

ADDENDUM NO. 2
NEWPORT TRANSFER STATION EXPANSION
CARTERET COUNTY, NORTH CAROLINA

TO: All Pre-Bid Meeting Attendees

FROM: LaBella Associates
400 South Tryon Street, Suite 1300
Charlotte, NC 28285

SUBJECT: **ADDENDUM NO. 2.** Dated Wednesday, January 31, 2024, to Construction Documents for the Newport Transfer Station Expansion (REBID), dated December 8, 2023, and amended via Addendum No. 1 on January 19, 2024.

This addendum forms a part of the Contract Documents. **Acknowledge receipt of this addendum with bid submittal. Failure to do so may subject the bidder to disqualification.**

➤ **Comments & Questions Received:**

The following changes, corrections and clarifications have been made to the Contract Documents:

- Q.1 Please reference the opening in the transfer station building on A1101. There appears to be 2 each unlabeled doors drawn at openings on column line 8. Please confirm that these are openings do not have doors.
- A.1 Correct, these are openings and do not have doors.
- Q.2 I have been unable to locate the required PEMB collateral load in spec section 133419. Please provide.
- A.2 Collateral loads to be determined by the PEMB manufacturer. As stated in specification section 133419 paragraph 2.03, B loading to be determined by MBMA "Metal Building Systems Manual". MBMA Table 1.3.1(c) provides typical collateral loading information.
- Q.3 I have an additional questions related to the metal buildings. What do you want the collateral load to be for each building?
- A.3 See answer to question no. 2.
- Q.4 Addendum #1 did NOT address the below Pre-Engineered related question about what collateral load is required for each building. Can we expect to see this clarification provided in the pending Addendum #2? If this is clarification is not provided in Addendum #2, we must assume a collateral load of 5 lbs for each building.
- A.4 See answer to question no. 2.

- Q.5 Reference 133419-11, 2.04, H, 1- you clearly state that in moist environments the Tneme-Zinc 90-97 primer will be 2.5 mils for primary and secondary members, but you also contradict prior statement to prime secondary framing formed from uncoated steel sheet to a minimum dry film thickness of .5 mils on each side. Please tell me what mil thickness primary and secondary members receive?
- A.5 2.5 mil for primary and secondary. See attached revised Specification 133419.
- Q.6 Generator's & ATS's
- Q.6.1 Does the Owner have an order placed for Generators/ATS's....Lead time is now over 12 months for these Items.
- A.6.1 The owner is in the process of ordering the generators and the ATS.
- Q.6.2 Note: 600A Service Entrance Rate ATS is about 12 or so months out after order.
- A.6.2 The owner is in the process of ordering the generators and the ATS.
- Q.6.3 Is the owner or contactor responsible for the startup of the generator's & ATS's?
- A.6.3 The successful bidder shall be responsible for startup and testing.
- Q.6.4 If contractor is responsible who is the manufacture of the equipment?
- A.6.4 See attached specifications (provided as reference) for the two generators and the ATS. Specifications 263213.13 and 263600 are attached to this addendum #2.
- Q.6.5 Is the owner or contactor furnishing the fuel?
- A.6.5 Contractor is responsible for furnishing the fuel. The contractor shall fill the fuel tank after completion of all testing.
- Q.6.6 If contactor is responsible for fuel what are the tank sizes?
- A.6.6 Assume 200 gallons of diesel for the larger generator, and 150 gallons of diesel fuel for the smaller generator.
- Q.7 Reference Page 6 of the Pre-Bid Meeting Minutes (Included in Addendum #1)....Please clarify what authority (Carteret County or USFS) has jurisdiction for issuing the building permits.
- A.7 The Owner has obtained a "Special Use Permit" from the U.S. Department of Agriculture Forest Service (USFS) that permits the construction of the new Transfer Station and various site improvements proposed as part of this bid.

Carteret County has jurisdiction over the issuance of building permits and performance of any required building inspections. The general contractor is responsible for obtaining building permits and inspections required by Carteret County, and any associated fees and expenditure.

- Q.8 As discussed at the Prebid Meeting, and documented on Page 2-Item #3 of the Prebid Meeting Minutes included in Addendum #1, there are numerous required documents that must be submitted with our bid. An extreme amount of time/effort will be required to ACCURATELY fill out the Bid Proposal Form, including the 2 page Unit Price Schedule during the last few hours of Bid day. Estimators will be focused on assembling the most competitive and accurate pricing in the best interest of the Owner. We respectfully ask the Owner to allow submitting the following supplemental required documents (listed per Page 2-Item #3-Prebid Minutes) either at 5 PM on bid day, or reconsider requiring the following list of documents to be submitted post bid by ONLY the apparent low bidder.....
- List of Subcontractors
 - Required bidder qualifications statement with supporting data (AGC 220)
 - Affidavit (Please clarify which affidavit is required)
 - Evidence of Insurance as required in the Supplementary Conditions
 - Resumes of key project personnel with similar experience
- (Bid bond/Performance Bond/Minority Business participation will be provided per standard bid day requirements)
- A.8 The Owner requires the submittal of those documents with the bid on the bid due date and time. As far as the Affidavit is concerned, refer to Section 00430 Affidavit of the Contract Documents.
- Q.9 Reference Addendum #1, Prebid Meeting Minutes- Page 1.....Second paragraph states: "This is mandatory prebid meeting held for the Newport Transfer Expansion Station project"..... Today, (1/24/24) we learned that a General Contractor not listed on the Prebid Meeting sign-in sheet is soliciting bids from Subcontractors for this project. Please confirm that only the GCs attending the 12/13/24 Pre-Bid meeting will be allowed to bid this project!
- Q.9. Attendance at the mandatory pre-bid meeting is a requirement to bid on this project.
- Q.10 Reference spec section 01025 Measurement & Payment, 1.04 C and 2.01. Many of the line items on the bid form are lump sum and state that payment will not be processed until "satisfactory evidence" has been confirmed that all work related to that line item are complete and fully functional. This excludes Bid Item 1, 20, 21, and certain unit price line items. If this is the intent of the contract then there will be tremendous strain on cash flow, and in essence force us to finance the project for the Owner. Certain site related items could be 90% complete and go unbilled for the majority of the project. We may have 1.3 million in pre-engineered metal building materials that are due to the supplier within 20 days from the time materials deliver that could potentially go unbilled to the Owner for 3-4 months. I would suggest allowing us to bill each lump sum line item based on a percent complete basis for work actually performed during a designated pay cycle. We could issue a schedule of values for each lump sum item to bill against to ensure accuracy. Most if not all subcontractors will not be willing to operate without being able to progress invoice for work complete on a monthly basis.
- A.10 The owner will accept billing on a percent complete basis for work completed during a designated pay cycle, i.e., on a monthly basis. To facilitate monthly payment applications, a schedule of values for each lump sum item shall be prepared by the general contractor to support monthly billing. Refer to Article 6 Payment Procedures of Section 00500 EJCDC Standard Form of Agreement between Owner and Contractor On The Basis of A Stipulated Price.

Q.11 Looking through Addendum 1, the trench drain question/answers that are addressed in Addendum #1 are contradicting to each other. Question 36 was asked regarding if the trench drains are cast in place (concrete formed with metal grates) I see that Question 75 also asks about the trench drains and it refers them to be manufactured Zurn Z882 Trench Drains. Which is correct? See below question/answers from Addendum 1.....

A.11 The trenches in the indoor portion of the transfer station will be all cast-in-place concrete. The trenches shall be coated with acid resistant coating as shown on Detail 5 on revised Drawing No. S1603 and Detail No. 13 on revised Drawing No. P2501.

The trenches in the outdoor portion of the transfer station and in the canopy storage building will be the trench drain system (Zurn Model Z882) with steel frame. Grate is to be black acid resistant epoxy coated ductile grate - Class E (minimum).

The two stormwater trenches at the lower bay of the transfer station building (entrance and exit of the bay) shown on the Civil Drawing C-0003 shall be cast-in-place concrete.

Q.12 Looks to me like the ramp and landing should be poured in place. The stair tread can be precast. Without any section details, it would be hard to price. I'm not sure if there is a company that makes ADA compliant precast ramps. This is a tough one.

A.12 See attached revised structural drawings with cast-in-place section details shown on revised Drawing S4100. The bid form and the measurement and payment section were revised to reflect a cast-in-place ramp and stairs.

Q.13 On page S1101 and sheet S1103 The slab is being called out as note S1.3 for varying thickness. However, on the details and slab on grade schedule it does not give us a thickness for the slabs. Can you please confirm the thickness of the SOG 1.3 on these drawings?

A.13 See attached revised structural drawings.

Q.14 One of my pump suppliers is having some issues meeting the desired specifications Please see his notes below. The specifications below are not attainable.

$HP = (GPM)(TDH) / (\text{Pump Efficiency}) 3960$. So, a $399 \times 54 = 21,546$ and if we could find a very efficient pump (say maybe 70% efficient) that would be $.7 \times 3960 = 2,772$. $21,546$ divided by $2,772 = 7.77$ Hp. We cannot supply a 3 Hp pump that will produce 399 GPM @ 54' TDH. Single phase power is only a good power source for up to about 5 Hp. I would also like to note that we typically see small stainless steel pumps for leachate applications.

A.14 The pump requirements for the pump station were re-evaluated and a pump meeting the specifications of Little Giant 620259, Model WS102HAM-12 or equal will be sufficient for this project. This pump must be an automatic pump with a piggyback mechanical float. Note the requirement on the precast concrete wet well for acid resistant coating (Detail A) on revised Drawing No. C-0005.

Q.15 What they sent over says 399 GPM MAX @ 54' TDH MAX, is that what they want the pump(s) to perform at? Or do they have multiple GPM @ TDH's they want this station to perform at? There are two stations, is that for both stations? One is a simplex (one pump) and the other is a duplex (two pumps)?

- A.15 Refer to the previous answer pertaining to the specified pump. Per the aforementioned specified pump, the pump should perform at 190 GPM @ 48' TDH max. The specified pump is for both pump stations and the number of pumps for each pump station is outlined in the contract documents (See Bid Item No. 28 in Section 01025: Measurement and Payment).
- Q.16 Question for Addendum #2 - Water line for civil. Is there a size or material type specified for the water line?
- A.16 Detail G on Drawing No. C-0007 shows the size and material type for the water line. The PVC pipe used for the water line shall be NSF rated for potable water supply.
- Q.17 An issue has come up in my search for the 30,000 Gallon FRP Storage Tank. I have been unable to find a self-supporting above ground FRP tank. They are designed to be buried and supported by the ground. Do you have a manufacture or a specification on it?
- A.17 In place of the 30,000-gallon FRP storage, please provide a 30,000-gallon horizontal steel tank with a bituminous interior coating. Drawing No. C-0005 was revised to show a steel tank. An updated measurement and payment section is also provided.
- Q.18 Please define which retaining walls are cast in place vs the modular block.
- A.18 Cast-in-place retaining wall are clearly shown on structural drawings. Civil Drawing No.C-004 was revised to show bottom and top of wall elevations for the Segmental Block Retaining walls. Additional changes shown on Drawing No. C-0004 include extending the guardrail above a section of the modular block retaining wall.
- Q.19 Please provide top and bottom of wall elevations for the retaining walls.
- A.19 See response to question no. 17.
- Q.20 Clarification needed about waterproofing for this project. There are several details on S1601, S1602 and S1603 that show drain mat but no waterproofing. If waterproofing is required on the foundation retaining walls then please provide Specifications for this requirement.
- A.20 Waterproofing is not required.
- Q.21 Please clarify that ALL Testing required for this Project is to be paid by OWNER.....Per General Conditions 00700-Pg. 39, Article 13.03-B....."OWNER shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests or approvals required by the Contract Documents...." This statement is in conflict with Spec Section 01400, Paragraph 1.02-C which reads: "During placement of structural fill material, the CONTRACTOR is to provide at his own expense a qualified soils technician as needed to ensure placement of structural fill material is in accordance with the Contract Documents. Provide and pay for all tests needed to achieve work of specified quality.
- Also, Spec Section 033000 (Cast-in-Place-Concrete), page 23, Part 3.017-A references testing, but not clear on whether this is paid by OWNER or CONTRACTOR.

A.21 The Owner's testing agency will perform third party testing and inspections as required by the project specifications, local building codes, and NC Department of Environmental Quality (NCDEQ) requirements. The contractor is responsible for their own work and the quality of their own work, which includes hiring a third party geotechnical firm to provide directions and testing during construction for the contractor as part of the construction quality control documentation (CQC). Contractor quality control is part of Line Item No. 5.

Comment received from bidders:

C.1 Reference Addendum #1, Page 13- Question #70..... Apparently, based on another bidder's question about not finding any Precast Structural Concrete.....This GC overlooked the 10" hollow core structural precast slabs noted on Sheet S1104-Transfer Station Building..... This is structural precast which is IN ADDITION to the ADA (architectural) precast ramps required at the Scalehouse, per Sheet S4100.

A.1 No exceptions taken.

➤ **Additional Revisions:**

Revised Specification No. 01025: Measurement & Payment Section was revised to define the payment milestones for the trailer building to match the rest of the PMB.

Additionally, as discussed during the pre-bid meeting, we are currently working with NCDEQ to finalize the conversion of the sediment basin post construction to permanent wet detention ponds. In response to recent comments received from NCDEQ, we will be issuing two new drawings by Monday, February 5, 2024, for the conversion of the sediment basins after conclusion of construction activities.

By:

Mousa Maimoun
LaBella Associates, P.C.

Attachments:

Attachment No. 1: Revised Contract Documents

Revised Section 00300: Bid Form

Attachment No. 2: Revised Specifications

Revised Specification No. 01025: Measurement & Payment Section

Revised Specification No. 133419: Metal Building Systems

Newly added Specification No. 263213.13: Diesel-Engine-Driven Generator Sets

Newly added Specification No. 263600: Transfer Switches

Attachment No. 3: Revised Civil Drawings

Revised Drawing No. C-0004: Grading Plan

Revised Drawing No. C-0005: Wastewater Management Plan

Revised Drawing No. C-0006: General Details

Attachment No. 4: Revised Structural Drawings

Revised Drawing No. S1002: Transfer Station General Schedules
Revised Drawing No. S1103: Transfer Station Lower Level Slab Plan
Revised Drawing No. S1603: Transfer Station Foundation Details
Revised Drawing No. S4100: Scalehouse Foundation Plan

Attachment No. 5: Revised Plumbing Drawings

Revised Drawing No. P1201: Transfer Station Plumbing Plan
Revised Drawing No. P2501: Office & Maintenance Plumbing Schedules and Details
Revised Drawing No. P3201: Canopy Storage Plumbing Plan

Attachment No. 1: Revised Contract Documents

Revised Section 00300: Bid Form

**SECTION 00300
BID FORM**

PROJECT IDENTIFICATION:

Newport Transfer Station Expansion
Carteret County, North Carolina

THIS BID IS SUBMITTED TO:

**Coastal Regional Solid Waste Management Authority
Attn: Bobby Darden, Executive Director
7400 Old Highway 70 West
New Bern, North Carolina 28562**

1.01 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with OWNER in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

2.01 Bidder accepts all of the terms and conditions of the Advertisement or Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. The Bid will remain subject to acceptance for 90 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of OWNER. Bidder will sign and deliver the required number of counterparts of the Agreement with the Bonds and other documents required by the Bidding Requirements at the pre-construction meeting to be scheduled within ten (20) business days after the date of OWNER's Notice of Award.

3.01 In submitting this Bid, Bidder represents, as set forth in the Agreement, that:

A. Bidder has examined and carefully studied the Bidding Documents, the other related data identified in the Bidding Documents, and the following Addenda, receipt of all, which is hereby acknowledged.

<u>Addendum No.</u>	<u>Addendum Date</u>
_____	_____
_____	_____
_____	_____

B. Bidder has visited the Site and become familiar with and is satisfied as to the general, local and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress and performance of the Work.

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or

subsurface structures at or contiguous to the Site, which have been identified in the Supplementary Conditions as provided in paragraph 4.02 of the General Conditions; and (2) reports and drawings of a Hazardous Environmental Condition, if any, which has been identified in the Supplementary Conditions as provided in paragraph 4.06 of the General Conditions.

E. Bidder has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder, and safety precautions and programs incident thereto.

F. Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.

G. Bidder is aware of the general nature of work to be performed by OWNER and others at the Site that relates to the Work as indicated in the Bidding Documents.

H. Bidder has correlated the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents.

I. Bidder has given ENGINEER written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by ENGINEER is acceptable to Bidder.

J. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

4.01 Bidder further represents that this Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any individual or entity to refrain from bidding; and Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over OWNER.

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price as totaled from the attached Unit Price Schedule:

Newport Transfer Station Expansion - BID PRICE:

Items No. 1-36 (written out)

(\$ _____)
(figures)

The contract price has been completed in accordance with paragraph 11.03.B of the General Conditions.

Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Work will be based on actual quantities provided, determined as provided in the Contract Documents.

6.01 Bidder agrees that the Newport Transfer Station Expansion work will be substantially complete as provided in paragraph 2.03 of the General Conditions, and completed and ready for final payment in accordance with paragraph 14.07.B of the General Conditions within 30 calendar days after the date of Substantial completion. Bidder further agrees that final record documents will be submitted to the ENGINEER no later than the time of final pay application.

6.02 Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work within the times specified above, which shall be stated in the Agreement.

7.01 The following documents are attached to and made a condition of this Bid:

- A. Required Bid security in the form of 5% of the maximum bid price;
- B. A tabulation of Subcontractors required to be identified in this Bid (on the form attached to this Bid document);
- C. Project superintendent qualifications statement with supporting data; and
- D. Affidavit (form attached to this Bid document).

8.01 The terms used in this Bid with initial capital letters have the meanings indicated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

9.01 The BIDDER certifies that he has not combined, conspired or agreed to intentionally rig, alter or otherwise manipulate, or to cause to be rigged, altered, or otherwise manipulated this bid for the purpose of allocating purchases or sales to or among persons, raising or otherwise fixing the prices of the goods or services, or excluding other persons from dealing with the OWNER.

SUBMITTED on _____, 20_____.

State Contractor License No. _____ (If applicable)

Bidder is:

An Individual

Name (typed or printed): _____

By: _____ (SEAL)

(Individual's signature)

Doing business as: _____

Business address: _____

Phone No.: _____ Fax No.: _____

A Partnership

Partnership Name: _____ (SEAL)

By: _____

(Signature of general partner -- attach evidence of authority to sign)

The business is a partnership consisting of individual partners whose full names are as follows:

Name (typed or printed): _____

Business address: _____

Phone No.: _____ Fax No.: _____

A Corporation

Corporation Name: _____ (SEAL)

State of Incorporation: _____

Type (General Business, Professional, Service, Limited Liability): _____

By: _____

(Signature – attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

(CORPORATE SEAL)

Attest _____

(Signature of Corporate Secretary)

Business address: _____

Phone No.: _____ Fax No.: _____

Date of Qualification to do business is _____.

A Joint Venture

Joint Venturer Name: _____ (SEAL)

By: _____
(Signature of joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Business address: _____

Phone No.: _____ Fax No.: _____

Joint Venturer Name: _____ (SEAL)

By: _____
(Signature of joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Business address: _____

Phone No.: _____ Fax No.: _____

Phone and Fax Number, and Address for receipt of official communications:

(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.)

CONTRACTOR: _____ DATE: _____

**UNIT PRICE SCHEDULE
NEWPORT TRANSFER STATION EXPANSION**

ITEM NO.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE (\$)	TOTAL ESTIMATED PRICE
1.	Mobilization and Demobilization	Lump Sum	1		
2.	Site Preparation	Lump Sum	1		
3.	Demolition and Removal of Structures	Lump Sum	1		
4.	Field Engineering and Survey	Lump Sum	1		
5.	Construction Quality Control	Lump Sum	1		
6.	Record Documents	Lump Sum	1		
7.	Asphalt Pavement Removal	Lump Sum	1		
8.	Earthwork - Unsuitable Materials	Cubic Yards	5,000		
9.	Classified Earthwork - (Cut/Structural Fill):	Lump Sum	1		
10.	Backfill and Placement of Cover Soils	Cubic Yards	1,000		
11.	Gravel Surface Areas	Lump Sum	1		
12.	Asphalt Paving	Lump Sum	1		
13.	Concrete Paving	Lump Sum	1		
14.	Guardrails	Lump Sum	1		
15.	Signage and Pavement Marking	Lump Sum	1		
16.	Concrete Retaining Walls	Lump Sum	1		
17.	Segmental Block Retaining Walls	Lump Sum	1		
18.	Bollards	Each	30		
19.	Concrete Slabs	Lump Sum	1		
20.	13,000 SF Transfer Station Building	Lump Sum	1		
21.	16,000 SF Covered Canopy	Lump Sum	1		

CONTRACTOR: _____ DATE: _____

22.	3,500 SF Office/Maintenance Building	Lump Sum	1		
23.	325 SF Scalehouse	Lump Sum	1		
24.	Cast-in-place Concrete Handicap Ramp, Ramp Handrails, and Cast-in-place Concrete Steps	Lump Sum	1		
25.	Parking Bumpers (Painted Yellow)	Each	4		
26.	Potable Water Well and Potable Water Conveyance	Lump Sum	1		
27.	Holding Tanks and Sanitary Sewer	Lump Sum	1		
28.	Leachate Storage Tank and Wastewater Collection and Conveyance	Lump Sum	1		
29.	Site Electrical Expansion/Relocation of Utilities	Lump Sum	1		
30.	Erosion and Sediment Control	Lump Sum	1		
31.	Underdrain Pipes	Lump Sum	1		
32.A.	Stormwater Management System	Lump Sum	1		
32.B.	Sediment Basins Cleanup & Conversion	Lump Sum	1		
33.	Landscaping	Lump Sum	1		
34.	Revegetation and Matting	Lump Sum	1		
35.	Construction Phasing	Lump Sum	1		
36.	Chain link Fence	Lump Sum	1		
Total of Items 1 - 36					

*Measurement Guideline for Unit Price Pay Quantities:
Linear, area, and volume measurements will be verified by survey.*

Attachment No. 2: Revised Specifications

Revised Specification No. 01025: Measurement & Payment Section

Revised Specification No. 133419: Metal Building Systems

Newly added Specification No. 263213.13: Diesel-Engine-Driven Generator Sets

Newly added Specification No. 263600: Transfer Switches

**SECTION 01025
MEASUREMENT AND PAYMENT**

PART 1 GENERAL

1.01 SUMMARY

- A. Measurement and payment criteria applicable to portions of the Work performed under a Lump Sum payment method.
- B. Measurement and payment criteria applicable to portions of the Work performed under a Unit Price payment method.
- C. All Work completed under the Contract will be measured using United States Units of Measurement.
- D. Defect assessment and non-payment for rejected Work.
- E. All items not specifically listed in the Bid Form for which there is no instructions as to where the price shall be included shall be covered by distributing the price within the listed items. No additional payment will be allowed.

1.02 UNIT QUANTITIES SPECIFIED

- A. Quantities and measurements indicated in Section 00300 Unit Price Schedule of the Contract Documents are for bidding and contract purposes only. Quantities and measurements supplied or placed in the Work and verified by ENGINEER shall determine payment.

1.03 MEASUREMENT OF QUANTITIES

- A. Measurement methods delineated in the individual specification sections are intended to complement the criteria of this section.
- B. Take all measurements and compute quantities. ENGINEER will verify measurements and quantities.
- C. Linear measurements shall be measured as shown on the Contract Drawings.
- D. Area computations shall be based upon horizontal (plan) measurements and transverse measurements.
- E. Volume computations shall be based upon the Average End Area Method or other mutually acceptable method.
- F. Tonnage measurements shall be based upon the actual weight of material brought to the site and placed. Tonnage material must be placed according to the dimensions shown on the Contract Drawings.
- G. Bid item quantities designated by "Each" shall be complete functional items as described in the Specifications and shown on the Contract Drawings, and shall be construed to include all necessary fittings, accessories, and appurtenances.

- H. Attach a copy of surveyor's calculations and supporting documentation to applications for payment verifying the total quantity of each completed unit cost work item.

1.04 PAYMENT

- A. "Lump Sum", when used as an item of payment, shall mean complete functioning item for the Work described in the Contract. When a complete structure or structural unit is specified as the unit of measurement the unit shall be construed to include all necessary fittings, accessories, and appurtenances.
- B. "Unit Price", when used as an item of payment, shall mean an agreed-upon price for individual portions, or units, of Work described in the Contract.
- C. Payment for each Lump Sum Price stated in the itemized bid shall constitute full compensation for all required labor, products, tools, equipment, plant, transportation, services, and incidentals; erection, application or installation of an item of the Work required to complete all Work specified under that particular item including cleanup, and all costs for doing related Work as set forth in these Specifications and/or on the Contract Drawings or implied in carrying out their intent. The price bid for each Lump Sum and Unit Price stated in the itemized bid shall be deemed to include an allowance for overhead and profit.
- D. Requests for payment shall be in accordance with the requirements provided within this Project Manual.
- E. No partial payments shall be made for the installation of items which have not been tested and approved.

1.05 DEFECT ASSESSMENT

- A. Replace the Work, or portions of the Work, not conforming to specified requirements.
- B. If, in the opinion of ENGINEER, it is not practical to remove and replace the Work, the ENGINEER will direct one of the following remedies:
 - 1. The defective Work may remain, but the Unit Sum/Price will be adjusted to a new Sum/Price at the discretion of the OWNER.
 - 2. The defective Work will be partially repaired to the instructions of the ENGINEER, and the unit Sum/Price will be adjusted to a new Sum/Price at the discretion of the OWNER.
- C. The individual specification sections may modify these options or may identify a specific formula or percentage Sum/Price reduction.
- D. The authority of the ENGINEER to assess the defect and identify payment adjustment is final.

1.06 NON-PAYMENT FOR REJECTED PRODUCTS

- A. Payment will not be made for any of the following:

1. Products wasted or disposed of in a manner that is not acceptable.
2. Products determined as unacceptable before or after placement.
3. Products not completely unloaded from the transporting vehicle.
4. Products placed beyond the lines and levels of the required Work.
5. Products remaining on hand after completion of the Work.
6. Loading, hauling and disposing of rejected Products.

PART 2 PROCEDURE

2.01 CONTRACT ITEMS

- A. The following are more detailed descriptions of payment items as listed on the Base Bid Form. The Bidder shall complete Section 00300 Unit Price Schedule for the Newport Transfer Station Expansion project. The project will be awarded to one (1) CONTRACTOR. The work includes, but is not necessarily limited to, what is described below.

Bid Item 1 – Mobilization and Demobilization:

The Lump Sum Price bid for this item shall be full compensation for mobilization and demobilization of all labor, equipment and material to the site, as well as CONTRACTOR-provided utilities and ongoing related expenses, considered normal for administration of the Work. , This item also includes, but not limited to: establishment of field office for the CONTRACTOR and ENGINEER; establishment of shops and plants; provision of sanitary and any other facilities or utilities required by the Specifications and State or Local regulations; moving on and off site all construction equipment, hauling units, mixers, compressors, and tools required to complete the work; establishment of storage yard area; all other work and operations which must be performed prior to beginning work on compensable items of work at the project site; the cost of required insurance and bonds and any other initial expense required by the Owner or the State; removal of any excess materials; development and maintenance of a traffic control plan; removal and proper disposal of all construction related wastes and debris; and restoration of all disturbed areas. Surface preparation outside the Limits of Work (as shown on the Contract Drawings), required by the CONTRACTOR for staging areas and parking areas will be paid as part of this item. 25 percent (25%) of the Lump Sum price bid will be paid with the first payment request following satisfactory evidence of mobilization of sufficient labor, equipment, and material to adequately progress the Work of this contract. 25 percent (25%) of the Lump Sum Price bid will be paid with the payment request subsequent to the payment request in which the initial payment for this item is made. 50 percent (50%) of the Lump Sum Price bid will be paid with the Final Payment request. The Lump Sum price bid for this item shall not exceed five (5) percent (5%) of the Total Base Bid.

Bid Item 2 – Site Preparation:

The Lump Sum Price bid for this item shall be payment in full for all materials, labor, and equipment required for installing initial/temporary erosion and sediment control measures (e.g., silt fences, inlet and outlet protections, berms, rock check dams, temporary seeding, etc.), clearing and grubbing, removal of land clearing debris, and stockpiling of topsoil in a location suitable for the CONTRACTOR. Included in this bid item are incidentals such as, loading, hauling, stockpiling, land clearing debris disposal, installation of erosion and sediment control features, construction of containment berms

as required by the Contract Drawings and Specifications. No additional allowances shall be permitted for clearing beyond the limits set forth by the Contract Drawings and Specifications. The Lump Sum Price bid will be paid with the payment request following satisfactory evidence of the removal of all tree stumps, removal of top soil, and installation of initial/temporary erosion and sediment control features. Land clearing debris will be accepted at the OWNER's Tuscarora Long-Term Regional Landfill (TLTRL) at no cost to the CONTRACTOR. The CONTRACTOR must obtain approval from the OWNER prior to hauling land clearing debris to the TLTRL. The CONTRACTOR is responsible for hauling land clearing debris from the Newport Transfer Station to the TLTRL located at 7400 Old US Hwy 70 W, New Bern, NC 28562.

Bid Item 3 – Demolition and Removal of Structures:

The Lump Sum Price bid for this item shall be payment in full for all materials, labor, and equipment required for demolition of existing site structures, including but is not limited to building, roads, tanks, etc., and removal of demolition debris, and proper disposal of the debris in accordance with Federal and State laws and regulations. Included in this bid item are incidentals such as, coordinating utilities removals, loading, hauling, demolition debris disposal, and site restoration. The Lump Sum Price bid will be paid with the payment request following satisfactory evidence of the removal of the existing structures. Demolition waste disposal at CRSWMA's TLTRL will be at no cost to the Contractor. The Contractor is required to stop at the landfill's scale for weighing and instructions for disposal. The CONTRACTOR is responsible for hauling land clearing debris from the Newport Transfer Station to the TLTRL located at 7400 Old US Hwy 70 W, New Bern, NC 28562.

Bid Item 4 – Field Engineering and Survey:

The Lump Sum Price bid for this item shall be payment for Field Engineering the CONTRACTOR conducts at the site including field engineering and surveying needed to accomplish the work. Survey of the construction area existing conditions prior to commencing construction activities shall be included. Ground elevations shall be surveyed and staked.

Bid Item 5 – Construction Quality Control:

The Lump Sum Price bid for this item shall be payment in full for all materials, labor, and equipment required to provide and install the new work in accordance with Section 01400. This will include, but not limited to, suppliers, manufacturers, products, services, site conditions, and workmanship.

Bid Item 6 – Record Documents:

The Lump Sum Price bid for this item shall be payment in full for all materials and labor to provide record drawings in accordance with Contract Drawings and Specifications. Record documents shall be prepared in accordance with Section 01720. The Lump Sum Price bid will be paid upon review and acceptance by the ENGINEER. In addition, included in this bid item is the monthly construction progress documentation required in Section 01725.

