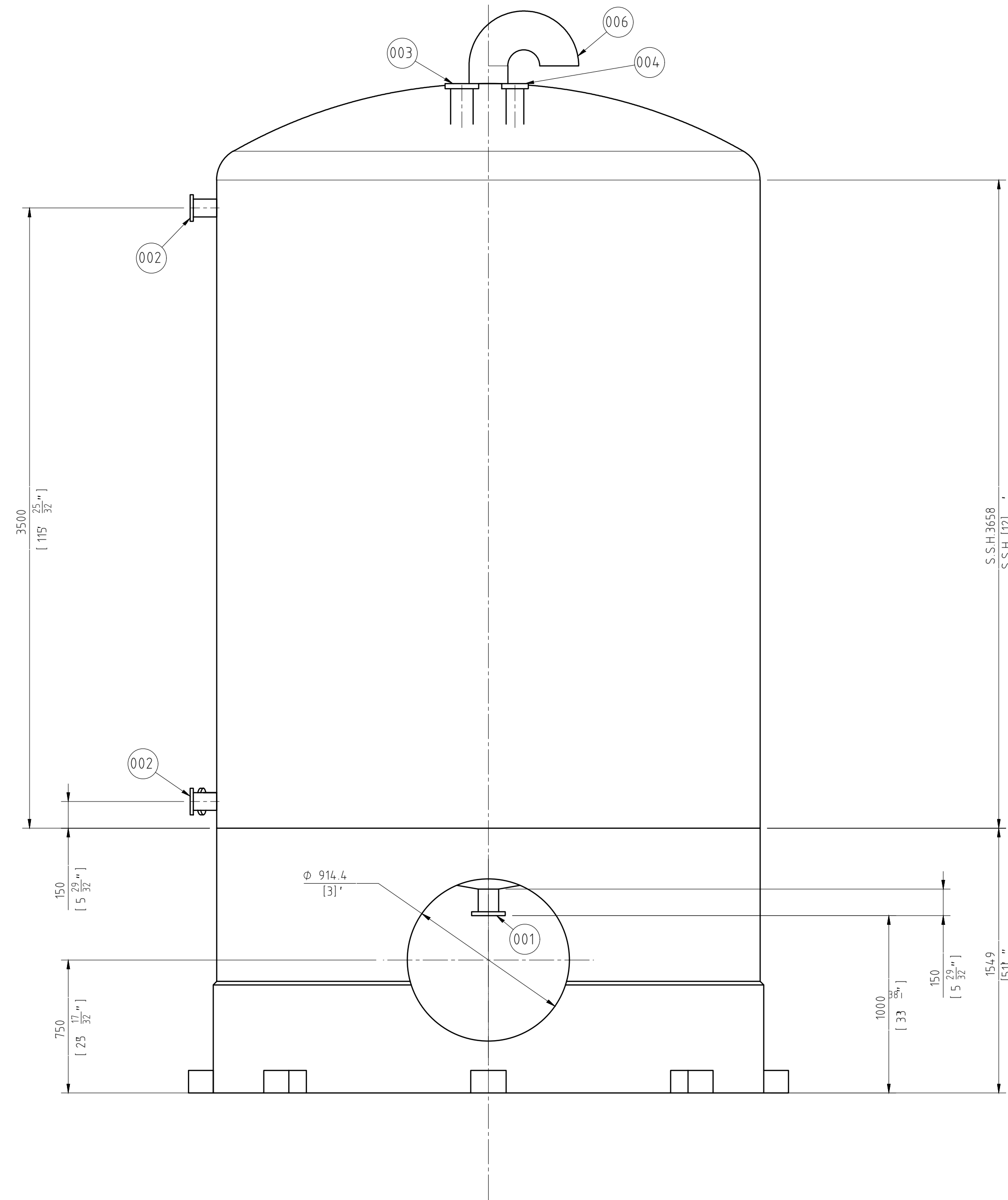
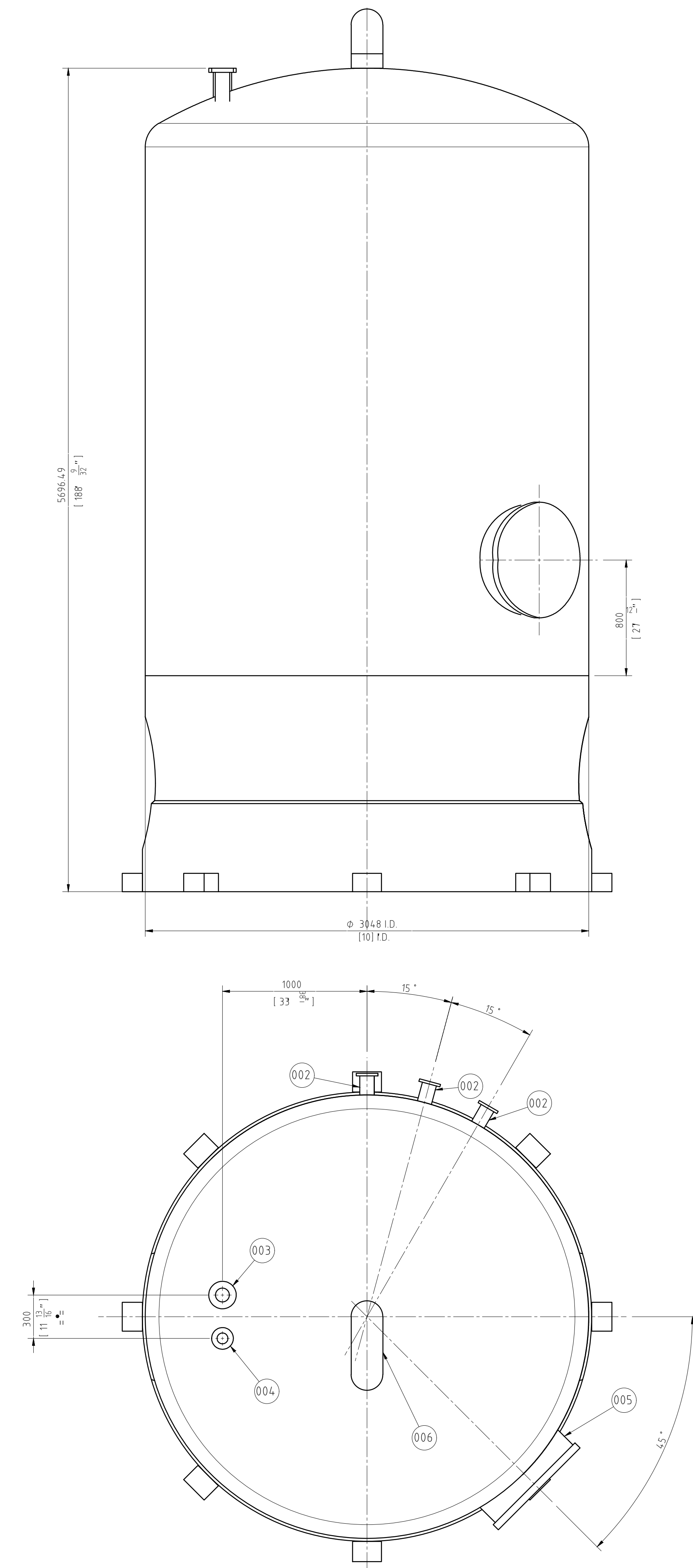
MATERIAL	CONDITION:		THIRD ANGLE PROJECTION	
UNITS: DUAL	TANK M2WRLT1			
SCALE: 1:20	REV:	IRI N°:	00	
DATA: 27-09-22	FIN W.T.:		SHEET 1 OF 1	
DRN: MDM	APP: ALL		043669	



NO	REVISION DESCRIPTION	DATE
XX		XX-XX-XX

Drawn By: **AES** Date: **10-19-22**
 Checked By: **AHR** Scale: **24"x36" 1:20**
 Project Number: **BHLP-22172**

C21

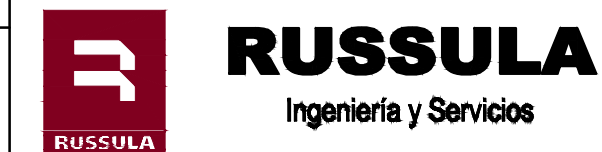


NOTES:

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REFERENCE LIST FOR ONE UNIT	
ITEMQTY	DESCRIPTION
001	1 PUMP SUCTION FLANGE 3" 150 lbs
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006	1 GOOSENECK VENT 8"

MATERIAL	CONDITION:	TANK M2WRLT1	THIRD ANGLE PROJECTION
UNITS: DUAL			
SCALE: 1:20			
DATA: 27-09-22			
DRN: MDM			
CHK: ALL			
APP: ALL			
FIN WT:		SHEET 1 OF 1	
APP: ALL		043669	



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

STATE OF ARKANSAS
 REGISTERED PROFESSIONAL ENGINEER
 No. 1062
 ANDREW H. RYKE

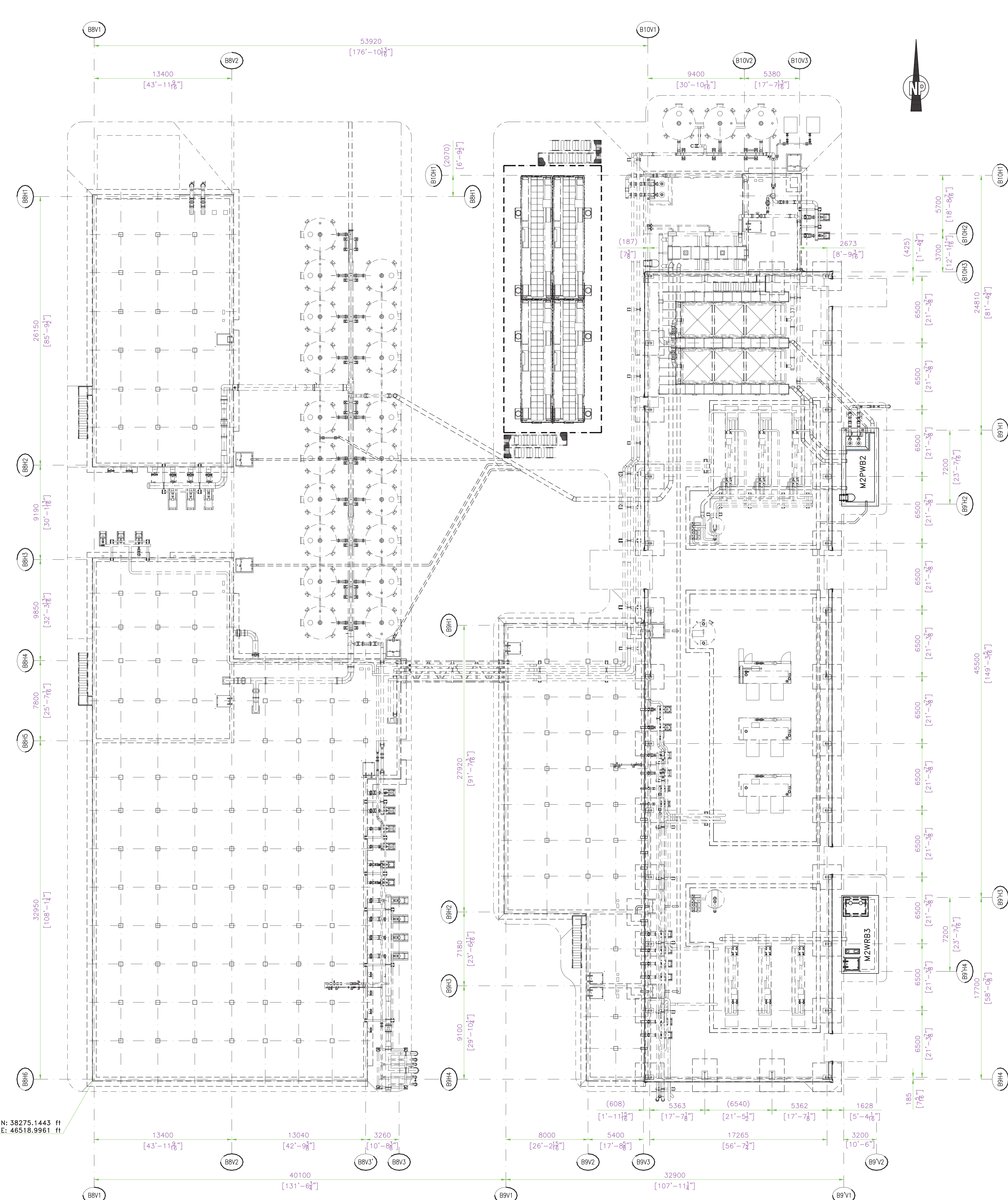
EXPLOATORY VENTURES, LLC
 STEEL MANUFACTURING COMPLEX
 LUBRICANT TANK M2WLT1

OSCEOLA ARKANSAS

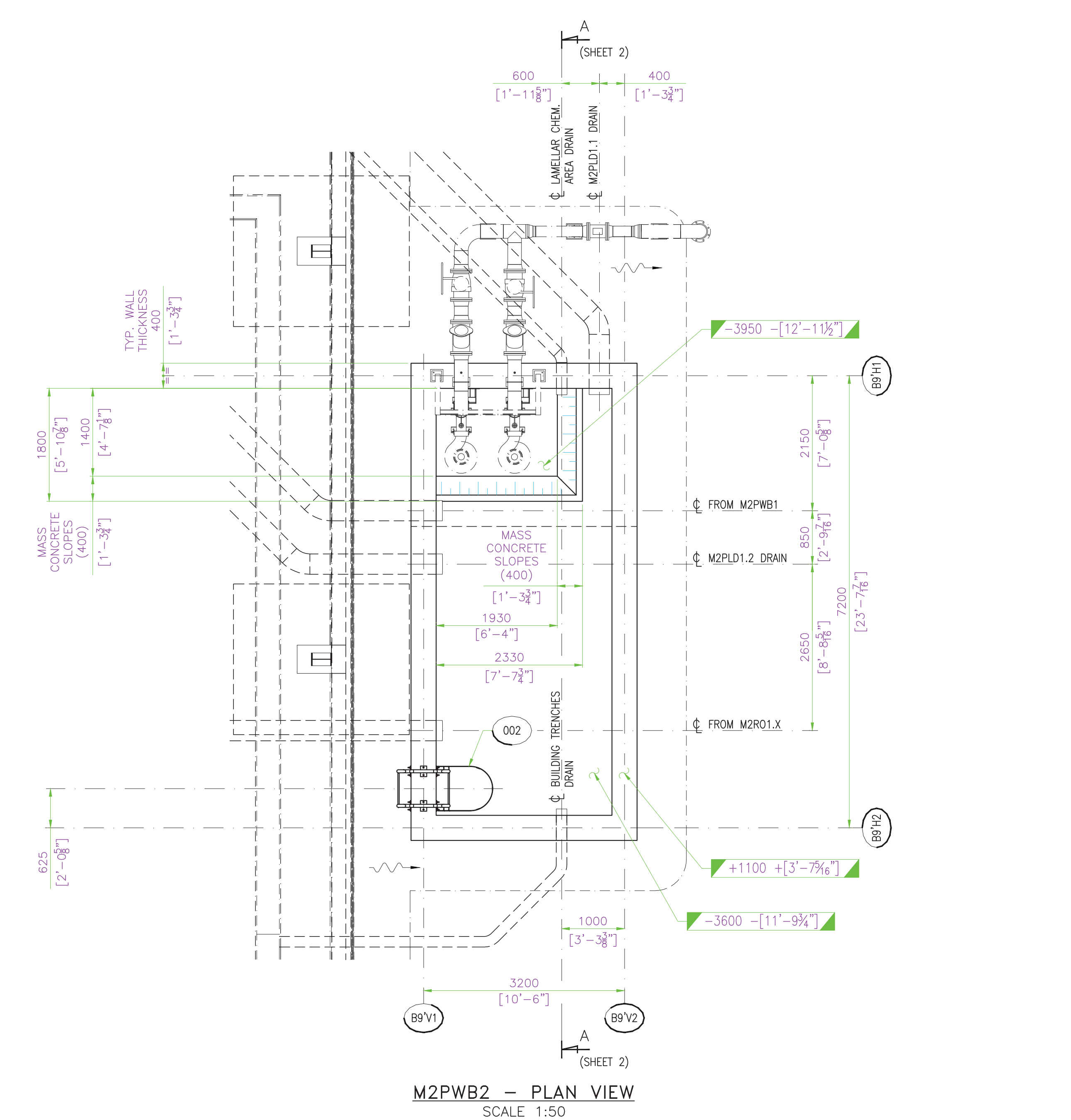
DATE	XX-XX-XX	NO	XX
REVISION DESCRIPTION		NO	XX
Drawn By:	AES	Date:	10-19-22
Checked By:	AHR	Scale:	24"x36" 1:20
Project Number:		BHLP-22172	
		C22	

DATE	REVISION	DESCRIPTION
XXXX	XXXX	

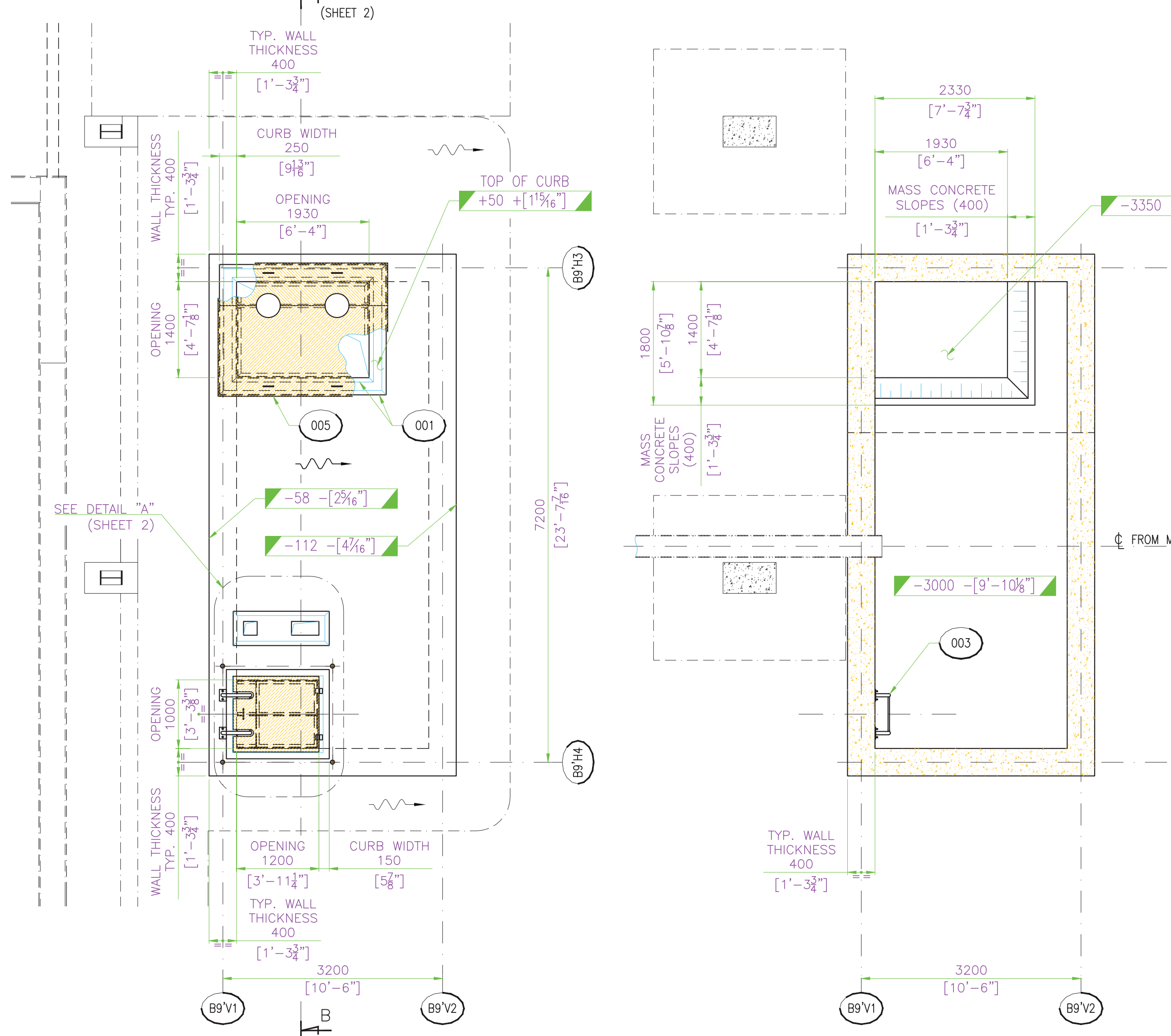
Drawn By: AES	Date: 10-19-22
Checked By: AHR	Scale: 36"=48"
Project Number: BHLP-22172	Sheet: 1 of 3



M2PWB2 & M2WRB3 - GENERAL PLAN VIEW

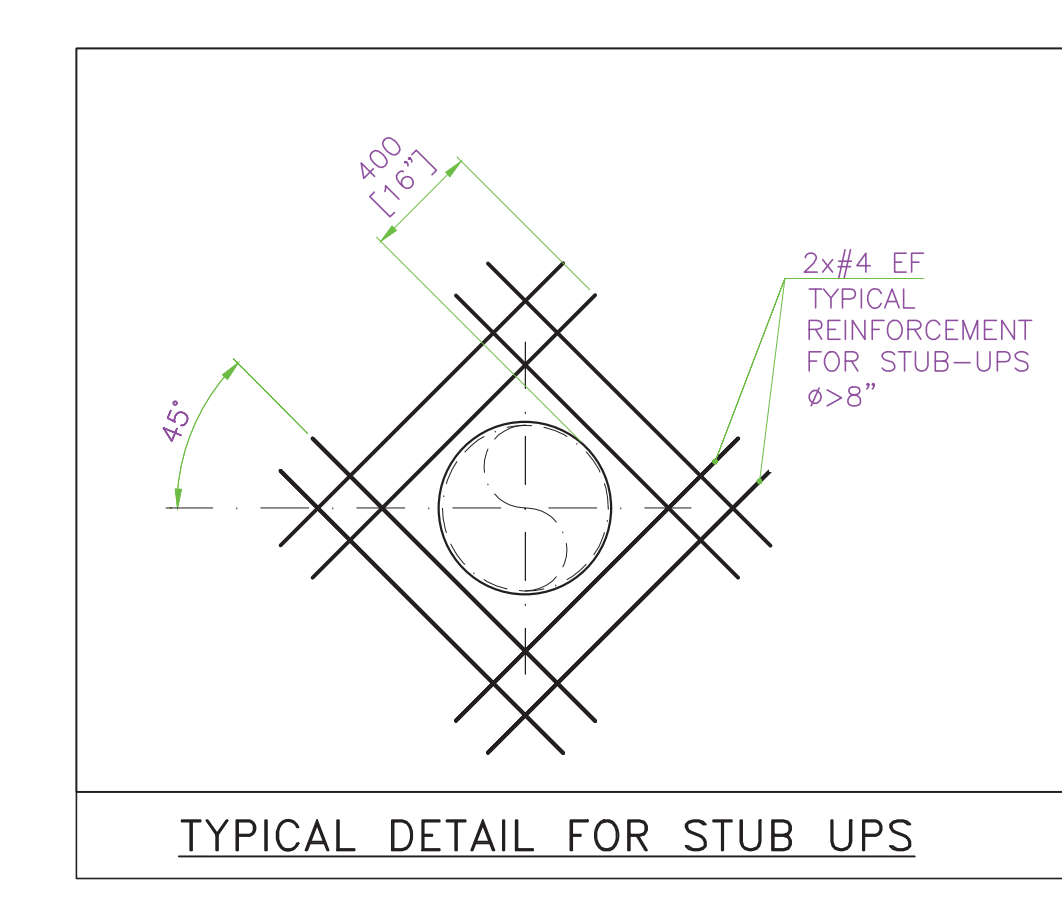


M2PWB2 - PLAN VIEW
 SCALE 1:50

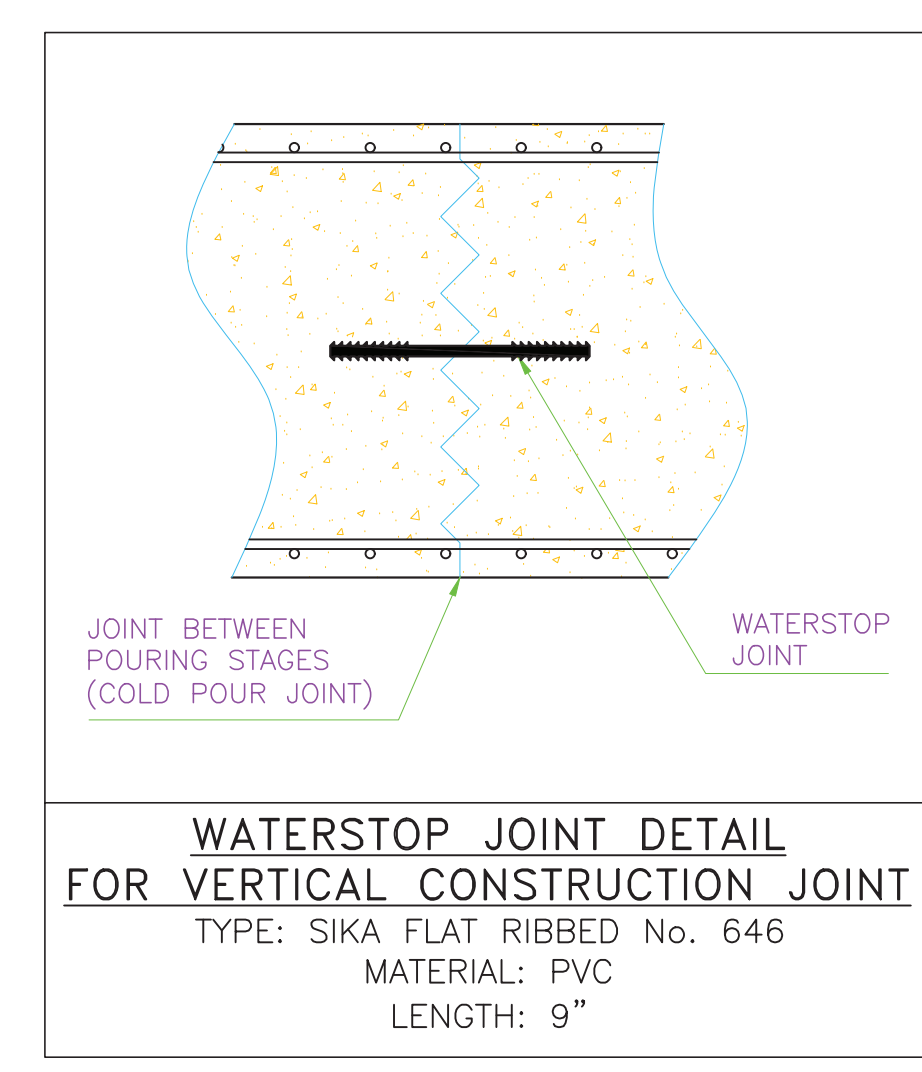


M2WRB3 - PLAN VIEW
 ±0.00 LEVEL
 SCALE 1:50

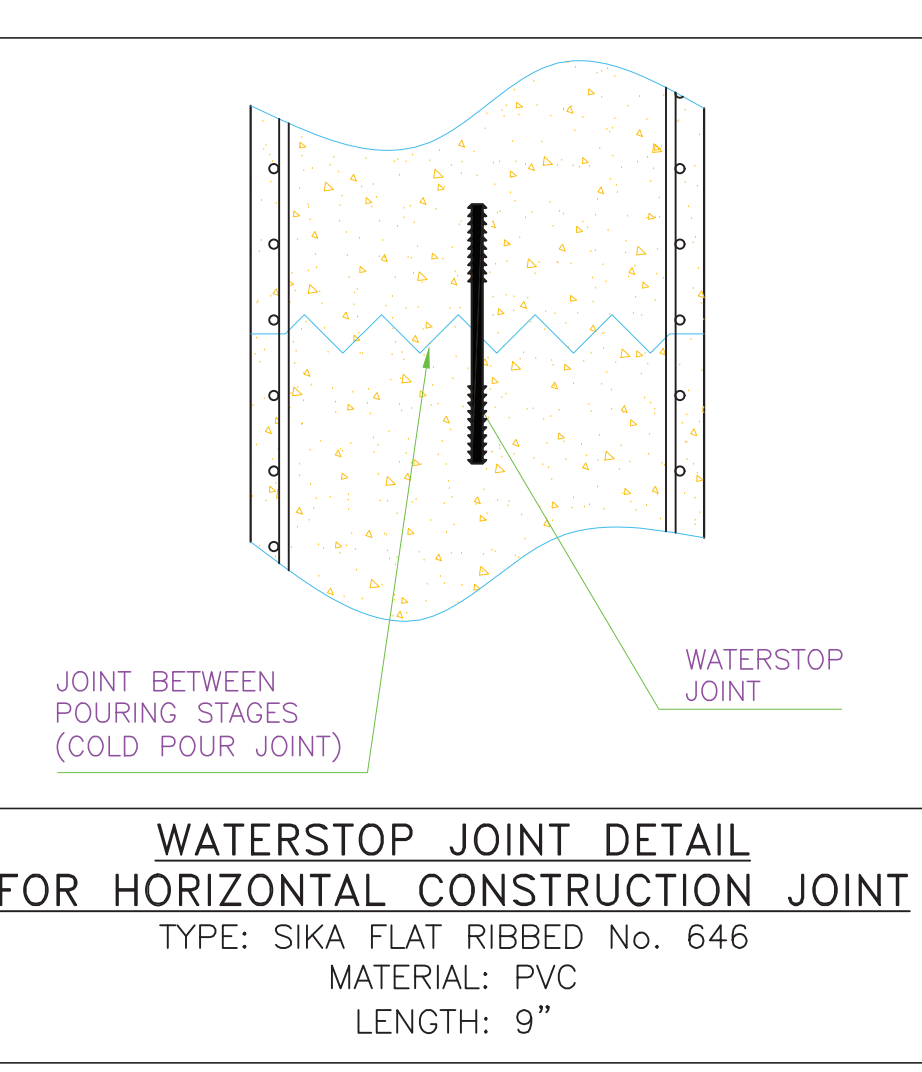
M2WRB3 - PLAN VIEW
 -1700 LEVEL
 SCALE 1:50



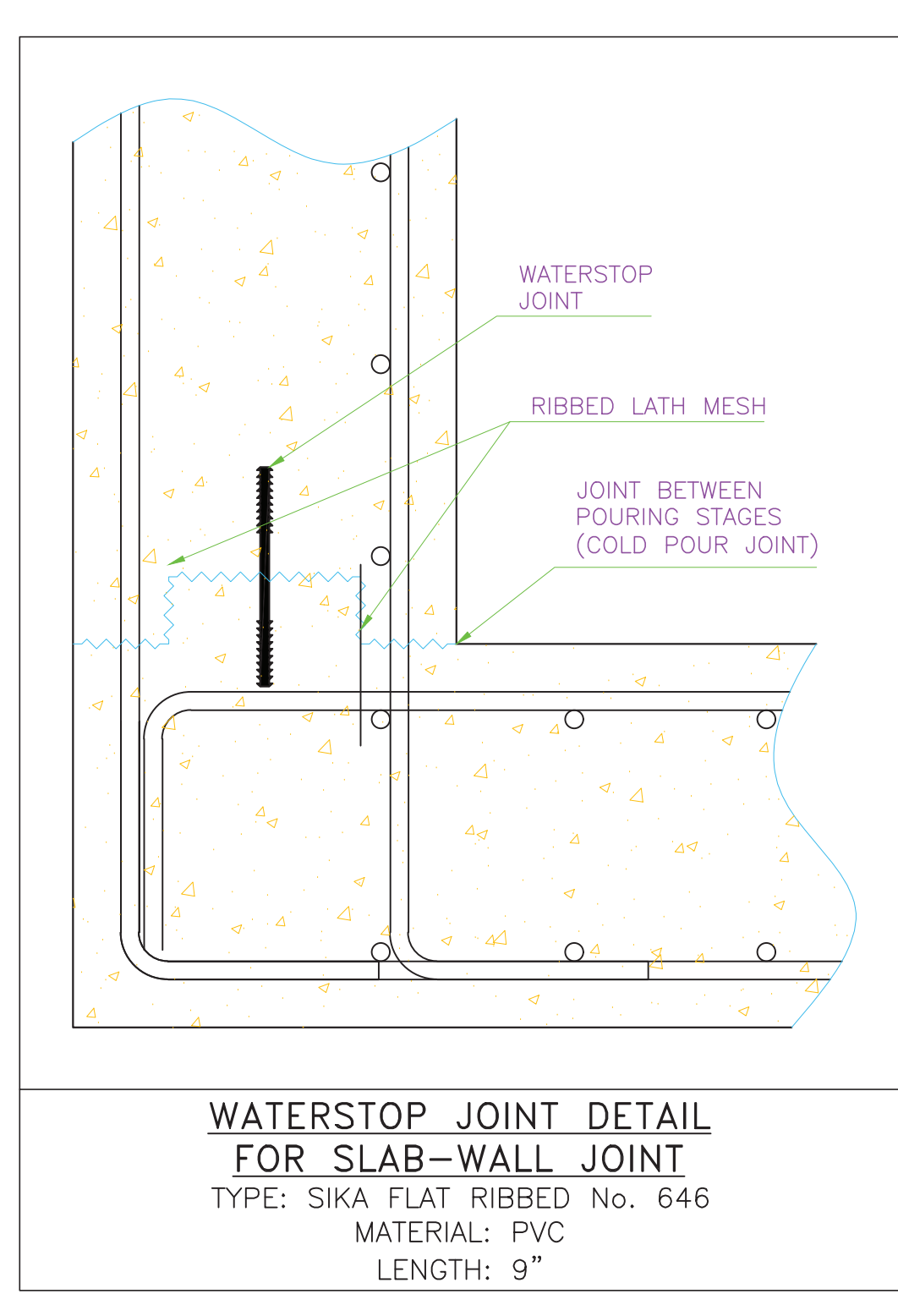
TYPICAL DETAIL FOR STUB UPS



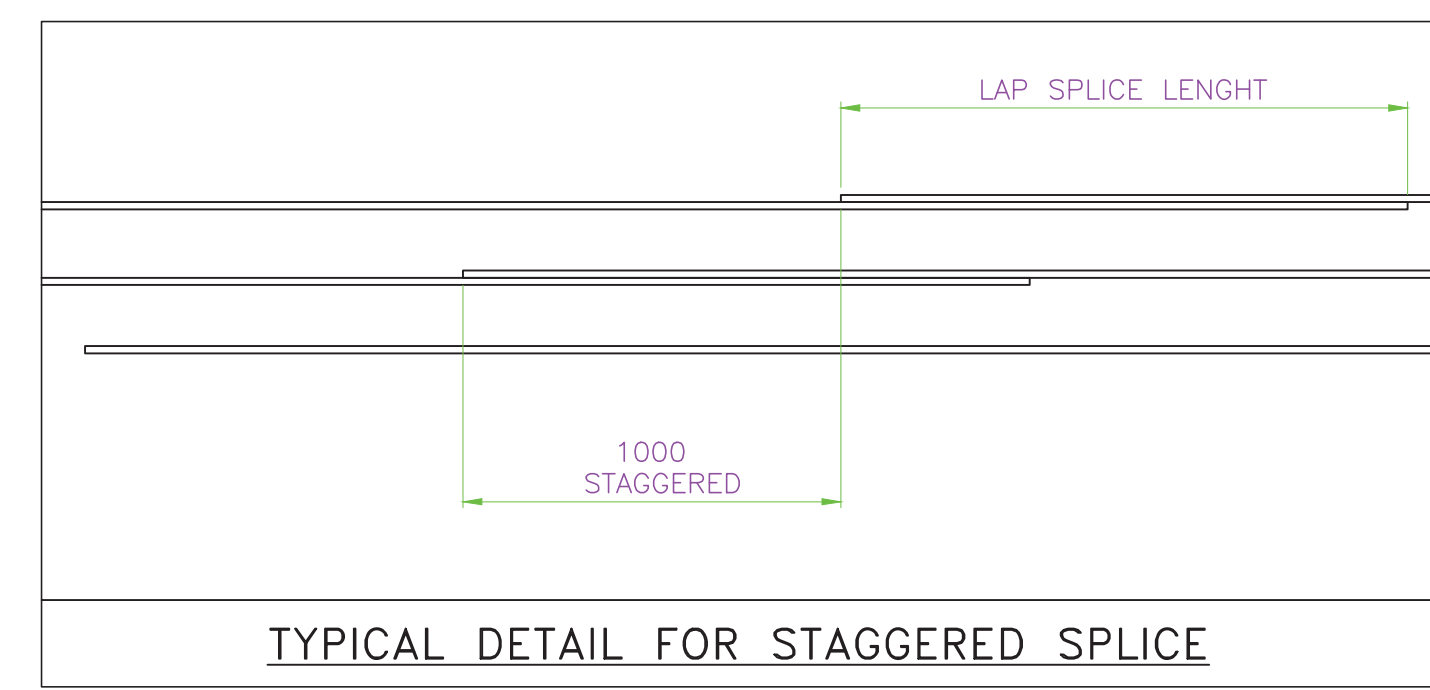
WATERSTOP JOINT DETAIL FOR VERTICAL CONSTRUCTION JOINT
 TYPE: Sika Flat Ribbed No. 646
 MATERIAL: PVC
 LENGTH: 9"



WATERSTOP JOINT DETAIL FOR HORIZONTAL CONSTRUCTION JOINT
 TYPE: Sika Flat Ribbed No. 646
 MATERIAL: PVC
 LENGTH: 9"

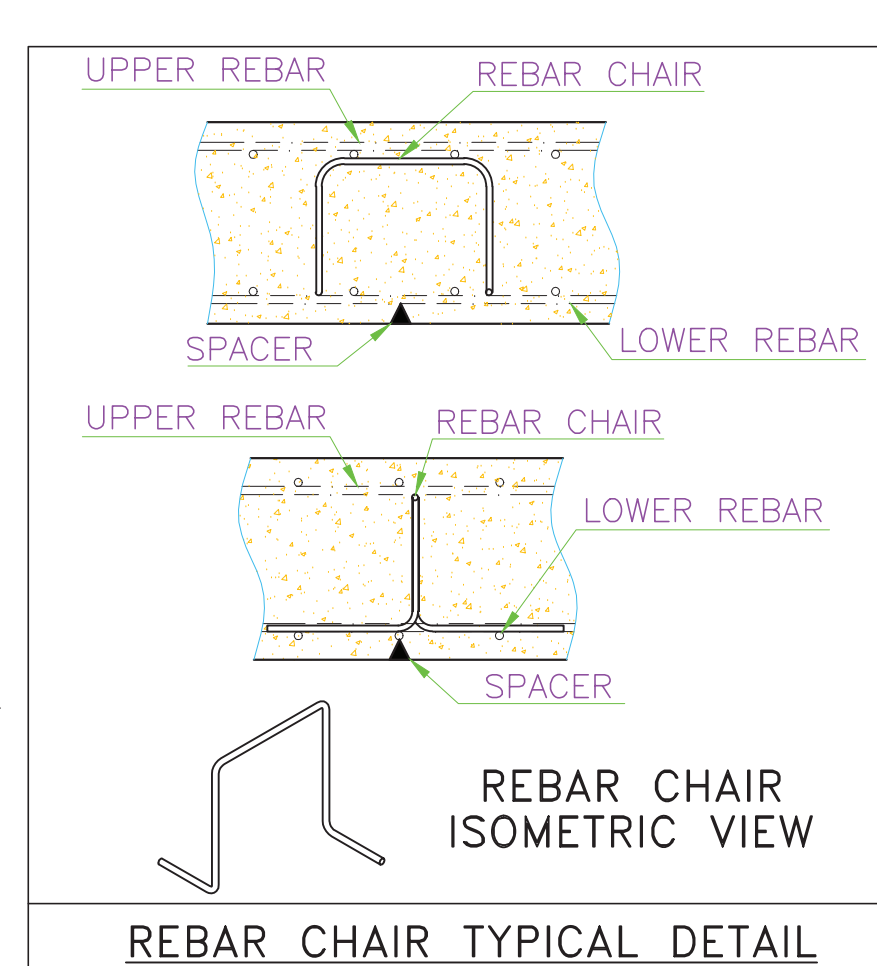


WATERSTOP JOINT DETAIL FOR SLAB-WALL JOINT
 TYPE: Sika Flat Ribbed No. 646
 MATERIAL: PVC
 LENGTH: 9"



TYPICAL DETAIL FOR STAGGERED SPLICE

- NOTES:**
- ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS AND BETWEEN BRACKETS IN THE IMPERIAL SYSTEM, UNLESS OTHERWISE SPECIFIED.
 - ALL ELEVATIONS NOTED ON THIS DRAWING ARE BASED ON ±0.00m, LEVEL CORRESPONDING TO +243'-6".
 - NORTH AND EAST COORDINATES NOTED ON THIS DRAWING ARE PLAN COORDINATES AND ARE EXPRESSED IN FEET.
 - THE NORTH DIRECTION NOTED ON THIS DRAWING IS THE NORTH OF THE PROJECT.
 - CHEMICAL ANCHOR BOLTS SHALL BE INSTALLED BY MECHANICAL CONTRACTOR.
 - GATHERING SLOPES SHALL NOT DECREASE THE NOMINAL DIMENSIONS OF THE CIVIL WORK.
 - CONCRETE FOR BASIN CONSTRUCTIONS SHALL BE MIXED WITH WATERPROOFING ADMIXTURES.
 - AN APPROPRIATE COATING SHALL BE APPLIED TO BASINS M2PWB2 AND M2WRB3.
 - USE AN APPROPRIATE WALL ANCHOR FITTING EMBEDDED INTO THE WALL WHERE CPVC/HDPE PIPES ENTER THE BASIN. ALTERNATIVELY, COVER PIPE WALL EMBEDDINGS WITH STICK WATERSTOP JOINT, OR SIMILAR, AVOIDING WATER SEEPAGE.
 - STRUCTURAL CONCRETE SHALL COMPLY WITH RUSSULA PS22_01642_CTS_001: CAST-IN-PLACE STRUCTURES.
 - EQUIPMENT AND STRUCTURES SHALL BE GROUTED AS INDICATED IN PS22_01642_CTS_002: GROUTING OF EQUIPMENT AND BASEPLATES.
 - EXCAVATION AND BACKFILL SHALL BE CARRIED OUT AS INDICATED IN PS22_01642_CTS_003: EXCAVATION AND BACKFILL.
 - CAST-IN ELEMENTS SHALL COMPLY WITH PS22_01642_004: EMBEDDED ELEMENTS IN CONCRETE.
 - CHEMICAL ANCHOR BOLTS MUST BE PLACED BY MECHANICAL INSTALLER.
 - UNDERGROUND PIPES AND CONDUITS MUST BE SEALED AROUND AT THE INTERFACE WITH SLABS.
 - IF REBAR INTERFERE WITH ANCHOR BOLTS OR ANY OTHER EMBEDDED ELEMENTS, REBARS MAY BE BENT BUT NEVER CUT.
 - REBAR PREPARATION AND INSTALLATION AS PER ACI 318, CHAPTER 25.
 - CONTACT SURFACE BETWEEN CONCRETE POURING STAGES MUST BE ROUGH, AND IT MUST BE CLEANED AND PRESOAKED BEFORE POURING THE NEXT STAGE. SURFACE MUST BE DAMP BUT NOT DRENCHED.
 - CONCRETE POURING STAGES WILL BE DEFINED BY THE CONTRACTOR IN ORDER TO MINIMIZE SLAB AND WALL RETRACTION WHEN CURING.
 - REBAR CHAIRS ARE CONSIDERED FOR HOLDING TOP LAYERS OF REINFORCING STEEL IN POSITION. SEE TYPICAL DETAIL ON SHEET 01.
 - FOR STUB UPS REINFORCING, SEE TYPICAL DETAIL ON SHEET 01.
 - STAGGER REBAR SPLICING ACCORDING TO TYPICAL DETAIL ON SHEET 01.