Bid Item 7 – Asphalt Pavement Removal:

The Lump Sum Price bid for this item, based on the Contract Drawings, for pavement removal, shall be payment in full for all materials, labor, and equipment required for the full depth removal of the existing asphalt pavement as shown on the Contract Drawings in areas to be repaved by the CONTRACTOR. Pavement material shall be removed either by milling machine. The removed asphalt will be further processed, if necessary, to produce a 1½” minus material. This processed material will be retained onsite for the OWNER in locations acceptable to the OWNER.

Bid Item 8 – Earthwork – Unsuitable Materials:

The Contract Unit Price per Cubic Yard for this item shall be payment in full for excavation of unsuitable material and backfill prior to structural fill placement. Included in this bid item are incidentals such as excavation, disposal of the excavated material, backfill and proper compaction. The limits of excavation shall be measured once all topsoil and organics and existing structures have been removed (fill areas) or upon reaching subgrade (excavation areas). The use of truck load counts to estimate materials removed or placed will not be accepted as a basis for payment. The limits of the excavation shall be determined by the ENGINEER and agreed by both the CONTRACTOR and OWNER or ENGINEER at the time of excavation. The quantity for this line item will be the in-place volume of unsuitable materials estimated from the limits of excavation. The contingency allowance shall be exercised only with the approval of the ENGINEER and the OWNER.

Bid Item 9 – Classified Earthwork (Cut/Structural Fill):

The Lump Sum Price for this item shall be payment in full for the earthwork required to comply with the Contract Documents and Specifications including all labor, material, equipment, and other incidentals, such as excavation, hauling, placing, spreading, compacting, and watering. Included in this bid item are incidentals such structural fill material hauling from offsite, as well as subgrade proof rolling and compaction.

Bid Item 10 – Backfill and Placement of Cover Soils:

The Contract Unit Price per Cubic Yard for this item shall be payment in full for the placement and compaction of two (2) feet of cover soil over excavated waste from areas of the project located within the pre-regulatory landfill (PRLF). The OWNER will provide cover soil material for the CONTRACTOR at the Tuscarora Long-Term Regional Landfill (TLTRL). The CONTRACTOR will be responsible for hauling the cover soil material from the TLTRL, or any other facility. Cover soil shall be used only to cover waste with 2 feet of soil. The contingency allowance shall be exercised only with the approval of the ENGINEER and the OWNER.

Bid Item 11 – Gravel Surface Areas:

The Lump Sum price bid for this item shall be payment in full for all materials, labor, and equipment required to complete the gravel surface areas to the lines and grades specified on the Contract Drawings. Work includes furnishing hauling, placing, spreading, compacting aggregate base as required to comply with the Contract Drawings and Specifications. Work also includes all material and labor required for the placement of geotextile fabric as required by the Contract Drawings.

Bid Item 12 – Asphalt Paving:

The Lump Sum price bid for this item shall be payment in full for all materials, labor, and equipment required to complete the asphalt paving to the lines and grades specified on the Contract Drawings. Included in this bid item are incidentals such as pavement cuts, hauling, placing, spreading, fine grading the aggregate base, Tensar TX160 Geogrid, compacting pavement shoulders, and paving as required to comply with the Contract Drawings and Specifications.

Bid Item 13 – Concrete Paving:

The Lump Sum price bid for this item, based on the cost per square yard of concrete paving, shall be payment in full for all materials, labor, and equipment required to complete the concrete paving to the lines and grades specified on the Contract Drawings. Included in this bid item are incidentals such as hauling, placing, spreading and fine grading the aggregate base, forming, and pouring, and finishing the concrete paving as required to comply with the Contract Drawings and Specifications for all concrete paving exterior to the Transfer Station building. This Lump Sum bid item includes all rebar and similar reinforcement required to complete the concrete paving.

Bid Item 14 – Guardrail:

The Lump Sum Price bid for this item shall be payment in full all materials, labor, and equipment required to provide and install the W-Beam Guardrail with metal posts. The work and materials shall conform to Contract Drawings and Specifications, and NCDOT Standard Specifications for Road and Structures, Section 862, Guardrail.

Bid Item 15 – Signage and Pavement Markings:

The Lump Sum bid shall be payment in full for all materials, labor, equipment and other incidentals as needed to complete the installation of all signage and pavement markings as shown on the Drawings.

Bid Item 16 – Concrete Retaining Walls:

The Lump Sum price bid for this item shall be payment in full for all materials, labor, and equipment required to complete construction of the concrete retaining walls, including the retaining walls at the exterior of the transfer station building, to the lines and grades specified on the Contract Drawings. Included in this bid item are incidentals such as rebar preparation, forming, pouring, spreading, and finishing, as required to comply with the Contract Drawings and Specifications.

Bid Item 17 – Segmental Block Retaining Walls:

The Lump Sum Price bid for this item shall be payment in full for all materials, labor, and equipment required to construct the segmental block retaining wall in the areas shown on the Contract Drawings. All work shall be performed in accordance with the Contract Drawings and Specifications, and includes but is not limited to, the precast segmental block, geogrid, crushed/washed stone, 4” perforated pipe, foundation, and subgrade preparation. The payment shall be full compensation for the materials and work completed and accepted.

Bid Item 18 – Bollards:

The Contract Unit Price bid for this item shall be payment in full for all materials, labor, and equipment required to provide and install 30 bollards at locations shown on the Contract Drawings including procurement, shipping, unloading, concrete, installation, and painting. The payment shall be full compensation for the materials and work completed and accepted.

Bid Item 19 – Concrete Slabs:

The Lump Sum Price bid for this item shall be payment in full for all materials, labor, and equipment required to construct the concrete slabs and pads in the areas shown on the Contract Drawings. All work shall be performed in accordance with the Contract Drawings and Specifications, and includes the concrete, reinforcing, macadam base course, and subgrade preparation. The payment shall be full compensation for the materials and work completed and accepted.

Bid Item 20 – 13,000 SF Transfer Station Building:

The Lump Sum price bid for this item shall be payment in full for all materials, labor, and equipment required to provide and install the 100' x 130' pre-engineered metal building (PEMB) including but not limited to, procurement, shipping, unloading, and PEMB installation. This work also includes constructing/installing all reinforced concrete slabs (including the EucoFloor 404 topped tipping floor), walls and foundations, interior and exterior lighting, electrical, mechanical, steel, waste deflectors, interior and exterior bollards, wastewater collection and removal piping (including wastewater trench drains), stormwater trench drains, interior electrical equipment, fire control equipment (e.g., hose reels and fire extinguishers) in order to comply with the Contract Drawings and Specifications. This Lump Sum bid item will include all doors, hardware, and other appurtenances associated with the transfer station building. Twenty-five percent (25%) of this line item will be paid upon completion of the building foundation. Fifty percent (50%) of this line item will be paid upon erection of the PEMB. Twenty-five percent (25%) of this line item will be retained until the building is completely functional.

Bid Item 21 – 16,000 SF Covered Canopy:

The Lump Sum price bid for this item shall be payment in full for all materials, labor, and equipment required to provide and install the 100' x 160' pre-engineered covered canopy including but not limited to, procurement, shipping, unloading, and canopy installation. This work also includes constructing/installing all reinforced concrete slabs, foundations, interior and exterior lighting, electrical, mechanical, steel, columns, exterior bollards, wastewater collection and removal piping (including wastewater trench drains), fire control equipment (e.g., hose reels and fire extinguishers) in order to comply with the Contract Drawings and Specifications. This Lump Sum bid item will include all hardware and other appurtenances associated with the covered canopy. Twenty-five percent (25%) of this line item will be paid upon completion of the building foundation. Fifty percent (50%) of this line item will be paid upon erection of the pre-engineered covered canopy. Twenty-five percent (25%) of this line item will be retained until the building is completely functional.

Bid Item 22 – 3,500 SF Office/Maintenance Building:

The Lump Sum Price bid for this item shall be payment in full for all materials, labor, and equipment required to provide and install the 70' x 50' PEMB including, but not limited to, procurement, shipping, unloading, reinforced concrete slab construction, and PEMB installation. The building shall be complete with all electrical, plumbing, telephone, and mechanical items, utility connections, doors, hardware, and all appurtenances as shown on the Contract Drawings and Specifications. This item also includes arranging for all building inspections as required by local codes. The payment shall be full compensation for the materials and work completed and accepted, and satisfactory proof of all required inspections. Twenty-five percent (25%) of this line item will be paid upon completion of the building foundation. Fifty percent (50%) of this line item will be paid upon erection of the pre-engineered PEMB. Twenty-five percent (25%) of this line item will be retained until the building is completely functional.

Bid Item 23 – 325 SF Scalehouse:

The Lump Sum price bid for this item shall be payment in full for all materials, labor, and equipment required to complete the construction of an approximately 11' x 29.5' building including all reinforced concrete slabs, walls and foundations, interior and exterior lighting, electrical, mechanical, plumbing, and building finishes. This item also includes arranging for all building inspections as required by local codes. The payment shall be full compensation for the materials and work completed and accepted and satisfactory proof of all required inspections.

Bid Item 24 – Cast-in-place Concrete Handicap Ramp, Ramp Handrails, and Concrete Steps:

The Lump Sum Price bid for this item shall be payment in full for all materials, labor, and equipment required to provide and install the cast in-place concrete handicap ramp, ramp handrails, and concrete steps for the scalehouse (Bid Item 23) as shown on the Contract Documents including, but not limited to, procurement, shipping, unloading, installation, and painting. The ramp, ramp handrails, and steps shall be complete with all appurtenances as shown on the Contract Drawings and Specifications. This item also includes arranging for all building inspections as required by local codes. The payment shall be full compensation for the materials and work completed and accepted, and satisfactory proof of all required inspections.

Bid Item 25 – Parking Bumpers (Painted Yellow):

The Contract Unit Price bid for this item shall be payment in full for all materials, labor, and equipment required to provide and install four (4) parking bumpers at the locations shown on the Contract Drawings, including procurement, shipping, unloading, installation, and painting. This item includes the parking spot markings. The payment shall be full compensation for the materials and work completed and accepted.

Bid Item 26 – Potable Water Well and Potable Water Conveyance:

The Lump Sum Price bid for this item shall be payment in full for drilling and installation of water supply well and installing the associated water conveyance pipes, fittings, and appurtenances including all labor, materials and permits necessary to complete the work. This item also includes connecting the new potable water supply system to the

existing transfer station building. The well shall be a minimum of six (6) inches in diameter furnished with steel casing, submersible pump, and a metal shed. The yield of the well should be a minimum of 3,000 gallons per day (GPD) and the pump should have a minimum flowrate of 40 gallons per minute (GPM). Well drilling and installation shall be in accordance with North Carolina Department of Environmental Quality (NCDEQ) rules for domestic water well requirements and quality. The payment shall be full compensation for permitting, materials and work completed, inspected and accepted.

Bid Item 27 – Holding Tanks and Sanitary Sewer:

The Lump Sum Price for this item shall be payment in full for all materials, labor, and equipment required to provide and install two (2) 2,000 gallon holding tanks at the locations shown on the Contract Drawings. This bid item includes installation of sanitary sewer, cleanouts, associated piping, level indicators, alarms, and connections. The installation includes complete plumbing installations and inspections as required by local codes. The payment shall be full compensation for the materials and work completed and accepted.

Bid Item 28 – Leachate Storage Tank and Wastewater Collection and Conveyance:

The Lump Sum Price for this item shall be payment in full for all materials, labor, and equipment required to provide and install a 30,000 gallon horizontal steel leachate storage tank with a bituminous interior coating at the location shown on the Contract Drawings. This bid item includes installation of wastewater trench drains, wastewater conveyance pipes, pump station, three (3) pumps, pumps electrical panels, cleanouts, associated piping, and connections. The installation includes complete plumbing installations and inspections as required by local codes. The payment shall be full compensation for the materials and work completed and accepted.

Bid Item 29 – Site Electrical Expansion/Relocation of Utilities:

The Lump Sum Price bid for this item shall be payment in full for all materials, labor, and equipment required to provide and install site electrical and lighting and relocate any site utilities in accordance with the Contract Drawings. The installation includes complete electrical installations and inspections required by local State and Federal codes for the transfer station building, office/maintenance building, covered canopy, scalehouse, and general lighting. The payment shall be full compensation for the materials and work completed and inspected.

Bid Item 30 – Erosion and Sediment Control:

The Lump Sum Price bid for this item shall be payment in full for all materials, labor, and equipment required to provide site erosion and sediment control as required by the Contract Drawings and Specification. This item includes, but is not limited to, grading, installing run-on and run-off controls, silt fence, erosion control blankets, constructing berms, constructing sediment basins and sediment trap, inspection and maintenance, and removal of temporary control measures at the completion of the work and restore as necessary and acceptable to the OWNER.

Bid Item 31 – Underdrain Pipes:

The Lump Sum Price bid for this item shall be payment in full for all materials, labor, and equipment required to provide and install two (2) subsurface drain (i.e., underdrain) pipes. Included in this bid item are, but not limited to, perforated pipe, filter fabric, coarse aggregate, and incidentals such as excavation, disposal of the excavated material, backfill and proper compaction. The payment shall be full compensation for the materials and work completed and accepted.

Bid Item 32.A. – Stormwater Management System:

The Lump Sum Price bid for this item shall be payment in full for all materials, labor, and equipment required to provide and install stormwater conveyance and management structures. Included in this bid item are, but not limited to, stormwater conveyance channels, outlet barrel, stormwater culvert piping, anti-seep collars, drop inlets, junction boxes, reinforced concrete end walls, inlet and outlet protection structures, and incidentals such as excavation, disposition of the excavated material, backfill and proper compaction. The payment shall be full compensation for the materials and work completed and accepted.

Bid Item 32.B. – Sediment Basins Cleanup & Conversion:

The Lump Sum Price bid for this item shall be payment in full for all materials, labor, and equipment required to clean the two (2) sediment basins and one (1) sediment trap at the completion of the project, and disposal of sediment material in accordance with state regulations. This item includes the restoration of sediment basins and trap grades shown on Contract Drawings, sediment basin conversion to a stormwater management pond, reseeding, matting, and providing record drawings for each sediment basin and trap.

Bid Item 33 – Landscaping:

The Lump Sum Price bid for this item shall be payment in full for all materials, labor, and equipment required to install the prepared landscaping plan. Work includes furnishing and installing all trees and shrubs in accordance with the prepared Landscaping Plan. This item includes, but not limited, to topsoil procurement, fertilizer and mulch application, temporary watering system installation and one year warranty on the trees and shrubs.

Bid Item 34 – Revegetation and Matting:

The Lump Sum Price bid for this item shall be payment in full for all materials, labor, and equipment required to restore and seed all areas disturbed by construction activities and not covered with asphalt and concrete pavement or aggregate. The work includes permanent seeding and matting of all areas not covered with asphalt in accordance with the Contract Drawings and Specifications. The payment shall be full compensation for the materials and work completed and accepted.

Bid Item 35 – Construction Phasing:

The Lump Sum Price bid for this item shall be payment in full for all materials, labor, and equipment required to phase/sequence the construction of this expansion project in a manner as to prevent disruption of normal site operations. The work includes incorporating traffic control measures, utilizing temporary site access roads, and sequencing construction activities. The payment shall be full compensation for the

materials and work completed and accepted. This line item includes building temporary gravel roads to maintain the existing transfer station traffic during the construction phases of the proposed transfer station.

Bid Item 36 –Chain Link Fence:

The Lump Sum Price bid for this item shall be payment in full for all materials, labor, and equipment required to provide and install a chain link fence as shown on Contract Documents. The work includes procurement and installation of 11-gauge, black plastic-coated chain link fence. The perimeter fence shall be part of the construction record documents. The payment shall be full compensation for the materials and work completed and accepted.

PART 3 EXECUTION

3.01 The CONTRACTOR shall be responsible to make all measurement and calculations to determine volumes and quantities for all applications for payment submittals and final record drawings prepared by a surveyor licensed in the State of North Carolina.

END OF SECTION 01025

**SECTION 133419
METAL BUILDING SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

A. RELATED DOCUMENTS

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Structural-steel framing.
2. Metal roof panels.
3. Metal wall panels.
4. Metal soffit panels.
5. Accessories.

1.03 DEFINITIONS

- A. Terminology Standard: See MBMA's "Metal Building Systems Manual" for definitions of terms for metal building system construction not otherwise defined in this Section or in referenced standards.
- B. Moist Environment: Areas indicated as "Moist Environment" on Drawings or Specifications. Moist environment areas require special finishing.

1.04 SUBMITTALS, GENERAL

- A. General: Submit all action submittals (except Samples for Verification) and informational submittals required by this Section concurrently.

1.05 ACTION SUBMITTALS

- A. Product Data: For each type of metal building system component. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
 1. Structural-steel-framing system.
 2. Metal roof panels.
 3. Metal wall panels.
 4. Metal liner panels.
 5. Insulation and vapor retarder facings.
 6. Flashing and trim.
 7. Accessories.

- B. Shop Drawings: For the following metal building system components. Include plans, elevations, sections, details, and attachments to other work.
1. Anchor-Bolt Plans: Submit anchor-bolt plans and templates before foundation work begins. Include location, diameter, and projection of anchor bolts required to attach metal building to foundation.
 2. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.
 3. Metal Roof and Wall Panel Layout Drawings: Show layouts of metal panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work; show locations of exposed fasteners.
 - 1) Show roof-mounted items.
 - 2) Show wall-mounted items.
- C. Samples for Initial Selection: For units with factory-applied color finish.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of sizes indicated below:
1. Metal Panels: Nominal **12 inches** long by actual panel width. Include fasteners, closures, and other exposed panel accessories.
- E. Delegated-Design Submittal: For metal building systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
1. Column Reactions: Submit all reactions required for final design of foundations for metal building systems not fewer than 14 days prior to beginning of construction of foundation components.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified erector, manufacturer, and professional engineer.
- B. Manufacturer Accreditation: Statement that metal building system and components were designed and produced by a manufacturer accredited according to the International Accreditation Service's AC472.
- C. Welding certificates.
- D. Metal Building System Certificates: For each type of metal building system, from manufacturer.
 1. Letter of Design Certification: Signed and sealed by a qualified professional engineer. Include the following:
 - 1) Name and location of Project.
 - 2) Order number.
 - 3) Name of manufacturer.
 - 4) Name of Contractor.
 - 5) Building dimensions including width, length, height, and roof slope.
 - 6) Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.

- 7) Governing building code and year of edition.
 - 8) Design Loads: Include dead load, roof live load, collateral loads, roof snow load, deflection, wind loads/speeds and exposure, seismic design category or effective peak velocity-related acceleration/peak acceleration, and auxiliary loads (cranes).
 - 9) Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.
 - 10) Building-Use Category: Indicate category of building use and its effect on load importance factors.
- E. Erector Certificates: For each product, from manufacturer.
 - F. Manufacturer Certificates: For each product, from manufacturer.
 - G. Material Test Reports: For each of the following products:
 - 1. Structural steel including chemical and physical properties.
 - 2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 - 3. Tension-control, high-strength, bolt-nut-washer assemblies.
 - 4. Shop primers.
 - 5. Nonshrink grout.
 - H. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for insulation and vapor-retarder facings. Include reports for thermal resistance, fire-test-response characteristics, water-vapor transmission, and water absorption.
 - I. Warranties: Sample of special warranties.

1.07 CLOSEOUT SUBMITTALS

- A. Field quality-control reports.
- B. Maintenance Data: For metal panel finishes to be included in maintenance manuals.
- C. Warranties: Executed special warranties.

1.08 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer and member of MBMA.
 - 1. Accreditation: According to the International Accreditation Service's AC472.
 - 2. Engineering Responsibility: Preparation of comprehensive engineering analysis and Shop Drawings by a professional engineer who is legally qualified to practice in jurisdiction where Project is located.
- B. Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.3, "Structural Welding Code - Sheet Steel."

- D. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings," for design requirements and allowable stresses.
- E. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.
- F. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to metal building systems including, but not limited to, the following:
 - 1) Condition of foundations and other preparatory work performed by other trades.
 - 2) Structural load limitations.
 - 3) Construction schedule. Verify availability of materials and erector's personnel, equipment, and facilities needed to make progress.
 - 4) Required tests, inspections, and certifications.
 - 5) Unfavorable weather and forecasted weather conditions.
 - 2. Review methods and procedures related to metal roof panel assemblies including, but not limited to, the following:
 - 1) Compliance with requirements for purlin and rafter conditions, including flatness and attachment to structural members.
 - 2) Structural limitations of purlins and rafters during and after roofing.
 - 3) Flashings, special roof details, roof drainage, roof penetrations, and condition of other construction that will affect metal roof panels.
 - 4) Temporary protection requirements for metal roof panel assembly during and after installation.
 - 5) Roof observation and repair after metal roof panel installation.
 - 3. Review methods and procedures related to metal wall panel assemblies including, but not limited to, the following:
 - 1) Compliance with requirements for support conditions, including alignment between and attachment to structural members.
 - 2) Structural limitations of girts and columns during and after wall panel installation.
 - 3) Flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
 - 4) Temporary protection requirements for metal wall panel assembly during and after installation.
 - 5) Wall observation and repair after metal wall panel installation.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with

positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

1.010 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when weather conditions permit metal panels to be installed according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements:
 - 1. Established Dimensions for Foundations: Comply with established dimensions on approved anchor-bolt plans, establishing foundation dimensions and proceeding with fabricating structural framing without field measurements. Coordinate anchor-bolt installation to ensure that actual anchorage dimensions correspond to established dimensions.
 - 2. Established Dimensions for Metal Panels: Where field measurements cannot be made without delaying the Work, either establish framing and opening dimensions and proceed with fabricating metal panels without field measurements, or allow for field trimming metal panels. Coordinate construction to ensure that actual building dimensions, locations of structural members, and openings correspond to established dimensions.

1.011 COORDINATION

- A. Coordinate sizes and locations of concrete foundations and casting of anchor-bolt inserts into foundation walls and footings. Concrete, reinforcement, and formwork requirements are specified in Division 03 Section "Cast-in-Place Concrete."
- B. Coordinate metal panel assemblies with flashing, trim, and construction of supports and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.012 WARRANTY

- A. Special Warranty on Metal Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - 1) Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - 2) Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - 3) Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.
- B. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that leak or otherwise fail to remain weathertight within specified warranty period.
 - 1. Warranty Period: 25 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Butler Manufacturing Company; a BlueScope Steel company.
 2. Ceco Building Systems; Division of NCI Building Systems, L.P.
 3. Metallic Building Company; Division of NCI Building Systems, L.P.
 4. Star Building Systems; an NCI company.
 5. VP Buildings; a United Dominion company.

2.02 METAL BUILDING SYSTEMS

- A. Description: Provide a complete, integrated set of mutually dependent components and assemblies that form a metal building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of water into building interior.
1. Provide metal building system of size and with bay spacings, roof slopes, and spans indicated.
- B. Primary-Frame Type:
1. Rigid Clear Span: Solid-member, structural-framing system without interior columns.
- C. End-Wall Framing: Manufacturer's standard, for buildings not required to be expandable, consisting of primary frame, capable of supporting one-half of a bay design load, and end-wall columns.
- D. Secondary-Frame Type: Manufacturer's standard purlins and joists and exterior-framed (bypass) girts.
- E. Roof System: Manufacturer's standard standing seam profile, lap-seam metal roof panels with factory-installed insulation.
- F. Exterior Wall System: Manufacturer's standard roll formed with major and minor corrugations, hidden-fastener metal wall panels with factory-installed insulation.

2.03 METAL BUILDING SYSTEM PERFORMANCE

- A. Delegated Design: Design metal building system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Metal building systems shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to procedures in MBMA's "Metal Building Systems Manual."

1. Design Loads: As indicated on Drawings and in accordance with the North Carolina State and as required by ASCE/SEI 7.
 2. Load Combinations: As required by governing building code. Design to worst-case combination.
 3. Deflection Limits: Design metal building system assemblies to withstand design loads with deflections no greater than the following:
 - 1) Purlins and Rafters: Vertical deflection of 1/240 of the span for total load; 1/360 of the span for live load.
 - 2) Girts: Horizontal deflection of 1/240 of the span.
 - a) Girts Bracing Masonry Walls: 1/600 of the span.
 - 3) Metal Roof Panels: Vertical deflection of 1/240 of the span for total load; 1/360 of the span for live load.
 - 4) Metal Wall Panels: Horizontal deflection of 1/240 of the span.
 - 5) Design secondary-framing system to accommodate deflection of primary framing and construction tolerances, and to maintain clearances at openings.
 4. Drift Limits: Engineer building structure to withstand design loads with drift limits no greater than the following:
 - 1) Lateral Drift: Maximum of 1/400 of the building height.
 5. Metal panel assemblies shall withstand the effects of gravity loads and loads and stresses within limits and under conditions indicated according to ASTM E 1592.
- C. Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- D. Air Infiltration for Metal Roof Panels: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of roof area when tested according to ASTM E 1680 at negative test-pressure difference of 1.57 lbf/sq. ft..
- E. Air Infiltration for Metal Wall Panels: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of wall area when tested according to ASTM E 283 at static-air-pressure difference of 1.57 lbf/sq. ft..
- F. Water Penetration for Metal Roof Panels: No water penetration when tested according to ASTM E 1646 at test-pressure difference of 2.86 lbf/sq. ft..
- G. Water Penetration for Metal Wall Panels: No water penetration when tested according to ASTM E 331 at a wind-load design pressure of not less than 2.86 lbf/sq. ft..
- H. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for Class 60.
- I. Thermal Performance: Provide insulated metal panel assemblies with the following maximum U-factors and minimum R-values for opaque elements when tested according to ASTM C 1363 or ASTM C 518:

1. Insulated Metal Roof Panel Assemblies:
 - 1) U-Factor: U-0.039
 - 2) R-Value: R25 Min.
 2. Insulated Metal Wall Panel Assemblies:
 - 1) U-Factor: U-0.094
 - 2) R-Value: 9.8 Min.
- J. Energy Performance: Provide roof panels that are listed on the DOE's ENERGY STAR Roof Products Qualified Product List for low slope roof products.
- K. Building Environment: Project buildings that are considered "Moist Environment" in their entirety.
1. Transfer Station
 2. Office & Maintenance Building
 3. Trailer Storage

2.04 STRUCTURAL-STEEL FRAMING

- A. Primary Framing: Manufacturer's standard primary-framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafter, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.
1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.
 - 1) Slight variations in span and spacing may be acceptable if necessary to comply with manufacturer's standard, as approved by Architect.
 2. Rigid Clear-Span Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Interior columns are not permitted.
 3. Long-Bay Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Provide interior columns fabricated from round steel pipes or tubes, or shop-welded, built-up steel plates.
 4. Exterior Column Type: Tapered.
 5. Rafter Type: Depth as required by design.
- B. End-Wall Framing: Manufacturer's standard primary end-wall framing fabricated for field-bolted assembly to comply with the following:
1. End-Wall and Corner Columns: I-shaped sections fabricated from structural-steel shapes; shop-welded, built-up steel plates; or C-shaped, cold-formed, structural-steel sheet.
 2. End-Wall Rafters: C-shaped, cold-formed, structural-steel sheet; or I-shaped sections fabricated from shop-welded, built-up steel plates or structural-steel shapes.
- C. Secondary Framing: Manufacturer's standard secondary framing, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Unless otherwise indicated, fabricate

framing from either cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet, prepainted with coil coating, to comply with the following:

1. Purlins: C- or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; minimum **2-1/2-inch**-wide flanges.
 - 1) Depth: As needed to comply with system performance requirements.
 2. Girts: C- or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes. Form ends of Z-sections with stiffening lips angled 40 to 50 degrees from flange, with minimum **2-1/2-inch**-wide flanges.
 - 1) Depth: As required to comply with system performance requirements.
 3. Eave Struts: Unequal-flange, C-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; to provide adequate backup for metal panels.
 4. Flange Bracing: Minimum **2-by-2-by-1/8-inch** structural-steel angles or **1-inch**-diameter, cold-formed structural tubing to stiffen primary-frame flanges.
 5. Sag Bracing: Minimum **1-by-1-by-1/8-inch** structural-steel angles.
 6. Base or Sill Angles: Minimum **3-by-2-inch** zinc-coated (galvanized) steel sheet.
 7. Purlin and Girt Clips: Manufacturer's standard clips fabricated from steel sheet. Provide galvanized clips where clips are connected to galvanized framing members.
 8. Secondary End-Wall Framing: Manufacturer's standard sections fabricated from zinc-coated (galvanized) steel sheet.
 9. Framing for Openings: Channel shapes; fabricated from cold-formed, structural-steel sheet or structural-steel shapes. Frame head and jamb of door openings and head, jamb, and sill of other openings.
 10. Miscellaneous Structural Members: Manufacturer's standard sections fabricated from cold-formed, structural-steel sheet; built-up steel plates; or zinc-coated (galvanized) steel sheet; designed to withstand required loads.
- D. Canopy Framing: Manufacturer's standard structural-framing system, designed to withstand required loads; fabricated from shop-welded, built-up steel plates or structural-steel shapes. Provide frames with attachment plates and splice members, factory drilled for field-bolted assembly.
1. Type: As indicated.
- E. Bracing: Provide adjustable wind bracing as follows:
1. Rods: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade **50**; or ASTM A 529/A 529M, Grade **50**; minimum **1/2-inch**-diameter steel; threaded full length or threaded a minimum of **6 inches** at each end.
 2. Cable: ASTM A 475, **1/4-inch**-diameter, extra-high-strength grade, Class B, zinc-coated, seven-strand steel; with threaded end anchors.
 3. Angles: Fabricated from structural-steel shapes to match primary framing, of size required to withstand design loads.
 4. Rigid Portal Frames: Fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
 5. Fixed-Base Columns: Fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.

6. Diaphragm Action of Metal Panels: Design metal building to resist wind forces through diaphragm action of metal panels.
 7. Bracing: Provide wind bracing using any method specified above, at manufacturer's option.
- F. Bolts: Provide plain-finish bolts for structural-framing components that are primed or finish painted. Provide hot-dip galvanized bolts for structural-framing components that are galvanized.
- G. Materials:
1. W-Shapes: ASTM A 992/A 992M; ASTM A 572/A 572M, Grade **50 or 55**; or ASTM A 529/A 529M, Grade **50 or 55**.
 2. Channels, Angles, M-Shapes, and S-Shapes: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade **50 or 55**; or ASTM A 529/A 529M, Grade **50 or 55**.
 3. Plate and Bar: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade **50 or 55**; or ASTM A 529/A 529M, Grade **50 or 55**.
 4. Structural-Steel Sheet: Hot-rolled, ASTM A 1011/A 1011M, Structural Steel (SS), Grades **30 through 55**, or High-Strength Low-Alloy Steel (HSLAS), Grades **45 through 70**; or cold-rolled, ASTM A 1008/A 1008M, Structural Steel (SS), Grades **25 through 80**, or High-Strength Low-Alloy Steel (HSLAS), Grades **45 through 70**.
 5. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grades **33 through 80**, or High-Strength Low-Alloy Steel (HSLAS), Grades **50 through 80**; with **G90 at moist environments** coating designation; mill phosphatized.
 6. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
 - 1) Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grades **33 through 80** or High-Strength Low-Alloy Steel (HSLAS), Grades **50 through 80**; with **G90** coating designation.
 7. Non-High-Strength Bolts, Nuts, and Washers: **ASTM A 307, Grade A**, carbon-steel, hex-head bolts; **ASTM A 563** carbon-steel hex nuts; and ASTM F 844 plain (flat) steel washers.
 - 1) Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C in moist environments.
 8. High-Strength Bolts, Nuts, and Washers: **ASTM A 325**, Type 1, heavy-hex steel structural bolts; **ASTM A 563** heavy-hex carbon-steel nuts; and **ASTM F 436** hardened carbon-steel washers.
 - 1) Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C in moist environments.
 9. High-Strength Bolts, Nuts, and Washers: **ASTM A 490**, Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with spline ends; **ASTM A 563** heavy-hex carbon-steel nuts; and **ASTM F 436** hardened carbon-steel washers, plain.
 - 1) Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C in moist environments.
 10. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex-head steel structural bolts with spline ends.
 - 1) Finish: Mechanically deposited zinc coating, ASTM B 695, Class 50 in moist environments.
 11. Unheaded Anchor Rods: ASTM F 1554, Grade 36.