REBAR CHAIR TYPICAL DETAIL

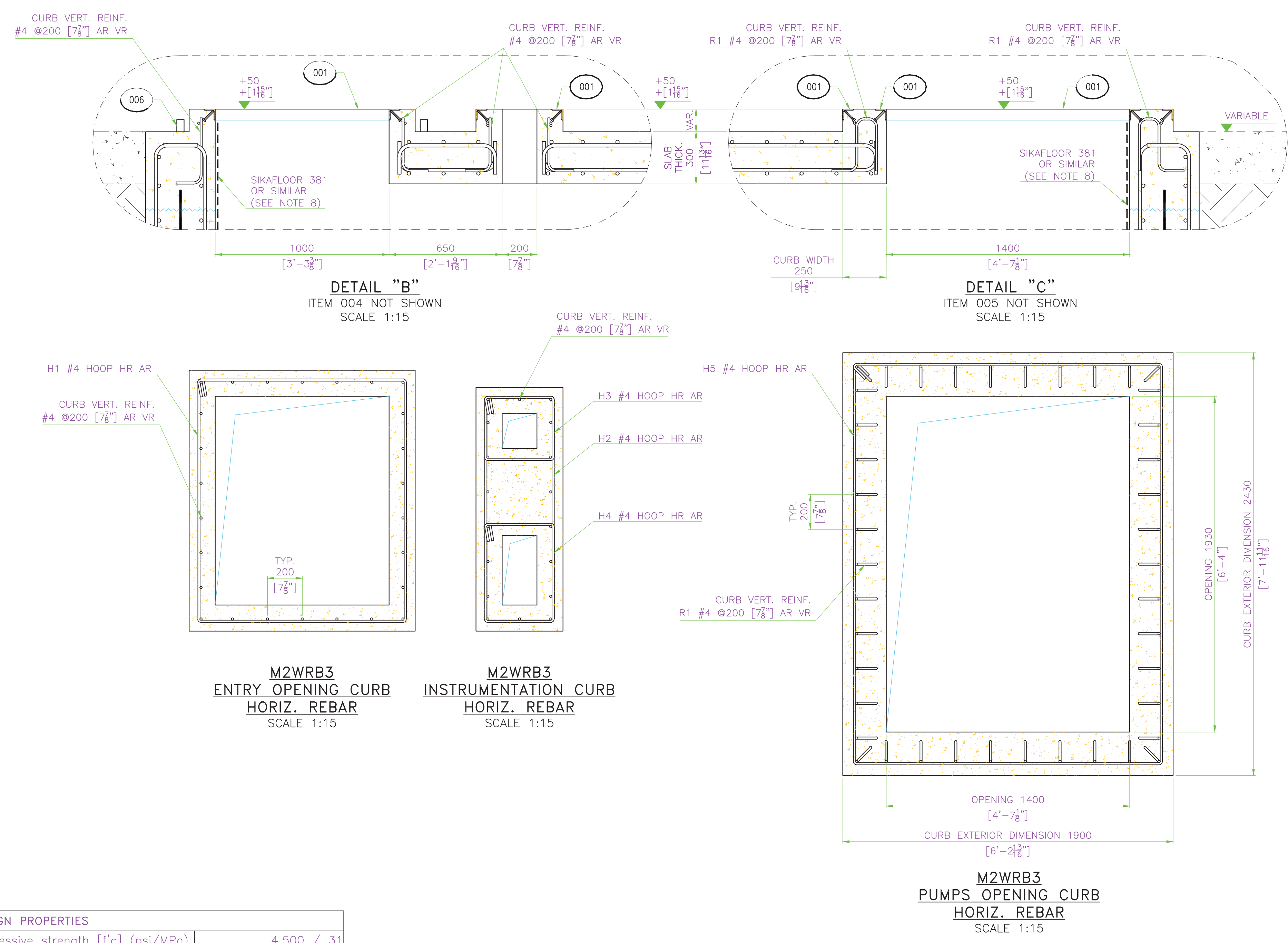
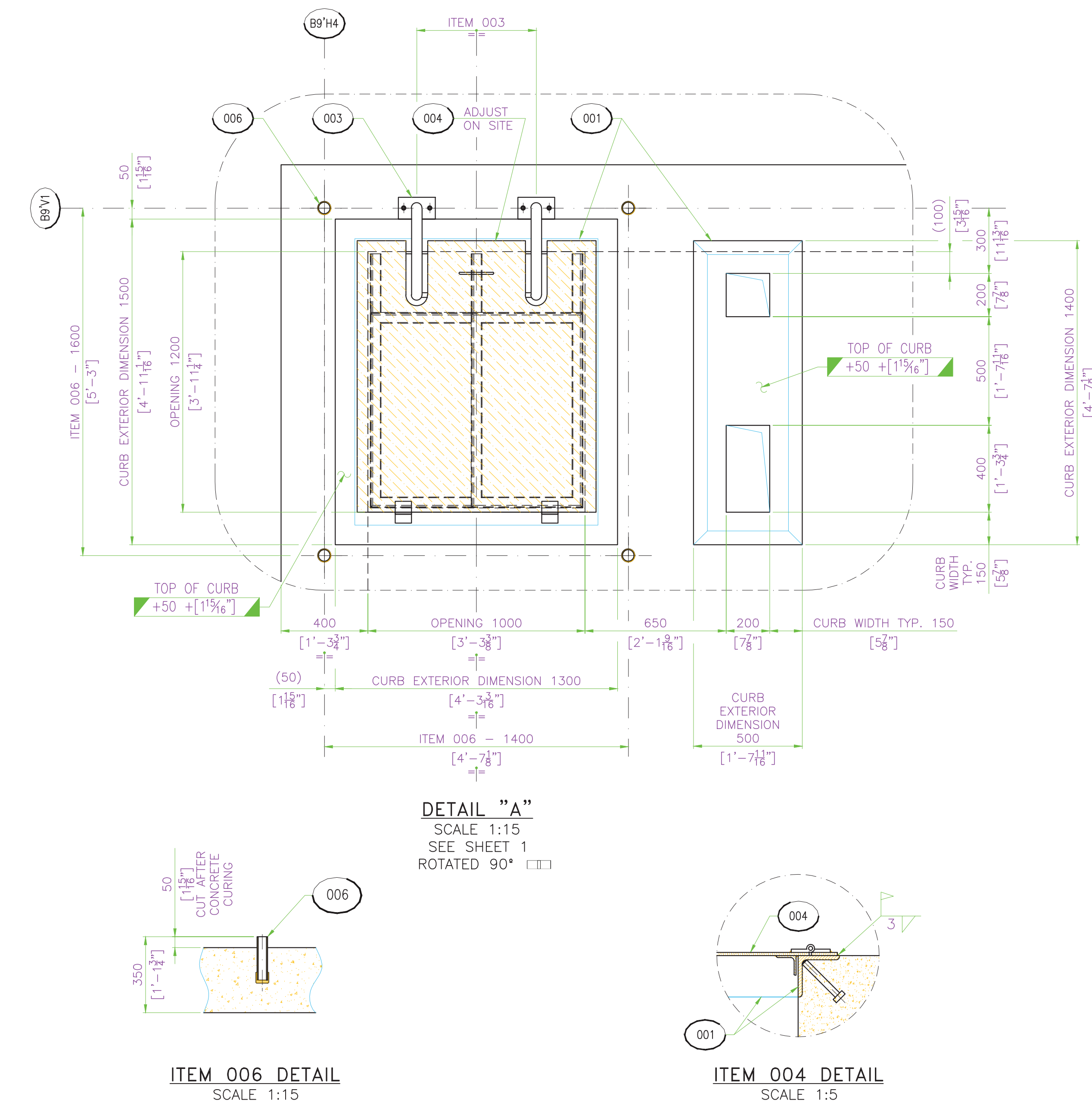
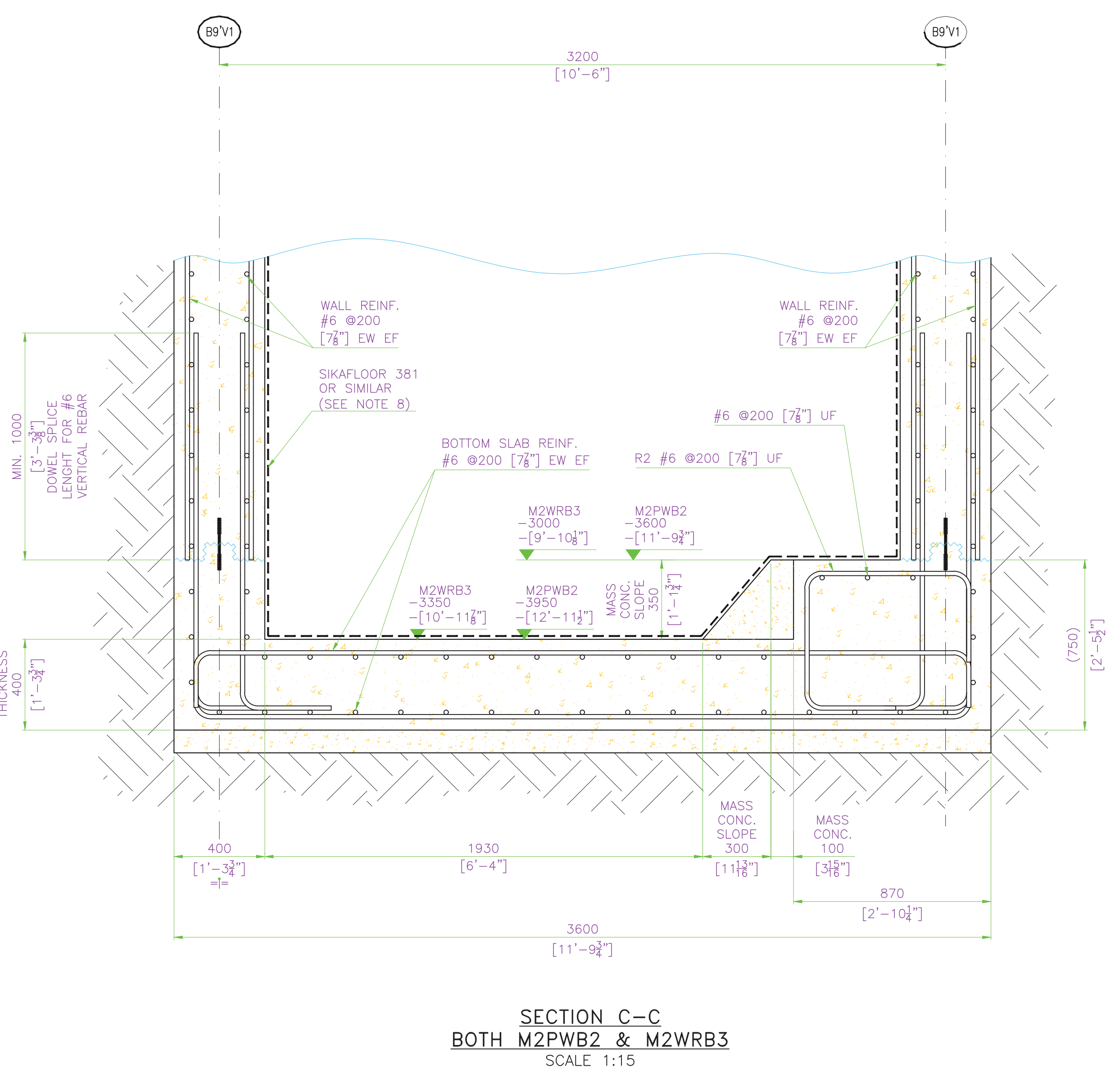
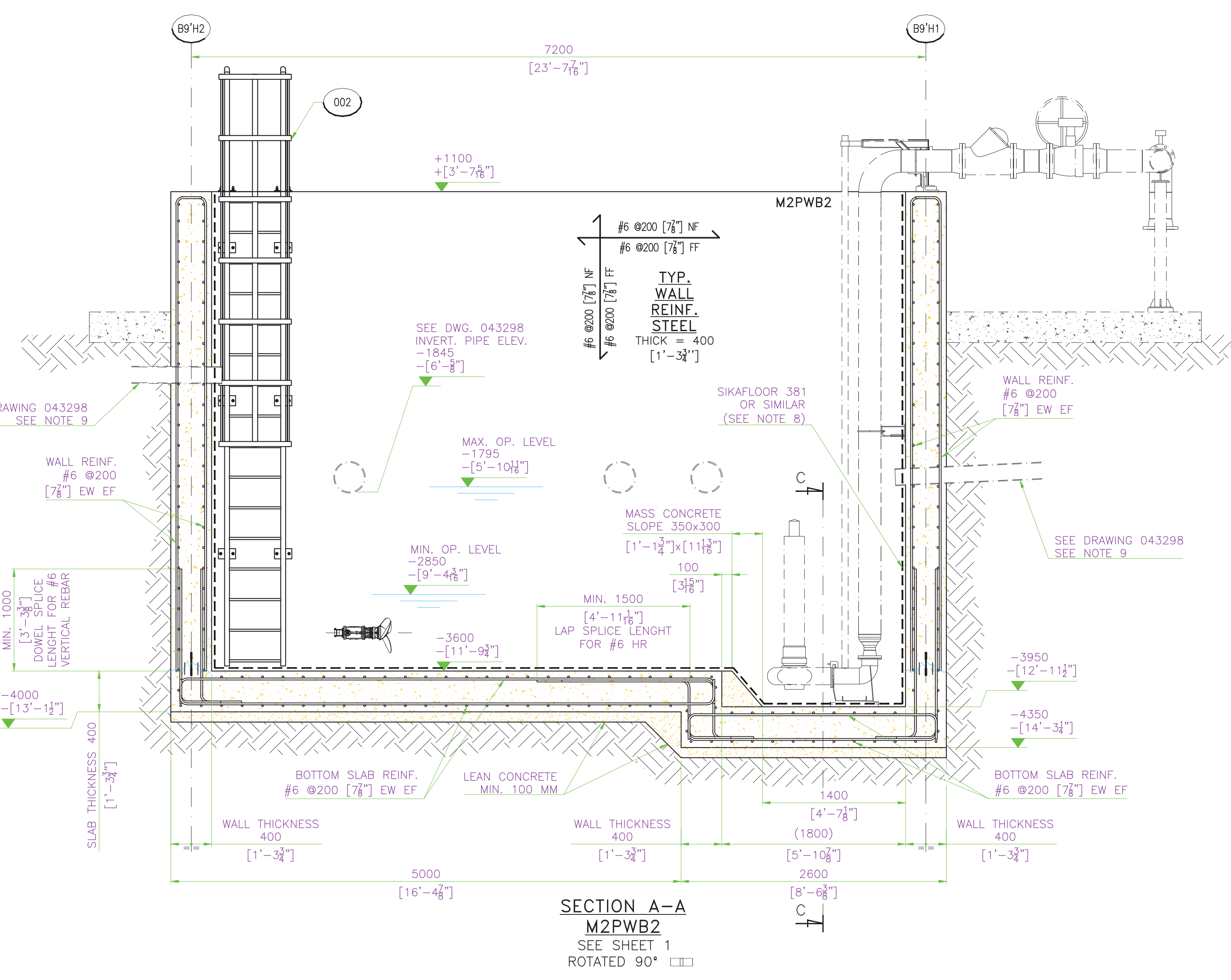
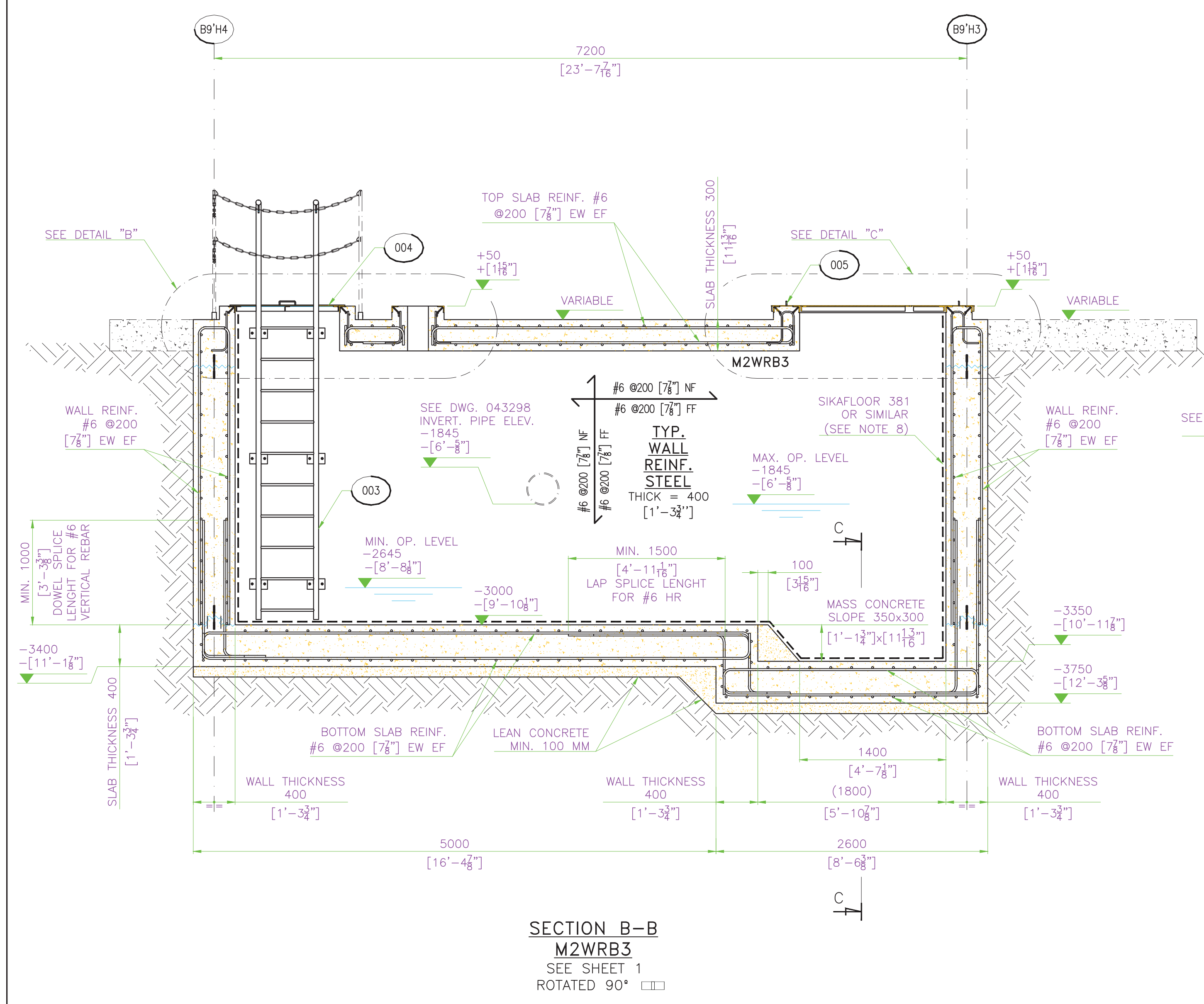
STRUCTURAL CONCRETE DESIGN PROPERTIES	
Characteristic cylinder compressive strength [f'c] (psi/MPa)	4,500 / 31
Concrete Slump Test - Abrams Cone (in/mm)	4'-6" / 100-150
Coarse Aggregate Size (in/mm)	3" / 19
Exposure categories	F2, S0, W2, C1
REINFORCING STEEL DESIGN PROPERTIES	
Deformed carbon-steel bars, uncoated	ASTM A615 grade 60 (60 ksi / 413 MPa)
Welded steel wire fabric	ASTM A706 grade 60 (60 ksi / 413 MPa)
NOMINAL CONCRETE COVER FOR REBAR	
FOUNDATIONS	2" / 50 mm
FOUNDATIONS (CONCRETE CAST AGAINST SOIL)	3" / 75 mm
WALLS	2" / 50 mm
COLUMNS	2" / 50 mm
BEAMS	2" / 50 mm
KEY TO ABBREVIATIONS	
VR = VERTICAL REBAR	UF = UPPER FACE
HR = HORIZONTAL REBAR	LF = LOWER FACE
DWL = DWEL REBAR	IF = INSIDE OF PAPER
CR = CROSS REBAR	NF = NEAR FACE
AR = ADDITIONAL REINFORCEMENT	FF = FAR FACE
	EF = EACH FACE
	EW = EACH WAY
CONVENTIONAL GRAPHICAL SYMBOLS	
PLAN VIEW	SECTIONS
▲ +0.00 ELEVATION AT FINISH	▼ +0.00
□ +0.00 ELEVATION AT RUSTIC	▽ +0.00
▲ +0.00 ELEVATION FOR MACHINERY RESTING	▼ +0.00
↘	DIRECTION OF SLOPE
SYMBOLS	
↗	HOOK END TOWARDS INSIDE OF PAPER
↘	HOOK END TOWARDS OUTSIDE OF PAPER
—	REBAR WITHOUT HOOK

SUPPLEMENTARY DRAWINGS:

- 043288 - MAKE UP BUILDING BASIC ENG.
- 043297 - SIDEWALKS
- 043298 - UNDERGROUND CPVC PIPES
- 043299 - MAKE UP BUILDING FOUNDATIONS
- 043300 - MAKE UP BUILDING FLOOR SLAB
- 042712 - ELECTRICAL CONDUITS

MATERIAL	CONDITION
UNITS: DUAL	CIVIL WORKS
SCALE: 1:175	M2PWB2 & M2WRB3
DATE: 28-09-22	FIRST ANGLE PROJECTION
DRN: JRF	REV. IRI #
CHK: JLM	A
APP: JLM	REV. IRI #

RUSSULA	043296
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- NOTES:**
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 - FOR STUP UPS REINFORCING, SEE TYPICAL DETAIL ON SHEET 01.
 - STAGGER REBAR SPlicing ACCORDING TO TYPICAL DETAIL ON SHEET 01.

STRUCTURAL CONCRETE DESIGN PROPERTIES	
Characteristic cylinder compressive strength [f'c] (psi/MPa)	4,500 / 31
Concrete Slump Test - Abrams Cone (in/mm)	4"-6" / 100-150
Coarse Aggregate Size (in/mm)	3" / 19
Exposure categories	F2, S0, W2, C1
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Welded steel wire fabric	ASTM A706 grade 60 (60 ksi / 413 MPa)
NOMINAL CONCRETE COVER FOR REBAR	
FOUNDATIONS	2" / 50 mm
FOUNDATIONS (CONCRETE CAST AGAINST SOIL)	3" / 75 mm
WALLS	2" / 50 mm
COLUMNS	2" / 50 mm
BEAMS	2" / 50 mm

CONVENTIONAL GRAPHICAL SYMBOLS	
PLAN VIEW	SECTIONS
▲ +0.00	ELEVATION AT FINISH
▼ +0.00	ELEVATION AT RUSTIC
▲ +0.00	ELEVATION FOR MACHINERY RESTING
—	DIRECTION OF SLOPE

KEY TO ABBREVIATIONS	
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	EW = EACH WAY

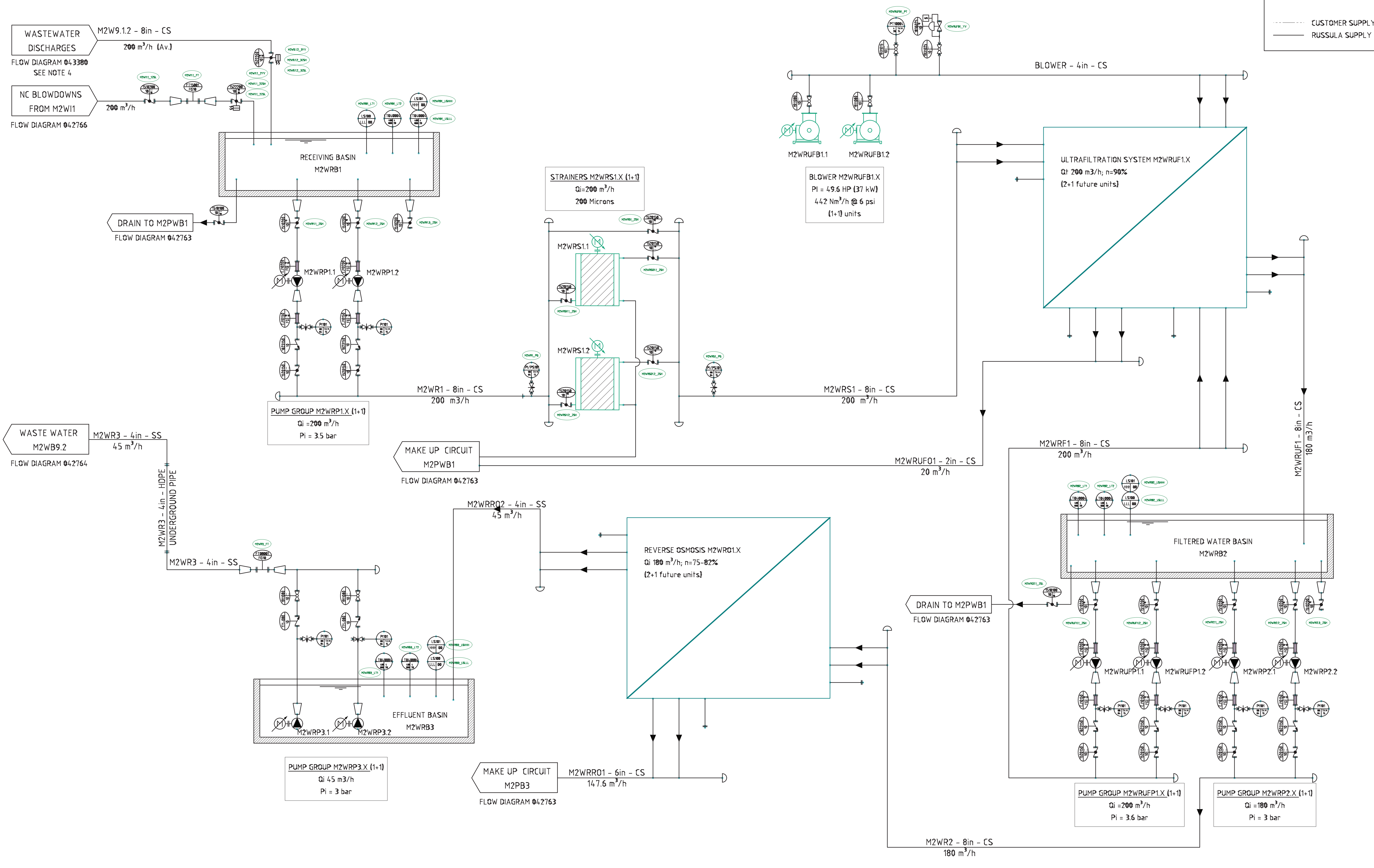
SYMBOLS	
↖	HOOK END TOWARDS INSIDE OF PAPER
↗	HOOK END TOWARDS OUTSIDE OF PAPER
—	REBAR WITHOUT HOOK

SUPPLEMENTARY DRAWINGS:	
043288	- MAKE UP BUILDING BASIC ENG.
043297	- SIDEWALKS
043298	- UNDERGROUND CPVC PIPES
043299	- MAKE UP BUILDING FOUNDATIONS
043300	- MAKE UP BUILDING FLOOR SLAB
042712	- ELECTRICAL CONDUITS

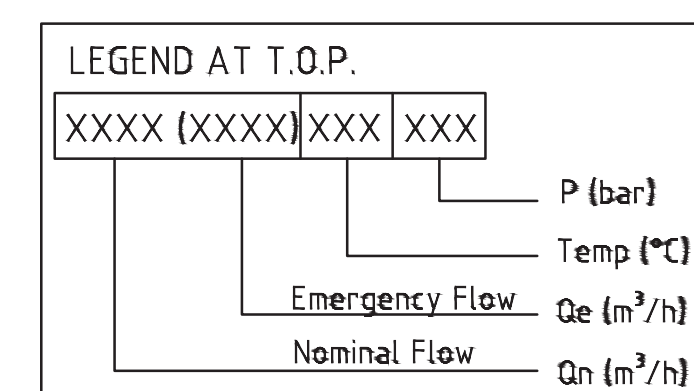
MATERIAL		CONDITION	
UNITS:	DUAL	CIVIL WORKS	M2PW2 & M2WRB3
SCALE:	1:50	FIRST ANGLE PROJECTION	
DATE:	28-09-22	REV.	A
DRN:	JRF	REV.	IR
CHK:	JLM	FIN WT:	SHEET 2 OF 3
APP:	JLM		

REVISION DESCRIPTION	
NO.	DESCRIPTION

Drawn By:	AES	Date:	10-19-22
Checked By:	AHR	Scale:	36"=48"
Project Number:	BHLP-22172		



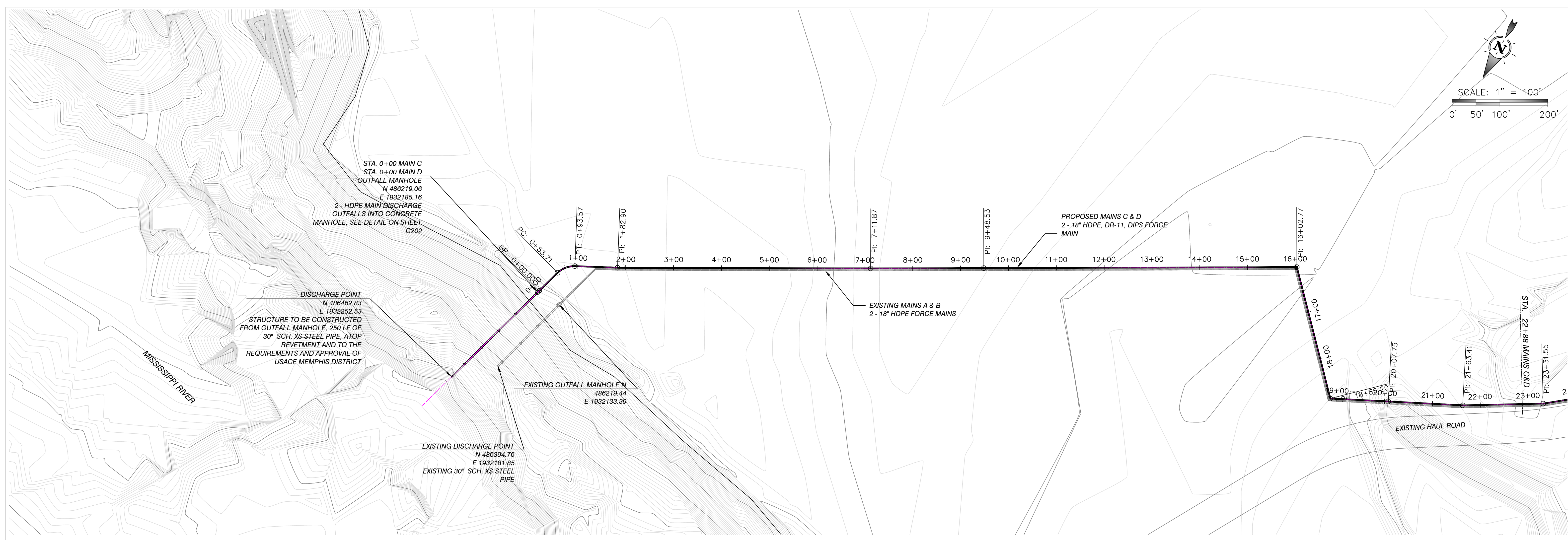
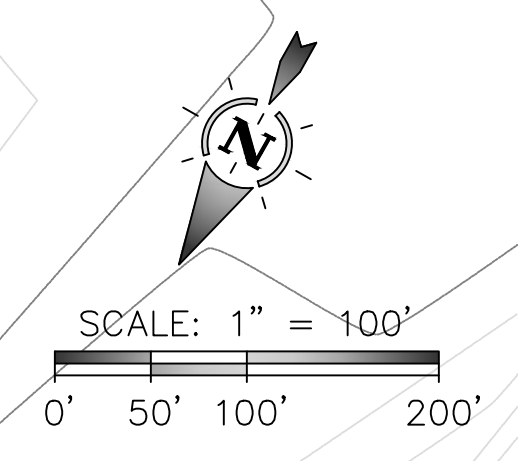
- NOTES:
- SEE DRAWING NUMBER 042767 "INSTRUMENTATION, VALVES & LINES CODE".
 - SOME PIPES AND VALVES SIZES MAY CHANGE WITH FINAL EQUIPMENT SELECTION.
 - ALL LINES INSTALLED OUTDOORS, WHOSE DIAMETER IS 10 INCHES OR LESS, OR WHICH ARE SUSCEPTIBLE TO HAVING STANDING WATER FOR LONG PERIODS (INLETS AND OUTLETS OF SPARE EQUIPMENT, BYPASSES, ETC.) WILL BE HEAT TRACED AND INSULATED.
 - WASTEWATER DISCHARGES CONTAIN CONTACT BLOWDOWN & NON CONTACT SIDE FILTRATION BACKWASH



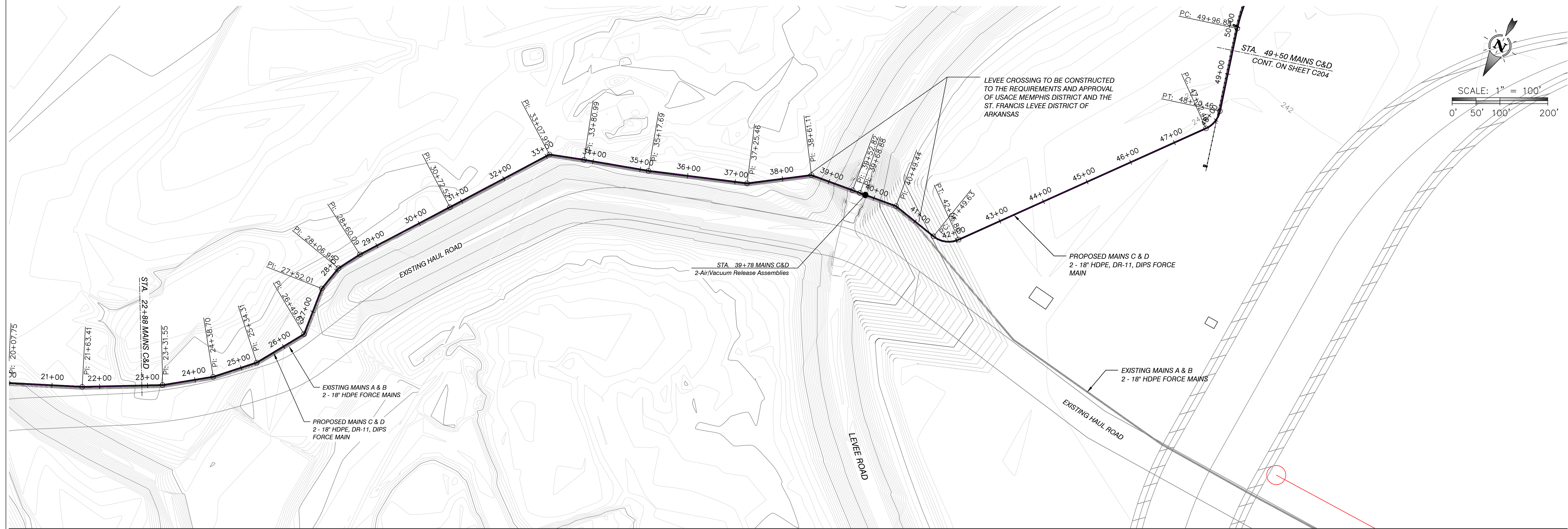
MATERIAL	CONDITION:	THIRD ANGLE PROJECTION	
UNITS: METRIC	FLOW DIAGRAM		
SCALE: W/S	WASTE WATER RECYCLING SYSTEM	REV.	IRI Nº
DATA: 06/04/2022		01	
DRN: MI		FIN WT:	
CHK: ALL		SHEET	OF
APP: ALL		042765	



DATE	XX-XX-XX	Drawn By:	AES	Date:	10-19-22
REVISION DESCRIPTION		Checked By:	AHR	Scale:	24"x36" NONE
NO	XX	Project Number:	BHLP-22172		
C25					



MAIN C & MAIN D STATION 0+00 TO 22+88



MAIN C & MAIN D STATION 22+88 TO 49+50

EXPLORATORY VENTURES, LLC
STEEL MANUFACTURING COMPLEX
 WASTEWATER FORCE MAIN AND OUTFALL STRUCTURE
 MAINS C & D, STATIONS 0+00 TO 49+50

DATE	02-02-2022
REVISION DESCRIPTION	INITIAL ISSUANCE FOR PERMIT REVIEW
NO	1
GENERAL REVISIONS	

DATE	02-02-2022
REVISION DESCRIPTION	INITIAL ISSUANCE FOR PERMIT REVIEW
NO	1
GENERAL REVISIONS	
Drawn By:	AES
Date:	02-01-2022
Checked By:	AHR
Scale:	NOTED
Project Number:	BRST-21723