- 1) Configuration: Straight.
 - 2) Nuts: **ASTM A 563** heavy-hex carbon steel.
 - 3) Plate Washers: ASTM A 36/A 36M carbon steel.
 - 4) Washers: **ASTM F 436** hardened carbon steel.
 - 5) Finish: Plain.
12. Headed Anchor Rods: ASTM F 1554, Grade 36.
- 1) Configuration: Straight.
 - 2) Nuts: **ASTM A 563** heavy-hex carbon steel.
 - 3) Plate Washers: ASTM A 36/A 36M carbon steel.
 - 4) Washers: **ASTM F 436** hardened carbon steel.
 - 5) Finish: Plain.
13. Threaded Rods: ASTM A 36/A 36M.
- 1) Nuts: **ASTM A 563** heavy-hex carbon steel.
 - 2) Washers: **ASTM F 436** hardened carbon steel.
 - 3) Finish: Plain.
14. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- H. Finish: Factory primed. Apply specified primer immediately after cleaning and pretreating.
1. Apply primer to primary and secondary framing to a minimum dry film thickness of **2.5 mils for framing in moist environments**.
 2. Prime galvanized members with specified primer after phosphoric acid pretreatment.
 3. Zinc-Rich Primer: Zinc-rich, aromatic urethane primer compatible with topcoat. For use in moist environments. Zinc-Rich primer may be field applied as required.
 - 1) Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a) Tnemec Company, Inc.; Tneme-Zinc 90-97.

2.05 METAL ROOF SYSTEM

- A. Metal Roof System: Office and Maintenance Building Basis of design - Butler Manufacturing "CMR-24®" roof system
- B. Roof System Design:
1. Design roof panels and liner panels in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
 2. Design roof paneling system to support design live, snow, and wind loads.
 3. Endwall Trim and Roof Transition Flashings: Allow roof panels to move relative to wall panels and/or parapets as roof expands and contracts with temperature changes.
- C. Roof Panels
1. Factory roll-formed, 24 inches wide, with 2 major corrugations, 2 inches high (2-3/4 inches including seam), 24 inches on center.
 2. Flat of the Panel: Cross flutes 6 inches on center, perpendicular to major corrugations in entire length of panel to reduce wind noise.

3. Variable Width Panels:
 - 1) For roof lengths not evenly divisible by the 2'-0" panel width, factory-manufactured variable-width (9-inch, 12-inch, 15-inch, 18-inch, and 21-inch-wide) panels shall be used to ensure modular, weathertight roof installation.
 - 2) Minimum Length: 15 feet.
 - 3) Supply maximum possible panel lengths.
- D. Panel Material and Finish:
1. 24-gauge galvanized steel, G90 coating; ASTM A 653, G90.
 2. Paint with exterior colors of Butler-Cote or equal finish system, full-strength, 70 percent "Kynar 500" or "Hylar 5000" fluoropolymer (PVDF) coating.
 3. PVDF Coating Warranty: Metal building system manufacturer shall warrant coating for 25 years for the following.
 - 1) Not to peel, crack, or chip.
 - 2) Chalking: Not to exceed ASTM D 4214, #8 rating.
 - 3) Fading: Not more than 5 color-difference units, ASTM D 2244.
- E. Use panels of maximum possible lengths to minimize end laps.
- F. Extend eave panels beyond structural line of sidewalls.
- G. Factory punch panels at panel end to match factory-punched holes in eave structural member.
- H. Panel End Splices: Factory punched and factory notched.
- I. Panel End Laps: Locate directly over, but not fastened to, a supporting secondary roof structural member and be staggered, to avoid 4-panel lap-splice condition.
- J. End Laps: Floating. Allows roof panels to expand and contract with roof panel temperature changes.
- K. Self-Drilling Fasteners: Not permitted in weathering membrane of roof system.
- L. Ridge Assembly:
1. Design ridge assembly to allow roof panels to move lengthwise with expansion and contraction as roof panel temperature changes.
 2. Factory punch parts for correct field assembly.
 3. Install panel closures and interior reinforcing straps to seal panel ends at ridge.
 4. Do not expose attachment fasteners on weather side.
 5. Use lock seam plug to seal lock seam portion of panel.
 6. High-Tensile Steel Ridge Cover: Span from panel closure to panel closure and flex as roof system expands and contracts.
- M. Insulation Board:
- N. Rigid "Thermax" Metal Building Board glass-fiber-reinforced, polyisocyanurate foam plastic core.
- O. Width: 4 feet.

- P. Maintain Class A fire rating.
- Q. Approved for use without thermal barrier.
- R. Maximum Thickness: 4 inches.
- S. Covered with embossed aluminum facing - Metal Building Board.
- T. Vapor Retarder:
- U. WMP-50, 0.0015-inch minimum thickness, UV-stabilized, white polypropylene, laminated to 30-pound Kraft paper / metalized polyester and reinforced with glass fiber and polyester scrim.
- V. Perm Rating: 0.02.
- W. Interior Liner Panels:
- X. Form panels from 0.0149 - inch minimum total coated thickness coated steel with minimum yield strength of 80,000 psi.
- Y. Painted Panel Finish:
 - 1. Exposed Side: 0.15-mil min primer and 0.70-mil minimum interior white polyester paint.
 - 2. Unexposed Side: 0.1-mil minimum primer and 0.40 minimum polyester backer
 - 3. Panel Dimensions: Nominal 36 inches wide with corrugations 1/2 inches high, 3 inches on center.
- Z. Factory cut panels to lengths required.
- AA. Accessories:
- BB. Accessories (i.e., ventilators, skylights, gutters, fascia): Standard with metal building system manufacturer, unless otherwise noted and furnished as specified.
- CC. Metal Coating on Gutters, Downspouts, Gable Trim, and Eave Trim: Butler-Cote or equal finish system, full-strength, 70 percent "Kynar 500" or "Hylar 5000" fluoropolymer (PVDF) coating.
- DD. Location of Standard Accessories: Indicated on erection drawings furnished by metal building system manufacturer.
- EE. Material used in flashing and transition parts and furnished as standard by metal building system manufacturer may or may not match roof panel material.
 - 1. Parts: Compatible and not cause corrosive condition.
 - 2. Copper and Lead Materials: Do not use with Galvalume or optional aluminum-coated panels.
- FF. Physical Properties:

GG. WMP-50 Vapor Retarder:

1. For conditions of high interior humidity, UV-stabilized, white polypropylene film.
2. Water Vapor Permeance (perm) Rating, ASTM E 96: 0.02.
3. Minimum Workability Temperature: 20 degrees F.
4. WMP-50 Vapor Retarder:
 - 1) Flame Spread: 5.
 - 2) Smoke Development: 30.

HH. Insulation Board Facing:

1. Water Vapor Permeance (perm) Rating, ASTM E 96: 0.03.

II. "Thermax" Metal Building Board Insulation:

1. Class I Factory Mutual Approval and UL Fire Hazard Classification Ratings, UL 723:
 - 1) Flame Spread: 25 or less.

2.06 METAL ROOF SYSTEM

A. Metal Roof System: Transfer Station & Trailer Storage Canopy Basis of Design - Butler Manufacturing "Butlerib@II" roof system.

B. Roof System Design:

1. Design roof panels in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
2. Design roof panels to support a 200-pound load distributed evenly over a 2-foot square area centered between purlins, without exceeding a panel deflection-to-span ratio of 1/180 in a 2-span condition.
3. Design roof paneling system for a minimum roof slope of 1/2 inch in 12 inches.
4. Design roof paneling system to support design live, snow, and wind loads.

C. Roof Panels:

D. General:

1. Factory roll-formed to provide width coverage of 3 feet.
2. Four major corrugations spaced 12 inches on center.
3. Each Major Corrugation: 1-1/2 inches high, 2-7/8 inches wide, tapering 1-9/32 inches wide at top, with no intermediate minor corrugations.
4. In Panel Flat: Two additional minor corrugations, 1 inch wide, 1/8 inch high, spaced 4 inches on center, between major corrugations.

E. Roof Panel Side Laps:

1. Overlap 1 major corrugation.
2. One of the Outboard Corrugations: Formed as overlapping corrugation.
3. Other Outboard Corrugation: Formed as underneath corrugation.
 - 1) Full corrugation to provide bearing support to side lap.
 - 2) Formed with continuous-length sealant groove.

- F. Roof Panel End Laps:
1. 6 inches.
 2. Supply maximum possible panel lengths, up to 38'-9", to minimize panel end laps.
 3. Factory punch roof panel end laps (top panel with a round hole and bottom panel with a slotted hole) to provide for expansion and contraction and panel alignment.
 4. Design end laps to occur over and be fastened to secondary structural members.
- G. Ridge Panels:
1. One-piece, factory formed to match roof slope.
 2. Ridge Panel Cross Section: Match roof panels.
 3. Ridge Panel Splices: Occur over first purlin on either side of building center.
- H. Eave Panels: Extend beyond building structural line.
- I. Factory punch roof panels at panel ends to match factory-punched or field-drilled holes in structural members to ensure proper alignment.
- J. Panel Material and Finish:
1. 26-gauge or 24-gauge painted Galvalume aluminum-zinc alloy (approximately 55 percent aluminum, 45 percent zinc), ASTM A 792.
 2. Paint with exterior colors of "Butler-Cote™" finish system, full-strength, 70 percent "Kynar 500" or "Hylar 5000" fluoropolymer (PVDF) coating.
 3. PVDF Coating Warranty: Metal building system manufacturer shall warrant coating for 25 years for the following.
 - 1) Not to peel, crack, or chip.
 - 2) Chalking: Not to exceed ASTM D 4214, #8 rating.
 - 3) Fading: Not more than 5 color-difference units, ASTM D 2244.
- K. Provision for Expansion and Contraction:
- L. Optional Factory-Punched Roof Panels: 5/16-inch by 3/4-inch-slotted holes at upper end and 5/16-inch-diameter holes at lower end.
- M. Slotted Holes: Permit thermal movement of panels without detrimental effect on roof panels.
- N. Fasteners:
- O. Fastener Locations and Quantities: Indicated on erection drawings furnished by metal building system manufacturer.
- P. Panel-to-Structural Connections: Type 410 stainless steel "Scrubolt™" fasteners, 3/8-inch hex head, with 3/4-inch OD aluminum-backed EPDM washers.

- Q. Panel-to-Panel Connections: Self-clinching aluminum “Lock-Rivet™” fasteners, with 3/4-inch diameter low-profile-head EPDM washers.
- R. Accessories:
- S. Accessories (i.e., ventilators, skylights, eave and gable trim, gutters, jacks, and curbs): Standard with metal building system manufacturer, unless otherwise noted and furnished as specified.
- T. Metal Coating on Gutters, Downspouts, Gable Trim, and Eave Trim: Butler-Cote or equal finish system, full-strength, 70 percent “Kynar 500” or “Hylar 5000” fluoropolymer (PVDF) coating.
- U. Location of Standard Accessories: Indicated on erection drawings furnished by metal building system manufacturer.

2.07 METAL WALL PANELS

- A. Exterior Metal Wall System: Transfer Station, Trailer Storage Canopy, & Scalehouse Basis of Design - Butler Manufacturing™ “Butlerib® II” wall system.
- B. Wall System Design: Design wall panels in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
- C. Wall Panels:
 - 1. Roll-formed panels, 3 feet wide with 4 major corrugations, 1-1/2 inches high, 12 inches on center, with 2 minor corrugations between each of the major corrugations entire length of panel.
 - 2. One piece from base to building eave.
 - 3. Upper End of Panels: Fabricate with mitered cut to match corrugations of “Butlerib® II” roof panels of 1/2 inch to 12 inches and square cut for all other roof panels and slopes.
 - 4. Factory punch or field drill wall panels at panel ends and match factory-punched or field-drilled holes in structural members for proper alignment.
- D. Panel Material and Finish:
 - 1. Paint with exterior colors of Butler-Cote or equal finish system, full-strength, 70 percent “Kynar 500” or “Hylar 5000” fluoropolymer (PVDF) coating.
 - 2. PVDF Coating Warranty: Metal building system manufacturer shall warrant coating for 25 years for the following.
 - 1) Not to peel, crack, or chip.
 - 2) Chalking: Not to exceed ASTM D 4214, #8 rating.
 - 3) Fading: Not more than 5 color-difference units, ASTM D 2244.
- E. Fasteners:
 - 1. Wall Panel-to-Structural Connections: Torx-head “Scrubolt™” fasteners.
 - 2. Wall Panel-to-Panel Connections: Torx-head self-drilling screws.
 - 3. Fastener Locations: Indicated on erection drawings furnished by metal building system manufacturer.
 - 4. Exposed Fasteners: Factory painted to match wall color.

- F. Accessories:
1. Accessories (i.e., doors, windows, louvers): Standard with metal building system manufacturer, unless otherwise noted and furnished as specified.
 2. Location of Standard Accessories: Indicated on erection drawings furnished by metal building system manufacturer.

2.08 METAL WALL PANELS

- A. Exterior Metal Wall System: Butler Manufacturing™ “Butler Thermawall™ Fluted” wall system.
- B. Wall System Design: Design wall panels in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
- C. Wall Panels:
1. Steel-faced, shop-assembled, factory-foamed, insulated panel units.
 2. Double tongue-and-groove, side-joint design, with fasteners concealed within side joint.
 3. Nominal Thickness: [2 inches]
 4. One piece from base to top of wall.
 5. Maximum Panel Length: 40 feet.
 6. Exterior Face:
 - 1) Nominal Width: 42 inches.
 - 2) Architectural Corrugations: 3/8 inch deep on nominal 8-1/2-inch centers.
 - 3) Finish: Non-directional embossed finish.
 7. Interior Face: Roll-formed from pre-painted steel with 1/16-inch-deep corrugations on 6-inch centers.
- D. Panel Material and Finish:
1. Corrugated Exterior-Faced Panels: 26-gauge, AZ50 aluminum-zinc coated steel.
 2. Interior Face: 26-gauge, AZ50 aluminum-zinc coated steel.
 3. Core: Poured-in-place polyurethane foam with a minimum 93 percent closed-cell structure.
 4. Exterior Panel Finish: Pre-finished with Butler-Cote or equal finish system, full-strength, 70 percent “Kynar 500” or “Hylar 5000” fluoropolymer (PVDF) coating in metal building system manufacturer’s standard colors.
 5. PVDF Coating Warranty: Metal building system manufacturer shall warrant coating for 25 years for the following.
 - 1) Not to peel, crack, or chip.
 - 2) Chalking: Not to exceed ASTM D 4214, #8 rating.
 - 3) Fading: Not more than 5 color-difference units, ASTM D 2244.
- E. Interior Panel Finish: Paint with USDA-approved interior white polyester paint.
- F. Panel Physical Properties:
- G. R-Value : Based on actual test results from ASTM C 518 of panel core material.
1. 2-Inch-Thick Panels: 14.16

- H. Insulated Panels: Carry the following listings:
 - 1. Factory Mutual Class 1 Rating for wall and ceiling construction FM 4880.
 - 2. Guide NYWR, Insulated Wall Construction Subject 1040.
 - 3. Surface Burning Characteristics: Panel core (6-inch unfaced) tested in accordance with ASTM E 84.
 - 1) Flame Spread: 25.
 - 2) Smoke Developed: 450.
 - 4. 1-Hour or 2-Hour Fire-Resistance Ratings: Achieve by incorporating 2 or 4 layers of 5/8-inch Type X gypsum wallboard on interior side of insulated panels.
 - 1) Rated-Wall Assembly: UL listing U652.
- G. Fasteners:
- H. Base, Top, and Girt Connections and Panel Joint Clip Attachments: #14 self-drilling screws.
 - 1. Install additional "Lockrivet" fasteners, if necessary due to wind load.
- I. Panel-to-Panel Fasteners: Not required.
 - 1. Connections: Hidden, eliminating exposed fasteners.
- J. Accessories:
- K. Accessories (i.e., doors, windows): Design to fit wall panel system or framed openings and furnish as standard by metal building system manufacturer, unless otherwise noted.
 - A. Location of Standard Accessories: Indicated on erection drawings furnished by metal building system manufacturer.

2.09 ACCESSORIES

- A. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.
 - 1. Form exposed sheet metal accessories that are without excessive oil-canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
- B. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fasciae, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.
 - 1. Closures: Provide closures at eaves and ridges, fabricated of same material as metal roof panels.
 - 2. Clips: Manufacturer's standard, formed from stainless-steel sheet, designed to withstand negative-load requirements.

3. Cleats: Manufacturer's standard, mechanically seamed cleats formed **from stainless-steel sheet**.
 4. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 5. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum **1-inch**-thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
 6. Thermal Spacer Blocks: Where metal panels attach directly to purlins, provide thermal spacer blocks of thickness required to provide **1-inch** standoff; fabricated from extruded polystyrene.
- C. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including copings, fasciae, mullions, sills, corner units, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels unless otherwise indicated.
1. Closures: Provide closures at eaves and rakes, fabricated of same material as metal wall panels.
 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum **1-inch**-thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- D. Flashing and Trim: Formed from **0.022-inch** nominal-thickness, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to match adjacent metal panels.
1. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.
 2. Opening Trim: Formed from **0.022-inch** nominal-thickness, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Trim head and jamb of door openings, and head, jamb, and sill of other openings.
- E. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.
- F. Materials:
1. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide fasteners with heads matching color of materials being fastened by means of plastic caps or factory-applied coating.
 - 1) Fasteners for Metal Roof Panels: Self-drilling, Type 410 stainless-steel or self-tapping, Type 304 stainless-steel or zinc-alloy-steel hex washer head, with EPDM washer under heads of fasteners bearing on weather side of metal panels.
 - 2) Fasteners for Metal Wall Panels: Self-drilling, Type 410 stainless-steel or self-tapping, Type 304 stainless-steel or zinc-alloy-steel hex washer head.

- 3) Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
- 4) Blind Fasteners: High-strength aluminum or stainless-steel rivets.
2. Corrosion-Resistant Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
3. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.
4. Metal Panel Sealants:
 - 1) Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene-compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape of manufacturer's standard size.
 - 2) Joint Sealant: ASTM C 920; one-part elastomeric polyurethane or polysulfide; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended by metal building system manufacturer.

2.010 FABRICATION

- A. General: Design components and field connections required for erection to permit easy assembly.
 1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
 2. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members shall be free of cracks, tears, and ruptures.
- B. Tolerances: Comply with MBMA's "Metal Building Systems Manual" for fabrication and erection tolerances.
- C. Primary Framing: Shop fabricate framing components to indicated size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.
 1. Make shop connections by welding or by using high-strength bolts.
 2. Join flanges to webs of built-up members by a continuous, submerged arc-welding process.
 3. Brace compression flange of primary framing with steel angles or cold-formed structural tubing between frame web and purlin web or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
 4. Weld clips to frames for attaching secondary framing.
 5. Shop Priming: Shop prime primary framing with specified primer after fabrication. Prepare surfaces for shop priming according to SSPC-SP 2 unless note otherwise below.
 - 1) SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning," for moist environments.
- D. Secondary Framing: Shop fabricate framing components to indicated size and section by roll-forming or break-forming, with baseplates, bearing plates, stiffeners, and other

plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.

1. Make shop connections by welding or by using non-high-strength bolts.
 2. Shop Priming: Prepare uncoated surfaces for shop priming according to SSPC-SP 2. Shop prime uncoated secondary framing with specified primer after fabrication.
- E. Metal Panels: Fabricate and finish metal panels at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.
1. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of metal panel.
- F. Galvanizing
1. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to all primary and end wall framing and all ASTM A 992, ASTM A 572 and ASTM A 36 steel according to ASTM A 123/A 123M.
 - 1) Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.

2.011 EXAMINATION

- A. Examine substrates, areas, and conditions, with erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Before erection proceeds, survey elevations and locations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments to receive structural framing, with erector present, for compliance with requirements and metal building system manufacturer's tolerances.
- C. Proceed with erection only after unsatisfactory conditions have been corrected.
- D. Beginning installation constitutes Contractor's acceptance of substrates and conditions.

2.012 PREPARATION

- A. Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition.
- B. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place unless otherwise indicated.

2.013 ERECTION OF STRUCTURAL FRAMING

- A. Erect metal building system according to manufacturer's written erection instructions and erection drawings.
- B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.
- C. Set structural framing accurately in locations and to elevations indicated, according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.
- D. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- E. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
 - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.
- F. Primary Framing and End Walls: Erect framing level, plumb, rigid, secure, and true to line. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist-cure grout for not less than seven days after placement.
 - 1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for bolt type and joint type specified.
 - 1) Joint Type: Snug tightened or pretensioned.
- G. Secondary Framing: Erect framing level, plumb, rigid, secure, and true to line. Field bolt secondary framing to clips attached to primary framing.
 - 1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
 - 2. Locate and space wall girts to suit openings such as doors and windows.
 - 3. Locate canopy framing as indicated.

4. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, ventilators, and other penetrations of roof and walls.
- H. Steel Joists[**and Joist Girders**]: Install joists[, **girders**,] and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Standard Specifications and Load Tables for Steel Joists and Joist Girders," joist manufacturer's written instructions, and requirements in this Section.
1. Before installation, splice joists delivered to Project site in more than one piece.
 2. Space, adjust, and align joists accurately in location before permanently fastening.
 3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
 4. Bolt joists to supporting steel framework using carbon-steel bolts unless otherwise indicated.
 5. Bolt joists to supporting steel framework using high-strength structural bolts unless otherwise indicated. Comply with RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for high-strength structural bolt installation and tightening requirements.
 6. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.
- I. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.
1. Tighten rod and cable bracing to avoid sag.
 2. Locate interior end-bay bracing only where indicated.
- J. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.
- K. Erection Tolerances: Maintain erection tolerances of structural framing within AISC 303.

2.014 METAL PANEL INSTALLATION, GENERAL

- A. Examination: Examine primary and secondary framing to verify that structural-panel support members and anchorages have been installed within alignment tolerances required by manufacturer.
1. Examine roughing-in for components and systems penetrating metal panels, to verify actual locations of penetrations relative to seams before metal panel installation.
- B. General: Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Field cut metal panels as required for doors, windows, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent metal panel finishes.

- 1) Field cutting of metal panels by torch is not permitted unless approved in writing by manufacturer.
 2. Install metal panels perpendicular to structural supports unless otherwise indicated.
 3. Flash and seal metal panels with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws.
 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 5. Locate metal panel splices over, but not attached to, structural supports with end laps in alignment.
 6. Lap metal flashing over metal panels to allow moisture to run over and off the material.
- C. Lap-Seam Metal Panels: Install screw fasteners using power tools with controlled torque adjusted to compress EPDM washers tightly without damage to washers, screw threads, or metal panels. Install screws in predrilled holes.
1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply metal panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
- D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.
- E. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers, and sealants indicated; or, if not indicated, provide types recommended by metal panel manufacturer.
1. Seal metal panel end laps with double beads of tape or sealant the full width of panel. Seal side joints where recommended by metal panel manufacturer.
 2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

2.015 METAL ROOF PANEL INSTALLATION

- A. General: Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.
1. Install ridge caps as metal roof panel work proceeds.
 2. Flash and seal metal roof panels with weather closures at eaves and rakes. Fasten with self-tapping screws.
- B. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint, at location and spacing and with fasteners recommended by manufacturer.
1. Install clips to supports with self-drilling or self-tapping fasteners.
 2. Install pressure plates at locations indicated in manufacturer's written installation instructions.

3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
 4. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so that clip, metal roof panel, and factory-applied sealant are completely engaged.
 5. Rigidly fasten eave end of metal roof panels and allow ridge end free movement due to thermal expansion and contraction. Pre-drill panels for fasteners.
 6. Provide metal closures at peaks rake edges rake walls and each side of ridge and hip caps.
- C. Lap-Seam Metal Roof Panels: Fasten metal roof panels to supports with exposed fasteners at each lapped joint, at location and spacing recommended by manufacturer.
1. Provide metal-backed sealing washers under heads of exposed fasteners bearing on weather side of metal roof panels.
 2. Provide sealant tape at lapped joints of metal roof panels and between panels and protruding equipment, vents, and accessories.
 3. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on end laps and on side laps of nesting-type metal panels, on side laps of ribbed or fluted metal panels, and elsewhere as needed to make metal panels weatherproof to driving rains.
 4. At metal panel splices, nest panels with minimum **6-inch** end lap, sealed with butyl-rubber sealant and fastened together by interlocking clamping plates.
- D. Metal Fascia Panels: Align bottom of metal panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws. Flash and seal metal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.
- E. Metal Roof Panel Installation Tolerances: Shim and align metal roof panels within installed tolerance of **1/4 inch in 20 feet** on slope and location lines as indicated and within **1/8-inch** offset of adjoining faces and of alignment of matching profiles.

2.016 METAL WALL PANEL INSTALLATION

- A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts, extending full height of building, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Unless otherwise indicated, begin metal panel installation at corners with center of rib lined up with line of framing.
 2. Shim or otherwise plumb substrates receiving metal wall panels.
 3. When two rows of metal panels are required, lap panels **4 inches** minimum.
 4. When building height requires two rows of metal panels at gable ends, align lap of gable panels over metal wall panels at eave height.
 5. Rigidly fasten base end of metal wall panels and allow eave end free movement due to thermal expansion and contraction. Pre-drill panels.
 6. Flash and seal metal wall panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.
 7. Install screw fasteners in predrilled holes.
 8. Install flashing and trim as metal wall panel work proceeds.

9. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated; or, if not indicated, as necessary for waterproofing.
 10. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws.
 11. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.
- B. Metal Wall Panels: Install metal wall panels on exterior side of girts. Attach metal wall panels to supports with fasteners as recommended by manufacturer.
- C. Installation Tolerances: Shim and align metal wall panels within installed tolerance of **1/4 inch in 20 feet**, nonaccumulative, on level, plumb, and on location lines as indicated, and within **1/8-inch** offset of adjoining faces and of alignment of matching profiles.

2.017 METAL SOFFIT PANEL INSTALLATION

- A. Provide metal soffit panels the full width of soffits. Install panels perpendicular to support framing.
- B. Flash and seal metal soffit panels with weather closures where panels meet walls and at perimeter of all openings.

2.018 THERMAL INSULATION INSTALLATION

- A. General: Install insulation concurrently with metal panel installation, in thickness indicated to cover entire surface, according to manufacturer's written instructions.
1. Set vapor-retarder-faced units with vapor retarder toward warm side of construction unless otherwise indicated. Do not obstruct ventilation spaces except for firestopping.
 2. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to the surrounding construction to ensure airtight installation.
 3. Install factory-laminated, vapor-retarder-faced blankets straight and true in one-piece lengths, with both sets of facing tabs sealed, to provide a complete vapor retarder.
 4. Install blankets straight and true in one-piece lengths. Install vapor retarder over insulation, with both sets of facing tabs sealed, to provide a complete vapor retarder.
- B. Blanket Roof Insulation: Comply with the following installation method:
1. Over-Framing Installation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing. Hold in place by metal roof panels fastened to secondary framing.
 2. Between-Purlin Installation: Extend insulation and vapor retarder between purlins. Carry vapor-retarder-facing tabs up and over purlin, overlapping adjoining facing of next insulation course and maintaining continuity of retarder. Hold in place with bands and crossbands below insulation. Over-Purlin-with-Spacer-Block Installation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing. Install layer of filler insulation

over first layer to fill space formed by metal roof panel standoffs. Hold in place by panels fastened to standoffs.

- 1) Thermal Spacer Blocks: Where metal roof panels attach directly to purlins, install thermal spacer blocks.
4. Two-Layers-between-Purlin-with-Spacer-Block Installation: Extend insulation and vapor retarder between purlins. Carry vapor-retarder-facing tabs up and over purlin, overlapping adjoining facing of next insulation course and maintaining continuity of retarder. Install layer of filler insulation over first layer to fill space between purlins formed by thermal spacer blocks. Hold in place with bands and crossbands below insulation.
 - 1) Thermal Spacer Blocks: Where metal roof panels attach directly to purlins, install thermal spacer blocks.
 5. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.
- C. Blanket Wall Insulation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing. Hold in place by metal wall panels fastened to secondary framing.
1. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.

2.019 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal roof panel assembly, including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
 2. Install components for a complete metal wall panel assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
 3. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
1. Install exposed flashing and trim that is without excessive oil-canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of **10 feet** with no joints allowed within **24 inches** of corner or intersection. Where lapped or bayonet-type

expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than **1 inch** deep, filled with mastic sealant (concealed within joints).

- C. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to panel as recommended by manufacturer.

2.020 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

- 1. Steel construction.

- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

- C. Tests and Inspections:

- 1. High-Strength, Field-Bolted Connections: Connections shall be **tested and** inspected during installation according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

- 2. Welded Connections: In addition to visual inspection, field-welded connections shall be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at inspector's option:

- 1) Liquid Penetrant Inspection: ASTM E 165.

- 2) Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.

- 3) Ultrasonic Inspection: ASTM E 164.

- 4) Radiographic Inspection: ASTM E 94.

- D. Record position and alignment of erected steel. Compare with required tolerances.

- E. Product will be considered defective if it does not pass tests and inspections.

- F. Prepare test and inspection reports.

2.021 CLEANING AND PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

- B. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

- C. Touchup Painting: After erection, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted structural framing, bearing plates, and accessories.

- 1. Clean and prepare surfaces by SSPC-SP 2, "Hand Tool Cleaning," or by SSPC-SP 3, "Power Tool Cleaning."

2. SSPC-SP 11, "Power Tool Cleaning to Bare Metal," for structural steel in moist environments.
 3. Apply a compatible primer of same type as shop primer used on adjacent surfaces.
- D. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- E. Metal Panels: Remove temporary protective coverings and strippable films, if any, as metal panels are installed. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
1. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 133419

**SECTION 263213.13
DIESEL-ENGINE-DRIVEN GENERATOR SETS**

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Diesel engine.
2. Diesel fuel-oil system.
3. Control and monitoring.
4. Generator overcurrent and fault protection.
5. Generator, exciter, and voltage regulator.
6. Outdoor engine generator enclosure.
7. Remote radiator motors.
8. Vibration isolation devices.