C201



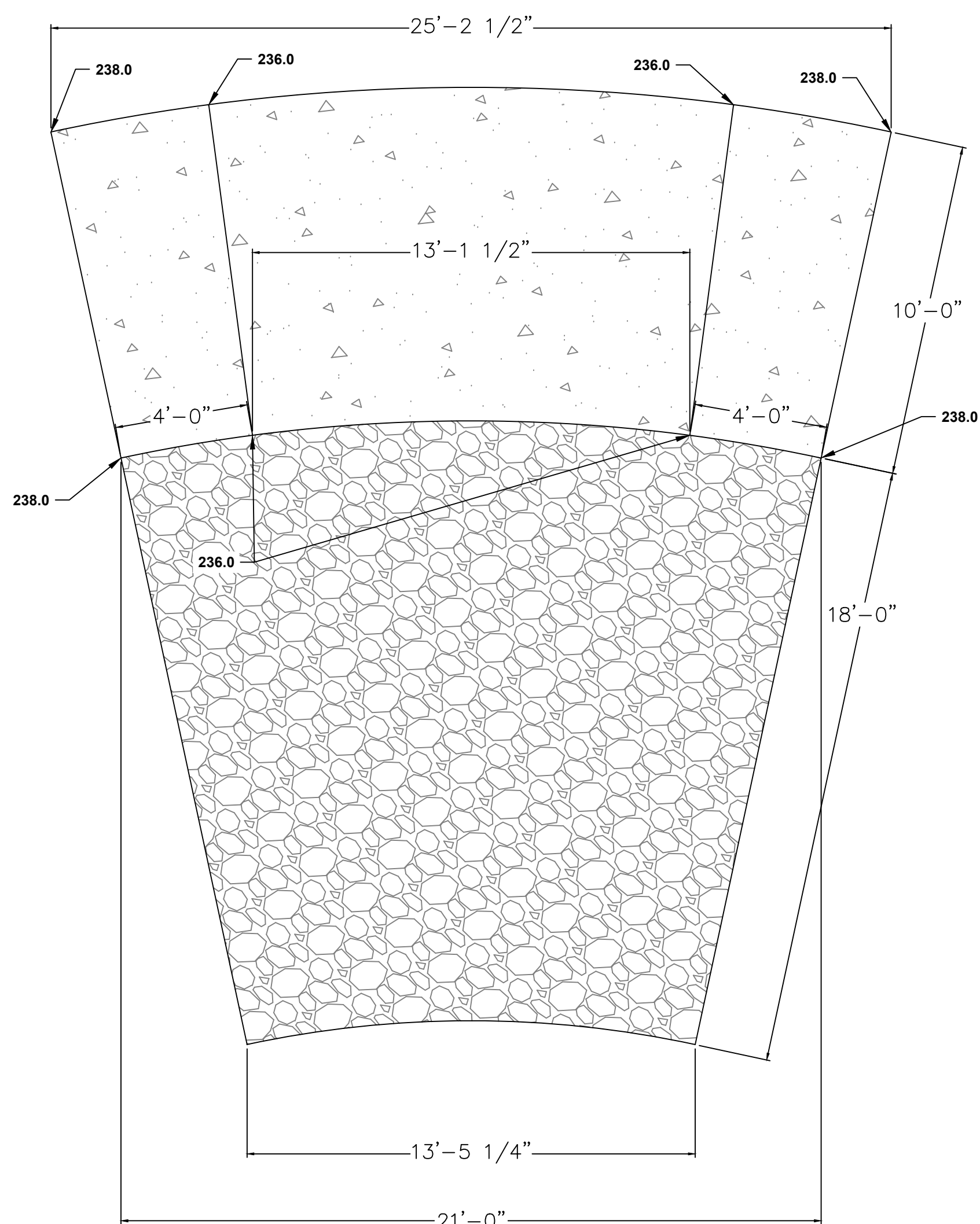
ARKANSAS
 REGISTERED
 PROFESSIONAL
 ENGINEER
 No. 10482
 ANDREW H. RIKE

EXPLORARY VENTURES, LLC
 STEEL MANUFACTURING COMPLEX

ARKANSAS

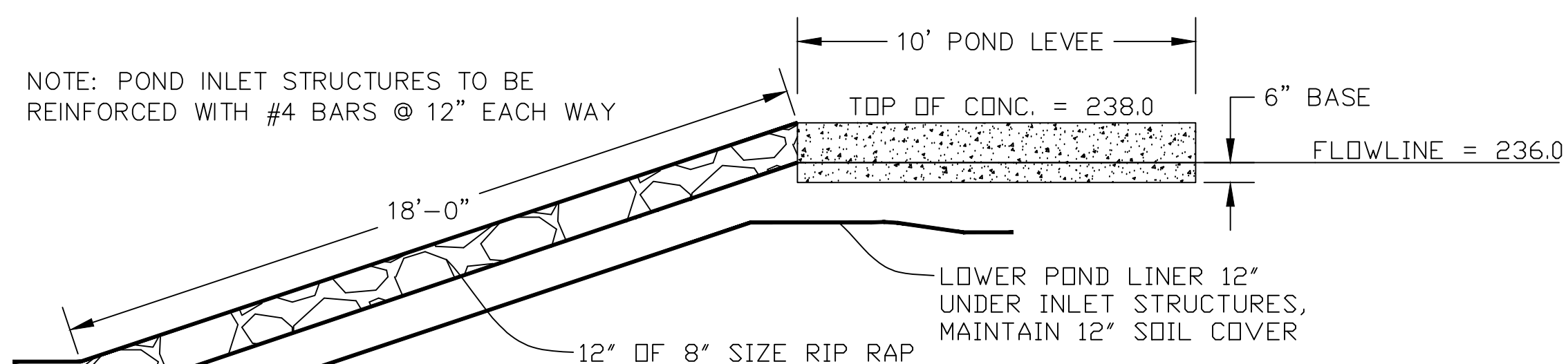
OSCEOLA

LEVEE CROSSING AND POND INLET DETAILS



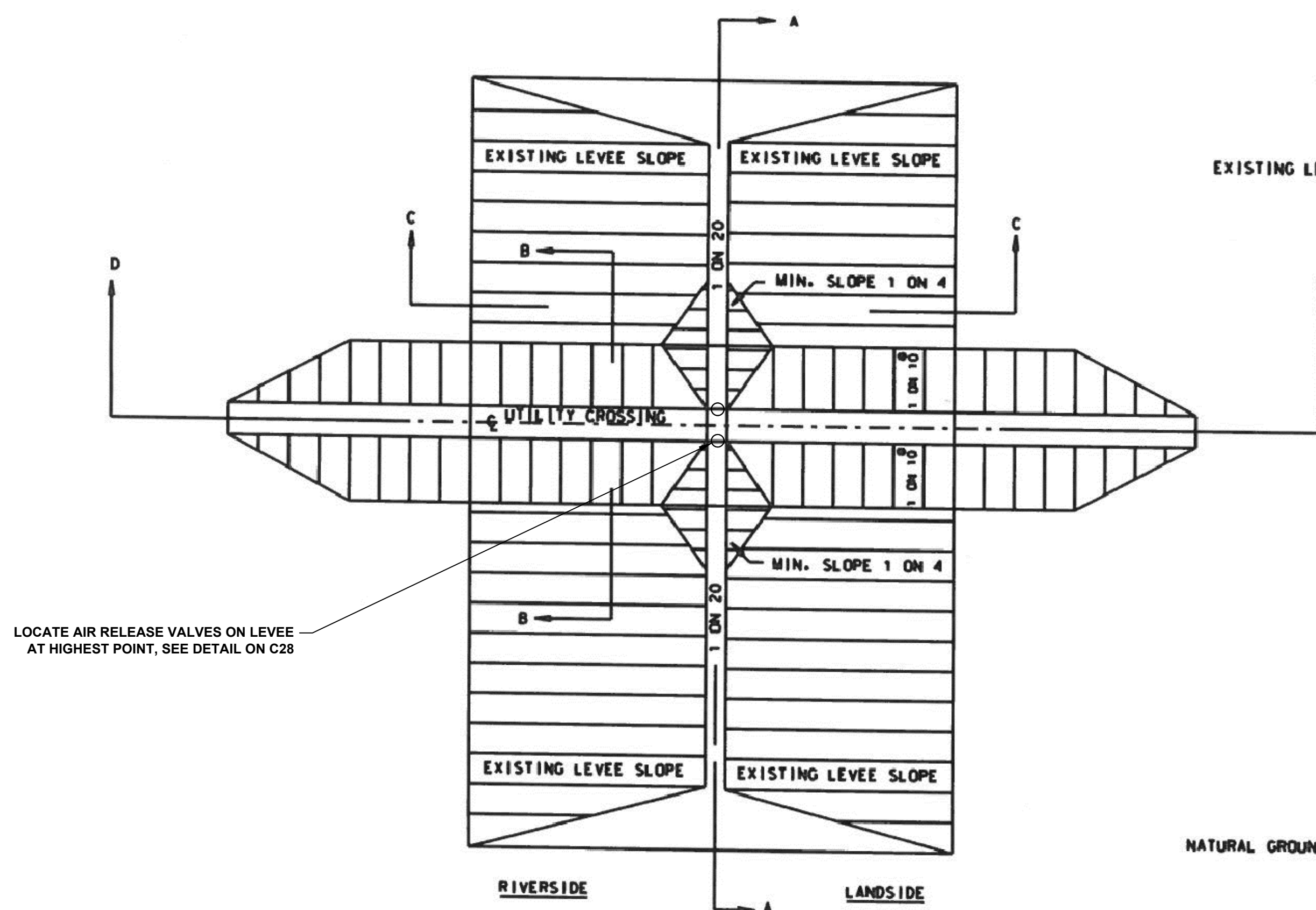
POND INLET PLAN

NOT TO SCALE



POND INLET ELEVATION

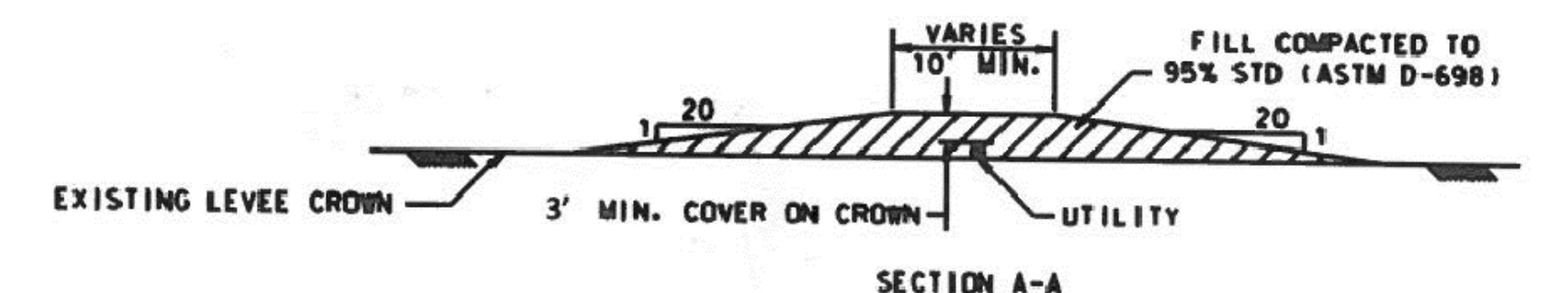
NOT TO SCALE



DETAIL PLAN

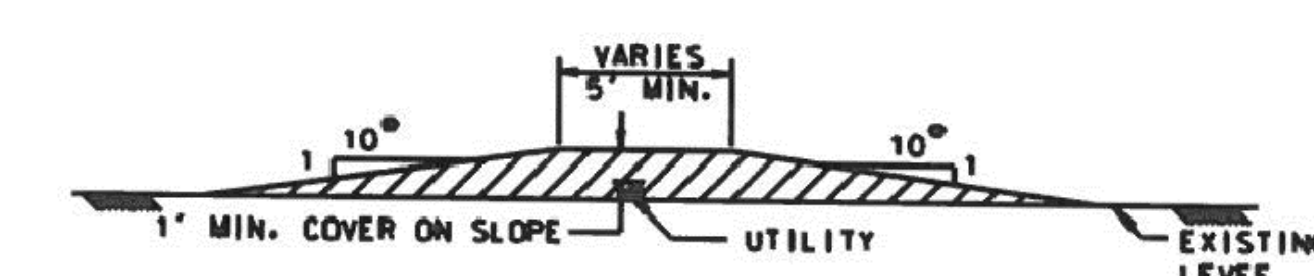
SCALE: NONE

LOCATE AIR RELEASE VALVES ON LEVEE AT HIGHEST POINT, SEE DETAIL ON C28



SECTION A-A

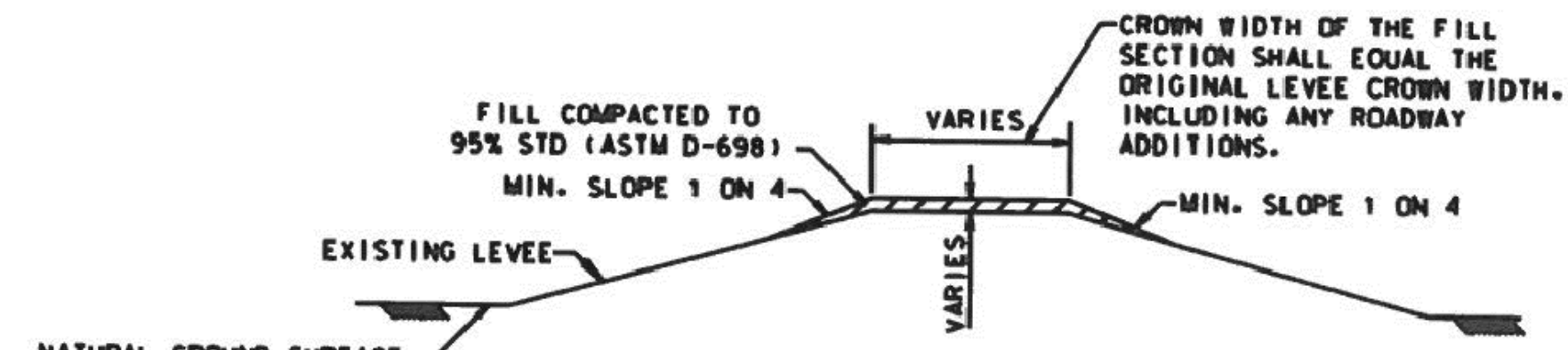
SCALE: NONE



SECTION B-B

SCALE: NONE

1V ON 10H SLOPE SHALL BE CHANGED TO 1V ON 20H FOR CROSSINGS IN LOUISIANA.

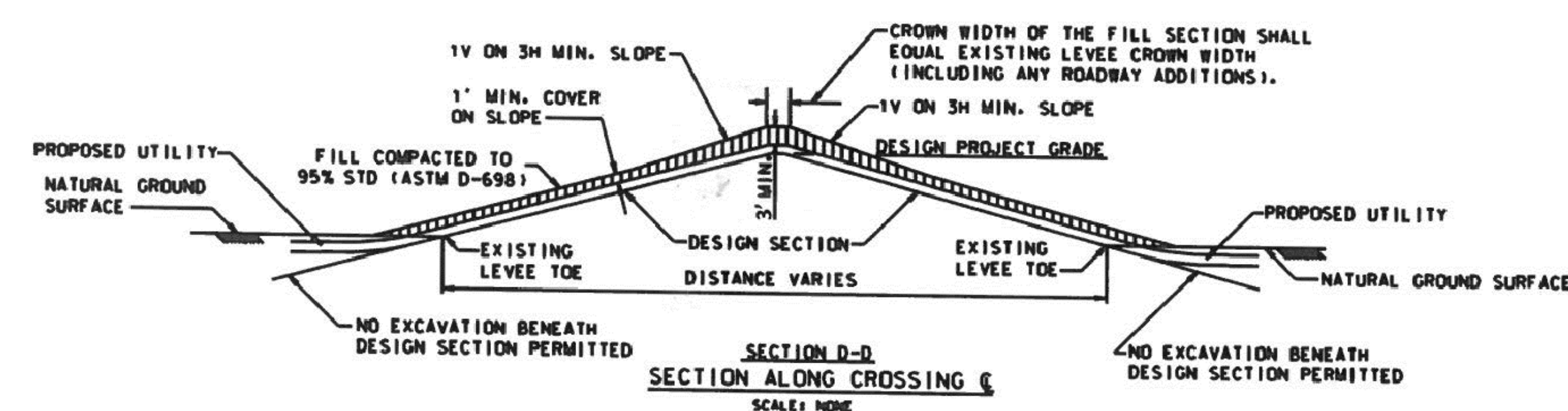


SECTION C-C

SCALE: NONE

NOTES:

1. ALL DISTURBED TURFED AREAS SHALL BE SEEDED OR SODDED WITH BERMAUDA OR TALL FESCUE OR APPROVED MIX. THE TURFING SHALL INCLUDE FERTILIZING AND MULCHING WHERE NEEDED.
2. THE LEVEE CROWN RAMP OVER THE UTILITY SHALL BE SURFACED TO MATCH EXISTING MATERIALS. THE SURFACING SHALL BE A MINIMUM OF 6 INCHES THICK.
3. FILL MATERIAL USED IN CONSTRUCTION OF UTILITY COVER SHALL BE SIMILAR TO MATERIAL IN EXISTING LEVEE SECTION.
4. UTILITIES SHALL BE PLACED ABOVE DESIGN SECTION OF LEVEE AND BERMS AT LOCATION OF THE CROSSING. EXISTING SURFACE OF BERM IS DESIGN SURFACE.
5. AREAS TO RECEIVE COVER SHALL HAVE EXISTING SURFACING OR TURF REMOVED PRIOR TO SCARIFYING AND PLACING OF COVER MATERIAL.



SECTION D-D

SCALE: NONE

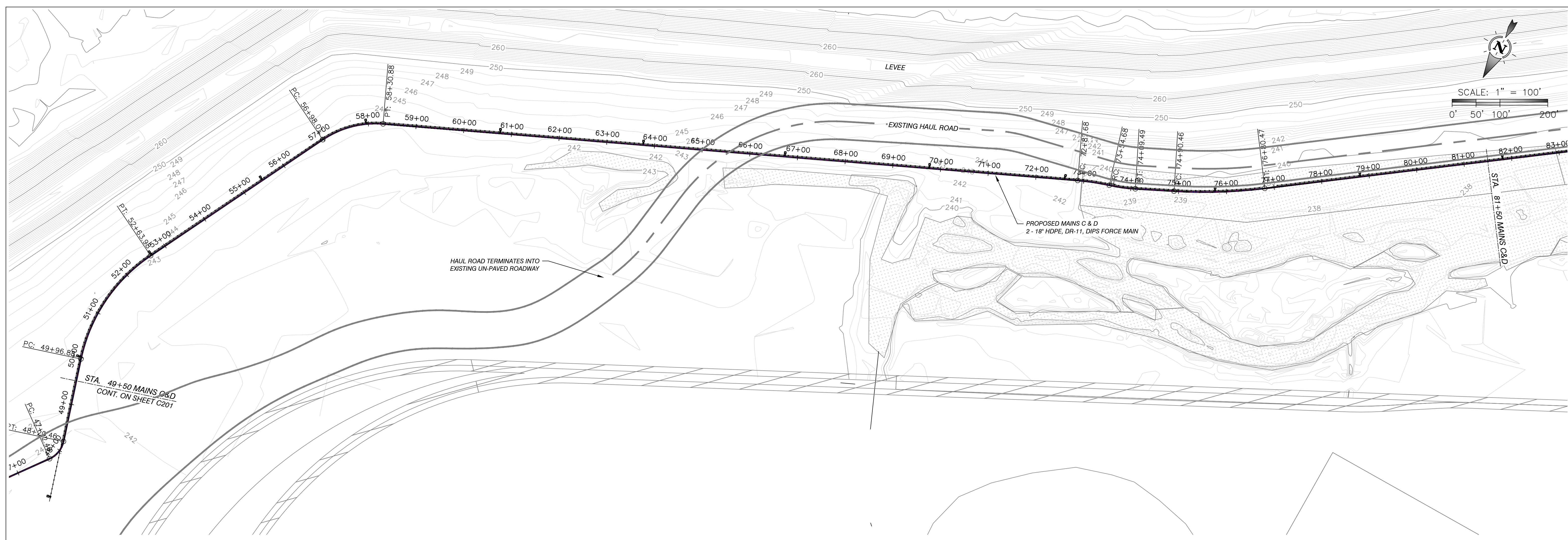
DATE:	02-02-2022
10-18-2022	

NO	REVISION DESCRIPTION	DATE
0	INITIAL ISSUANCE FOR PERMIT REVIEW	02-02-2022
1	GENERAL REVISIONS	10-18-2022

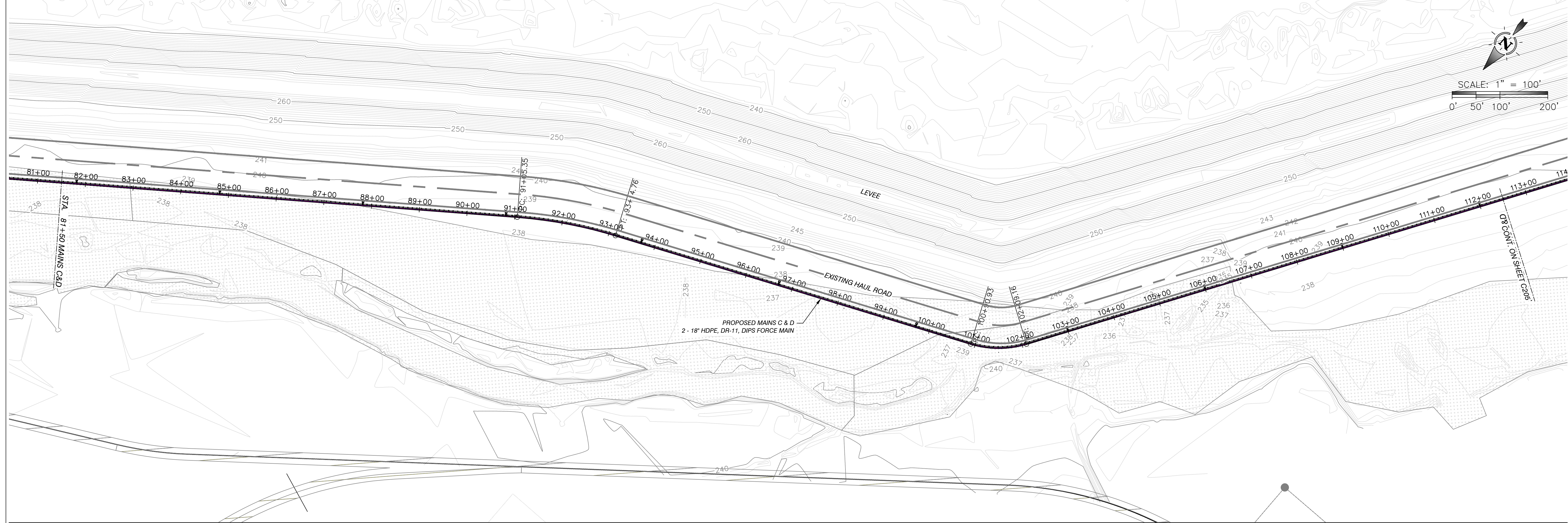
Drawn By: AES Date: 02-01-2022
 Checked By: AHR Scale: NOTED

Project Number: BRST-22172

C203



MAIN C & MAIN D STATION 49+50 TO 81+50



MAIN C & MAIN D STATION 81+50 TO 112+50

EXPLORATORY VENTURES, LLC
STEEL MANUFACTURING COMPLEX

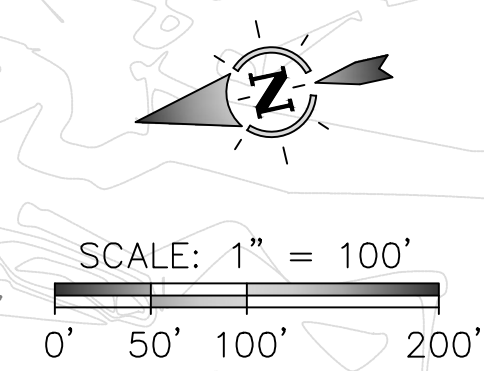
OSCEOLA
 WASTEWATER FORCE MAIN
 MAINS C & D, STATIONS 49+50 TO 112+50

NO	ADDED SHEET	REVISION DESCRIPTION	DATE
0			10-18-2022

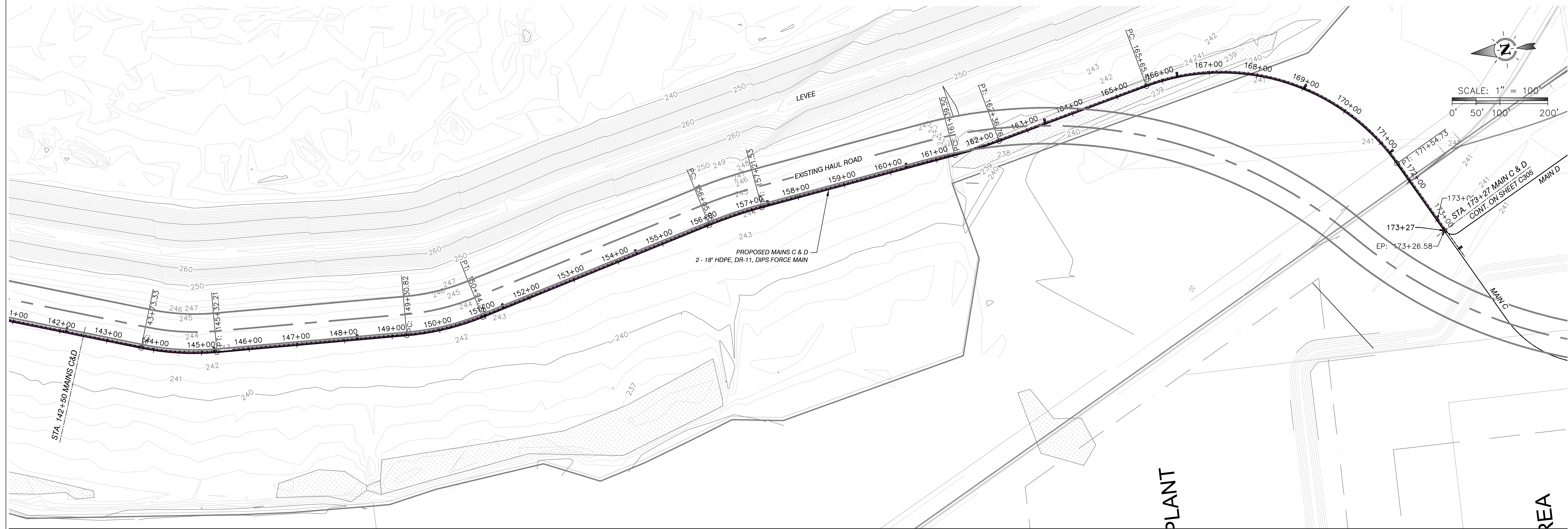
Drawn By: **AES** Date: **10-18-2022**
 Checked By: **AHR** Scale: **NOTED**