B. Related Requirements:

1. Section 263600 "Transfer Switches" for transfer switches including sensors and relays to initiate automatic-starting and -stopping signals for engine generators.

1.03 DEFINITIONS

A. EPS: Emergency power supply.

B. EPSS: Emergency power supply system.

C. Operational Bandwidth: The total variation from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
2. Include thermal damage curve for generator.
3. Include time-current characteristic curves for generator protective device.
4. Include fuel consumption in gallons per hour at 0.8 power factor at 0.5, 0.75, and 1.0 times generator capacity.
5. Include generator efficiency at 0.8 power factor at 0.5, 0.75, and 1.0 times generator capacity.
6. Include airflow requirements for cooling and combustion air in cubic feet per minute at 0.8 power factor, with air-supply temperature of 95, 80, 70, and 50 deg F. Provide

Drawings indicating requirements and limitations for location of air intake and exhausts.

7. Include generator characteristics, including, but not limited to, kilowatt rating, efficiency, reactances, and short-circuit current capability.

B. Shop Drawings:

1. Include plans and elevations for engine generator and other components specified. Indicate access requirements affected by height of subbase fuel tank.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Identify fluid drain ports and clearance requirements for proper fluid drain.
4. Design calculations for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
5. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include base weights.
6. Include diagrams for power, signal, and control wiring. Complete schematic, wiring, and interconnection diagrams showing terminal markings for engine generators and functional relationship between all electrical components.

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer manufacturer and testing agency.

B. Source Quality-Control Reports: Including, but not limited to, the following:

1. Certified summary of prototype-unit test report.
2. Certified Test Reports: For components and accessories that are equivalent, but not identical, to those tested on prototype unit.
3. Report of factory test on units to be shipped for this Project, showing evidence of compliance with specified requirements.
4. Report of sound generation.
5. Report of exhaust emissions showing compliance with applicable regulations.
6. Certified Torsional Vibration Compatibility: Comply with NFPA 110.

C. Field quality-control reports.

D. Warranty: For special warranty.

1.06 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For packaged engine generators to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
 - a. List of tools and replacement items recommended to be stored at Project for ready access. Include part and drawing numbers, current unit prices, and source of supply.
 - b. Operating instructions laminated and mounted adjacent to generator location.
 - c. Training plan.

1.07 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fuses: One for every 10 of each type and rating, but no fewer than one of each.
 - 2. Indicator Lamps: Two for every six of each type used, but no fewer than two of each.
 - 3. Filters: One set each of lubricating oil, fuel, and combustion-air filters.
 - 4. Tools: Each tool listed by part number in operations and maintenance manual.

1.08 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Testing Agency Qualifications: Accredited by NETA.
 - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.09 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of packaged engine generators and associated auxiliary components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 1 year from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Source Limitations: Obtain packaged engine generators and auxiliary components from single source from single manufacturer.

2.02 PERFORMANCE REQUIREMENTS

- A. B11 Compliance: Comply with B11.19.
- B. NFPA Compliance:
 - 1. Comply with NFPA 37.
 - 2. Comply with NFPA 70.
 - 3. Comply with NFPA 110 requirements for Level 2 EPSS.
- C. UL Compliance: Comply with UL 2200.
- D. Environmental Conditions: Engine generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:
 - 1. Ambient Temperature: 5 to 104 deg F.

2. Relative Humidity: Zero to 95 percent.
 3. Altitude: Sea level to 1000 feet.
- E. Unusual Service Conditions: Engine generator equipment and installation are required to operate under the following conditions:
1. High salt-dust content in the air due to sea-spray evaporation.

2.03 ENGINE GENERATOR ASSEMBLY DESCRIPTION

- A. Factory-assembled and -tested, water-cooled engine, with brushless generator and accessories.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- C. Power Rating: Standby.
- D. EPSS Class: Engine generator shall be classified as a Class 48 according to NFPA 110.
- E. Power Factor: 0.8, lagging.
- F. Frequency: 60 Hz.
- G. Voltage: 240-V ac.
- H. Induction Method: Turbocharged.
- I. Governor: Adjustable isochronous, with speed sensing.
- J. Mounting Frame: Structural steel framework to maintain alignment of mounted components without depending on concrete foundation. Provide lifting attachments sized and spaced to prevent deflection of base during lifting and moving.
- K. Capacities and Characteristics:
1. Power Output Ratings: Nominal ratings as indicated at 0.8 power factor excluding power required for the continued and repeated operation of the unit and auxiliaries.
 2. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of component.
- L. Engine Generator Performance:
1. Steady-State Voltage Operational Bandwidth: 3 percent of rated output voltage from no load to full load.
 2. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within three seconds.
 3. Steady-State Frequency Operational Bandwidth: 0.5 percent of rated frequency from no load to full load.

4. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
5. Transient Frequency Performance: Less than 5 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within five seconds.
6. Output Waveform: At no load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for single harmonics. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.
7. Sustained Short-Circuit Current: For a three-phase, bolted short circuit at system output terminals, system shall supply a minimum of 250 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to generator system components.
8. Start Time:
 - a. Comply with NFPA 110, Type 10 system requirements.

2.04 DIESEL ENGINE

- A. Fuel: ASTM D975, diesel fuel oil, Grade 2-D S15.
- B. Rated Engine Speed: 1800 rpm.
- C. Lubrication System: Engine or skid-mounted.
 1. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.
 2. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature. Unit shall be capable of full flow and is designed to be fail-safe.
 3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.
- D. Jacket Coolant Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with UL 499.
- E. Integral Cooling System: Closed loop, liquid cooled, with radiator factory mounted on engine generator set mounting frame and integral engine-driven coolant pump.
 1. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
 2. Size of Radiator: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.
 3. Expansion Tank: Constructed of welded steel plate and rated to withstand maximum closed-loop coolant system pressure for engine used. Equip with gage glass and petcock.
 4. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
 5. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging-, UV-, and abrasion-resistant fabric.

- a. Rating: 50-psig maximum working pressure with coolant at 180 deg F, and noncollapsible under vacuum.
- b. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.

F. Muffler/Silencer:

1. Critical type, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements.
 - a. Minimum sound attenuation of 25 dB at 500 Hz.

G. Air-Intake Filter: Standard-duty, engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.

H. Starting System: 12-V electric, with negative ground.

1. Components: Sized so they are not damaged during a full engine-cranking cycle with ambient temperature at maximum specified in "Performance Requirements" Article.
2. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.
3. Cranking Cycle: As required by NFPA 110 for system level specified.
4. Battery: Lead acid, with capacity within ambient temperature range specified in "Performance Requirements" Article to provide specified cranking cycle at least twice without recharging.
5. Battery Cable: Size as recommended by engine manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.
6. Battery Stand: Factory-fabricated, two-tier metal with acid-resistant finish designed to hold the quantity of battery cells required and to maintain the arrangement to minimize lengths of battery interconnections.
7. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation and 35-A minimum continuous rating.
8. Battery Charger: Current-limiting, automatic-equalizing, and float-charging type designed for lead-acid batteries. Unit shall comply with UL 1236 and include the following features:
 - a. Operation: Equalizing-charging rate of 10 A shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.
 - b. Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 40 to 140 deg F to prevent overcharging at high temperatures and undercharging at low temperatures.
 - c. Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.
 - d. Ammeter and Voltmeter: Flush mounted in door. Meters shall indicate charging rates.
 - e. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.

- f. Enclosure and Mounting: NEMA 250, Type 1, wall-mounted cabinet.

2.05 DIESEL FUEL-OIL SYSTEM

- A. Comply with NFPA 37.
- B. Piping: Fuel-oil piping shall be Schedule 40 black steel, complying with requirements in Section 231113 "Facility Fuel-Oil Piping." Cast iron, aluminum, copper, and galvanized steel shall not be used in the fuel-oil system.
- C. Main Fuel Pump: Mounted on engine to provide primary fuel flow under starting and load conditions.
- D. Fuel Filtering: Remove water and contaminants larger than 1 micron.
- E. Relief-Bypass Valve: Automatically regulates pressure in fuel line and returns excess fuel to source.
- F. Subbase-Mounted, Double-Wall, Fuel-Oil Tank: Factory installed and piped, complying with UL 142 fuel-oil tank. Features include the following:
 - 1. Tank level indicator.
 - 2. Leak detection in interstitial space.
 - 3. Vandal-resistant fill cap.
 - 4. Containment Provisions: Comply with requirements of authorities having jurisdiction.

2.06 CONTROL AND MONITORING

- A. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of engine generator. When mode-selector switch is switched to the on position, engine generator starts. The off position of same switch initiates engine generator shutdown. When engine generator is running, specified system or equipment failures or derangements automatically shut down engine generator and initiate alarms.
- B. Manual Starting System Sequence of Operation: Switching on-off switch on the generator control panel to the on position starts engine generator. The off position of same switch initiates engine generator shutdown. When engine generator is running, specified system or equipment failures or derangements automatically shut down engine generator and initiate alarms.
- C. Provide minimum run time control set for 15 minutes with override only by operation of a remote emergency-stop switch.
- D. Comply with UL 508A.
- E. Configuration:
 - 1. Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common control and monitoring panel mounted

on the engine generator. Mounting method shall isolate the control panel from engine generator vibration. Panel shall be powered from the engine generator battery.

F. Control and Monitoring Panel:

1. Digital engine generator controller with integrated LCD display, controls, and microprocessor, capable of local and remote control, monitoring, and programming, with battery backup.
 2. Analog control panel with dedicated gages and indicator lights for the instruments and alarms indicated below.
 3. Instruments: Located on the control and monitoring panel and viewable during operation.
 - a. Engine lubricating-oil pressure gage.
 - b. DC voltmeter (alternator battery charging).
 - c. Running-time meter.
 4. Controls and Protective Devices: Controls, shutdown devices, and common alarm indication, including the following:
 - a. Cranking control equipment.
 - b. Run-Off-Auto switch.
 - c. Control switch not in automatic position alarm.
 - d. Overcrank shutdown device.
 - e. Low-water temperature alarm.
 - f. High engine temperature prealarm.
 - g. High engine temperature.
 - h. High engine temperature shutdown device.
 - i. Overspeed shutdown device.
 - j. Low fuel main tank.
 - 1) Low-fuel-level alarm shall be initiated when the level falls below that required for operation for duration required for the indicated EPSS class.
 - k. Coolant low-level alarm.
 - l. Coolant high-temperature alarm.
 - m. Coolant low-temperature alarm.
 - n. Coolant high-temperature shutdown device.
 - o. Battery high-voltage alarm.
 - p. Low cranking voltage alarm.
 - q. Battery-charger malfunction alarm.
 - r. Battery low-voltage alarm.
 - s. Low-starting air pressure alarm.
 - t. Low-starting hydraulic pressure alarm.
- G. Common Remote Panel with Common Audible Alarm: Include necessary contacts and terminals in control and monitoring panel. Remote panel shall be powered from the engine generator battery.
- H. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator unless otherwise indicated.

2.07 GENERATOR OVERCURRENT AND FAULT PROTECTION

- A. Overcurrent protective devices shall be coordinated to optimize selective tripping when a short circuit occurs.
 - 1. Overcurrent protective devices for the entire EPSS shall be coordinated to optimize selective tripping when a short circuit occurs. Coordination of protective devices shall consider both utility and EPSS as the voltage source.
 - 2. Overcurrent protective devices for the EPSS shall be accessible only to authorized personnel.
- B. Generator Overcurrent Protective Device:
 - 1. Molded-case circuit breaker, electronic-trip type; 100 percent rated; complying with UL 489:
 - a. Tripping Characteristics: Adjustable long-time and short-time delay and instantaneous.
 - b. Trip Settings: Selected to coordinate with generator thermal damage curve.
 - c. Shunt Trip: Connected to trip breaker when engine generator is shut down by other protective devices.
 - d. Mounting: Adjacent to, or integrated with, control and monitoring panel.
- C. Ground-Fault Indication: Comply with NFPA 70, "Emergency System" signals for ground fault.
 - 1. Trip generator protective device on ground fault.

2.08 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

- A. Comply with NEMA MG 1.
- B. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.
- C. Electrical Insulation: Class H.
- D. Stator-Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required. Provide 12-lead alternator.
- E. Range: Provide limited range of output voltage by adjusting the excitation level.
- F. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.
- G. Enclosure: Dripproof.
- H. Instrument Transformers: Mounted within generator enclosure.
- I. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified and as required by NFPA 110.

1. Adjusting Rheostat on Control and Monitoring Panel: Provide plus or minus 5 percent adjustment of output-voltage operating band.
 2. Maintain voltage within 30 percent on one step, full load.
 3. Provide anti-hunt provision to stabilize voltage.
 4. Maintain frequency within 15 percent and stabilize at rated frequency within 2 seconds.
- J. Strip Heater: Thermostatically controlled unit arranged to maintain stator windings above dew point.

2.09 OUTDOOR ENGINE GENERATOR ENCLOSURE

A. Description:

1. Vandal-resistant, sound-attenuating, weatherproof steel housing; wind resistant up to 100 mph. Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Panels shall be removable by one person without tools. Instruments and control shall be mounted within enclosure.
2. Prefabricated or pre-engineered, galvanized-steel-clad, integral structural-steel-framed, walk-in enclosure; erected on concrete foundation.

B. Structural Design and Anchorage: Comply with ASCE/SEI 7 for wind loads up to 100 mph.

C. Hinged Doors: With padlocking provisions.

D. Space Heater: Thermostatically controlled and sized to prevent condensation.

E. Thermal Insulation: Manufacturer's standard materials and thickness selected in coordination with space heater to maintain winter interior temperature within operating limits required by engine generator components.

F. Engine-Cooling Airflow through Enclosure: Maintain temperature rise of system components within required limits when unit operates at 110 percent of rated load for two hours with ambient temperature at top of range specified in system service conditions.

1. Louvers: Fixed-engine, cooling-air inlet and discharge. Stormproof and drainable louvers prevent entry of rain and snow.
2. Ventilation: Provide temperature-controlled exhaust fan interlocked to prevent operation when engine is running.

G. Interior Lights with Switch: Factory-wired, vapor-proof luminaires within housing; arranged to illuminate controls and accessible interior. Arrange for external electrical connection.

1. AC lighting system and connection point for operation when remote source is available.
2. DC lighting system for operation when remote source and generator are both unavailable.

H. Convenience Outlets: Factory-wired, GFCI. Arrange for external electrical connection.

2.010 VIBRATION ISOLATION DEVICES

- A. Elastomeric Isolator Pads: Oil- and water-resistant elastomer or natural rubber, arranged in single or multiple layers, molded with a nonslip pattern and galvanized-steel baseplates of sufficient stiffness for uniform loading over pad area, and factory cut to sizes that match requirements of supported equipment.
 - 1. Material: Standard neoprene separated by steel shims.
 - 2. Shore A Scale Durometer Rating: 30.
 - 3. Number of Layers: One.
 - 4. Minimum Deflection: 1 inch.
- B. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic restraint.
 - 1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to wind loads or if weight is removed; factory-drilled baseplate bonded to 1/4-inch-thick, elastomeric isolator pad attached to baseplate underside; and adjustable equipment-mounting and -leveling bolt that acts as blocking during installation.
 - 2. Outside Spring Diameter: Not less than 80 percent of compressed height of the spring at rated load.
 - 3. Minimum Additional Travel: 50 percent of required deflection at rated load.
 - 4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 - 6. Minimum Deflection: 1 inch.
- C. Vibration isolation devices shall not be used to accommodate misalignments or to make bends.

2.011 FINISHES

- A. Indoor and Outdoor Enclosures and Components: Manufacturer's standard finish over corrosion-resistant pretreatment and compatible primer.

2.012 SOURCE QUALITY CONTROL

- A. Prototype Testing: Factory test engine generator using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.
 - 1. Tests: Comply with IEEE 115.
- B. Project-Specific Equipment Tests: Before shipment, factory test engine generator and other system components and accessories manufactured specifically for this Project. Perform tests at rated load and power factor. Include the following tests:
 - 1. Test components and accessories furnished with installed unit that are not identical to those on tested prototype to demonstrate compatibility and reliability.
 - 2. Test generator, exciter, and voltage regulator as a unit.
 - 3. Full load run.
 - 4. Maximum power.

5. Voltage regulation.
6. Transient and steady-state governing.
7. Single-step load pickup.
8. Safety shutdown.
9. Provide 14 days' advance notice of tests and opportunity for observation of tests by Owner's representative.
10. Report factory test results within 10 days of completion of test.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting packaged engine generator performance.
- B. Examine roughing-in for piping systems and electrical connections. Verify actual locations of connections before packaged engine generator installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:
 1. Notify Architect and Owner no fewer than two working days in advance of proposed interruption of electrical service.
 2. Do not proceed with interruption of electrical service without Architect's and Owner's written permission.

3.03 INSTALLATION

- A. Comply with NECA 1 and NECA 404.
- B. Comply with packaged engine generator manufacturers' written installation and alignment instructions and with NFPA 110.
- C. Equipment Mounting:
 1. Install packaged engine generators on cast-in-place concrete equipment bases. Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."
 2. Coordinate size and location of concrete bases for packaged engine generators. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.
 3. Install packaged engine generator with elastomeric isolator pads having a minimum deflection of 1 inch on 4-inch- high concrete base. Secure enclosure to anchor bolts installed in concrete bases.

- D. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.
- E. Exhaust System: Install Schedule 40 black steel piping with welded joints and connect to engine muffler. Install thimble at wall. Piping shall be same diameter as muffler outlet.
 - 1. Piping materials and installation requirements are specified in Section 232113 "Hydronic Piping."
 - 2. Install flexible connectors and steel piping materials according to requirements in Section 232116 "Hydronic Piping Specialties."
 - 3. Insulate muffler/silencer and exhaust system components according to requirements in Section 230719 "HVAC Piping Insulation."
 - 4. Install isolating thimbles where exhaust piping penetrates combustible surfaces with a minimum of 9 inches of clearance from combustibles.
- F. Drain Piping: Install condensate drain piping to muffler drain outlet full size of drain connection with a shutoff valve, stainless-steel flexible connector, and Schedule 40 black steel pipe with welded joints.
 - 1. Piping materials and installation requirements are specified in Section 232113 "Hydronic Piping."
 - 2. Drain piping valves, connectors, and installation requirements are specified in Section 232116 "Hydronic Piping Specialties."
- G. Fuel Piping:
 - 1. Diesel storage tanks, tank accessories, piping, valves, and specialties for fuel systems are specified in Section 231113 "Facility Fuel-Oil Piping."
 - 2. Copper and galvanized steel shall not be used in the fuel-oil piping system.
- H. Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

3.04 CONNECTIONS

- A. Connect fuel, cooling-system, and exhaust-system piping adjacent to packaged engine generator to allow space for service and maintenance.
- B. Connect engine exhaust pipe to engine with flexible connector.
- C. Connect fuel piping to engines with a gate valve and union and flexible connector.
- D. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- E. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Provide a minimum of one 90-degree bend in flexible conduit routed to the engine generator from a stationary element.
- F. Balance single-phase loads to obtain a maximum of 10 percent unbalance between any two phases.

3.05 IDENTIFICATION

- A. Identify system components according to Section 230553 "Identification for HVAC Piping and Equipment" and Section 260553 "Identification for Electrical Systems."
- B. Install a sign indicating the generator neutral is bonded to the main service neutral at the main service location.

3.06 FIELD QUALITY CONTROL

A. Testing Agency:

- 1. Owner will engage a qualified testing agency to perform tests and inspections.
- 2. Engage a qualified testing agency to perform tests and inspections.
- 3. Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- 4. Perform tests and inspections with the assistance of a factory-authorized service representative.

B. Tests and Inspections:

- 1. Perform tests recommended by manufacturer and each visual and mechanical inspection and electrical and mechanical test listed in first two subparagraphs below, as specified in NETA ATS. Certify compliance with test parameters.
 - a. Visual and Mechanical Inspection:
 - 1) Compare equipment nameplate data with Drawings and the Specifications.
 - 2) Inspect physical and mechanical condition.
 - 3) Inspect anchorage, alignment, and grounding.
 - 4) Verify that the unit is clean.
 - b. Electrical and Mechanical Tests:
 - 1) Perform insulation-resistance tests according to IEEE 43.
 - a) Machines Larger Than 200 hp: Test duration shall be 10 minutes. Calculate polarization index.
 - b) Machines 200 hp or Less: Test duration shall be one minute. Calculate the dielectric-absorption ratio.
 - 2) Test protective relay devices.
 - 3) Verify phase rotation, phasing, and synchronized operation as required by the application.
 - 4) Functionally test engine shutdown for low oil pressure, overtemperature, overspeed, and other protection features as applicable.
 - 5) Perform vibration test for each main bearing cap.
 - 6) Verify correct functioning of the governor and regulator.
- 2. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to those specified here, including, but not limited to, single-step full-load pickup test.
- 3. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.
 - a. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.
 - b. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.

- c. Verify acceptance of charge for each element of the battery after discharge.
 - d. Verify that measurements are within manufacturer's specifications.
 - 4. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
 - 5. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine generator system before and during system operation. Check for air, exhaust, and fluid leaks.
 - 6. Exhaust-System Back-Pressure Test: Use a manometer with a scale exceeding 40-inch wg. Connect to exhaust line close to engine exhaust manifold. Verify that back pressure at full-rated load is within manufacturer's written allowable limits for the engine.
 - 7. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50 and 100 percent step-load increases and decreases, and verify that performance is as specified.
 - 8. Harmonic-Content Tests: Measure harmonic content of output voltage at 25 and 100 percent of rated linear load. Verify that harmonic content is within specified limits.
- C. Coordinate tests with tests for transfer switches and run them concurrently.
 - D. Test instruments shall have been calibrated within the past 12 months, traceable to NIST Calibration Services, and adequate for making positive observation of test results. Make calibration records available for examination on request.
 - E. Leak Test: After installation, charge exhaust, coolant, and fuel systems and test for leaks. Repair leaks and retest until no leaks exist.
 - F. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation for generator and associated equipment.
 - G. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - H. Remove and replace malfunctioning units and retest as specified above.
 - I. Retest: Correct deficiencies identified by tests and observations, and retest until specified requirements are met.
 - J. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.
 - K. Infrared Scanning: After Substantial Completion, but not more than 60 days after final acceptance, perform an infrared scan of each power wiring termination and each bus connection while running with maximum load. Remove all access panels so terminations and connections are accessible to portable scanner.
 - 1. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan 11 months after date of Substantial Completion.
 - 2. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

3. Record of Infrared Scanning: Prepare a certified report that identifies terminations and connections checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.07 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators.

END OF SECTION 263213.13

SECTION 263600 TRANSFER SWITCHES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Contactor-type automatic transfer switches.
2. Molded-case-type automatic transfer switches.
3. Transfer switch accessories.

1.02 ACTION SUBMITTALS

A. Product Data:

1. Contactor-type automatic transfer switches.
2. Molded-case-type automatic transfer switches.
3. Transfer switch accessories.

B. Product Data Submittals: For each product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for transfer switches.
2. Include rated capacities, operating characteristics, electrical characteristics, and accessories.

C. Shop Drawings:

1. Include plans, elevations, sections, details showing minimum clearances, conductor entry provisions, gutter space, and installed features and devices.
2. Include material lists for each switch specified.
3. Single-Line Diagram: Show connections between transfer switch, power sources, and load; and show interlocking provisions for each combined transfer switch and bypass/isolation switch.
4. Riser Diagram: Show interconnection wiring between transfer switches, bypass/isolation switches, annunciators, and control panels.

1.03 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer-authorized service representative.

B. Field quality-control reports.

1.04 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

- a. Features and operating sequences, both automatic and manual.
- b. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

1.05 QUALITY ASSURANCE

A. Testing Agency Qualifications:

1. Member company of NETA.
 - a. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.06 FIELD CONDITIONS

- ##### A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service:
1. Notify Architect and Owner no fewer than two days in advance of proposed interruption of electrical service.
 2. Do not proceed with interruption of electrical service without Architect's and Owner's written permission.

1.07 WARRANTY

- ##### A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of transfer switch or transfer switch components that fail in materials or workmanship within specified warranty period.
1. Warranty Period: 12 months from date of Substantial Completion.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- ##### A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- ##### B. Comply with NEMA ICS 1.
- ##### C. Comply with NFPA 110.
- ##### D. Comply with UL 1008 unless requirements of these Specifications are stricter.
- ##### E. Tested Fault-Current Closing and Short-Circuit Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.
1. Where transfer switch includes internal fault-current protection, rating of switch and trip unit combination shall exceed indicated fault-current value at installation location.

2. Short-time withstand capability for three cycles.
- F. Repetitive Accuracy of Solid-State Controls: All settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C.
 - G. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.62. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.
 - H. Electrical Operation: Accomplish by a nonfused, momentarily energized solenoid or electric-motor-operated mechanism. Switches for emergency or standby purposes shall be mechanically and electrically interlocked in both directions to prevent simultaneous connection to both power sources unless closed transition.
 - I. Neutral Switching: Where four-pole switches are indicated, provide neutral pole switched simultaneously with phase poles.
 - J. Neutral Terminal: Solid and fully rated unless otherwise indicated.
 - K. Heater: Equip switches exposed to outdoor temperatures and humidity, and other units indicated, with an internal heater. Provide thermostat within enclosure to control heater.
 - L. Battery Charger: For generator starting batteries.
 1. Float type, rated 2 A.
 2. Ammeter to display charging current.
 3. Fused ac inputs and dc outputs.
 - M. Annunciation, Control, and Programming Interface Components: Devices at transfer switches for communicating with remote programming devices, annunciators, or annunciator and control panels shall have communication capability matched with remote device.
 - N. Factory Wiring: Train and bundle factory wiring and label, consistent with Shop Drawings, by color-code or by numbered or lettered wire and cable with printed markers at terminations. Color-coding and wire and cable markers are specified in Section 260553 "Identification for Electrical Systems."
 1. Designated Terminals: Pressure type, suitable for types and sizes of field wiring indicated.
 2. Power-Terminal Arrangement and Field-Wiring Space: Suitable for top, side, or bottom entrance of feeder conductors as indicated.
 3. Control Wiring: Equipped with lugs suitable for connection to terminal strips.
 4. Accessible via front access.
 - O. Enclosures: General-purpose NEMA 250, Type 3R, complying with NEMA ICS 6 and UL 508, unless otherwise indicated.

2.02 CONTACTOR-TYPE AUTOMATIC TRANSFER SWITCHES

- A. Comply with Level 1 equipment according to NFPA 110.

- B. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.
1. Limitation: Switches using molded-case switches or circuit breakers or insulated-case circuit-breaker components are unacceptable.
 2. Switch Action: Double throw; mechanically held in both directions.
 3. Contacts: Silver composition or silver alloy for load-current switching. Contactor-style automatic transfer-switch units, rated 600 A and higher, shall have separate arcing contacts.
 4. Conductor Connectors: Suitable for use with conductor material and sizes.
 5. Material: Hard-drawn copper, 98 percent conductivity.
 6. Main and Neutral Lugs: Compression type.
 7. Ground Lugs and Bus-Configured Terminators: Compression type.
 8. Ground bar.
 9. Connectors shall be marked for conductor size and type according to UL 1008.
- C. Automatic Open-Transition Transfer Switches: Interlocked to prevent the load from being closed on both sources at the same time.
1. Sources shall be mechanically and electrically interlocked to prevent closing both sources on the load at the same time.
- D. Manual Switch Operation, Load-Breaking: Under load, with door closed and with either or both sources energized. Transfer time is same as for electrical operation. Control circuit automatically disconnects from electrical operator during manual operation.
- E. Manual Switch Operation, Non-Load-Breaking: Unloaded. Control circuit automatically disconnects from electrical operator during manual operation.
- F. Electric Nonautomatic Switch Operation: Electrically actuated by push buttons designated "Normal Source" and "Alternative Source." Switch shall be capable of transferring load in either direction with either or both sources energized.
- G. Digital Communication Interface: Matched to capability of remote annunciator or annunciator and control panel.
- H. Automatic Transfer-Switch Controller Features:
1. Controller operates through a period of loss of control power.
 2. Voltage/Frequency Lockout Relay: Prevent premature transfer to generator. Pickup voltage shall be adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent. Pickup frequency shall be adjustable from 90 to 100 percent of nominal. Factory set for pickup at 95 percent.
 3. Time Delay for Retransfer to Normal Source: Adjustable from zero to 30 minutes, and factory set for 10 minutes. Override shall automatically defeat delay on loss of voltage or sustained undervoltage of emergency source, provided normal supply has been restored.
 4. Test Switch: Simulate normal-source failure.
 5. Switch-Position Pilot Lights: Indicate source to which load is connected.
 6. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and emergency-source sensing circuits.

- a. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."
 - b. Emergency Power Supervision: Red light with nameplate engraved "Emergency Source Available."
7. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.
 8. Transfer Override Switch: Overrides automatic retransfer control so transfer switch will remain connected to emergency power source regardless of condition of normal source. Pilot light indicates override status.
 9. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum.
 10. Engine Shutdown Contacts:
 - a. Time delay adjustable from zero to five minutes, and factory set for five minutes. Contacts shall initiate shutdown at remote engine-generator controls after retransfer of load to normal source.
 11. Engine-Generator Exerciser: Solid-state, programmable-time switch starts engine generator and transfers load to it from normal source for a preset time, then retransfers and shuts down engine after a preset cool-down period. Initiates exercise cycle at preset intervals adjustable from 7 to 30 days. Running periods shall be adjustable from 10 to 30 minutes. Factory settings shall be for 7-day exercise cycle, 20-minute running period, and 5-minute cool-down period. Exerciser features include the following:
 - a. Exerciser Transfer Selector Switch: Permits selection of exercise with and without load transfer.
 - b. Push-button programming control with digital display of settings.
 - c. Integral battery operation of time switch when normal control power is unavailable.

2.03 TRANSFER SWITCH ACCESSORIES

A. Remote Annunciator System:

1. Source Limitations: Same manufacturer as transfer switch in which installed.
2. Functional Description: Remote annunciator panel shall annunciate conditions for indicated transfer switches.
3. Annunciation panel display shall include the following indicators:
 - a. Sources available, as defined by actual pickup and dropout settings of transfer-switch controls.
 - b. Switch position.
 - c. Switch in test mode.
 - d. Failure of communication link.
4. Annunciator Panel: LED-lamp type with audible signal and silencing switch.
 - a. Indicating Lights: Grouped for each transfer switch monitored.
 - b. Label each group, indicating transfer switch it monitors, location of switch, and identity of load it serves.
 - c. Mounting: Flush, modular, steel cabinet unless otherwise indicated.
 - d. Lamp Test: Push-to-test or lamp-test switch on front panel.

B. Remote Annunciator and Control System:

1. Source Limitations: Same manufacturer as transfer switch in which installed.
2. Include the following functions for indicated transfer switches:

- a. Indication of sources available, as defined by actual pickup and dropout settings of transfer-switch controls.
 - b. Indication of switch position.
 - c. Indication of switch in test mode.
 - d. Indication of failure of digital communication link.
 - e. Key-switch or user-code access to control functions of panel.
 - f. Control of switch-test initiation.
 - g. Control of switch operation in either direction.
3. Malfunction of annunciator, annunciation and control panel, or communication link shall not affect functions of automatic transfer switch. In the event of failure of communication link, automatic transfer switch automatically shall revert to standalone, self-contained operation. Automatic transfer-switch sensing, controlling, or operating function shall not depend on remote panel for proper operation.
4. Remote Annunciation and Control Panel: Solid-state components. Include the following features:
- a. Controls and indicating lights grouped together for each transfer switch.
 - b. Label each indicating light control group. Indicate transfer switch it controls, location of switch, and load it serves.
 - c. Digital Communication Capability: Matched to that of transfer switches supervised.
 - d. Mounting: Flush, modular, steel cabinet unless otherwise indicated.

2.04 SOURCE QUALITY CONTROL

- A. Factory Tests: Test and inspect components, assembled switches, and associated equipment according to UL 1008. Ensure proper operation. Check transfer time and voltage, frequency, and time-delay settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.
- B. Prepare test and inspection reports.
1. For each of the tests required by UL 1008, performed on representative devices, for emergency systems. Include results of test for the following conditions:
- a. Overvoltage.
 - b. Undervoltage.
 - c. Loss of supply voltage.
 - d. Reduction of supply voltage.
 - e. Alternative supply voltage or frequency is at minimum acceptable values.
 - f. Temperature rise.
 - g. Dielectric voltage-withstand; before and after short-circuit test.
 - h. Overload.
 - i. Contact opening.
 - j. Endurance.
 - k. Short circuit.
 - l. Short-time current capability.
 - m. Receptacle withstand capability.
 - n. Insulating base and supports damage.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Floor-Mounting Switch: Anchor to floor by bolting.
 - 1. Install transfer switches on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."
 - 2. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases.
 - 3. Provide workspace and clearances required by NFPA 70.
- B. Annunciator and Control Panel Mounting: Flush in wall unless otherwise indicated.
- C. Identify components according to Section 260553 "Identification for Electrical Systems."
- D. Set field-adjustable intervals and delays, relays, and engine exerciser clock.
- E. Comply with NECA 1.

3.02 CONNECTIONS

- A. Wiring to Remote Components: Match type and number of cables and conductors to generator sets, control, and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.
- B. Wiring Method: Install cables in raceways and cable trays except within electrical enclosures. Conceal raceway and cables except in unfinished spaces.
 - 1. Comply with requirements for raceways specified in Section 260533.13 "Conduits for Electrical Systems."
- C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
- D. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- E. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- F. Connect twisted pair cable according to Section 260523 "Control-Voltage Electrical Power Cables."
- G. Route and brace conductors according to manufacturer's written instructions and Section 260529 "Hangers and Supports for Electrical Systems." Do not obscure manufacturer's markings and labels.
- H. Brace and support equipment according to Section 260548.16 "Seismic Controls for Electrical Systems."

- I. Final connections to equipment shall be made with liquidtight, flexible metallic conduit no more than 18 inches in length.

3.03 FIELD QUALITY CONTROL

A. Administrant for Tests and Inspections:

1. Engage qualified testing agency to administer and perform tests and inspections.

B. Tests and Inspections:

1. After installing equipment, test for compliance with requirements according to NETA ATS.
2. Visual and Mechanical Inspection:
 - a. Compare equipment nameplate data with Drawings and Specifications.
 - b. Inspect physical and mechanical condition.
 - c. Inspect anchorage, alignment, grounding, and required clearances.
 - d. Verify that the unit is clean.
 - e. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.
 - f. Verify that manual transfer warnings are attached and visible.
 - g. Verify tightness of all control connections.
 - h. Inspect bolted electrical connections for high resistance using one of the following methods, or both:
 - 1) Use of low-resistance ohmmeter.
 - 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method according to manufacturer's published data.
 - i. Perform manual transfer operation.
 - j. Verify positive mechanical interlocking between normal and alternate sources.
 - k. Perform visual and mechanical inspection of surge arresters.
 - l. Inspect control power transformers.
 - 1) Inspect for physical damage, cracked insulation, broken leads, tightness of connections, defective wiring, and overall general condition.
 - 2) Verify that primary and secondary fuse or circuit-breaker ratings match Drawings.
 - 3) Verify correct functioning of drawout disconnecting contacts, grounding contacts, and interlocks.
3. Electrical Tests:
 - a. Perform insulation-resistance tests on all control wiring with respect to ground.
 - b. Verify settings and operation of control devices.
 - c. Calibrate and set all relays and timers.
 - d. Verify phase rotation, phasing, and synchronized operation.
 - e. Perform automatic transfer tests.
 - f. Verify correct operation and timing of the following functions:
 - 1) Normal source voltage-sensing and frequency-sensing relays.
 - 2) Engine start sequence.
 - 3) Time delay on transfer.
 - 4) Alternative source voltage-sensing and frequency-sensing relays.
 - 5) Automatic transfer operation.
 - 6) Interlocks and limit switch function.
 - 7) Time delay and retransfer on normal power restoration.
 - 8) Engine cool-down and shutdown feature.

4. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.
 - a. Check for electrical continuity of circuits and for short circuits.
 - b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.
 - c. Verify that manual transfer warnings are properly placed.
 - d. Perform manual transfer operation.
 5. After energizing circuits, perform each electrical test for transfer switches stated in NETA ATS and demonstrate interlocking sequence and operational function for each switch at least three times.
 - a. Simulate power failures of normal source to automatic transfer switches and retransfer from emergency source with normal source available.
 - b. Verify time-delay settings.
 - c. Verify pickup and dropout voltages by data readout or inspection of control settings.
 - d. Test bypass/isolation unit functional modes and related automatic transfer-switch operations.
 - e. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.
 6. Ground-Fault Tests: Coordinate with testing of ground-fault protective devices for power delivery from both sources.
 - a. Verify grounding connections and locations and ratings of sensors.
- C. Coordinate tests with tests of generator and run them concurrently.
- D. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.
- E. Transfer switches will be considered defective if they do not pass tests and inspections.
- F. Remove and replace malfunctioning units and retest as specified above.
- G. Prepare test and inspection reports.

3.04 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment.
- B. Training shall include testing ground-fault protective devices and instructions to determine when the ground-fault system shall be retested. Include instructions on where ground-fault sensors are located and how to avoid negating the ground-fault protection scheme during testing and circuit modifications.
- C. Coordinate this training with that for generator equipment.

END OF SECTION 263600

Attachment No. 3: Revised Civil Drawings:

Revised Drawing No. C-0004: Grading Plan

Revised Drawing No. C-0005: Wastewater Management Plan

Revised Drawing No. C-0006: General Details

WASTE MANAGEMENT PLAN

A. WASTE SCREENING, CLASSIFICATION, HANDLING, AND TEMPORARY STORAGE

BASED ON THE APPROXIMATE WASTE LIMITS OF THE PRE-REGULATORY LANDFILL, ONLY ROADS AND DITCHES FROM THIS EXPANSION CONSTRUCTION WILL BE CONSTRUCTED WITHIN THE PRE-REGULATORY LANDFILL AREA. LABELLA ESTIMATES A MINIMUM OF APPROXIMATELY 3,400 CY OF WASTE MATERIAL AND COVER SOIL WILL BE EXCAVATED USING THE PROPOSED GRADING PLAN AND A MINIMUM OF TWO (2) FEET BELOW THE PROPOSED FINISHED GRADE TO ALLOW FOR THE RECONSTRUCTION OF THE FINAL CAP OF THE PRE-REGULATORY LANDFILL. ADDITIONAL EXCAVATION MAY BE NEEDED TO ALLOW FOR THE CONSTRUCTION OF A SUITABLE SUBGRADE FOR THE ROADWAYS.

ONLY EXPERIENCED CONTRACTORS THAT HAVE PRIOR EXPERIENCE IN EXCAVATING, HANDLING, CLASSIFYING, AND DISPOSAL OF WASTE, AND MANAGING LEACHATE AND LANDFILL GAS WILL BE CONSIDERED FOR THIS PROJECT. THE CONTRACTOR WILL BE REQUIRED TO EXCAVATE AND REMOVE WASTE MATERIAL IN SECTIONS TO ALLOW FOR THE INSTALLATION OF DAILY COVER (A MINIMUM OF 12" OF SOIL) AT THE END OF EACH DAY. THE COVERED AREA WILL BE SLOPED TO ALLOW FOR STORMWATER RUNOFF AND TO MINIMIZE INFILTRATION INTO THE UNDERLYING WASTE. NO WASTE SHALL BE LEFT UNCOVERED OR EXPOSED AT THE END OF EACH WORKING DAY OR PRIOR TO A STORM. PLASTIC SHEETING OR TARPS MAY BE USED BY THE CONTRACTOR TO COVER EXPOSED WASTE PRIOR TO THE RECONSTRUCTION OF THE FINAL CAP SYSTEM. IF DEEMED MORE PRACTICAL THAN USING COVER SOIL, DIVERSION BERMS, CONSTRUCTED BY ADDING SOIL TO THE EXISTING LANDFILL CAP, WILL BE USED TO DIVERT RUN-OFF FROM FLOWING INTO THE EXCAVATION AREA.

ALL EXCAVATED MATERIAL FROM THE PRE-REGULATORY LANDFILL WILL BE SCREENED/IDENTIFIED DURING EXCAVATION. IF THE EXCAVATED MATERIAL IS IDENTIFIED AS MUNICIPAL SOLID WASTE (MSW), THE MATERIAL WILL BE HAULED TO THE TRANSFER STATION BUILDING BEFORE DISPOSAL AT A SUBTITLE D LANDFILL. IF THE MATERIAL IS DEEMED UNSUITABLE/UNACCEPTABLE FOR DISPOSAL AT A SUBTITLE D LANDFILL, THE MATERIAL WILL BE STORED IN LEAK-RESISTANT TRAILERS/CONTAINERS FOR FURTHER IDENTIFICATION, SCREENING, AND TESTING. NO EXCAVATED MATERIAL FROM THE PRE-REGULATORY LANDFILL WILL BE STOCKPILED ON-SITE.

B. WASTE DISPOSAL

ALL EXCAVATED MATERIAL FROM THE PRE-REGULATORY LANDFILL WILL BE DISPOSED IN ACCORDANCE WITH FEDERAL AND STATE REGULATIONS AND RULES. SEE SPECIFICATION 01060 (REGULATORY REQUIREMENTS). IF THE EXCAVATED MATERIAL IS DEEMED ACCEPTABLE FOR DISPOSAL IN A SUBTITLE D MSW LANDFILL, THE MATERIAL WILL BE HAULED TO THE TRANSFER STATION FOR DISPOSAL AT THE TUSCARORA LONG-TERM REGIONAL LANDFILL (TLRL). SOLID WASTE PERMIT NO. 2509-MSWLF-1999. IF THE MATERIAL IS DEEMED HAZARDOUS WASTE, CRSWMA WILL CONTACT AN ENVIRONMENTAL SERVICES COMPANY TO REMOVE AND PROPERLY DISPOSE OF THE MATERIAL AT A SUBTITLE C LANDFILL. ALL RECORDS OF WASTE REMOVED FROM THE SITE TO A SUBTITLE D OR SUBTITLE C LANDFILL WILL BE DOCUMENTED AND RETAINED ON-SITE DURING CONSTRUCTION.

C. CONTINGENCY PLAN

AS MENTIONED IN SECTION A OF THIS PLAN, A CONTRACTOR EXPERIENCED IN WASTE EXCAVATION, WASTE HANDLING, WASTE DISPOSAL AND DEALING WITH LANDFILL GAS/EXPLOSIVE GASES WILL BE SELECTED TO PERFORM THIS WORK. THIS CONTRACTOR WILL BE INFORMED OF THE PRE-REGULATORY LANDFILL AND WILL BE REQUIRED TO USE EXPLOSIVE GAS MONITORING, FIRE PREVENTION AND CONTROL, AND GENERAL SAFETY MEASURES AND PROCEDURES DURING CONSTRUCTION. IN THE EVENT OF A FIRE, THE APPROPRIATE INDIVIDUALS AND AGENCIES TO CONTACT ARE PROVIDED IN SECTION 5.0 OF THE FACILITY'S OPERATIONS PLAN (WHICH WILL BE RETAINED ON-SITE AT ALL TIMES DURING CONSTRUCTION AND THE FACILITY'S OPERATION). CRSWMA HAS A MUTUAL AID AGREEMENT WITH THE TOWN OF NEWPORT FIRE SERVICE TO PROVIDE FIRE-FIGHTING SERVICES FOR THE TRANSFER STATION. ADDITIONALLY, LEAK-RESISTANT TRAILERS/CONTAINERS WILL BE AVAILABLE AT THE EXCAVATION AREA TO STORE ANY SUSPECT WASTE FOR FURTHER IDENTIFICATION, SCREENING, AND OFF-SITE DISPOSAL AT REGULATED FACILITIES. IF THE MATERIAL IS DEEMED AS HAZARDOUS WASTE, CRSWMA WILL CONTACT AN ENVIRONMENTAL SERVICES COMPANY TO REMOVE AND PROPERLY DISPOSE THE MATERIAL AT A SUBTITLE C LANDFILL. IF WASTE IS DISCOVERED OUTSIDE OF THE APPROXIMATE WASTE LIMITS OF THE PRE-REGULATORY LANDFILL, CRSWMA WILL IMPLEMENT THE SAME PROCEDURES DESCRIBED IN SECTIONS A AND B OF THIS WASTE MANAGEMENT PLAN.

D. RESTORATION OF PRE-REGULATORY LANDFILL CAP SYSTEM

AFTER THE EXCAVATION AND REMOVAL OF THE WASTE MATERIAL TO A MINIMUM OF TWO (2) FEET BELOW PROPOSED FINISHED GRADES, A SOIL CAP OF TWO (2) FEET OF CLEAN SOIL WILL BE USED TO CAP THE UNDERLYING WASTE MASS PRIOR TO THE CONSTRUCTION OF THE PROPOSED ROADS AND DITCHES. AT THE COMPLETION OF THE CONSTRUCTION, THE ACCESS ROADS WILL BE PAVED AND THE DITCHES WILL BE STABILIZED. THE RUNOFF FROM THE ROADS, AND THE STORMWATER IN THE DITCHES WILL BE CONVEYED TO THE PROPOSED SEDIMENT BASINS.

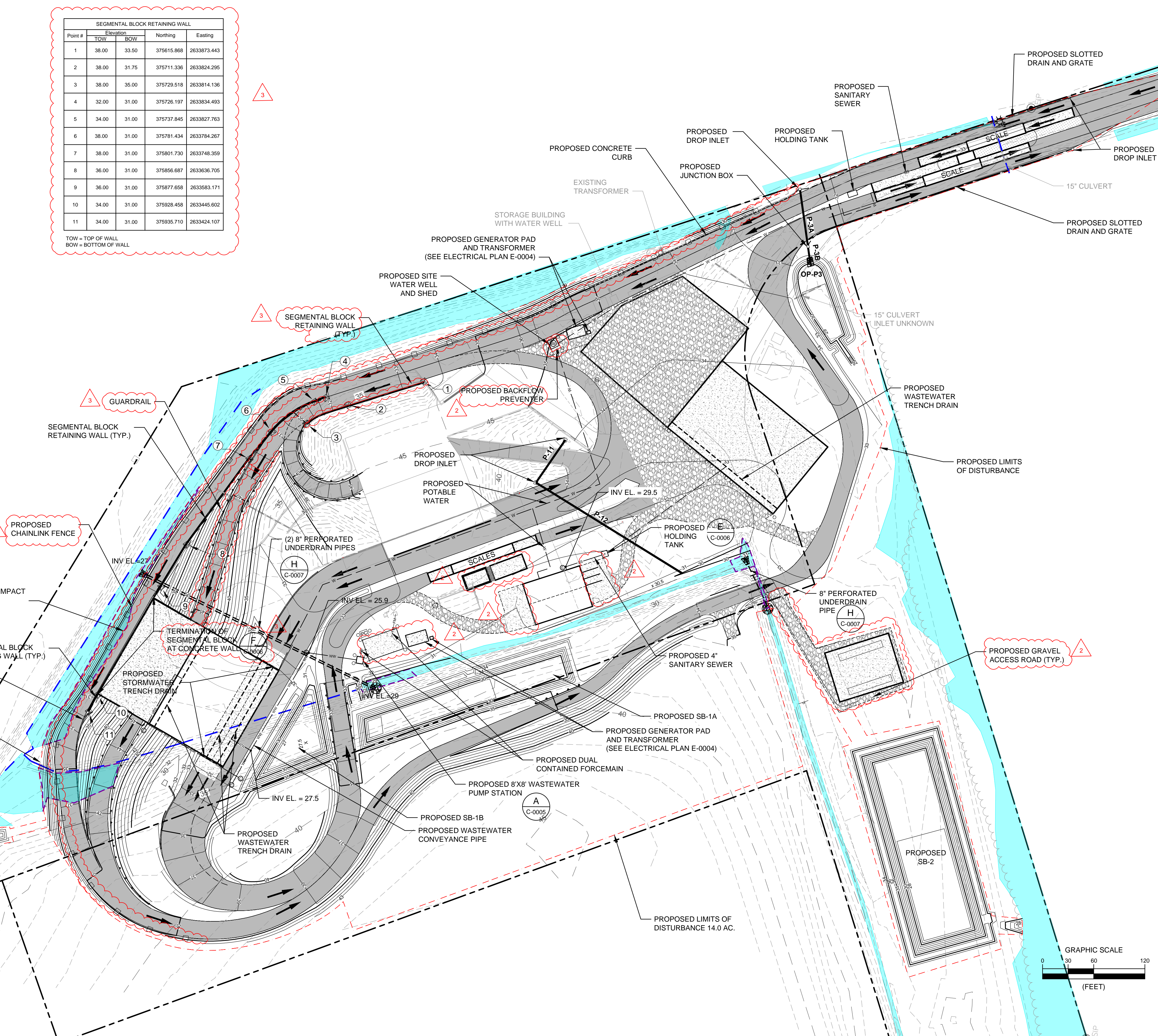
NOTES:

1. NO COMPOSTING WILL BE PERFORMED AT THE SITE. ALL YARD WASTE WILL BE HAULED TO THE TUSCARORA LONG-TERM REGIONAL LANDFILL (TLRL).
2. PRIOR TO PLANNED CONSTRUCTION ACTIVITIES, EDGE MARKERS SHALL BE INSTALLED ALONG THE APPROXIMATE BOUNDARY OF THE PRE-REGULATORY LANDFILL. THESE LANDFILL EDGE MARKERS SHALL BE CLEARLY VISIBLE AND MAINTAINED THROUGHOUT THE LIFE TERM OF THE TRANSFER STATION.
3. CRSWMA SHALL SUBMIT A PRE-CONSTRUCTION NOTIFICATION (PCN) TO THE UNITED STATES ARMY CORP OF ENGINEER (USACE) DISTRICT ENGINEER PRIOR TO THE COMMENCEMENT OF CONSTRUCTION ACTIVITIES.

Point #	Elevations		Northing	Easting
	TOW	BOW		
1	38.00	33.50	375615.868	2633873.443
2	38.00	31.75	375711.336	2633824.295
3	38.00	35.00	375729.518	2633814.136
4	32.00	31.00	375726.197	2633834.493
5	34.00	31.00	375737.845	2633827.763
6	38.00	31.00	375781.434	2633784.267
7	38.00	31.00	375801.730	2633748.359
8	36.00	31.00	375866.687	2633636.705
9	36.00	31.00	375877.658	2633583.171
10	34.00	31.00	375928.458	2633445.602
11	34.00	31.00	375935.710	2633424.107

TOW = TOP OF WALL
BOW = BOTTOM OF WALL

NOTE:
WASTE EXCAVATION, REMOVAL, AND DISPOSAL WILL BE PERFORMED BY THE OWNER. THE WASTE MANAGEMENT PLAN SHOWN ON THIS DRAWING IS A REGULATORY REQUIREMENT AND IS PROVIDED FOR REFERENCE. THE CONTRACTOR WILL PERFORM THE BACKFILLING OF THE EXCAVATED AREAS PER SECTION D OF THE WASTE MANAGEMENT PLAN.



CORPORATE ENGINEERING
LICENSE NO. C-0430

LABELLA ASSOCIATES P.C.
REGISTERED ARCHITECTURE COMPANY
CERT. NO. 52904
REGISTERED PROFESSIONAL ENGINEER
MOLISA A. MAINMORN
NORTH CAROLINA
049153

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COASTAL REGIONAL SOLID WASTE MANAGEMENT AUTHORITY

7400 OLD US 70 HIGHWAY
NEW BERN, NC 28562



NEWPORT TRANSFER STATION EXPANSION

800 HIBBS ROAD
NEWPORT, NC 28570

NO.	DATE	DESCRIPTION
3	1/31/2024	REVISED FOR ADDENDUM #2
2	1/18/24	REVISED FOR ADDENDUM #1
1	12/8/23	ISSUED FOR REBID

Revisions

PROJECT NUMBER: 2201731.02

DRAWN BY: RH

REVIEWED BY: KN

ISSUED FOR: REBID

DATE: 12/08/23

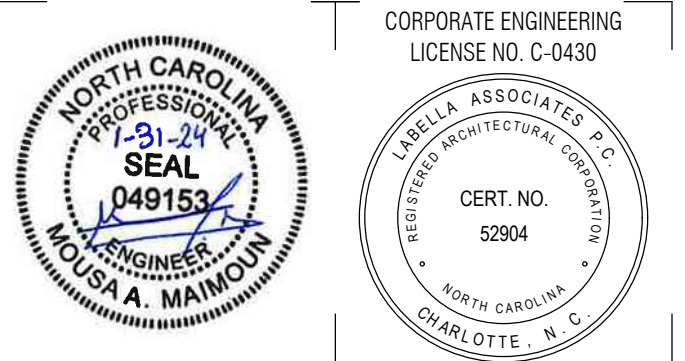
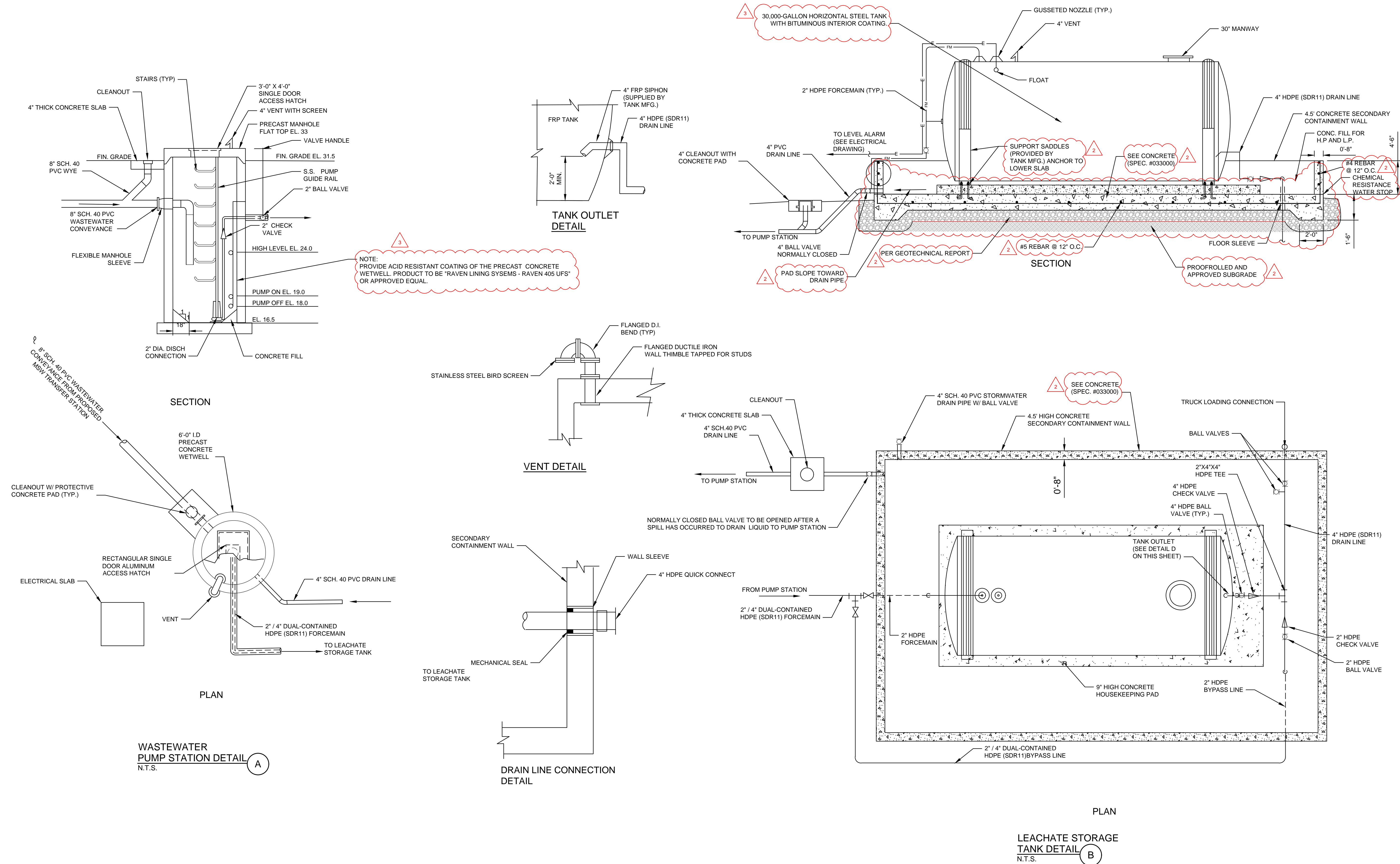
DRAWING NAME:

GRADING PLAN

DRAWING NUMBER:

C-0004

- NOTES:
1. PROVIDE GALVANIZED PIPE SUPPORTS AND BRACKETS IN ACCORDANCE WITH MSS SP-58.
 2. ELECTRICAL CONDUIT AND 2" FORCEMAIN SHALL BE SUPPORTED BY GALV KINDORF STRUTS AND BRACKETS AS RECOMMENDED BY MSS SP-58.



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COASTAL REGIONAL SOLID WASTE MANAGEMENT AUTHORITY

7400 OLD US 70 HIGHWAY
NEW BERN, NC 28562



NEWPORT TRANSFER STATION EXPANSION

800 HIBBS ROAD
NEWPORT, NC 28570

NO.	DATE	DESCRIPTION
3	1/31/2024	REVISED FOR ADDENDUM #2
2	1/18/24	REVISED FOR ADDENDUM #1
1	12/8/23	ISSUED FOR REBID

PROJECT NUMBER: 2201731.02

DRAWN BY: RH
REVIEWED BY: KN

ISSUED FOR: REBID

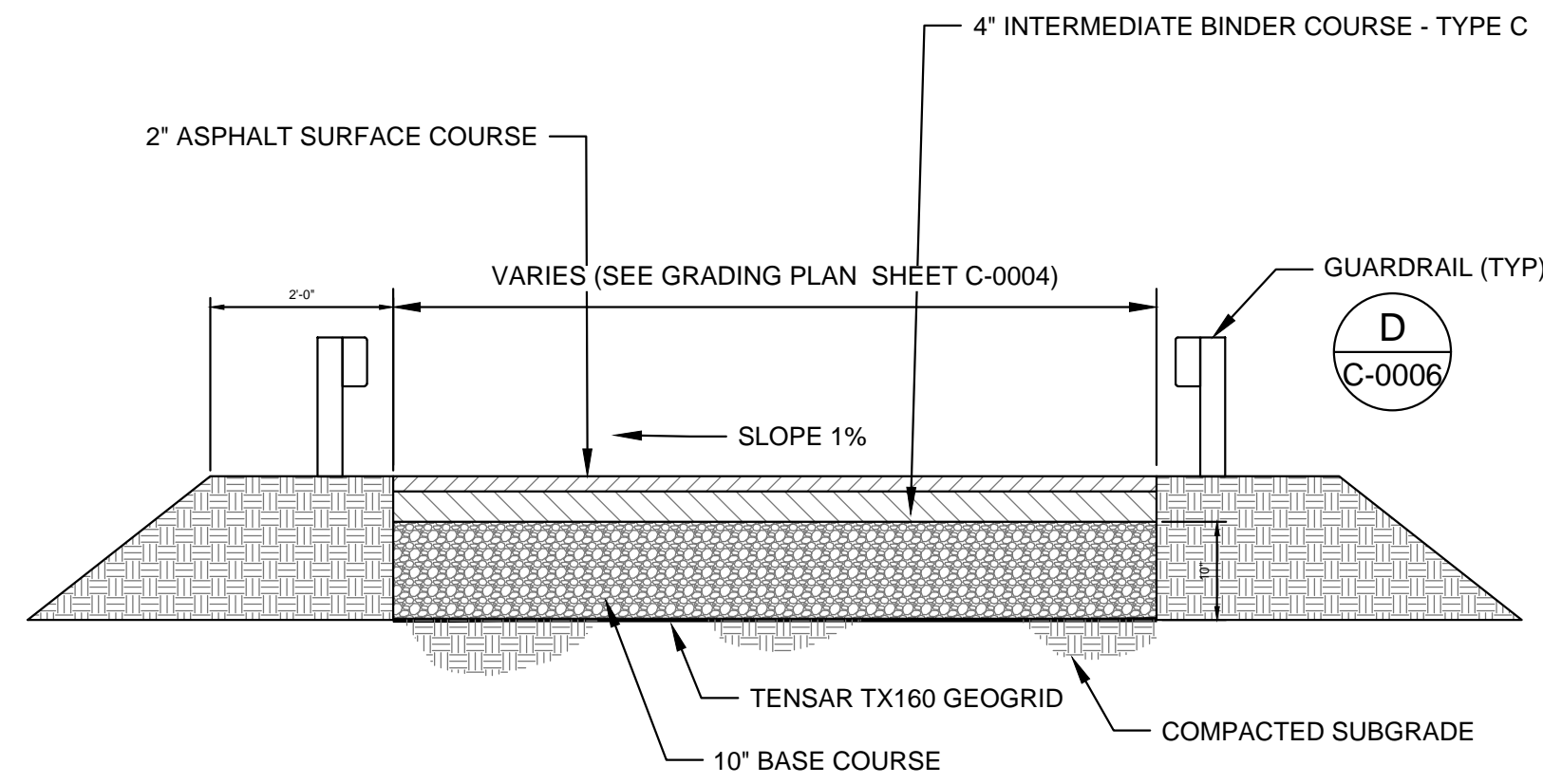
DATE: 12/08/23

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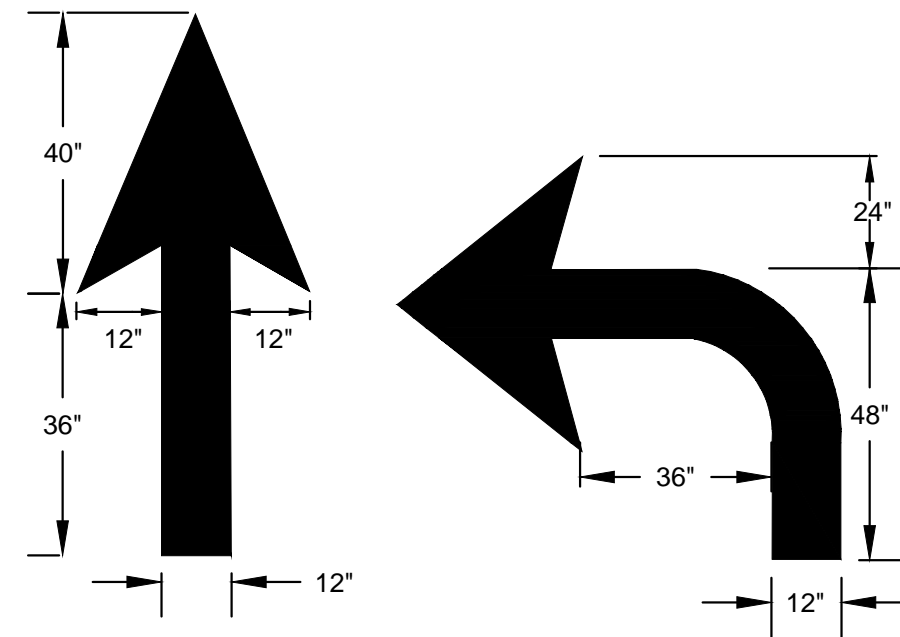
WASTEWATER MANAGEMENT PLAN