Project Number: **BRST-21723**

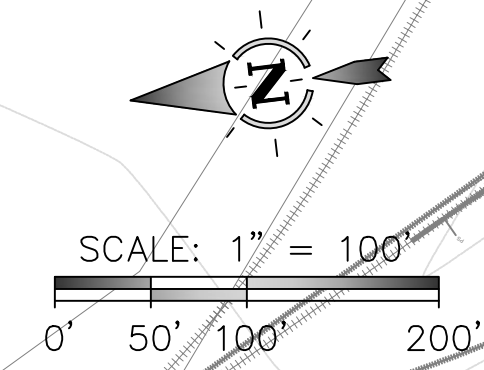
C204



MAIN C & MAIN D STATION 112+50 TO 124+50



MAIN C & MAIN D STATION 124+50 TO 173+27



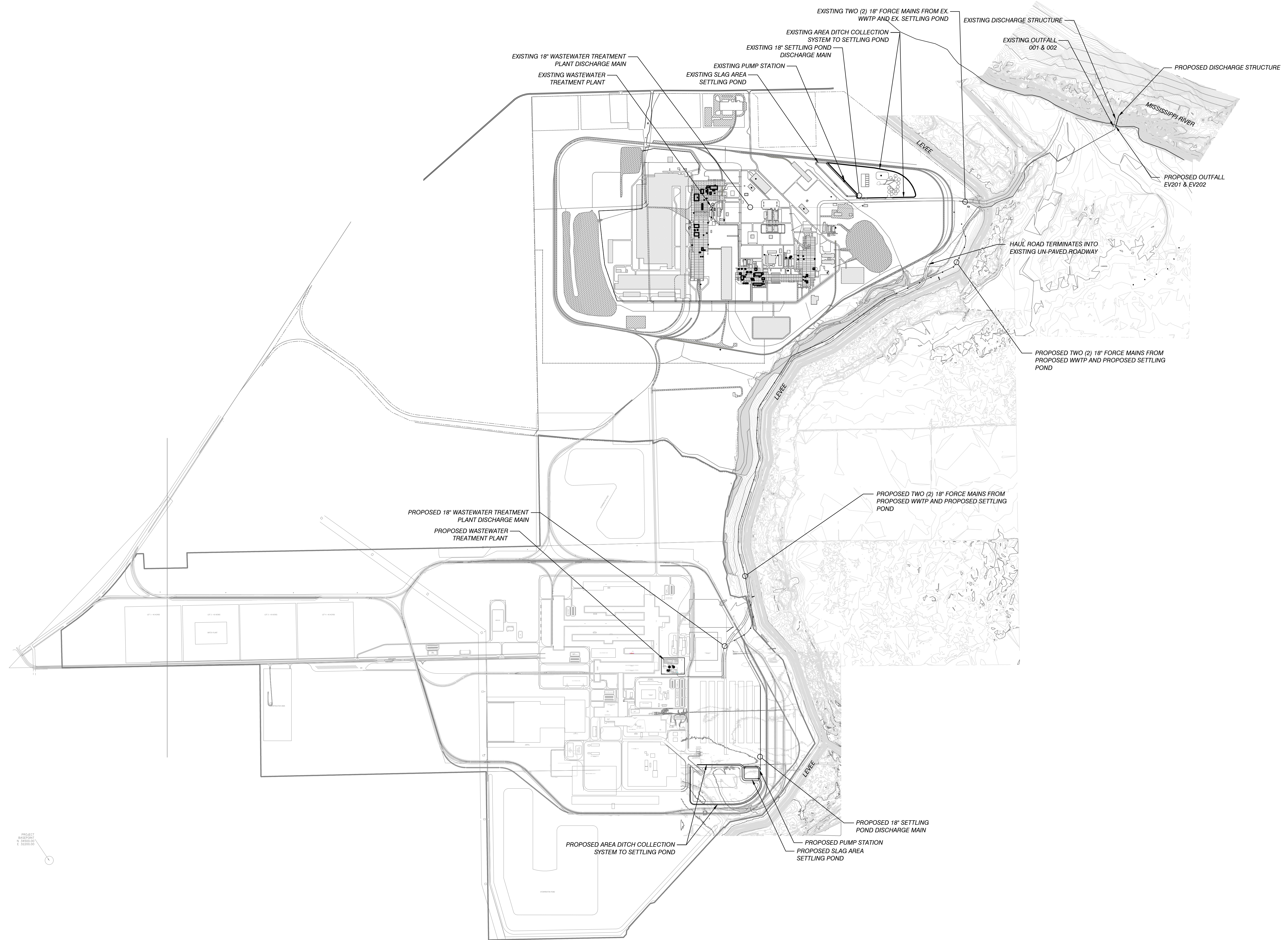
EXPLORATORY VENTURES, LLC
STEEL MANUFACTURING COMPLEX

ARIZONA
 ARKANSAS
 CALIFORNIA
 FLORIDA
 GEORGIA
 ILLINOIS
 INDIANA
 IOWA
 KANSAS
 KENTUCKY
 LOUISIANA
 MICHIGAN
 MINNESOTA
 MISSISSIPPI
 MISSOURI
 MONTANA
 NEBRASKA
 NEVADA
 NEW HAMPSHIRE
 NEW JERSEY
 NEW YORK
 NORTH CAROLINA
 NORTH DAKOTA
 OHIO
 OKLAHOMA
 OREGON
 PENNSYLVANIA
 RHODE ISLAND
 SOUTH CAROLINA
 SOUTH DAKOTA
 TENNESSEE
 TEXAS
 UTAH
 VERMONT
 VIRGINIA
 WASHINGTON
 WEST VIRGINIA
 WISCONSIN
 WYOMING
 ARIZONA
 ARKANSAS
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 SOUTH DAKOTA
 TENNESSEE
 TEXAS
 UTAH
 VERMONT
 VIRGINIA
 WASHINGTON
 WEST VIRGINIA
 WISCONSIN
 WYOMING

NO	REVISION DESCRIPTION	DATE
0 <td>ADDED SHEET <td>10-18-2022</td> </td>	ADDED SHEET <td>10-18-2022</td>	10-18-2022

Drawn By: **AES** Date: **10-18-2022**
 Checked By: **AHR** Scale: **NOTED**
 Project Number: **BRST-21723**

C205



PROJECT
BASED ON
N 28400.00
E 32200.00

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



EXPLORATORY VENTURES, LLC
STEEL MANUFACTURING COMPLEX
GENERAL LAYOUT - WASTEWATER FACILITIES

NO	REVISION DESCRIPTION	DATE
0	INITIAL ISSUANCE FOR INTERNAL REVIEW	09-02-2022
1	GENERAL REVISIONS	10-18-2022

Drawn By: **AHR** Date: **09-06-2022**
 Checked By: **CJM** Scale: **1" = 1,000'**
 Project Number: **BRST-22172**

C301

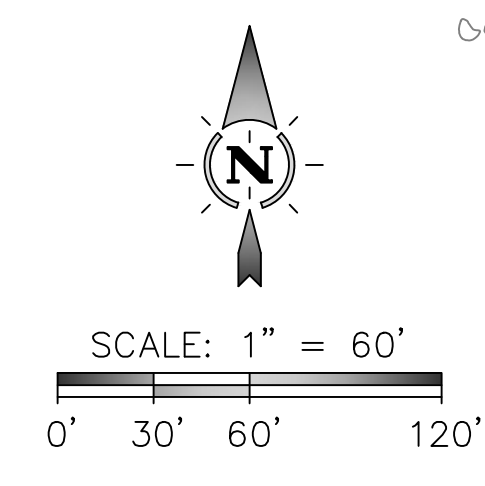
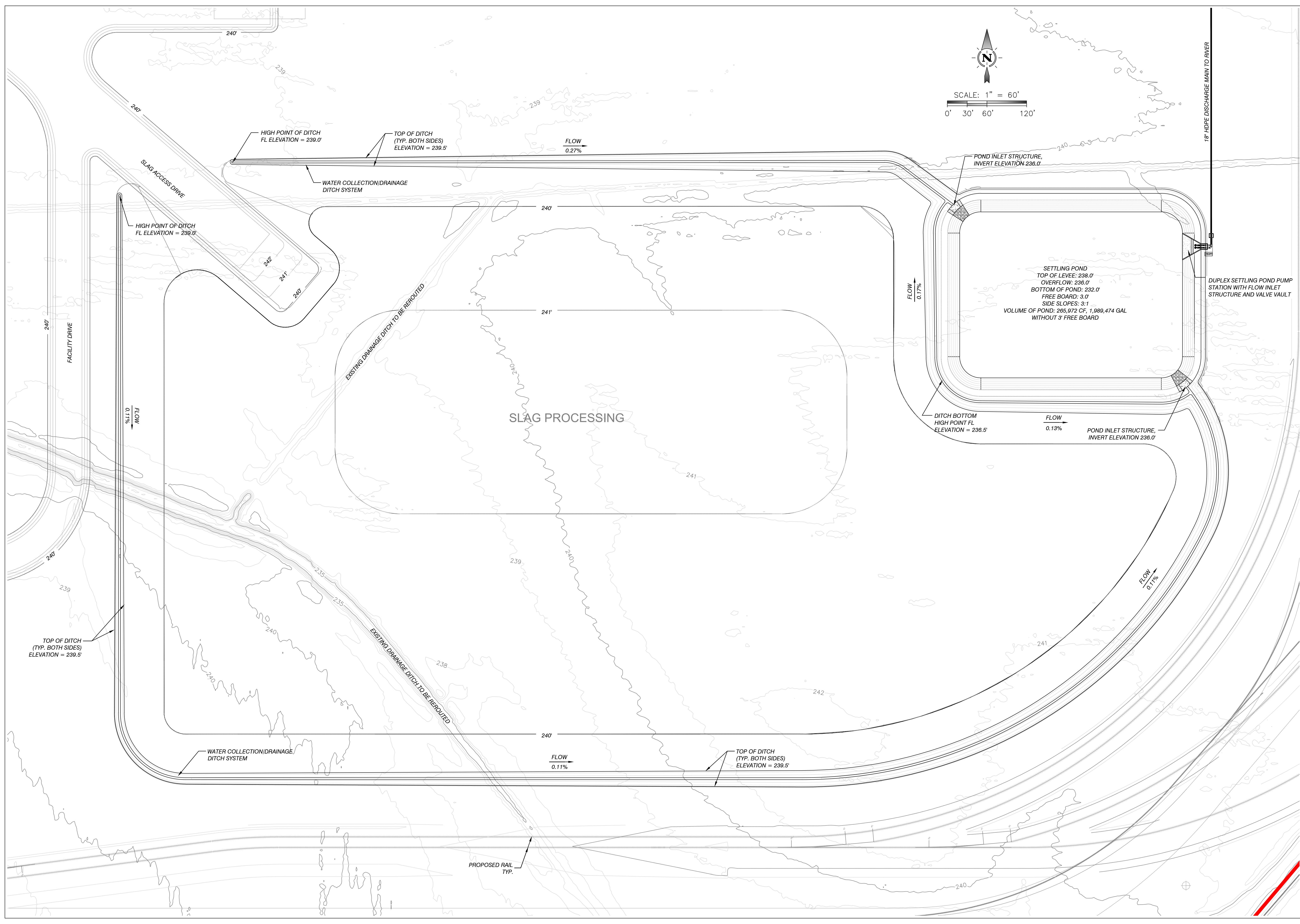
OSCEOLA ARKANSAS



EXPLORATORY VENTURES, LLC
STEEL MANUFACTURING COMPLEX

SLAG AREA - SITE PLAN

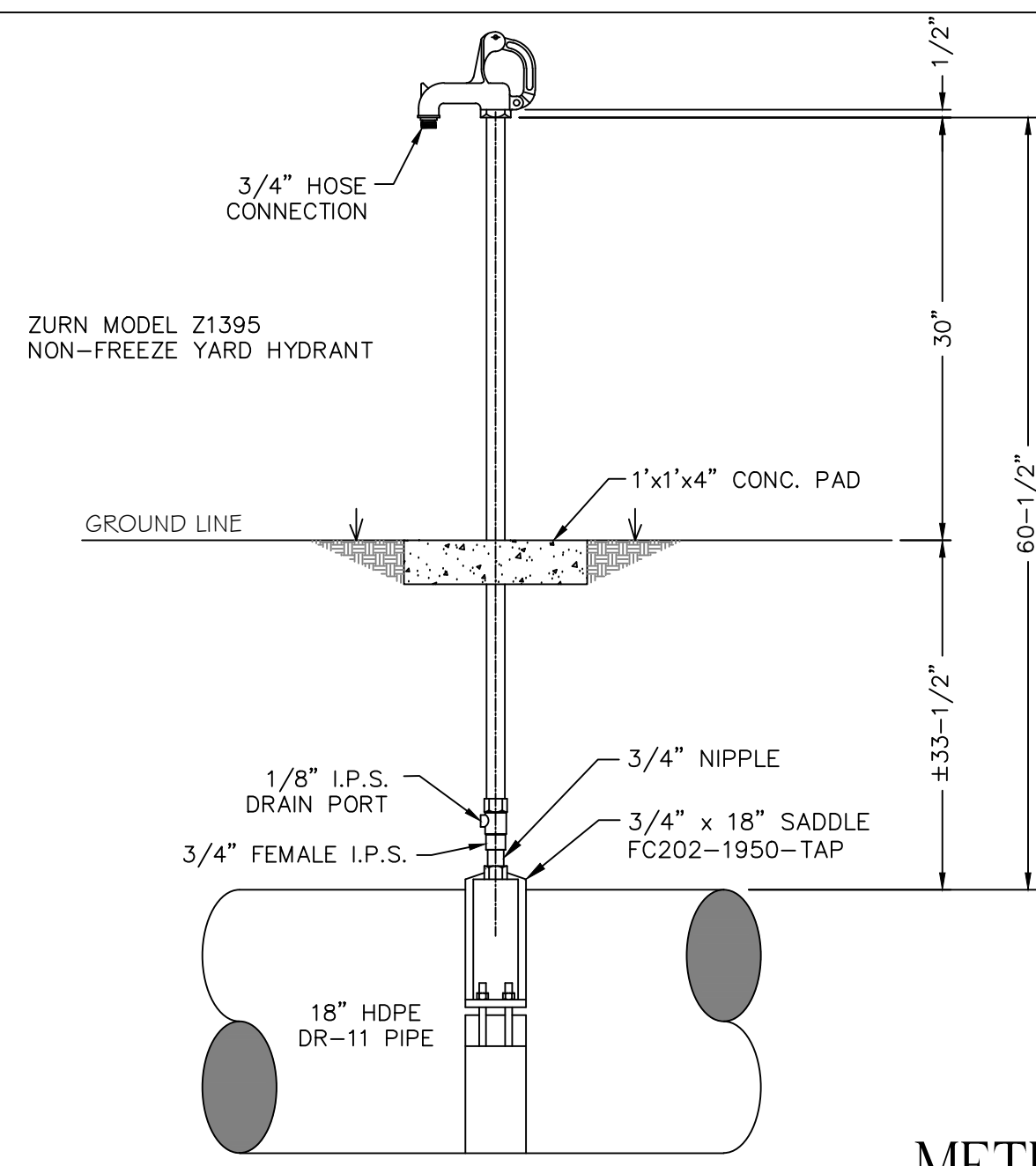
OSCEOLA



NO	REVISION DESCRIPTION	DATE
0	INITIAL ISSUANCE FOR INTERNAL REVIEW	09-02-2022
1	GENERAL REVISIONS	10-18-2022

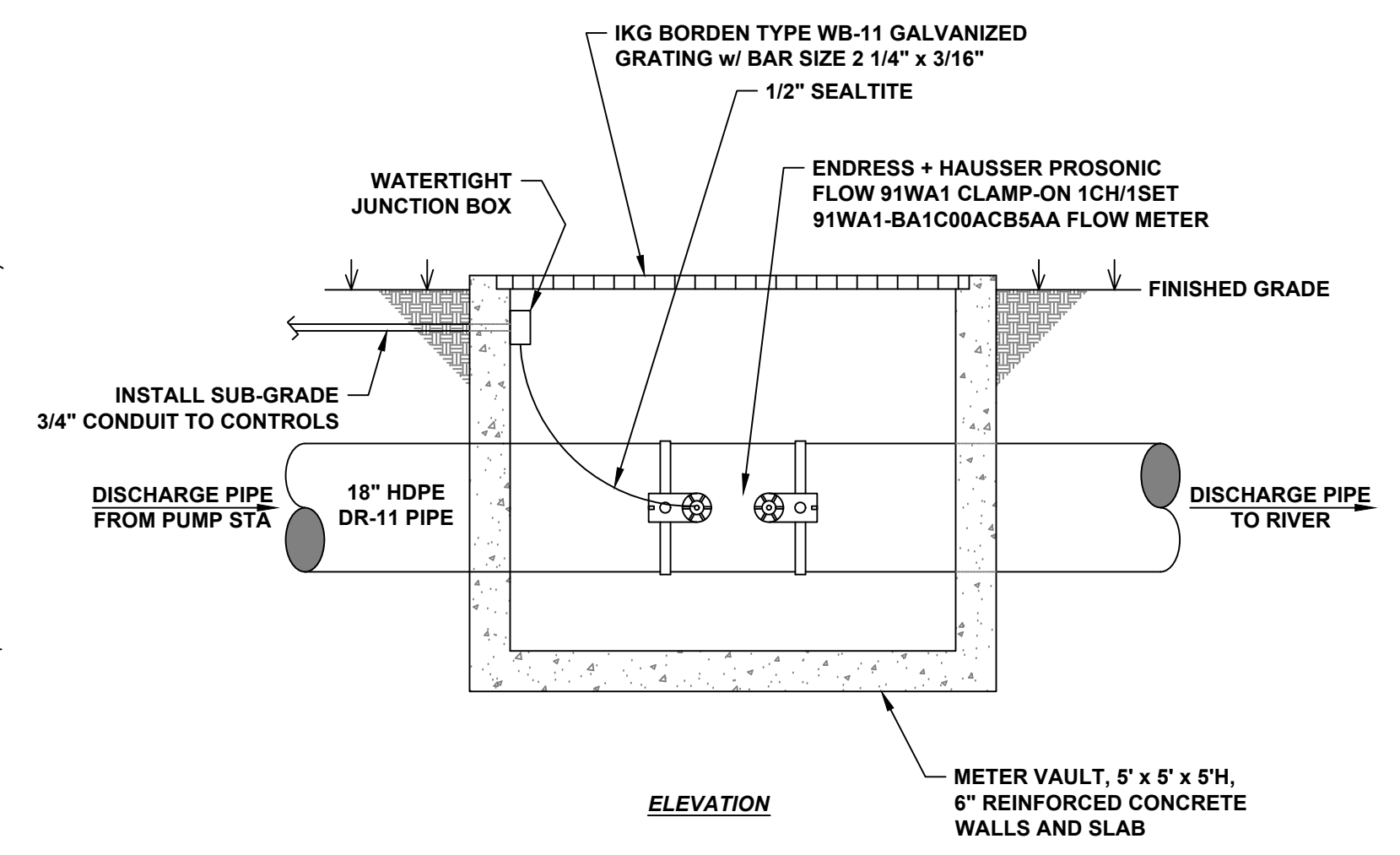
Drawn By: **AHR** Date: **09-06-2022**
 Checked By: **CJM** Scale: **1" = 60'**
 Project Number: **BRST-21723**