DRAWING NUMBER:

C-0005



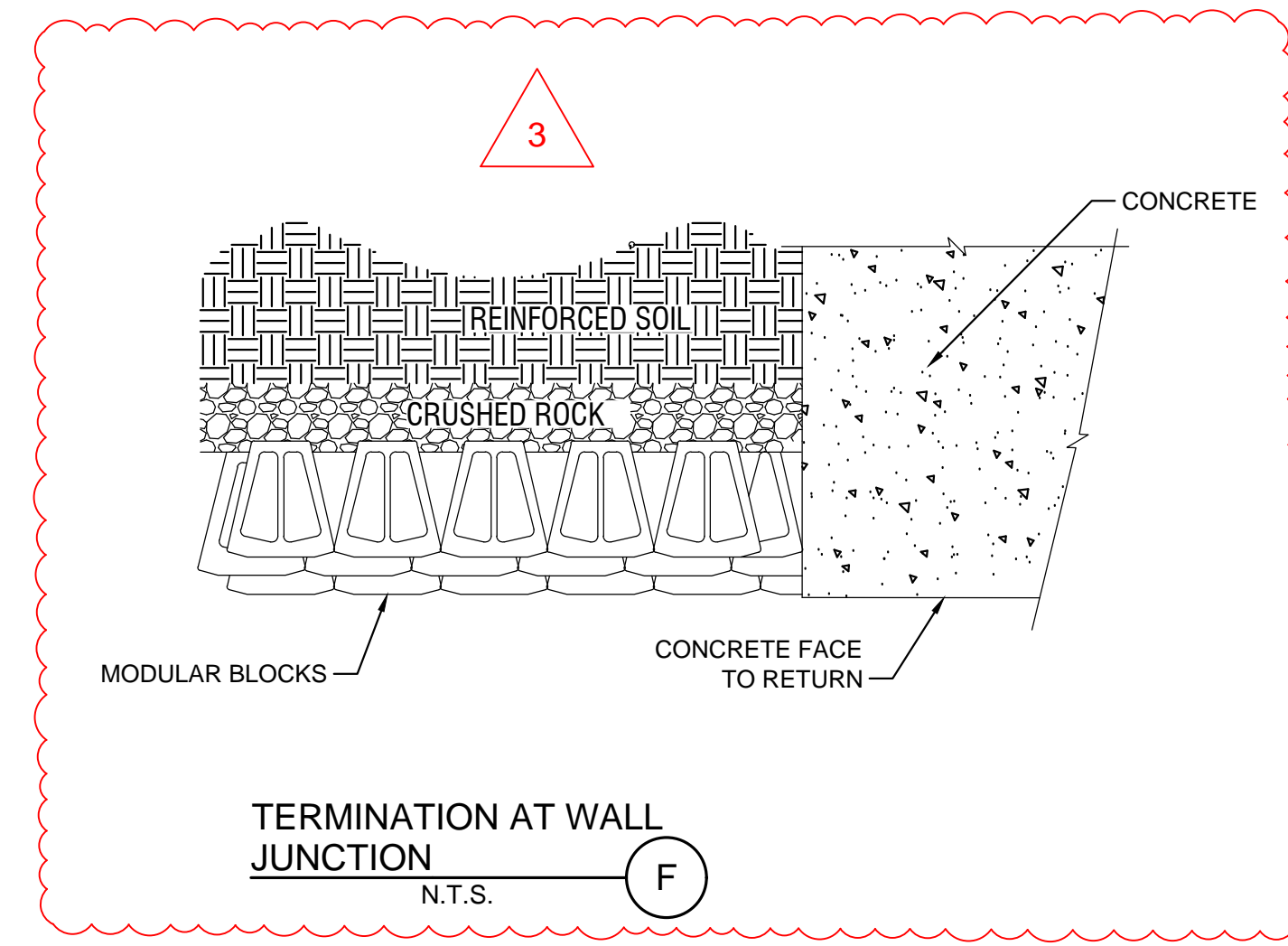
TRANSFER STATION ACCESS RAMP
N.T.S. (A)



GENERAL NOTES:

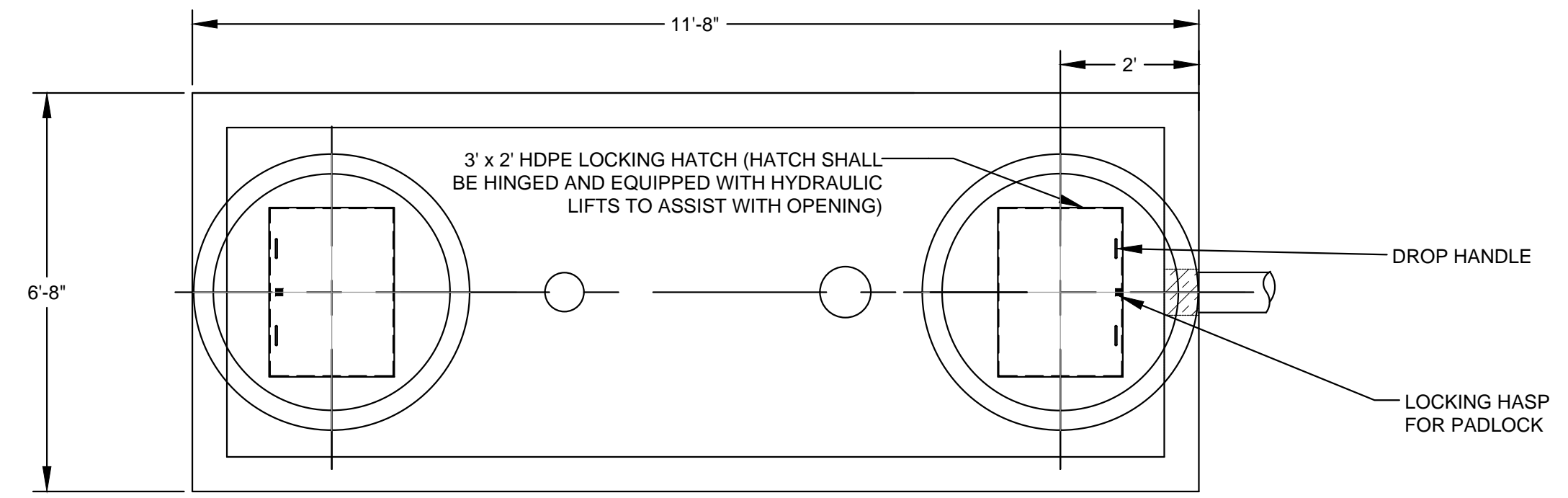
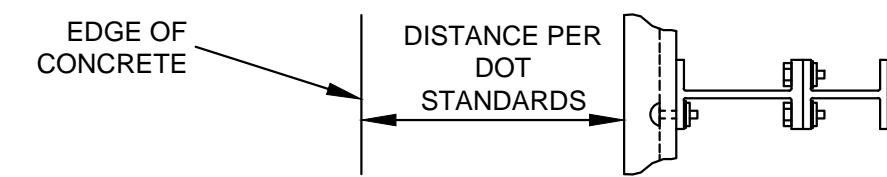
- PAVEMENT MARKING SHALL BE 12" WIDE AND PAINTED WHITE UNLESS OTHERWISE INDICATED.
- DO NOT LOCATE PAVEMENT MARKING SYMBOLS AS TO ENCR OACH INTO INTERSECTION AREAS.
- DO NOT PLACE PAVEMENT MARKING SYMBOLS ACROSS TRANSVERSE EXPANSION JOINTS ON PORTLAND CEMENT CONCRETE PAVEMENTS.

TRAFFIC MARKING DETAIL
N.T.S. (B)

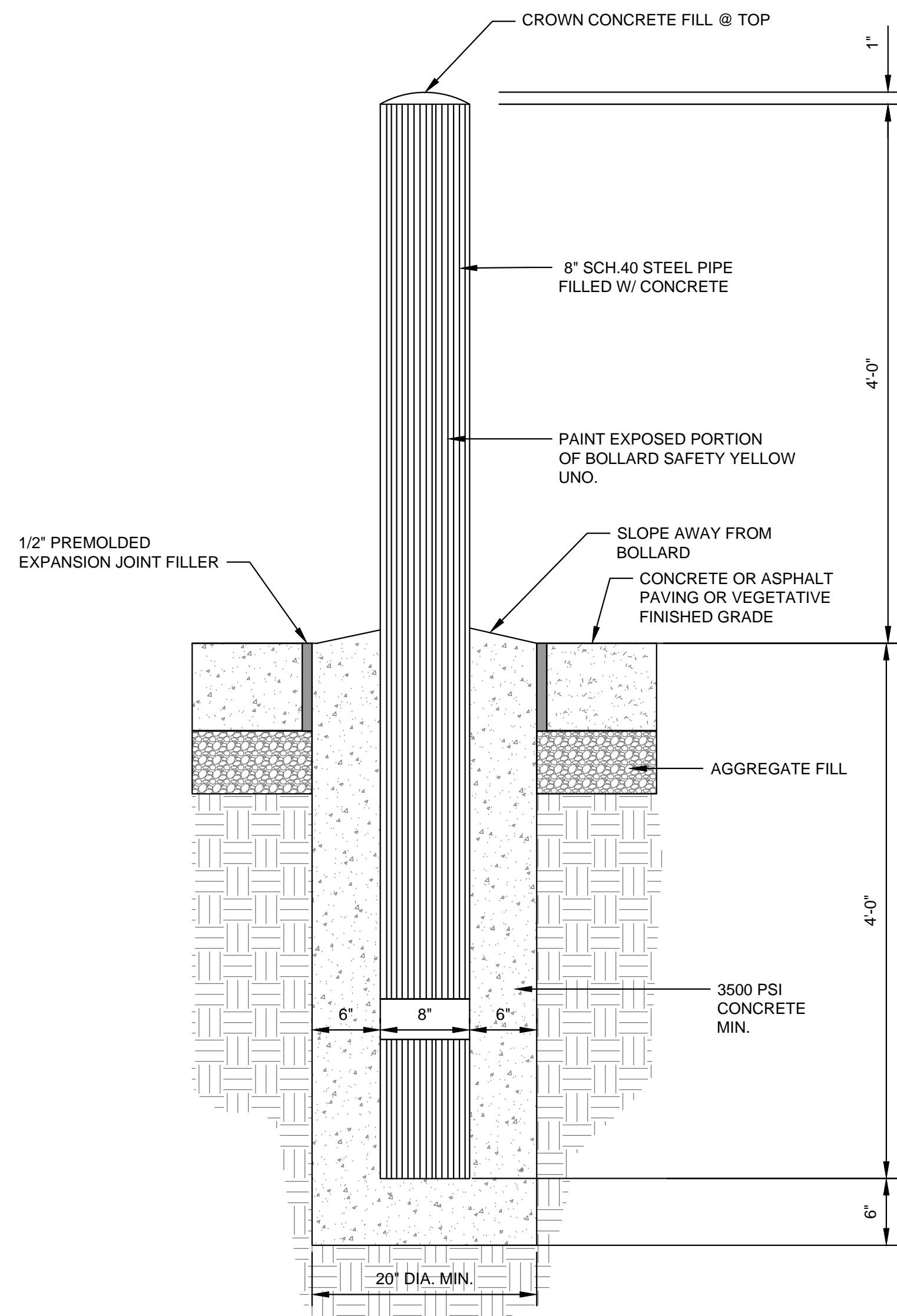


TERMINATION AT WALL JUNCTION
N.T.S. (F)

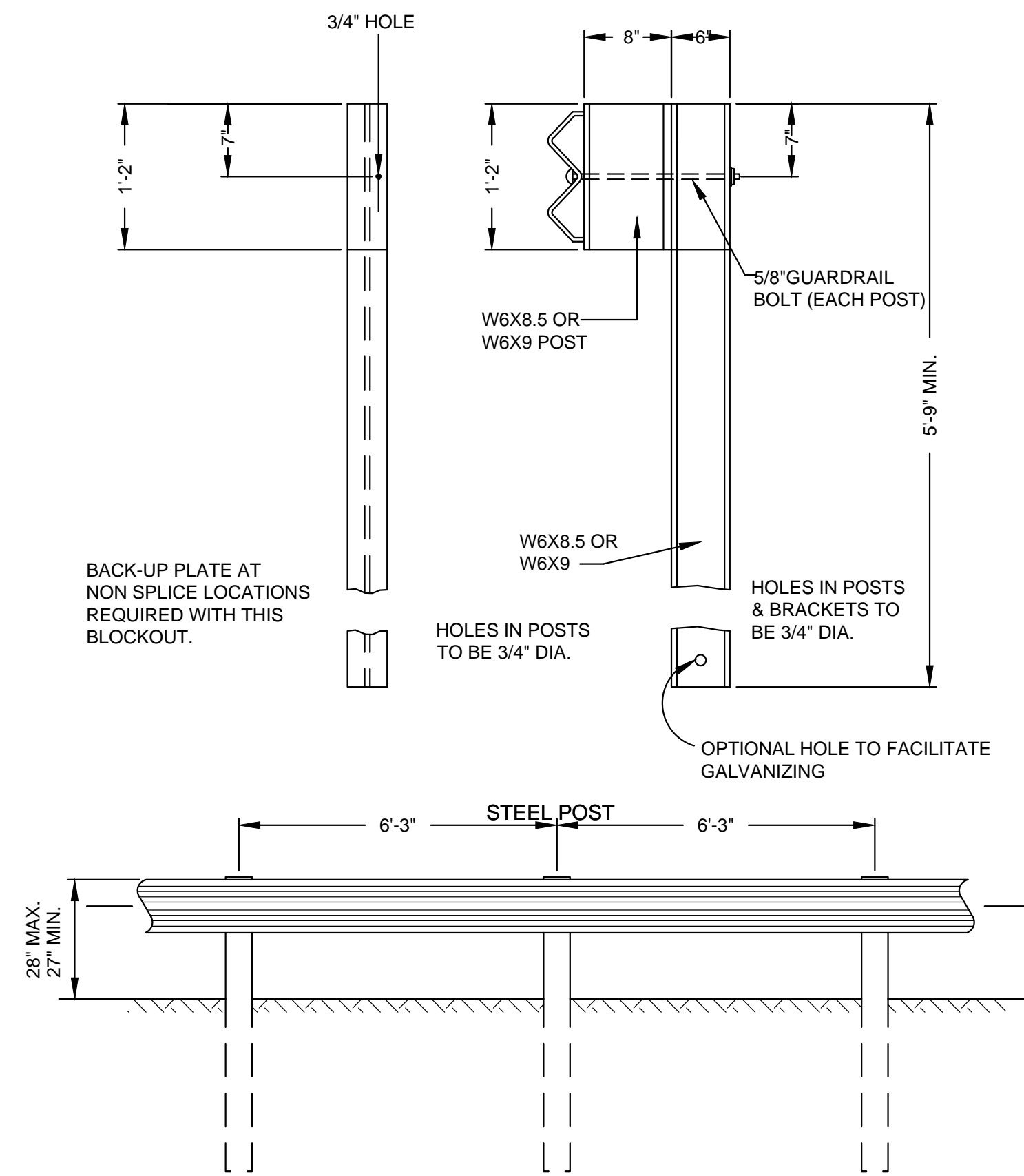
- NOTES:** ALL BOLTS, NUTS, WASHERS, AND STEEL BLOCKOUTS ARE TO BE GALVANIZED.
POST AND BLOCKOUT MAY BE HOT ROLLED OR WELDED.
STANDARD WASHER TO BE USED ON LAST 50' OF RUN OFF END.



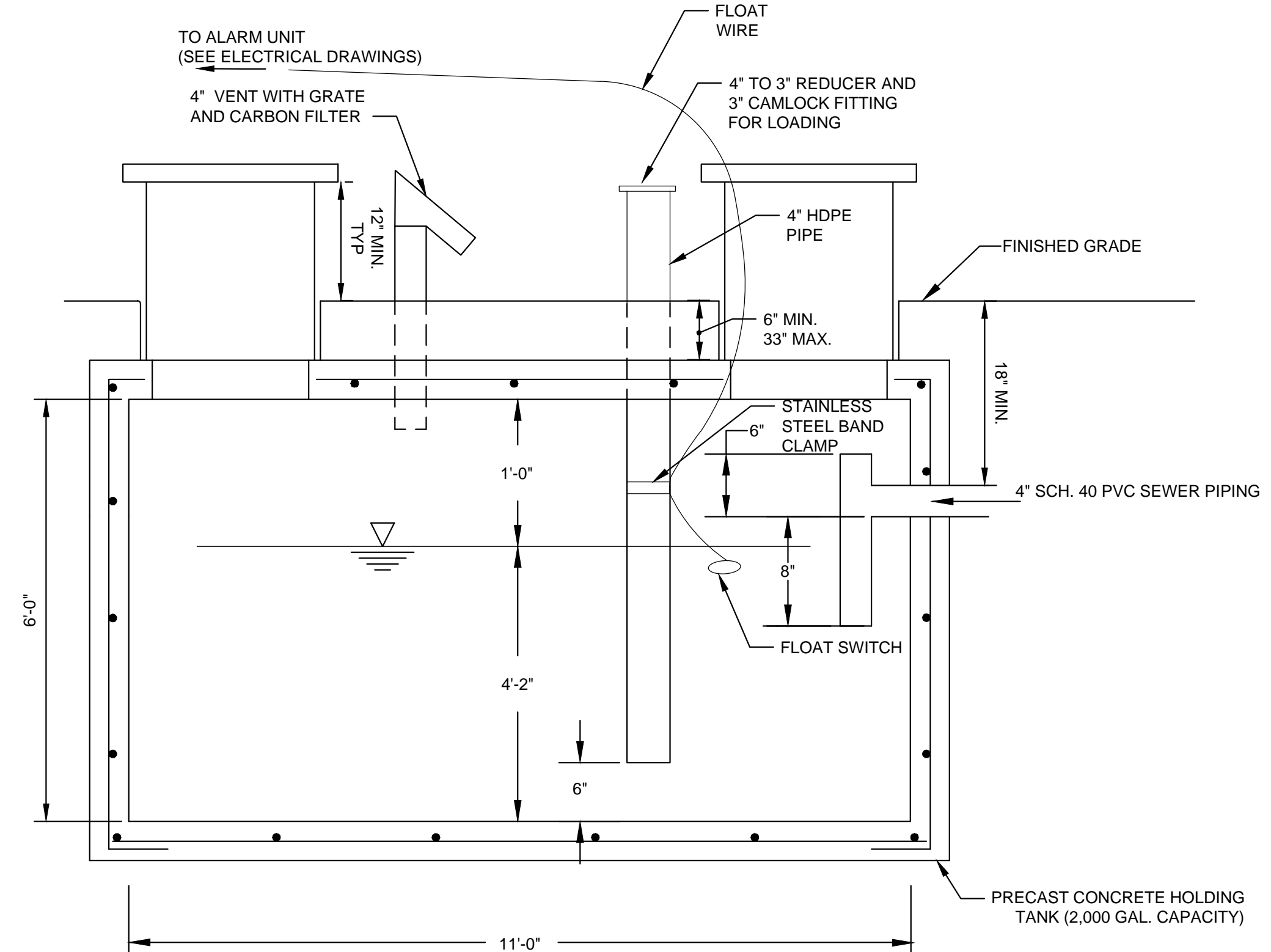
PLAN VIEW



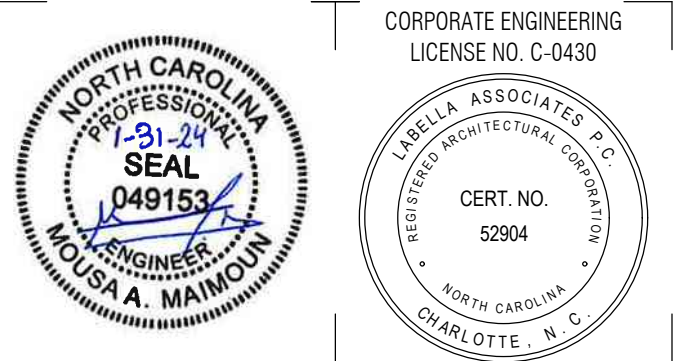
BOLLARD DETAIL
N.T.S. (C)



GUARDRAIL DETAIL
N.T.S. (D)



2000 GAL. HOLDING TANK
N.T.S. (E)



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COASTAL REGIONAL SOLID WASTE MANAGEMENT AUTHORITY

7400 OLD US 70 HIGHWAY
NEW BERN, NC 28562



NEWPORT TRANSFER STATION EXPANSION

800 HIBBS ROAD
NEWPORT, NC 28570

NO.	DATE	DESCRIPTION
3	1/31/2024	REVISED FOR ADDENDUM #2
2	1/18/24	REVISED FOR ADDENDUM #1
1	12/8/23	ISSUED FOR REBID

PROJECT NUMBER: 2201731.02

DRAWN BY: RH

REVIEWED BY: KN

ISSUED FOR: REBID

DATE: 12/08/23

DRAWING NAME:

GENERAL DETAILS

DRAWING NUMBER:

C-0006

Attachment No. 4: Revised Structural Drawings:

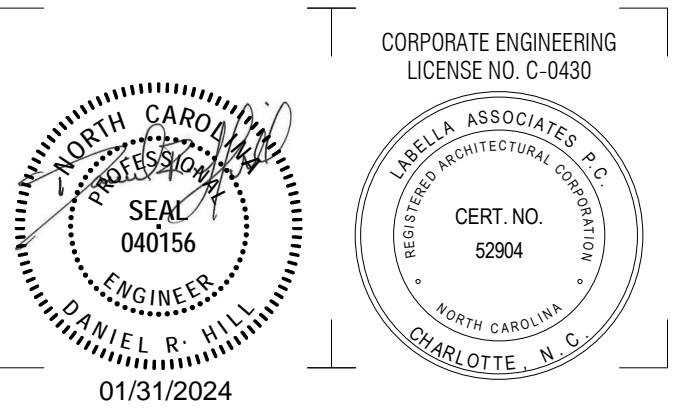
Revised Drawing No. S1002: Transfer Station General Schedules

Revised Drawing No. S1103: Transfer Station Lower Level Slab Plan

Revised Drawing No. S1603: Transfer Station Foundation Details

Revised Drawing No. S4100: Scalehouse Foundation Plan

SLAB-ON-GRADE LEGEND	
1	SLAB-ON-GRADE: ARROWS INDICATE LIMITS # = SLAB MARK
2	SPOT ELEVATION INDICATES DEPTH BELOW F.F.E. (DATUM ELEVATION 0'-0")
3	CONTROL/CONSTRUCTION JOINT
4	WALL MARK: SEE WALL SCHEDULE
5	F.D. = FLOOR DRAIN (SEE MECH. & ARCH.)
6	C.O. = CLEAN OUT (SEE MECH. & ARCH.)
7	DENOTES STEP IN BOTTOM OF SLAB
8	DENOTES SLOPE IN SLAB



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NO.	DATE	DESCRIPTION
2	1/31/2024	Bid Set RFI #2

PROJECT NUMBER: 2201731.02

DRAWN BY: JW
REVIEWED BY: DRH

ISSUED FOR: BID SET

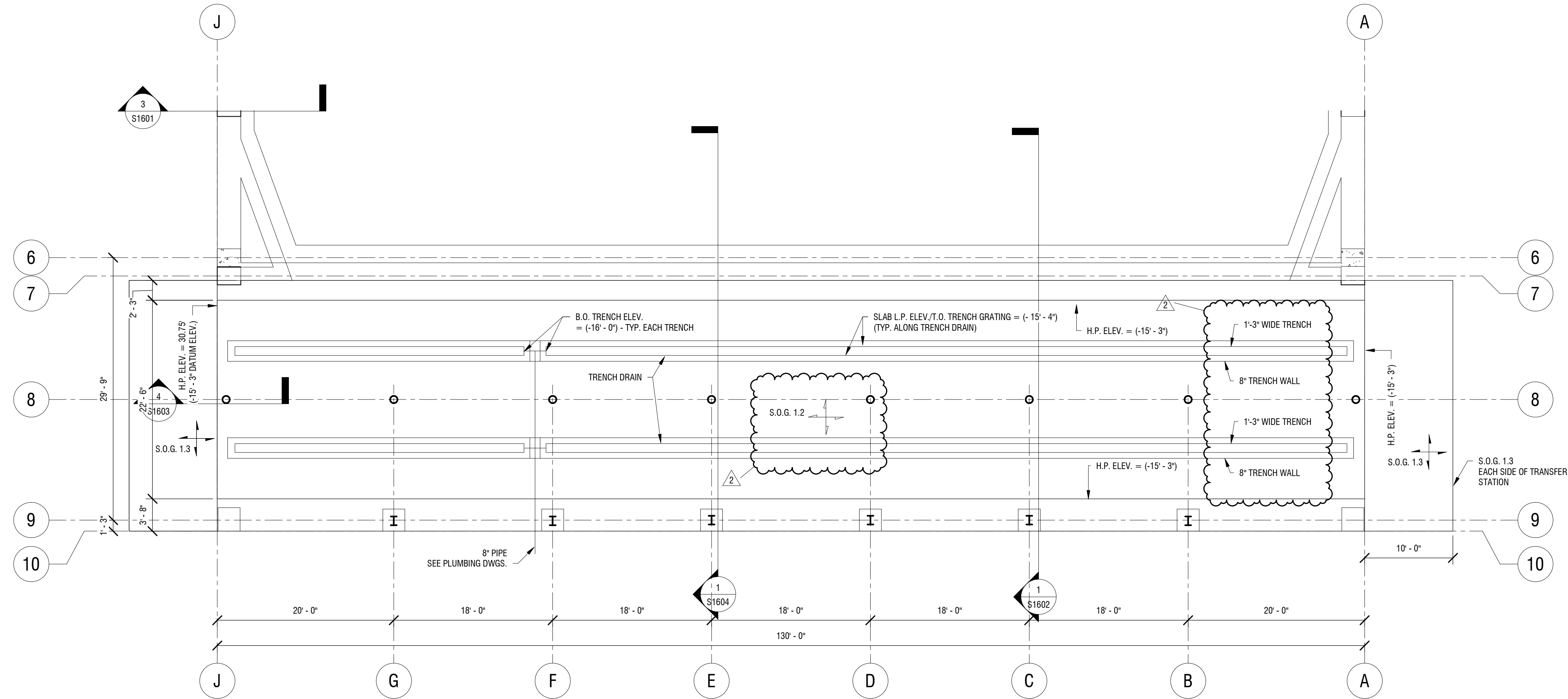
DATE: 10.25.2023

DRAWING NAME:

**TRANSFER STATION
LOWER LEVEL SLAB PLAN**

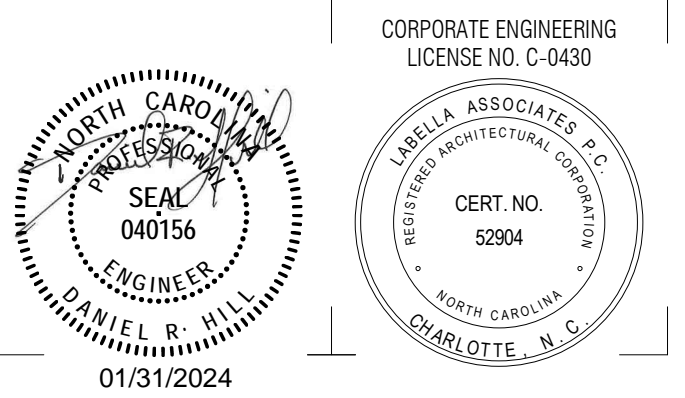
DRAWING NUMBER:

S1103



1 LOWER LEVEL SLAB PLAN
S1103 1/8" = 1'-0"

- FOUNDATION PLAN NOTES:**
1. BOTTOM OF FOOTING ELEVATIONS ARE REFERENCED FROM FINISHED FLOOR ELEVATION 48'-0" (DATUM ELEV. 0'-0") AND ARE NOTED ON PLAN.
 2. PLACE A MINIMUM OF 12" OF GRANULAR FREE DRAINING MATERIAL BEHIND ALL RETAINING WALLS.
 3. CENTER ISOLATED FOOTINGS UNDER COLUMNS AND/OR AT COLUMN LINE INTERSECTIONS, U.O.N.
 4. DO NOT SCALE DRAWINGS. SEE ARCHITECTURAL FLOOR PLANS FOR DIMENSIONS NOT INDICATED ON STRUCTURAL DRAWINGS.
 5. SECTIONS INDICATED ON PLAN ARE TYPICAL FOR SIMILAR CONDITIONS.



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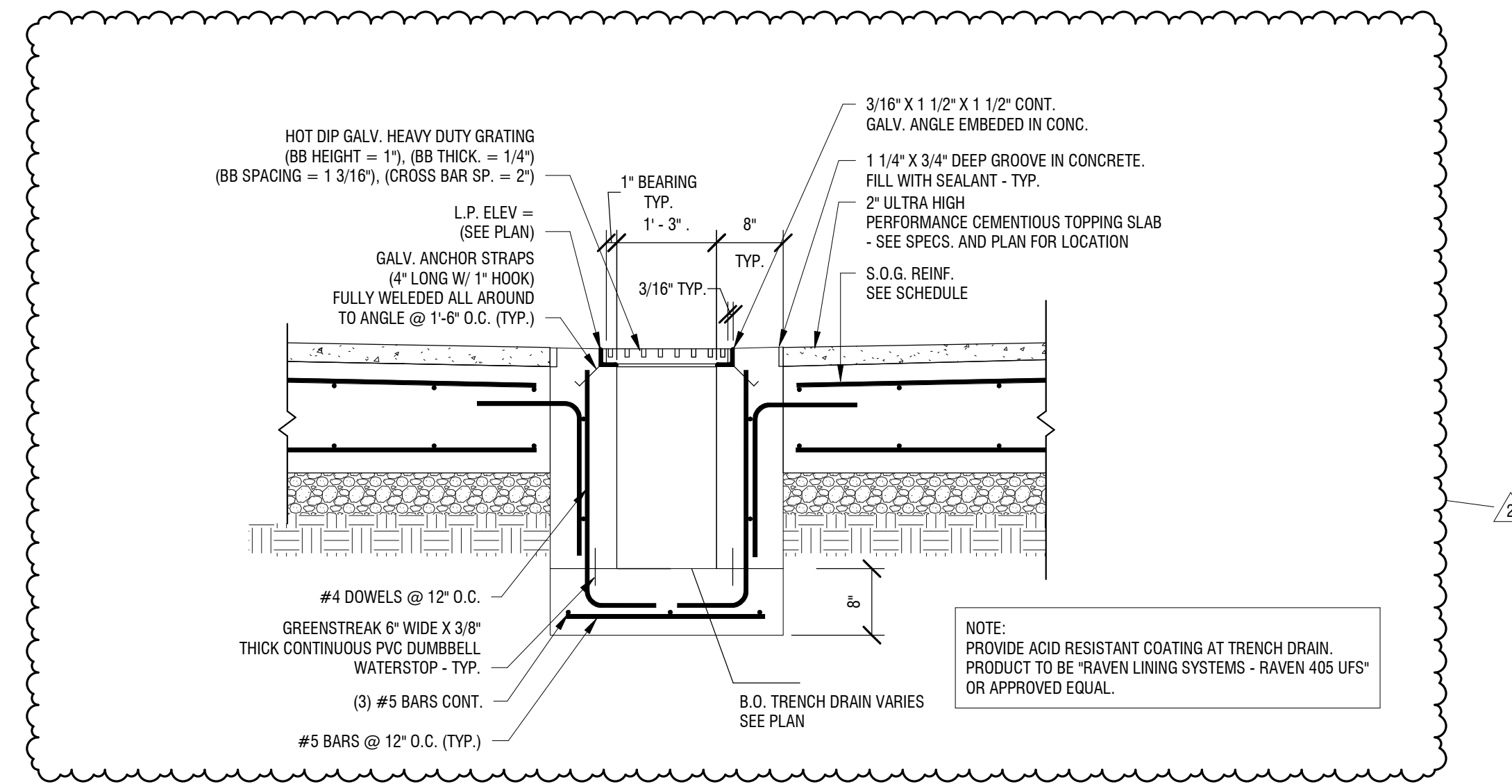
DATE: 10.25.2023

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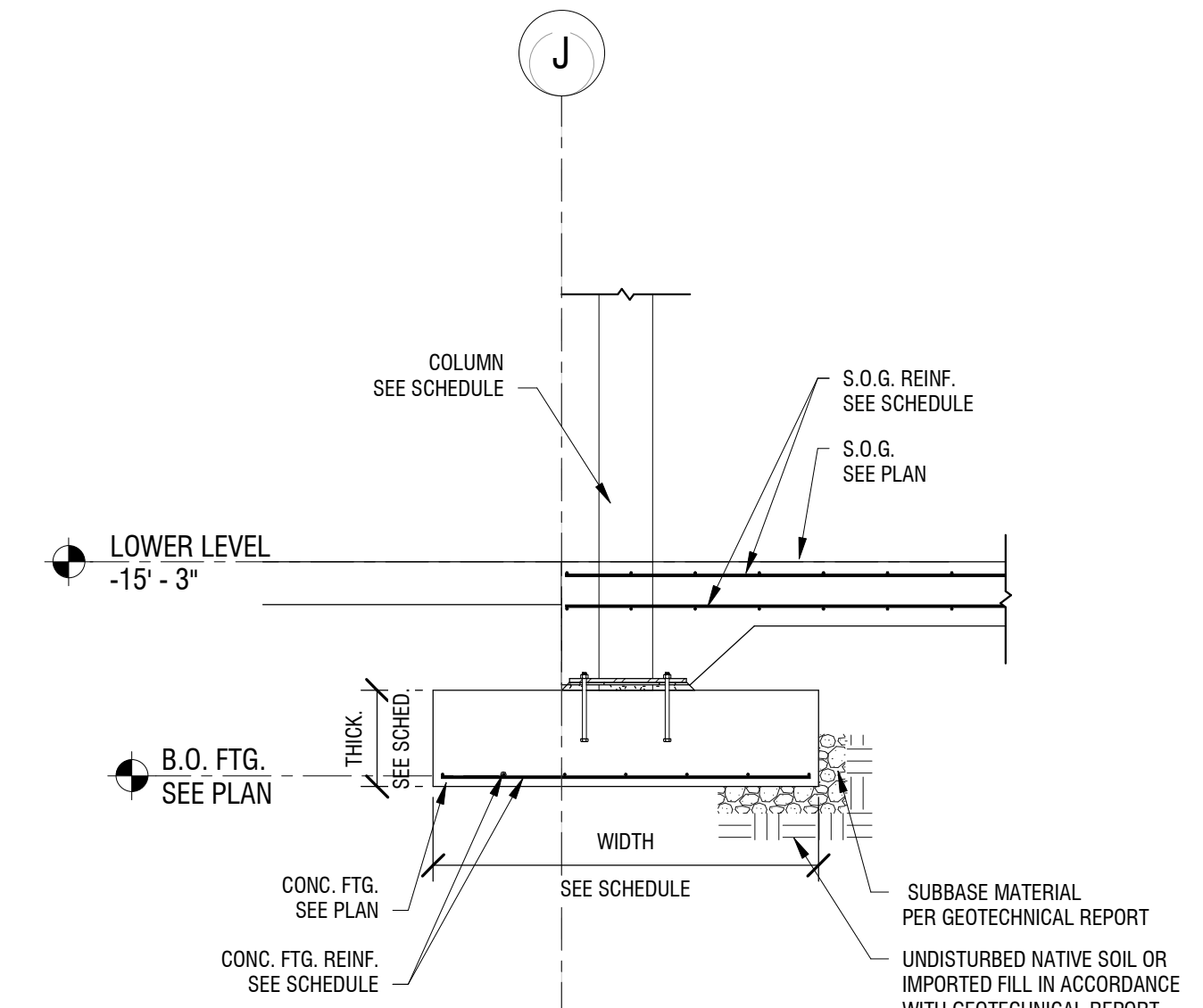
TRANSFER STATION FOUNDATION DETAILS

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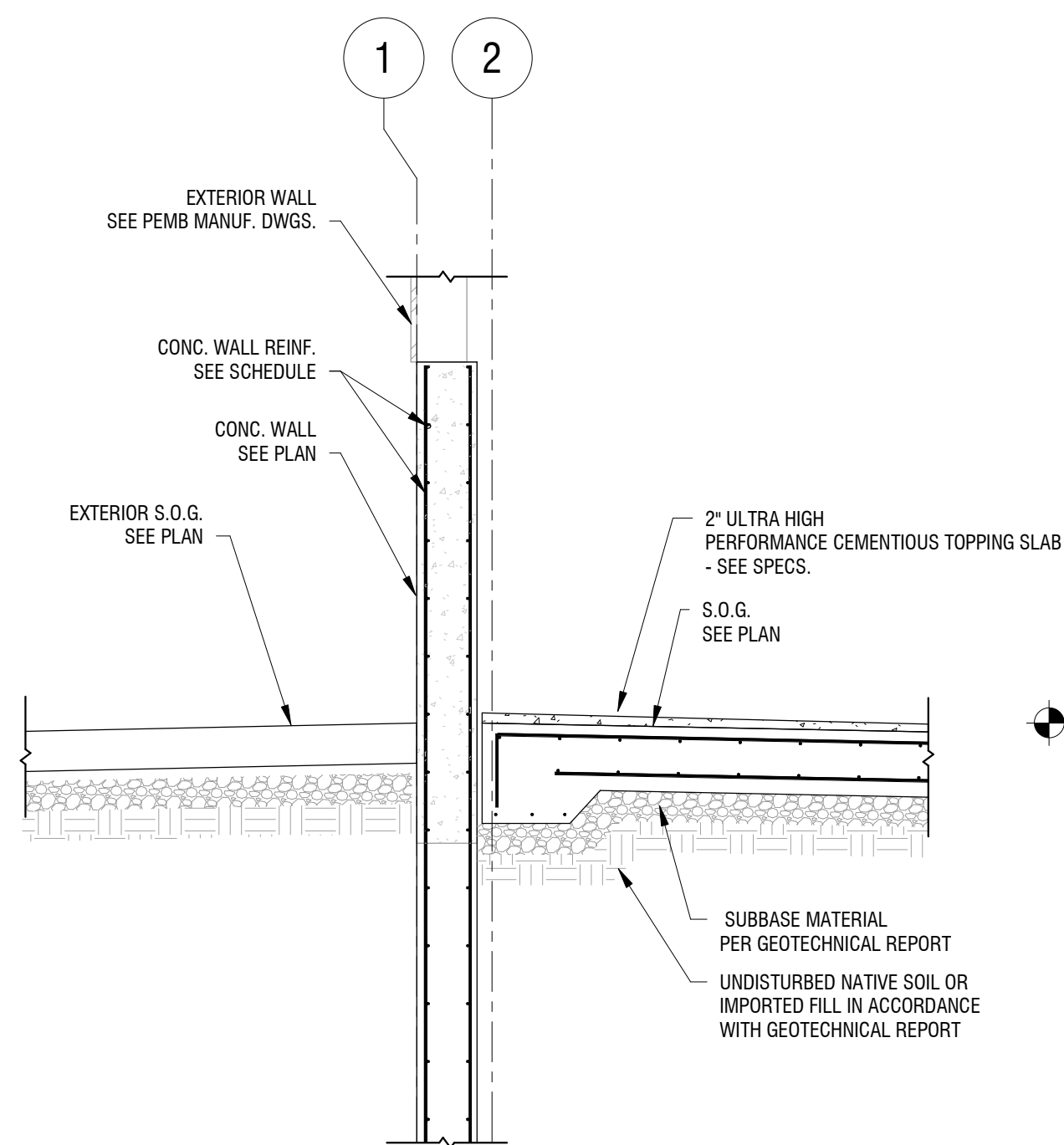
S1603



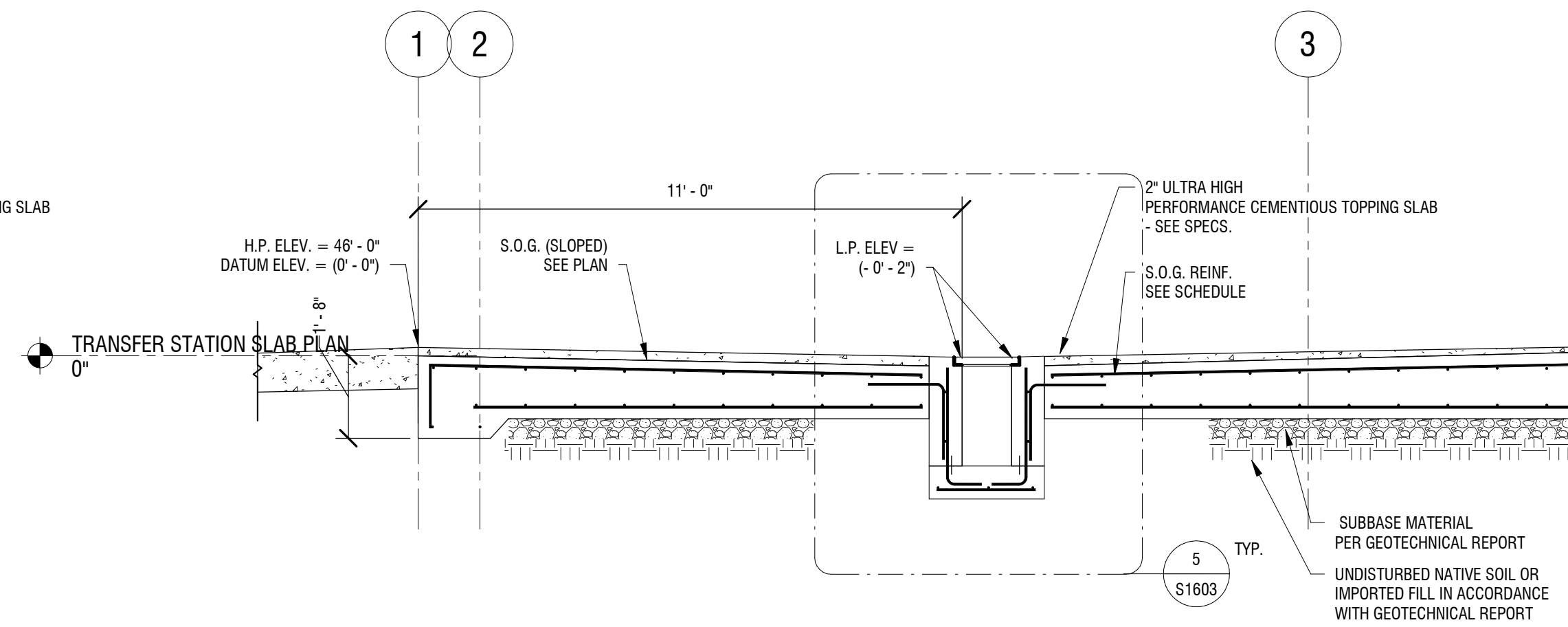
5 TRANSFER STATION INTERIOR TRENCH DRAIN
S1603 3/4" = 1'-0"



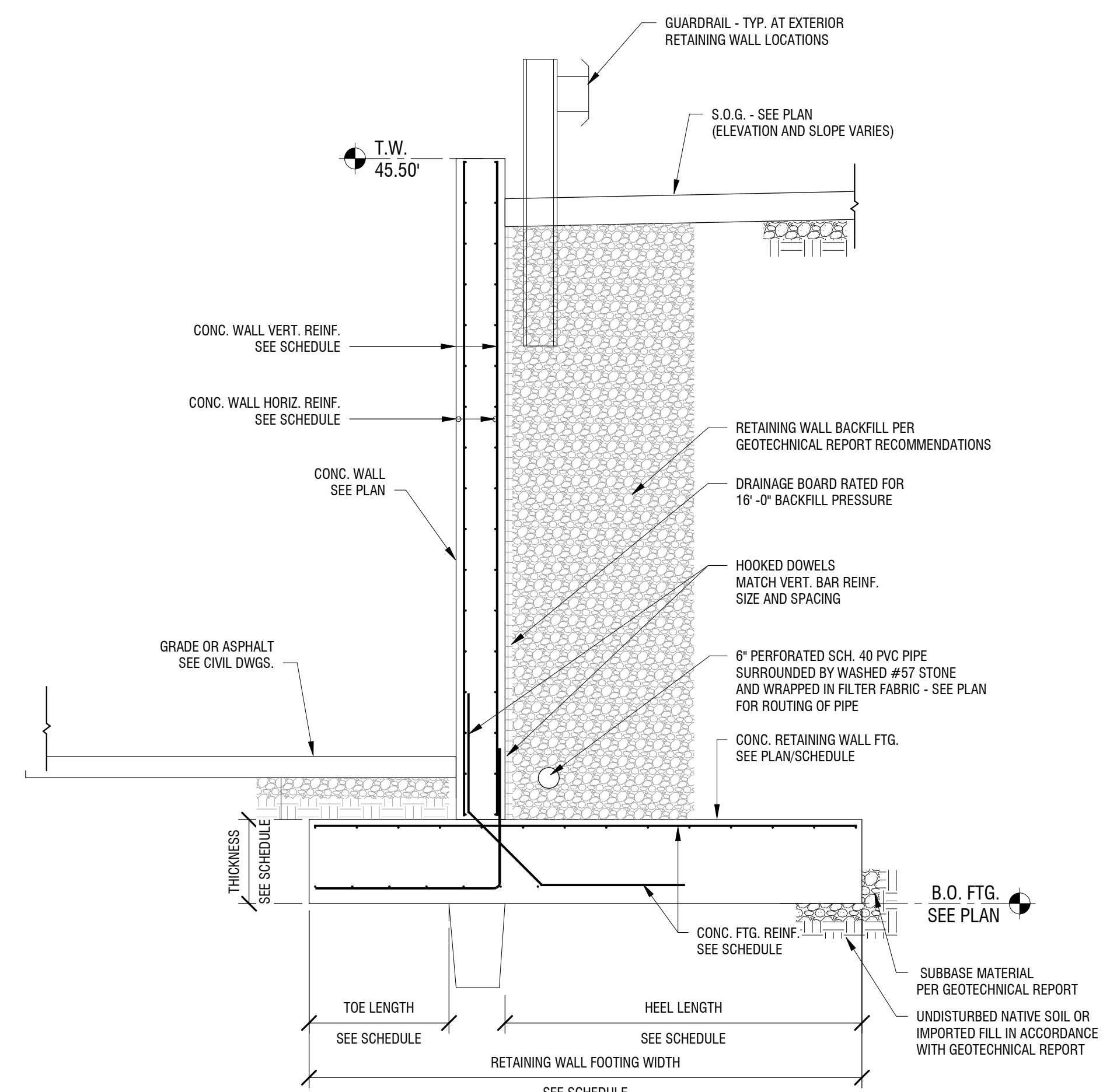
4 LOWER LEVEL SLAB EDGE DETAIL
S1603 3/8" = 1'-0"



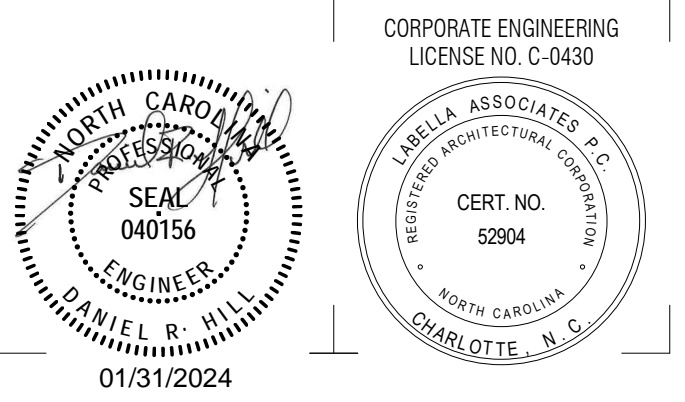
3 SLAB EDGE DETAIL
S1603 3/8" = 1'-0"



2 FOUNDATION DETAIL AT TRENCH DRAIN
S1603 3/8" = 1'-0"



1 RETAINING WALL DETAIL
S1603 3/8" = 1'-0"



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Revisions		

PROJECT NUMBER: 2201731.01

DRAWN BY: JLW

REVIEWED BY: DRH

ISSUED FOR: BIDDING

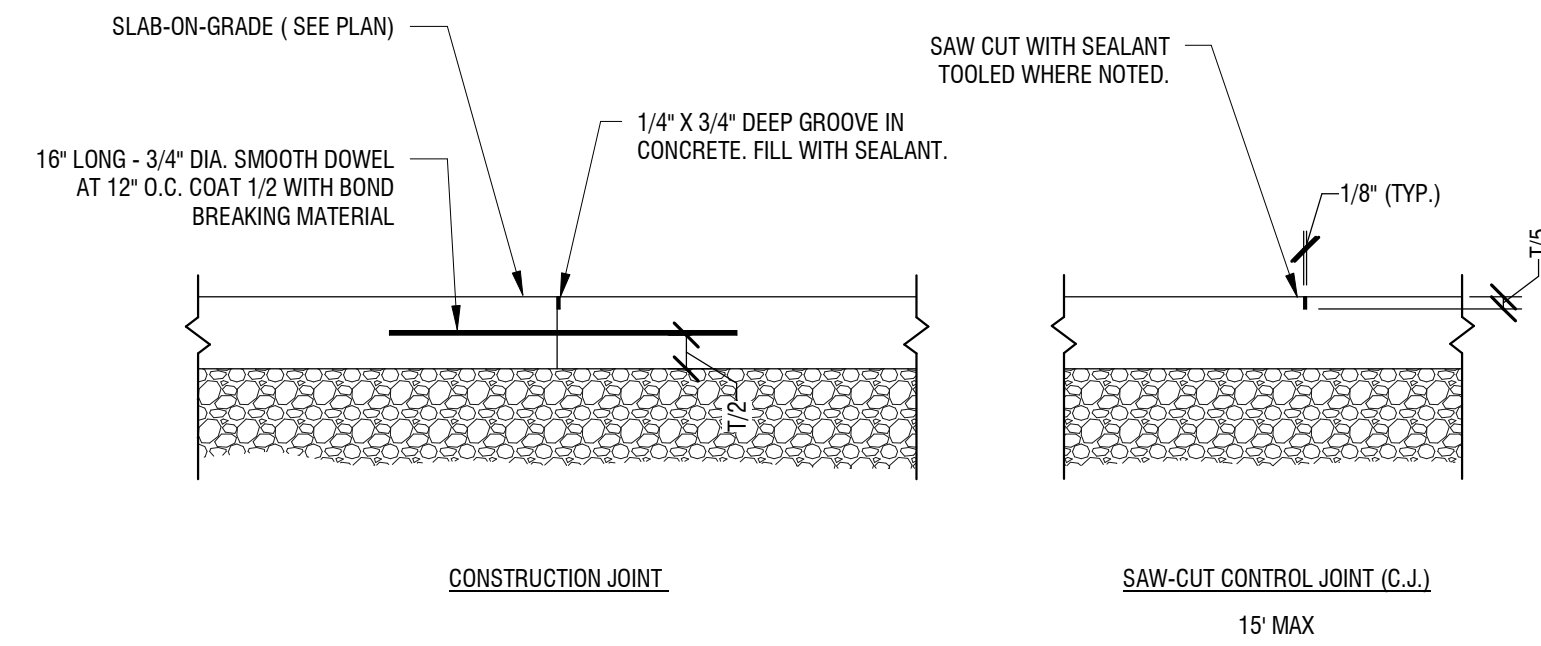
DATE: 10/25/23

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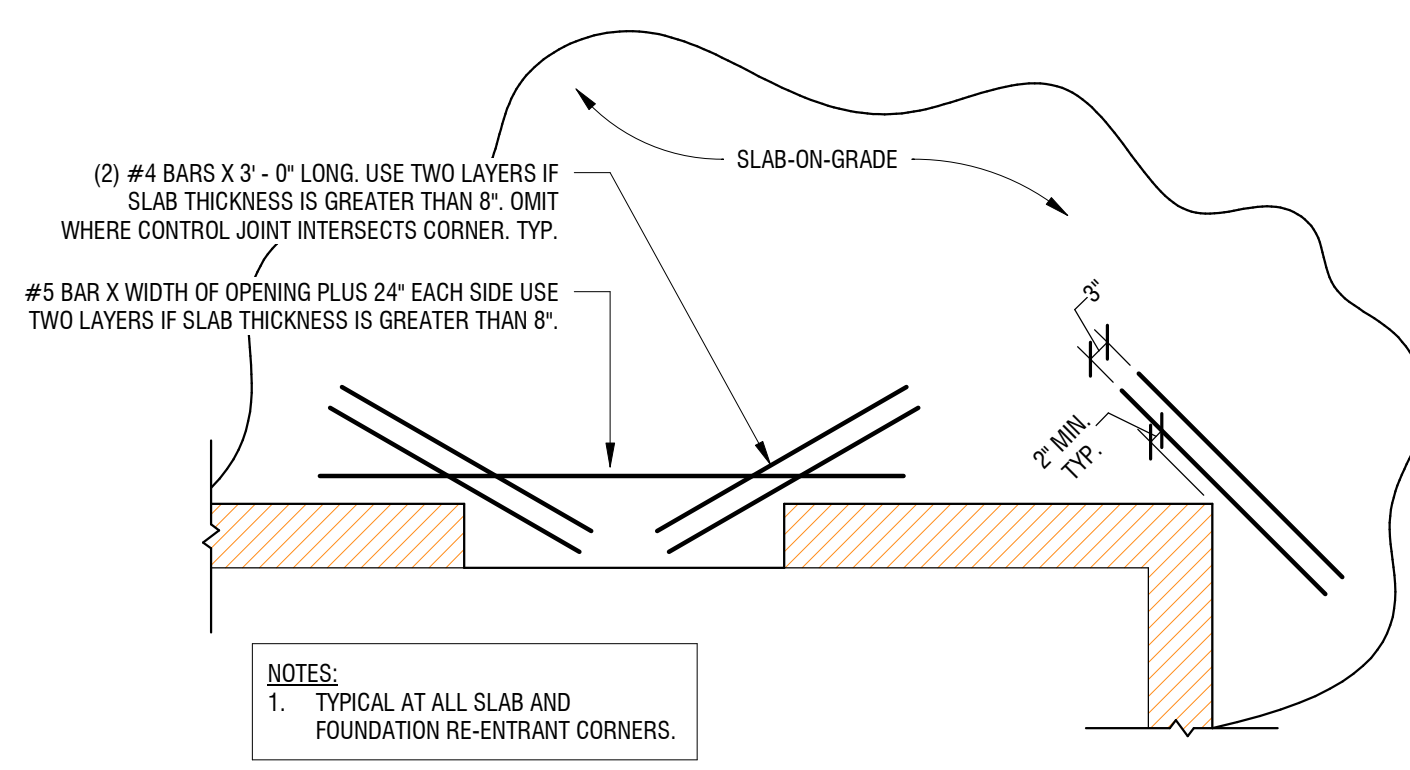
SCALEHOUSE FOUNDATION PLAN

DRAWING NUMBER:

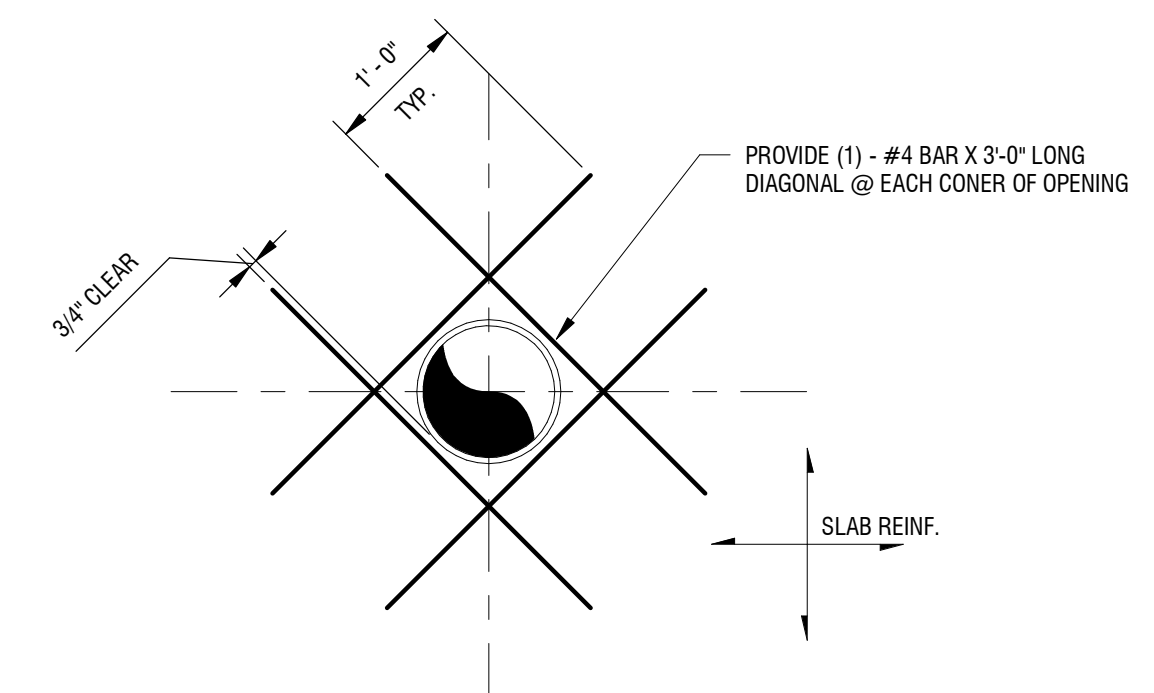
S4100



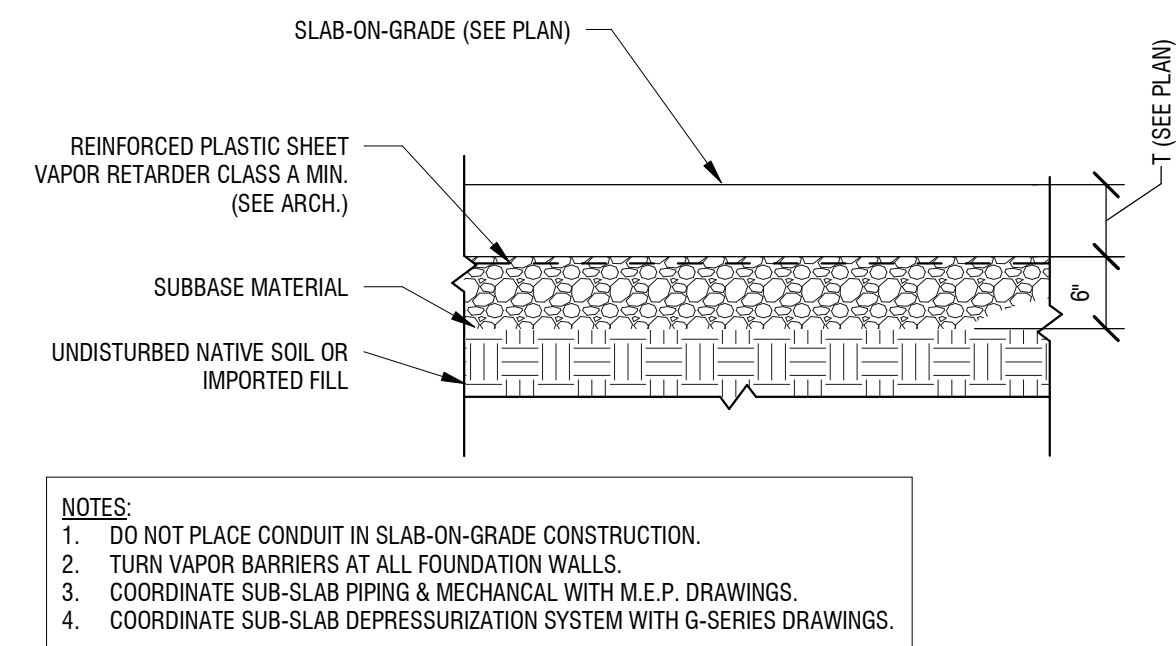
7 TYPICAL SLAB-ON-GRADE JOINT
S4100 3/4" = 1'-0"