C302

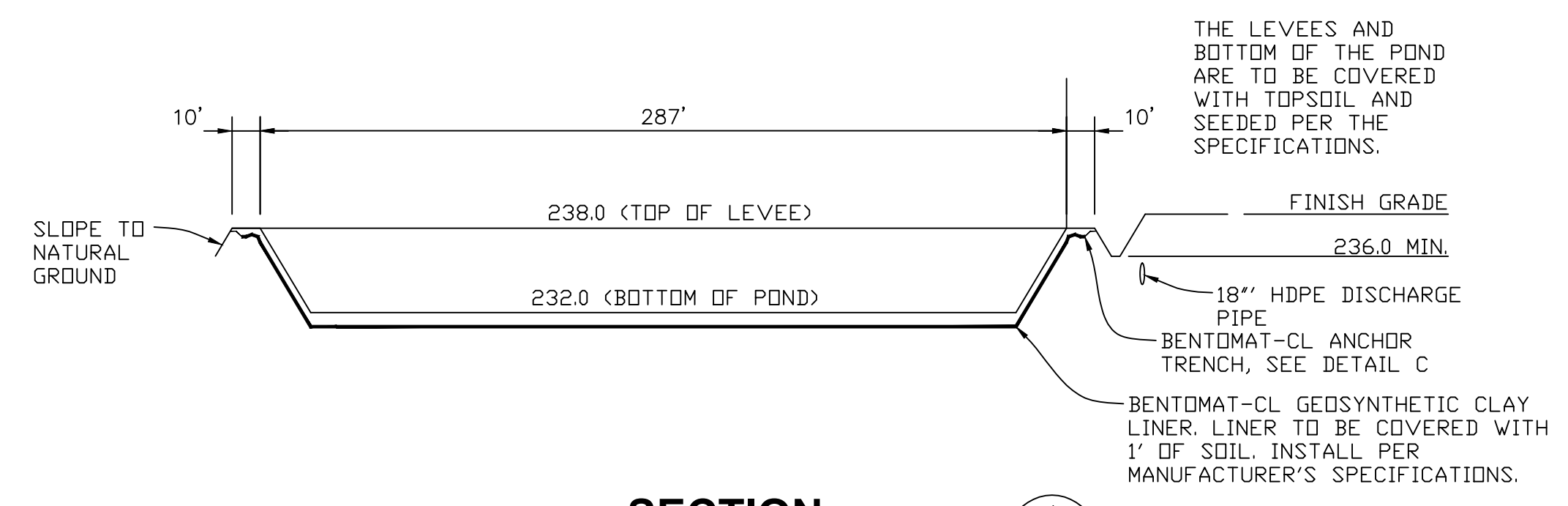


METERING / SAMPLING DETAILS

NOT TO SCALE

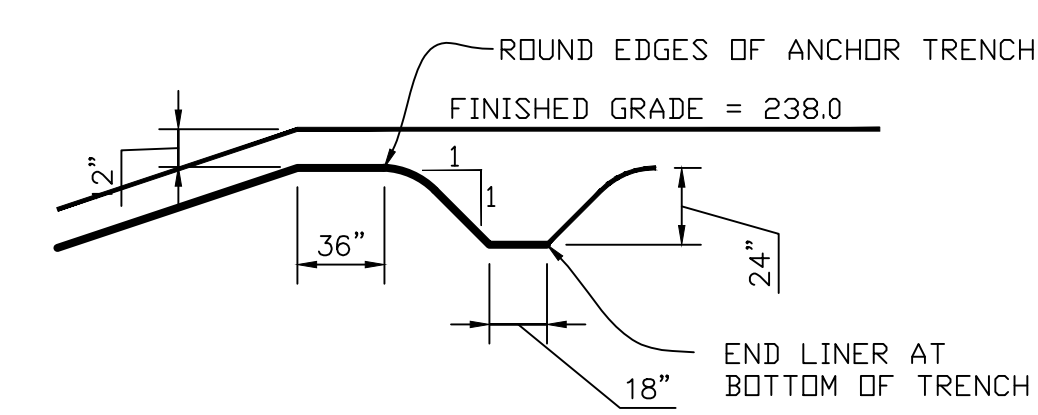


ELEVATION



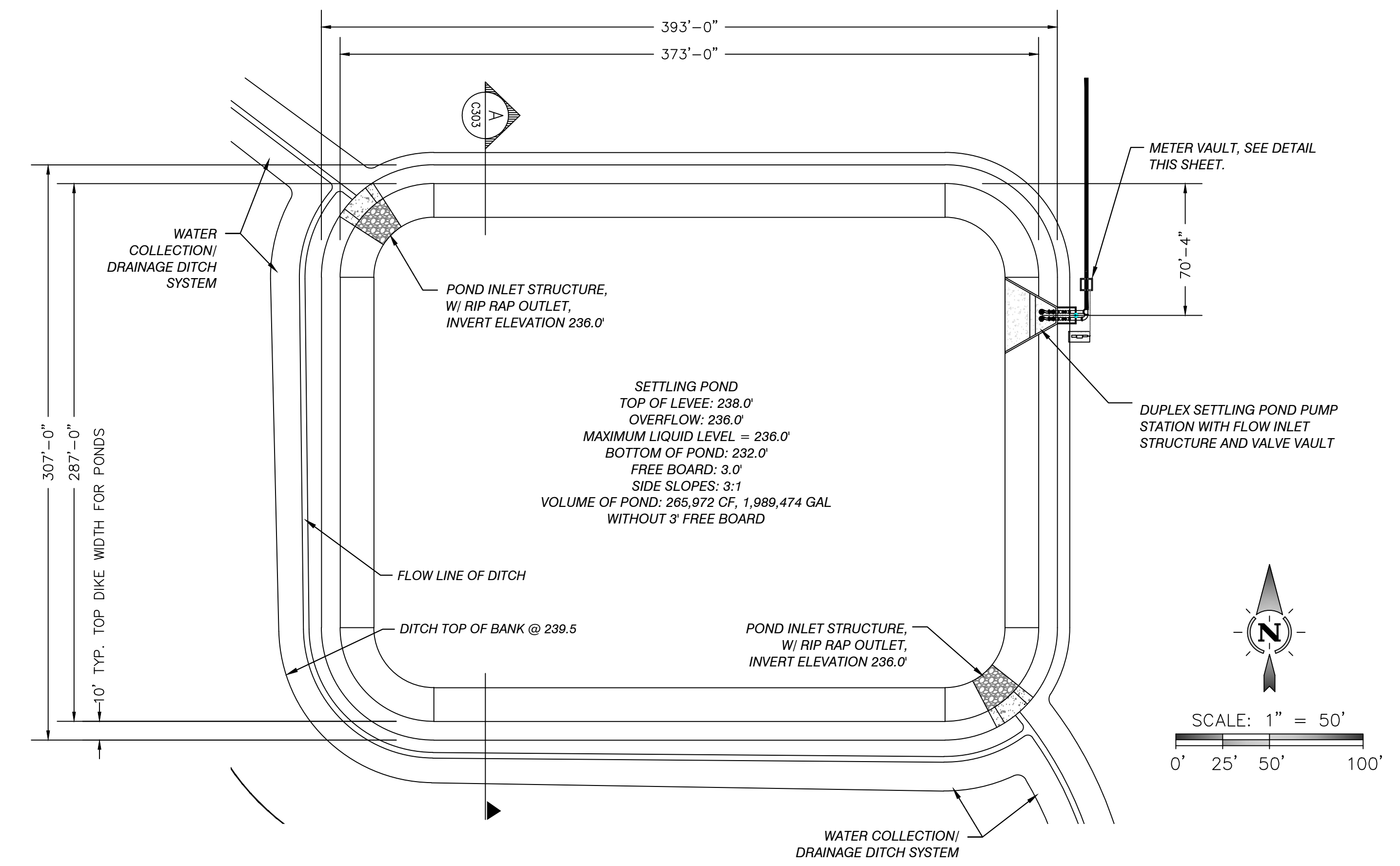
SECTION

SCALE: HOR. 1" = 50'
VER. 1" = 10'



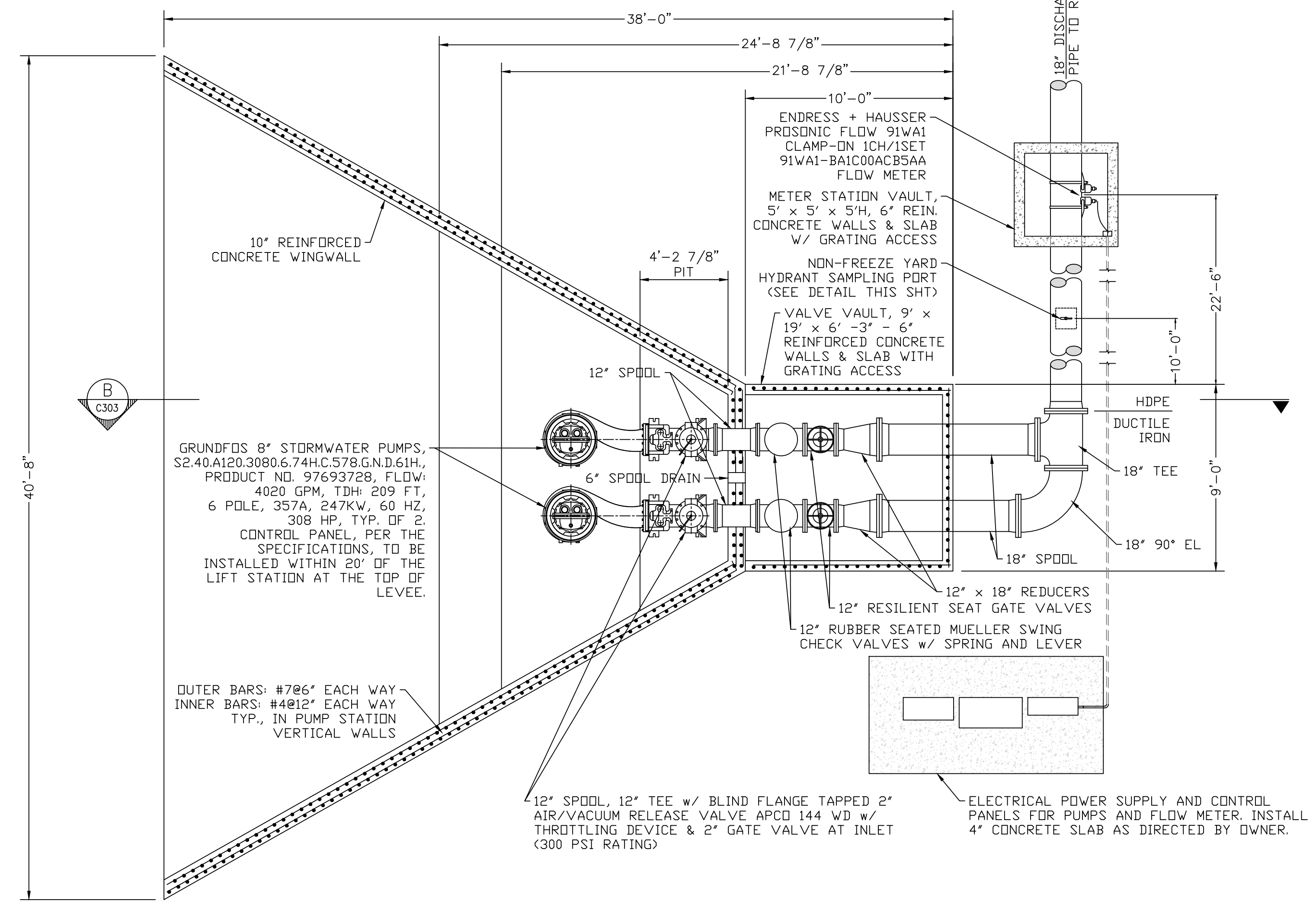
DETAIL

SCALE: HOR. 1" = 1'
VER. 1" = 1'



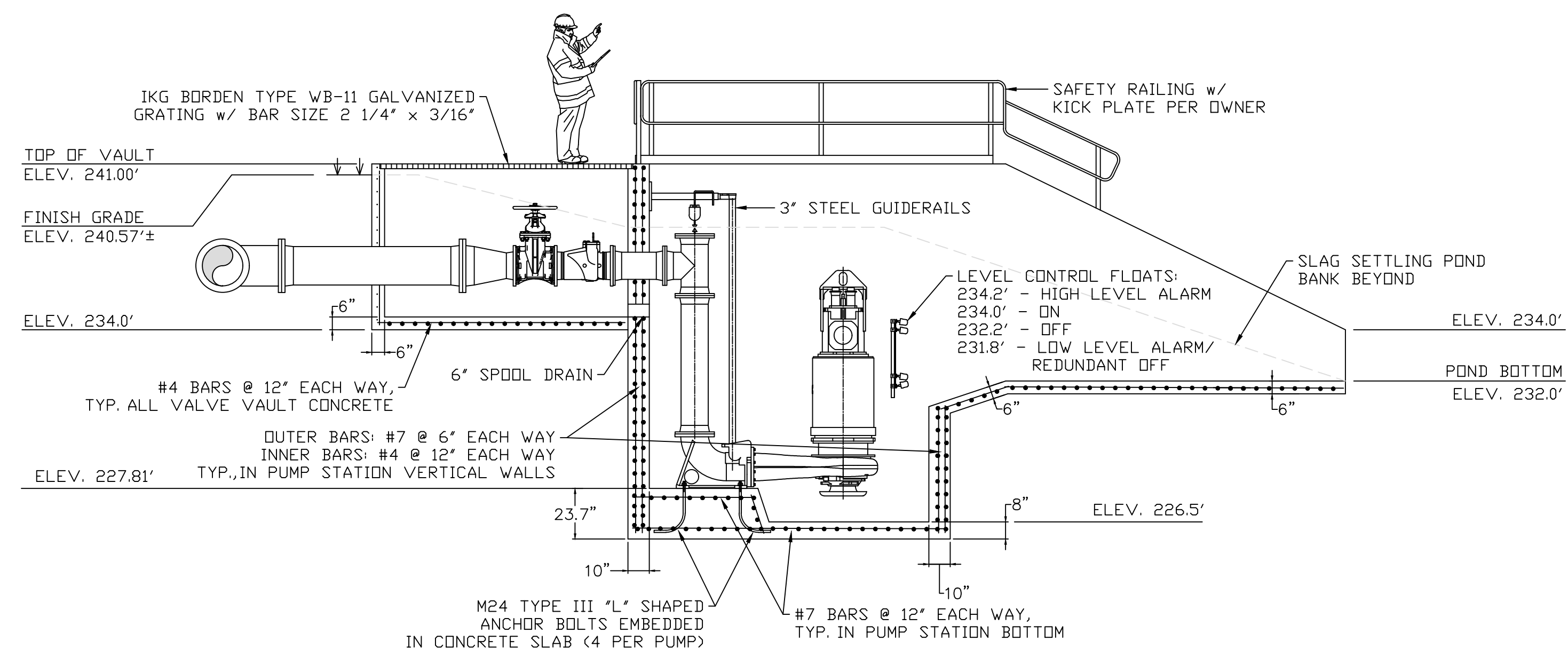
SETTLING POND - SITE PLAN

SCALE: 1" = 50'



PUMP STATION PLAN

SCALE: 1/4" = 1'



SECTION

SCALE: 1/4" = 1'

Harbor
5800 Evergreen Drive
Little Rock, AR 72205
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Fax (501) 588-0123
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EXPLORATORY VENTURES, LLC
STEEL MANUFACTURING COMPLEX

OSCEOLA

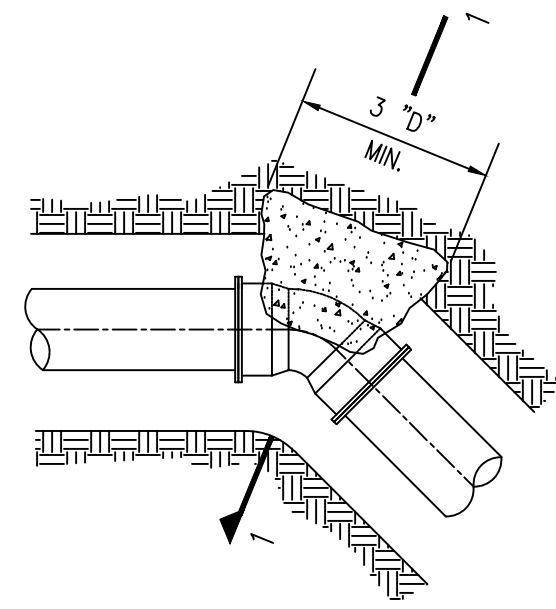
NO	REVISION DESCRIPTION	DATE
0	INITIAL ISSUANCE FOR PERMIT REVIEW	09-06-2022
1	GENERAL REVISIONS	10-18-2022

Drawn By: **AHR** Date: **09-06-2022**
Checked By: **CJM** Scale: **NOTED**

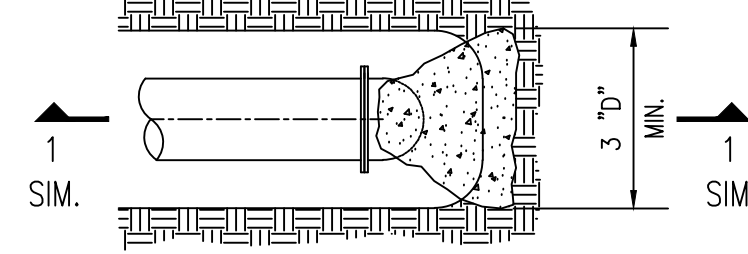
Project Number: **BRST-21723**

C303

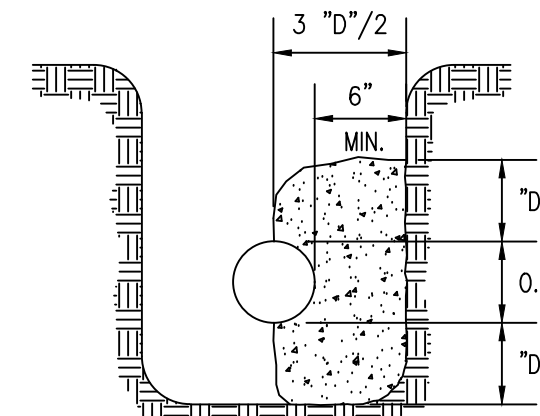
SETTLING POND, PUMP STATION, METER/SAMPLING STATION



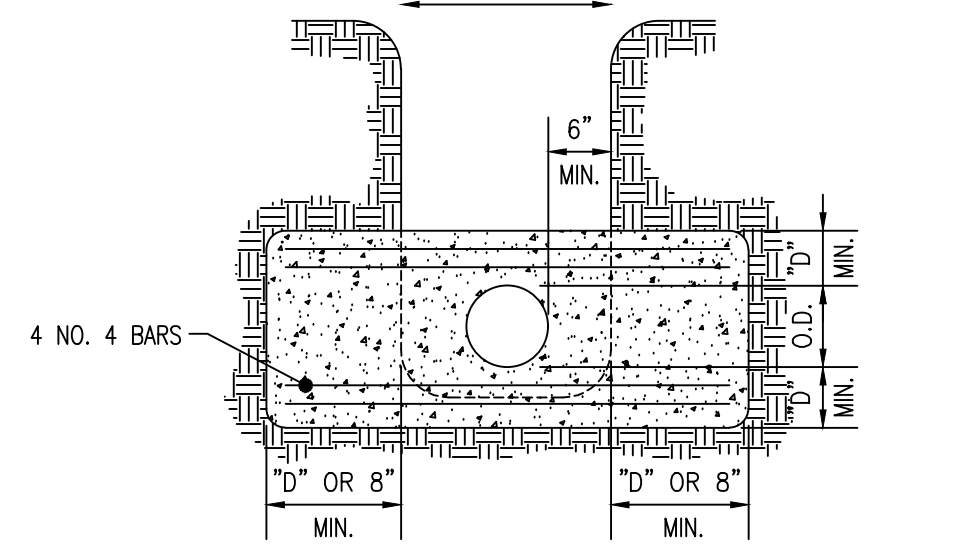
PLAN - 45° HORIZONTAL BEND THRUST BLOCKING



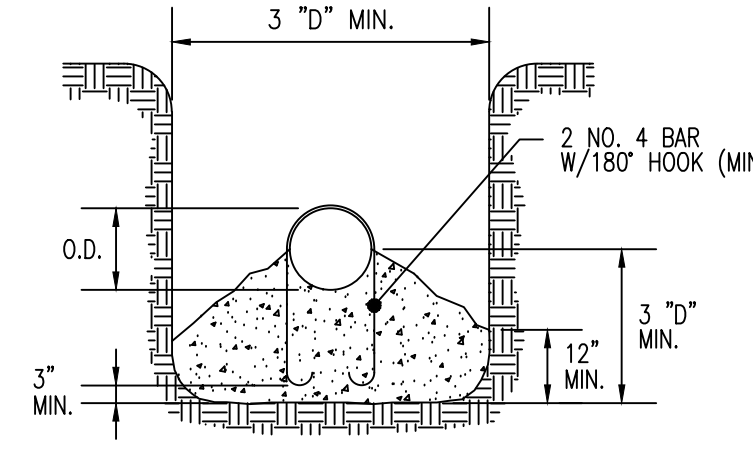
PLAN - DEAD END OR PLUG



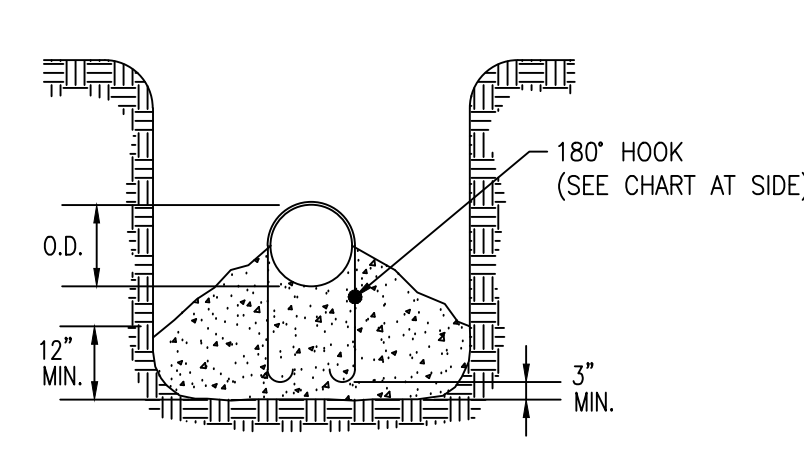
SECTION 1-1



SECTION 2-2

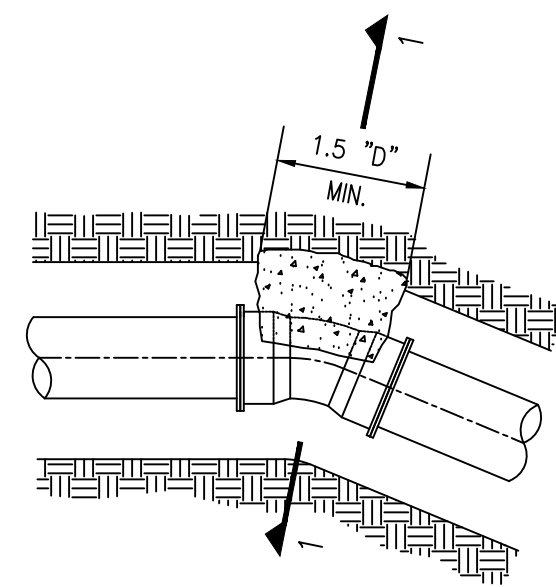


SECTION 3-3

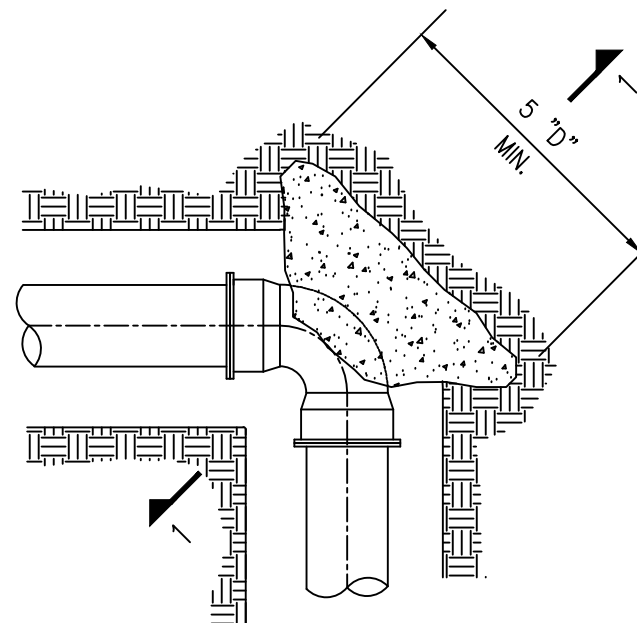


SECTION 4-4

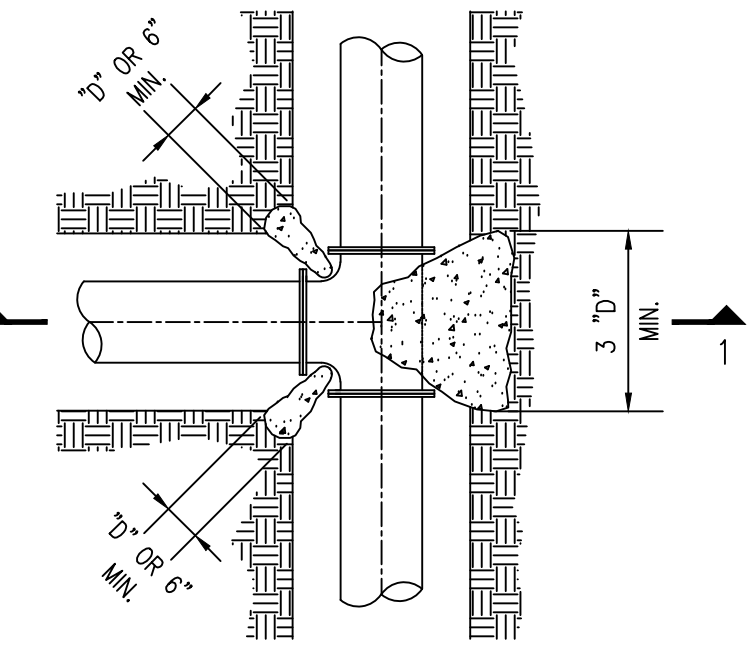
VOLUME & SIZES REQ'D FOR VERTICAL OVERBENDS											
90°			45°			22 1/2°			11 3/4°		
"V" CU. YDS	"B.A." SQ. FT.	REIN. RODS	"V" CU. YDS	"B.A." SQ. FT.	REIN. RODS	"V" CU. YDS	"B.A." SQ. FT.	REIN. RODS	"V" CU. YDS	"B.A." SQ. FT.	REIN. RODS
11/2	4	2#4	1	2	1#4	1/2	1	1#4	1/4	1	1#4
3	6	4#4	2	4	2#4	1	2	1#4	1/2	1	1#4
5	10	5#4	3	6	3#4	11/2	3	1#5	3/4	2	1#4
7	14	5#5	4	8	4#5	2	4	2#4	1	2	1#4



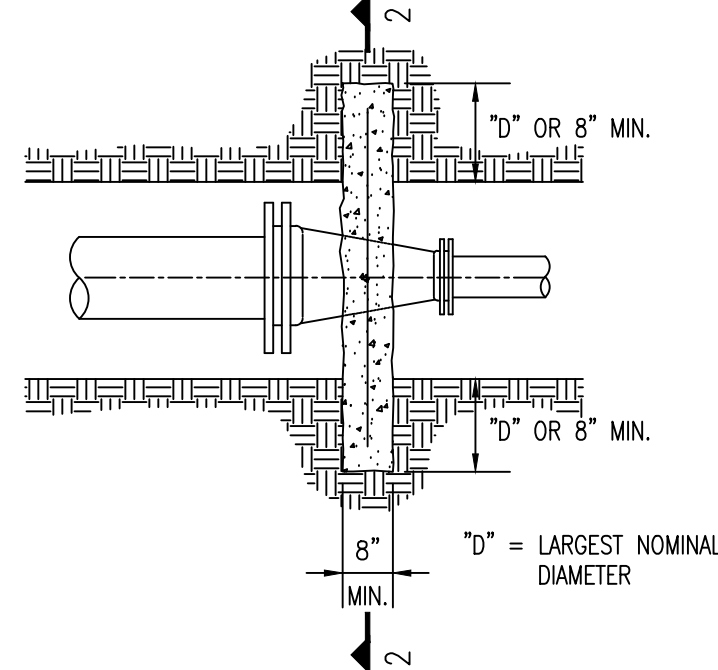
PLAN - 11.25° - 22.5° HORIZONTAL BEND THRUST BLOCKING



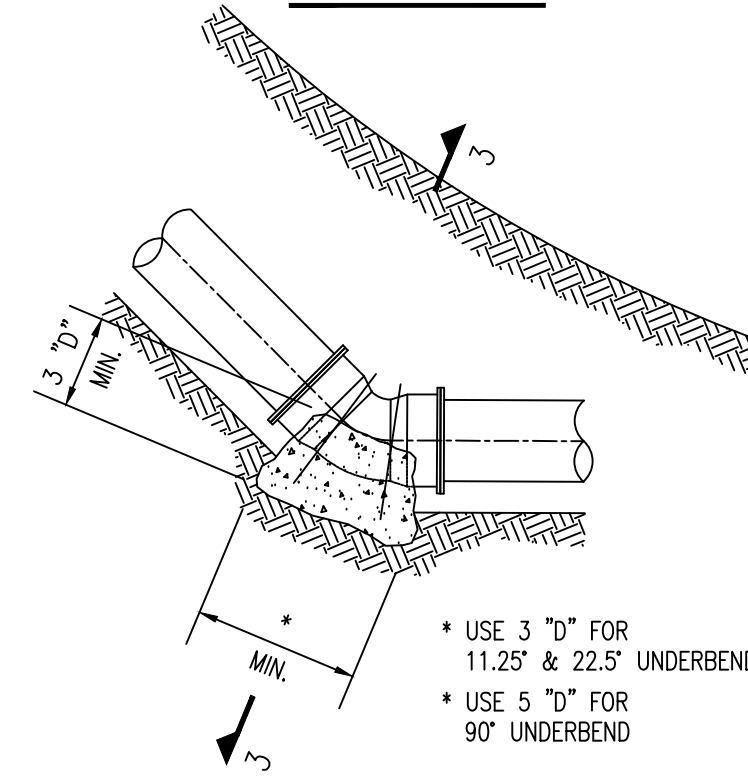
PLAN - 90° HORIZONTAL BEND THRUST BLOCKING



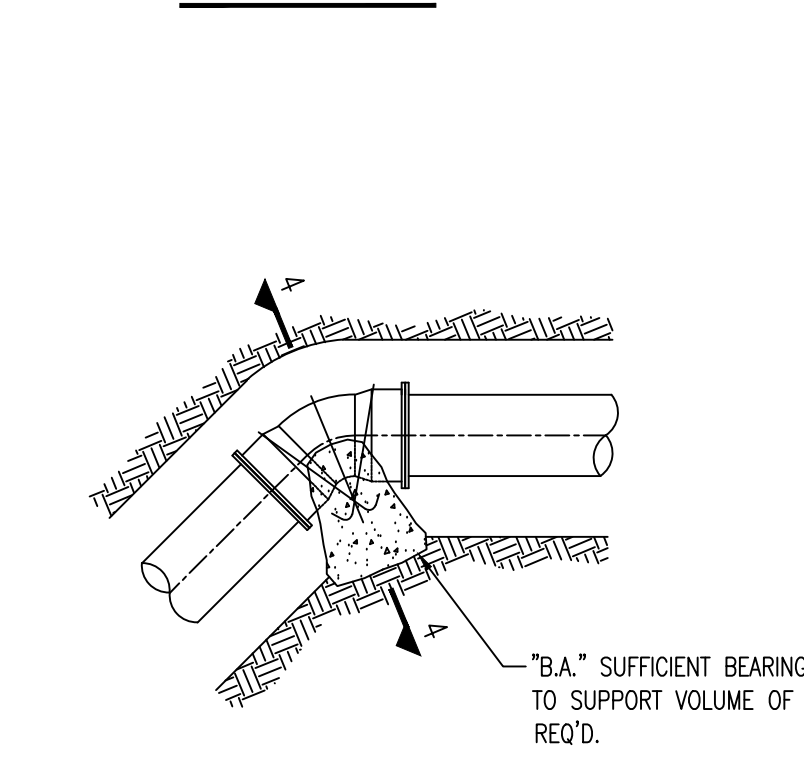
PLAN - TEE HORIZONTAL THRUST BLOCKING



PLAN - REDUCER THRUST BLOCKING



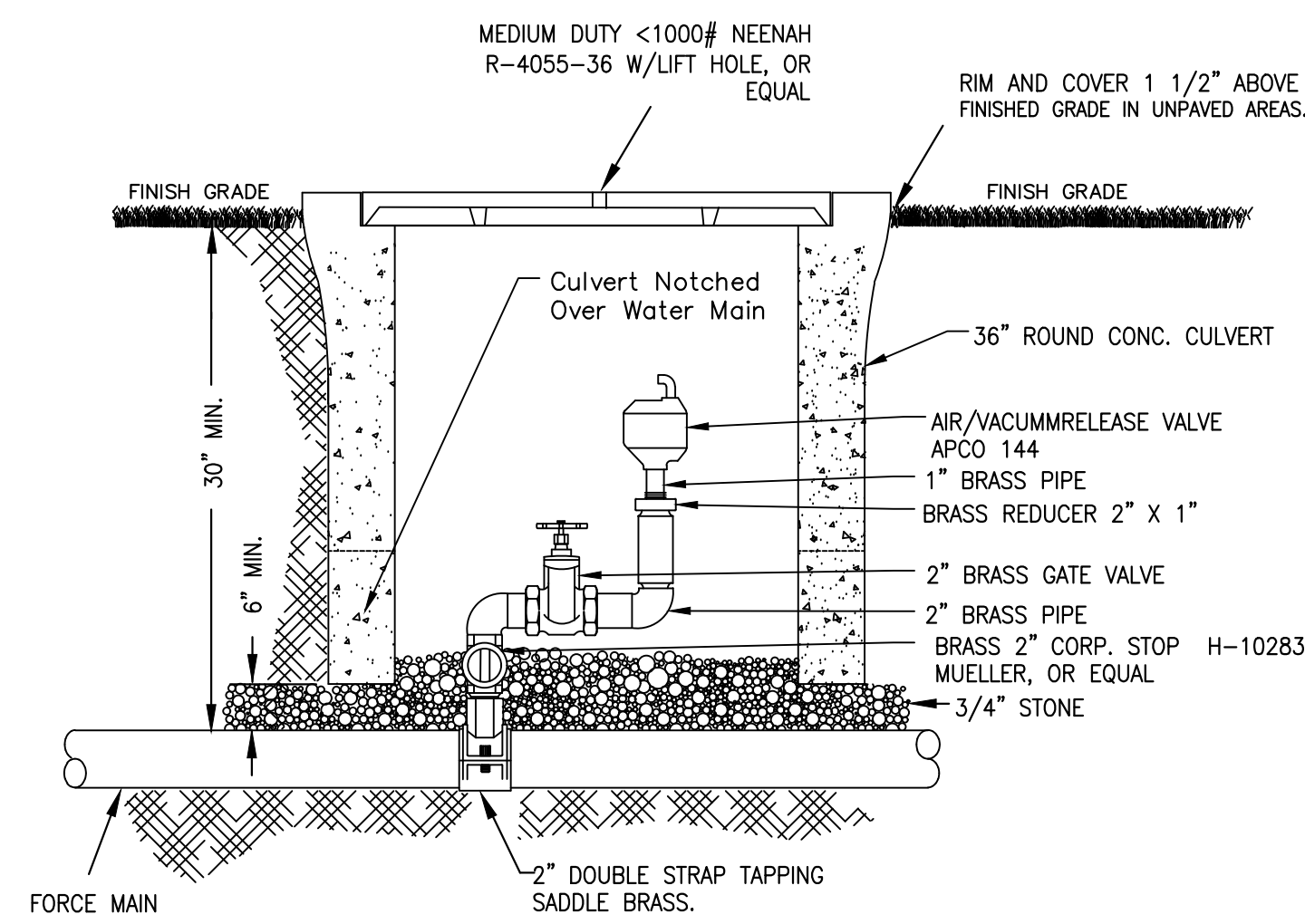
ELEV. - VERTICAL UNDERBEND THRUST BLOCKING



ELEV. - VERTICAL OVERBEND THRUST BLOCKING

STANDARD MASS CONCRETE THRUST BLOCKING FOR ALL PRESSURE PIPE

SCALE: N.T.S.

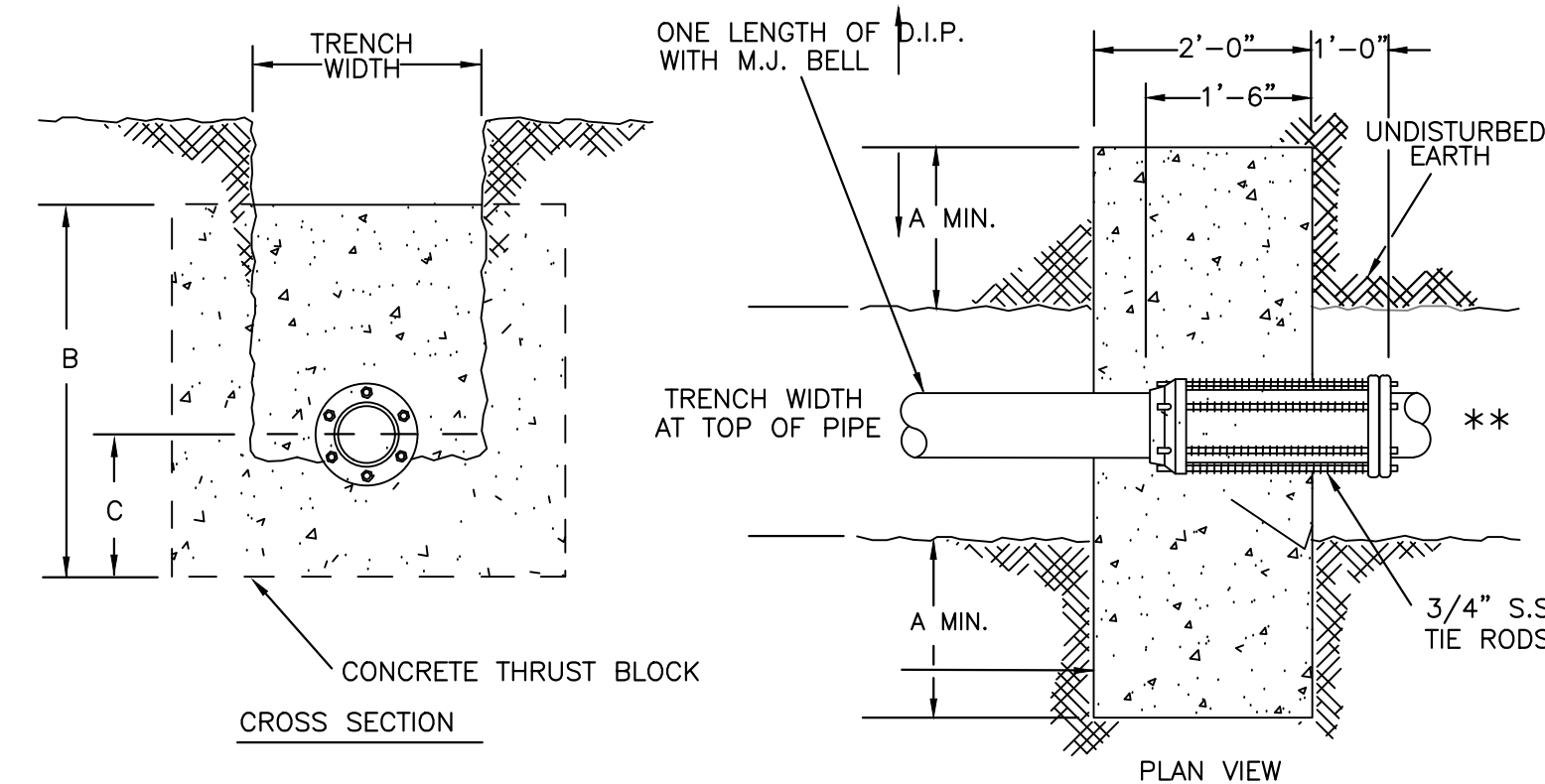


AIR RELEASE VALVE DETAIL

SCALE: N.T.S.

PIPE DIAMETER	A	B	C	NO. OF TIE RODS REQUIRED
4"	9"	36"	18"	2
6"	12"	36"	18"	2
8"	12"	36"	18"	2
10"	12"	36"	18"	2
12"	18"	36"	18"	2
16"	18"	48"	24"	4
18"	18"	48"	24"	4

DESIGN ENGINEER SHALL VERIFY ABOVE DIMENSIONS AND THE NUMBER OF TIE RODS.



THRUST BLOCK DETAIL FOR LINE TERMINUS



DATE:
09-06-2022
10-18-2022

REVISION DESCRIPTION
0 INITIAL ISSUANCE FOR PERMIT REVIEW
1 GENERAL REVISIONS

Drawn By: AHR Date: 09-06-2022

Checked By: CJM Scale: NOTED

Project Number: BRST-22172

ACID REGEN FACILITY

ACID REGEN AREA

CARBON PLANT
12 ACRES

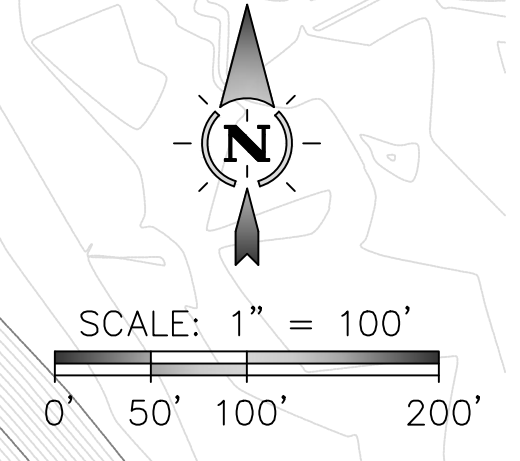
WASTE
WATER
TREATMENT

STA. 194+98 MAIN C
1-CONNECT TO PUMP DISCHARGE

MAIN C - 18" HDPE DR-11, DIPS FORCE MAIN

EXIST. HAUL ROAD

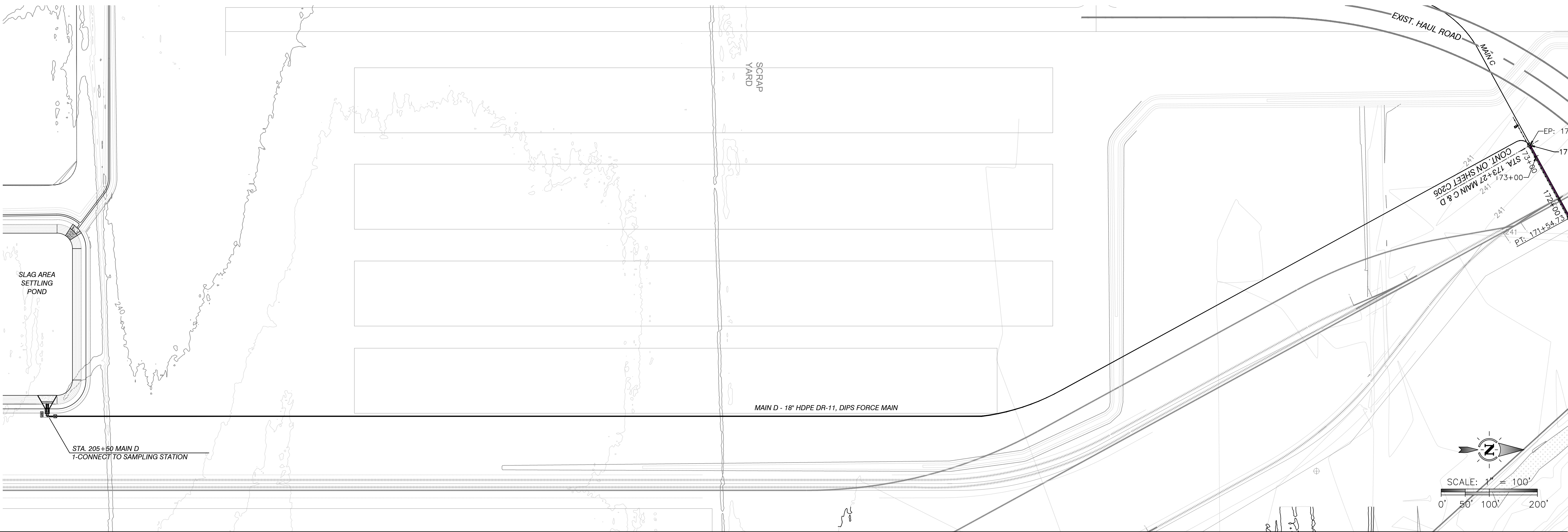
MAIN D - 18" HDPE DR-11, DIPS FORCE MAIN



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 www.harbo renv.com

ARKANSAS
 REGISTERED
 PROFESSIONAL
 ENGINEER
 No. 10482
 ANDREW H. RICE

MAIN C STATION 173+27 TO 194+98



MAIN D STATION 173+27 TO 205+50

EXPLORATORY VENTURES, LLC STEEL MANUFACTURING COMPLEX

NO.	REVISION DESCRIPTION	DATE
0	INITIAL ISSUANCE FOR PERMIT REVIEW	09-06-2022
1	GENERAL REVISIONS	10-18-2022

Drawn By: **AHR** Date: **09-06-2022**
 Checked By: **CJM** Scale: **1" = 100'**
 Project Number: **BRST-22172**

C305

End of Wastewater Permit Application