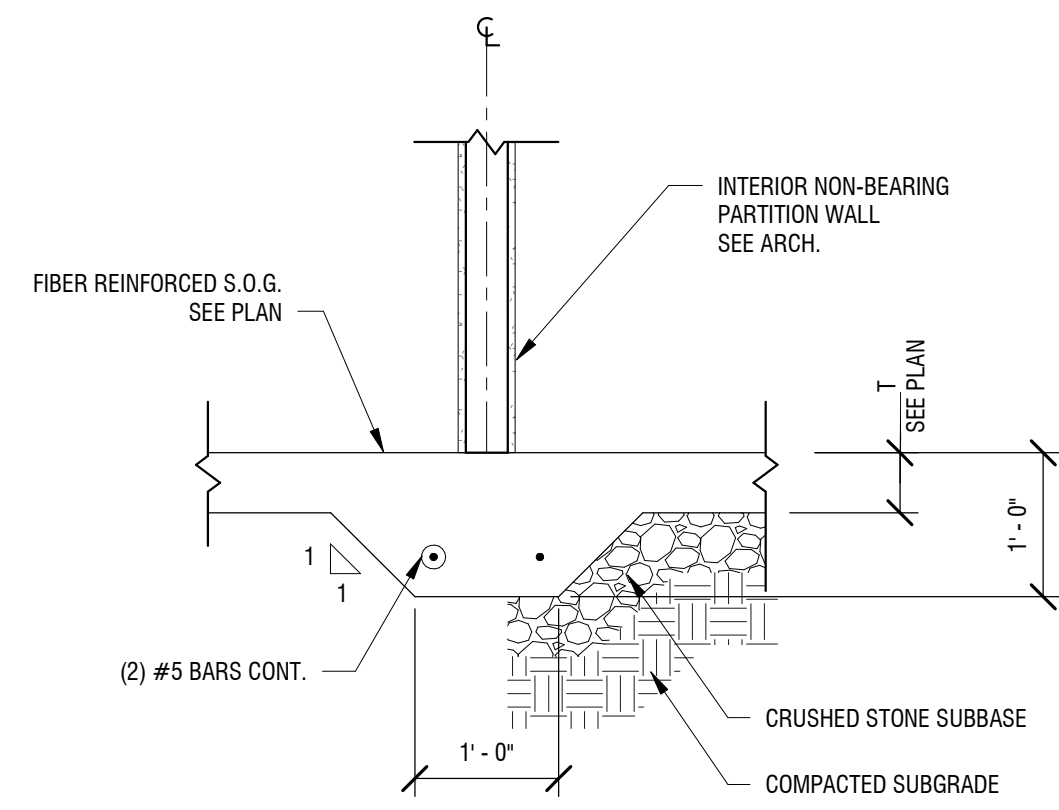
6 TYPICAL SLAB-ON-GRADE RE-ENTRANT CORNER
S4100 1/2" = 1'-0"



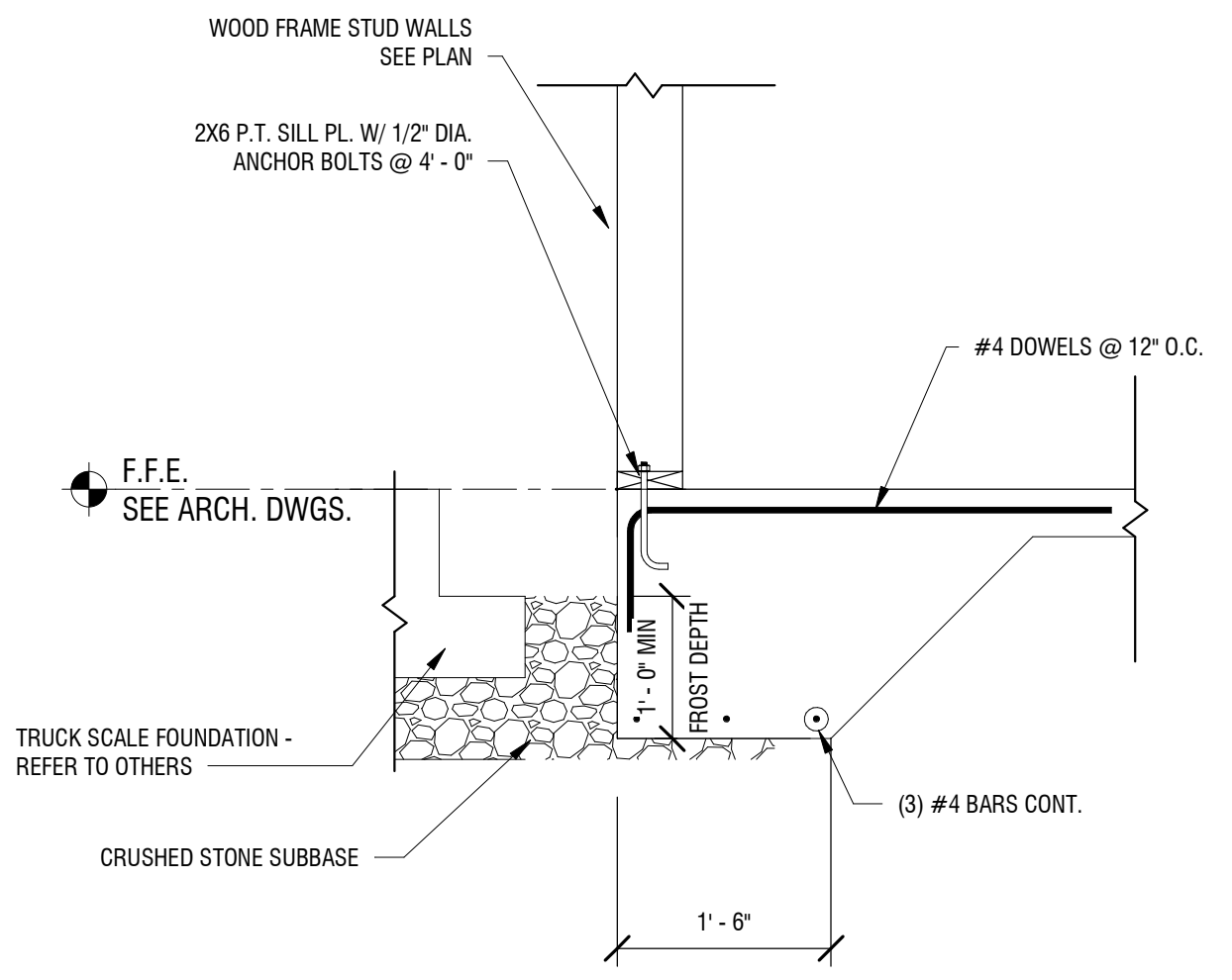
5 TYPICAL OPENING IN SLAB ON GRADE
S4100 3/4" = 1'-0"



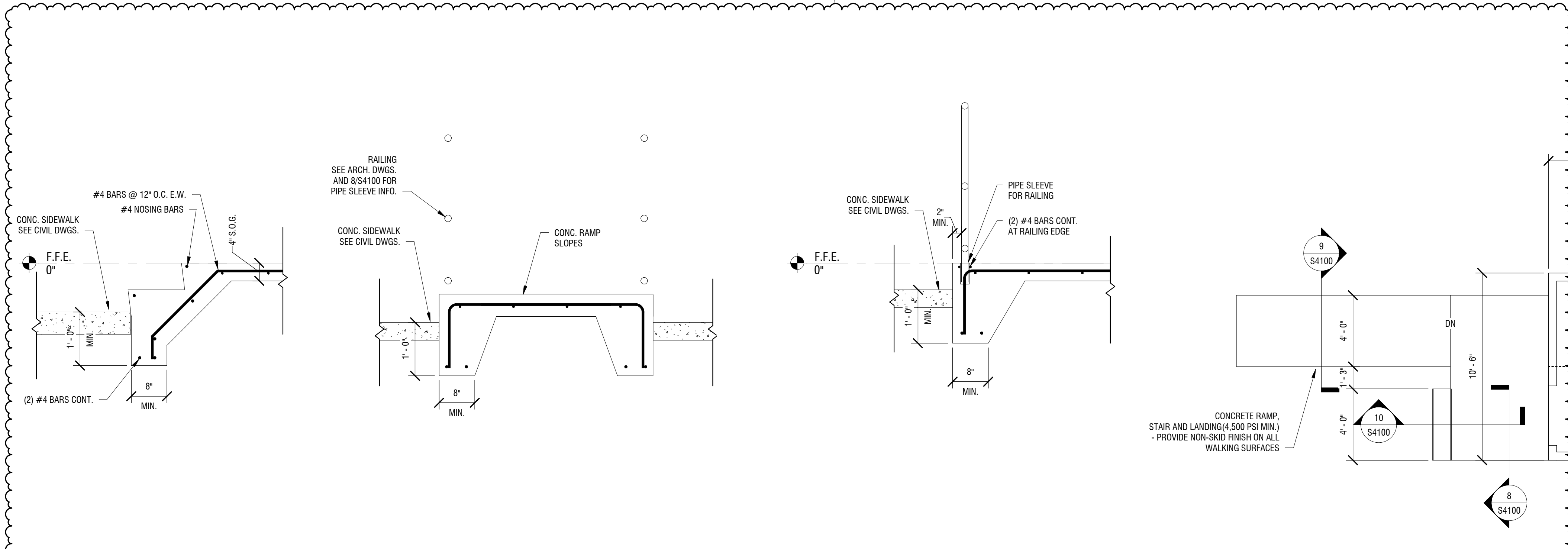
4 TYPICAL SLAB-ON-GRADE WITH VAPOR BARRIER
S4100 3/4" = 1'-0"



3 TYPICAL SLAB UNDER PARTITION
S4100 3/4" = 1'-0"



2 FOUNDATION SLAB EDGE DETAIL
S4100 3/4" = 1'-0"



1 FOUNDATION PLAN
S4100 1/4" = 1'-0"

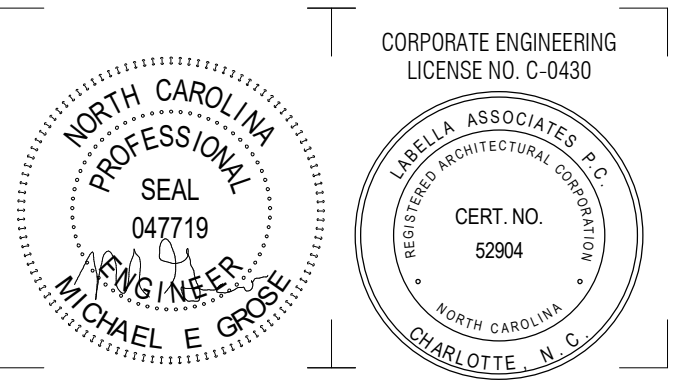
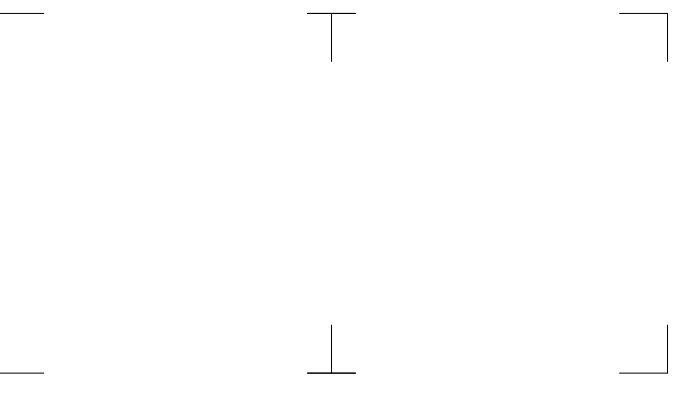
- FOUNDATION PLAN NOTES:
- DIMENSIONS GIVEN ARE FROM EXTERIOR FACE OF THICKENED SLAB EDGE AND ALIGN WITH FACE OF EXTERIOR WOOD STUD WALL.
 - DO NOT SCALE DRAWINGS. SEE ARCHITECTURAL FLOOR PLANS FOR DIMENSIONS NOT INDICATED ON STRUCTURAL DRAWINGS.
 - SECTIONS INDICATED ON PLAN ARE TYPICAL FOR SIMILAR CONDITIONS.
 - COORDINATE SAW CUT CONTROL JOINTS WITH ARCHITECTURE FLOOR PLAN

Attachment No. 5: Revised Plumbing Drawings:

Revised Drawing No. P1201: Transfer Station Plumbing Plan

Revised Drawing No. P2501: Office & Maintenance Plumbing Schedules and Details

Revised Drawing No. P3201: Canopy Storage Plumbing Plan



1/31/24

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Revisions
S.E.D. NUMBER: 110011
PROJECT NUMBER: 2201731.01

DRAWN BY: MG
REVIEWED BY: MG

ISSUED FOR: REBID

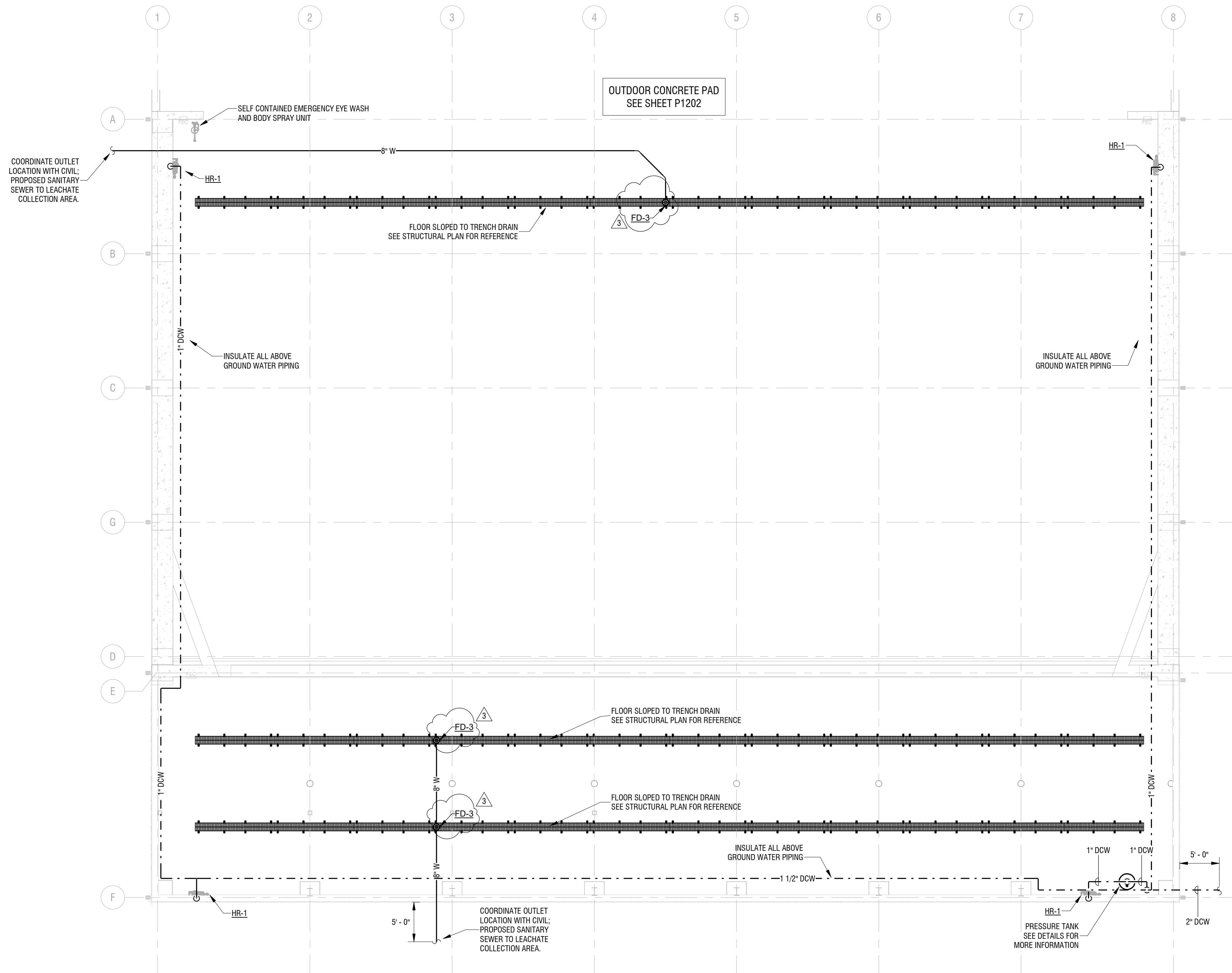
DATE: 1/31/24

DRAWING NAME:

**TRANSFER STATION
PLUMBING PLAN**

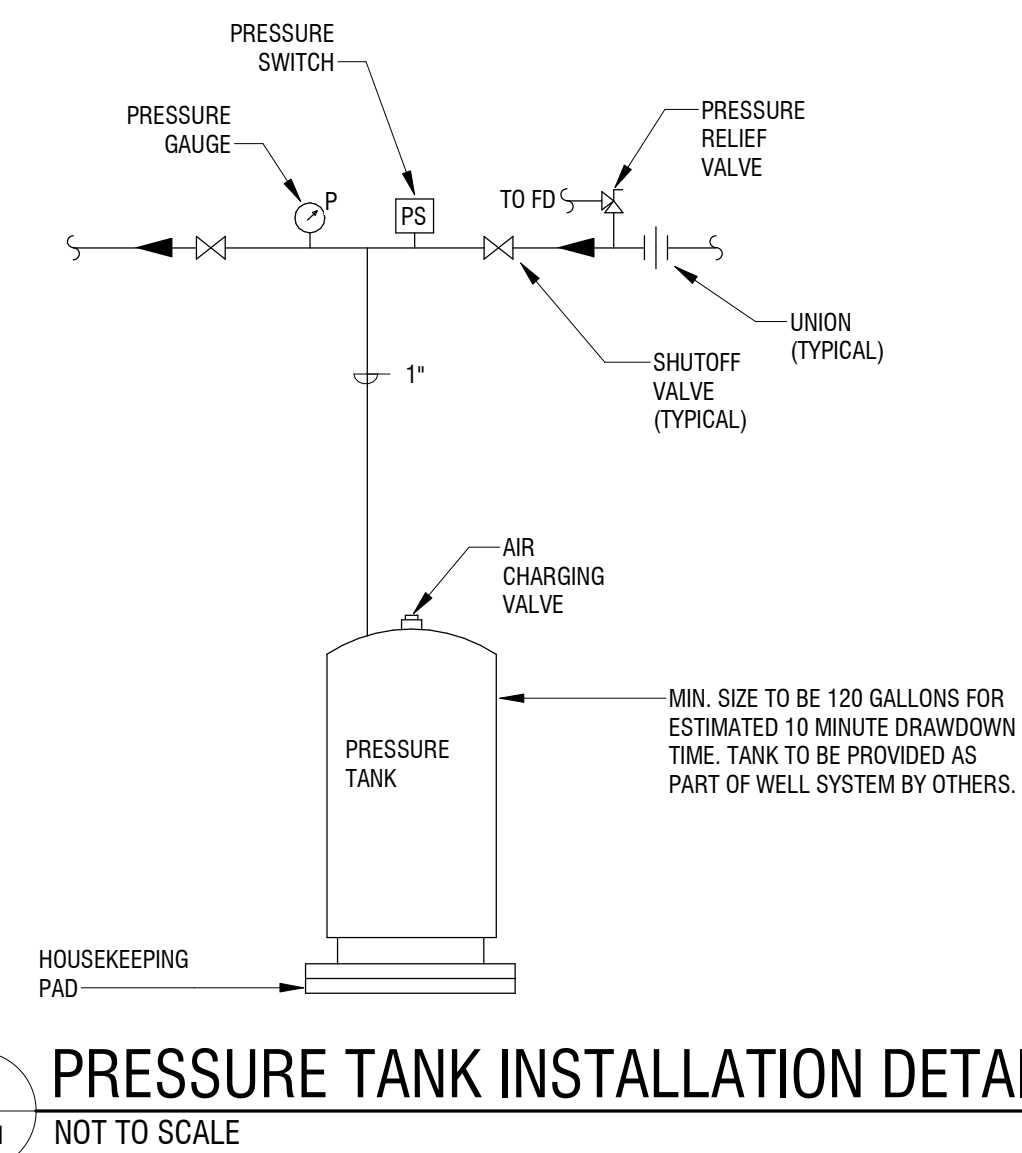
DRAWING NUMBER:

P1201



1 PLUMBING FLOOR PLAN

P1201 1/8" = 1'-0"



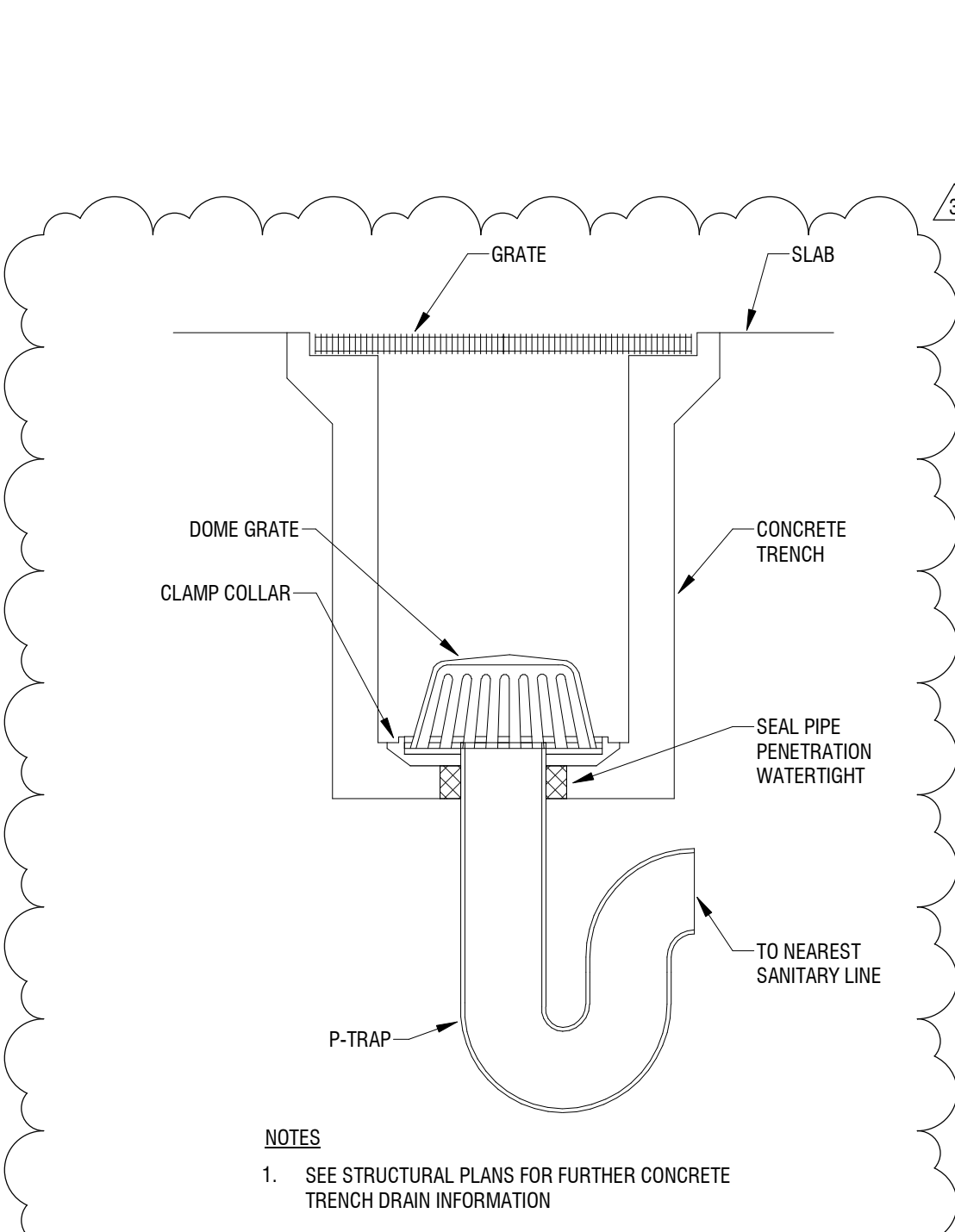
2 PRESSURE TANK INSTALLATION DETAIL
NOT TO SCALE



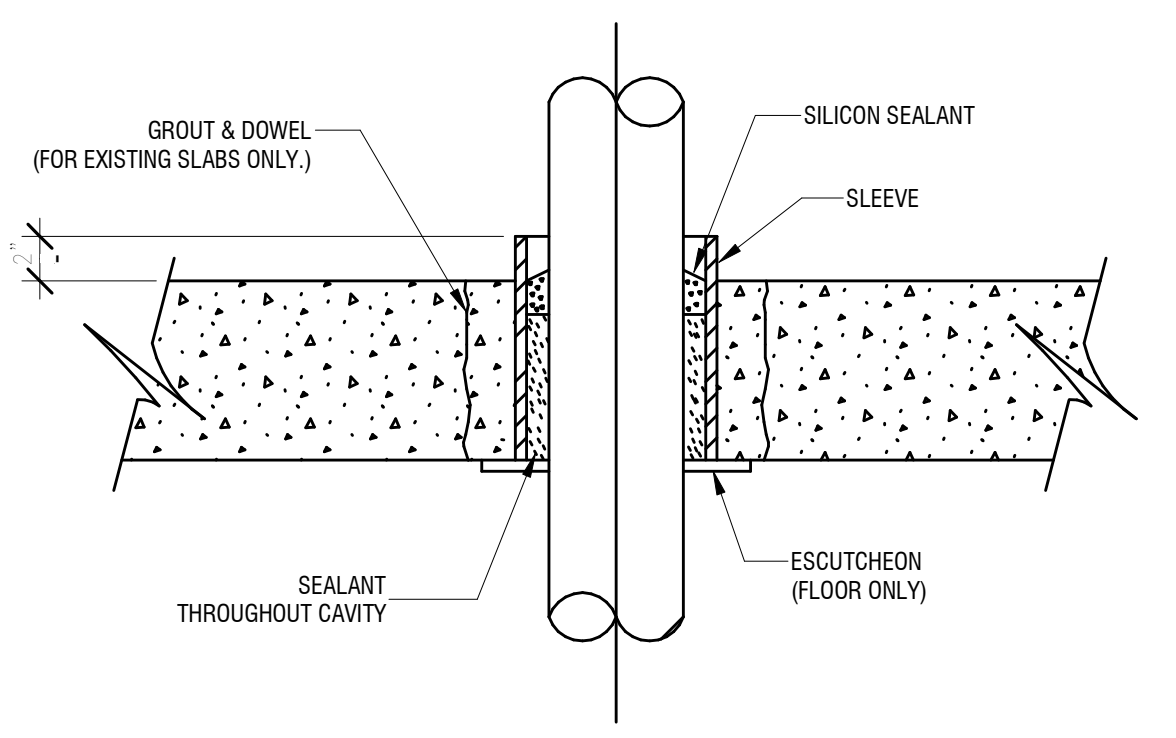
PLUMBING FIXTURE SCHEDULE										
MARK	TRIM	COLD	HOT	SAN/W	VENT	SUPPORT	ADA	MANUFACTURER	MODEL	NOTES
CO-1	-	-	-	3"	-	FLOOR	-	ZURN	Z1400	EXTRA HEAVY DUTY, CAST IRON, ADJUSTABLE, TAPERED THREAD PLUG
CO-2	-	-	-	4"	-	GRADE	-	NIBCO	-	PVC CLEANOUT, INSTALL LEVEL WITH GRADE
EW-1	-	1/2"	-	1-1/2"	1-1/2"	WALL MOUNT	YES	ELKAY	LZSTL8WSLP	8I-LEVEL, BOTTLE FILLER, FILTERED, 8 GPH CHILLING CAPACITY, 115V/1PH, 5A, 370W
EWS-1	-	1/2"	1/2"	1-1/4"	1-1/4"	WALL MOUNT	YES	BRADLEY	S19224	PROVIDE WITH EMERGENCY THERMOSTATIC MIXING VALVE (MODEL# S19-2000), PLASTIC BOWL, DRENCH HOSE WITH VACUUM BREAKER, AND ANTI-FREEZE VALVE
FD-1	-	-	-	2"	2"	FLOOR	-	ZURN	FD2210	LIGHT DUTY FOR FOOT TRAFFIC, PROVIDE WITH TRAP SEAL
FD-2	-	-	-	3"	2"	FLOOR	-	ZURN	2508	EXTRA HEAVY DUTY, CAST IRON, PROVIDE WITH TRAP SEAL
HB-1	---	3/4"	---	---	---	WALL MOUNT	---	WOODFORD	21	ANTI-SIPHON ANGLE SILL FAUCET, CAST BRASS, SATIN NICKEL PLATED, 1/2" THREADED INLET, METAL WHEEL HANDLE, VACUUM BREAKER BACKFLOW CHECK VALVE
HB-2	---	3/4"	---	---	---	WALL MOUNT	---	WOODFORD	67	TWO INDEPENDENT CHECK VALVES, CAST BRASS, SATIN NICKEL PLATE, ANTI-FREEZE, VACUUM BREAKER BACKFLOW CHECK VALVE
IMB-1	-	1/2"	-	-	-	WALL MOUNT	-	IPS	MIB10AB	LEAD FREE, QUARTER TURN VALVE, WHITE POWDER COATED FINISH
LAV-1	AMERICAN STD 7053.105	1/2"	1/2"	1-1/2"	1-1/2"	COUNTER	YES	-	-	TWO SINKS INTEGRAL TO COUNTERTOP, 0.5GPM BATTERY-POWERED FAUCET, PROVIDE THERMOSTATIC MIXING VALVE SET TO 105°F
S-1	DELTA B1310LF	1/2"	1/2"	1-1/2"	1-1/2"	DROP-IN	YES	ELKAY	LWDB332264	33"x22"x6" DOUBLE BOWL, 22GA STAINLESS STEEL, SATIN FINISH
S-2	-	1/2"	1/2"	1-1/2"	1-1/2"	WALL MOUNT	YES	ELKAY	SEHS-7X	17"x15"x11" SINGLE BOWL, 20GA STAINLESS STEEL, GOOSENECK FAUCET INCLUDED
UR-1	-	3/4"	-	2"	1-1/2"	WALL CARRIER	YES	AMERICAN STANDARD	6590.505	0.5GPF, WHITE VITREOUS CHINA, BATTERY POWERED FLUSH VALVE INCLUDED
WC-1	-	1/2"	-	3"	2"	FLOOR MOUNT	YES	AMERICAN STANDARD	231AA.104	1.28GPF, VITREOUS CHINA, WHITE, OPEN FRONT SEAT

TRANSFER STATION PLUMBING FIXTURE SCHEDULE										
MARK	TRIM	COLD	HOT	SAN/W	VENT	SUPPORT	ADA	MANUFACTURER	MODEL	NOTES
HR-1	-	3/4"	-	-	-	WALL	-	REELCRAFT	D89075	SPRING RETURN, 75FT (3/4 IN I.D.), 3/4 IN MNRT, 250 PSI MAX OP. PRESS.
TD-1	-	-	-	-	-	FLOOR	-	ZURN	2882	BLACK ACID RESISTANT EPOXY COATED DECILE GRATE - CLASS 5 (MIN.)
FD-3	-	-	-	8"	-	FLOOR	-	JAY R SMITH MFG	1001	UNIVERSAL REPLACEMENT DOME AND COLLAR ASSEMBLY FOR 8" PIPE DRAIN

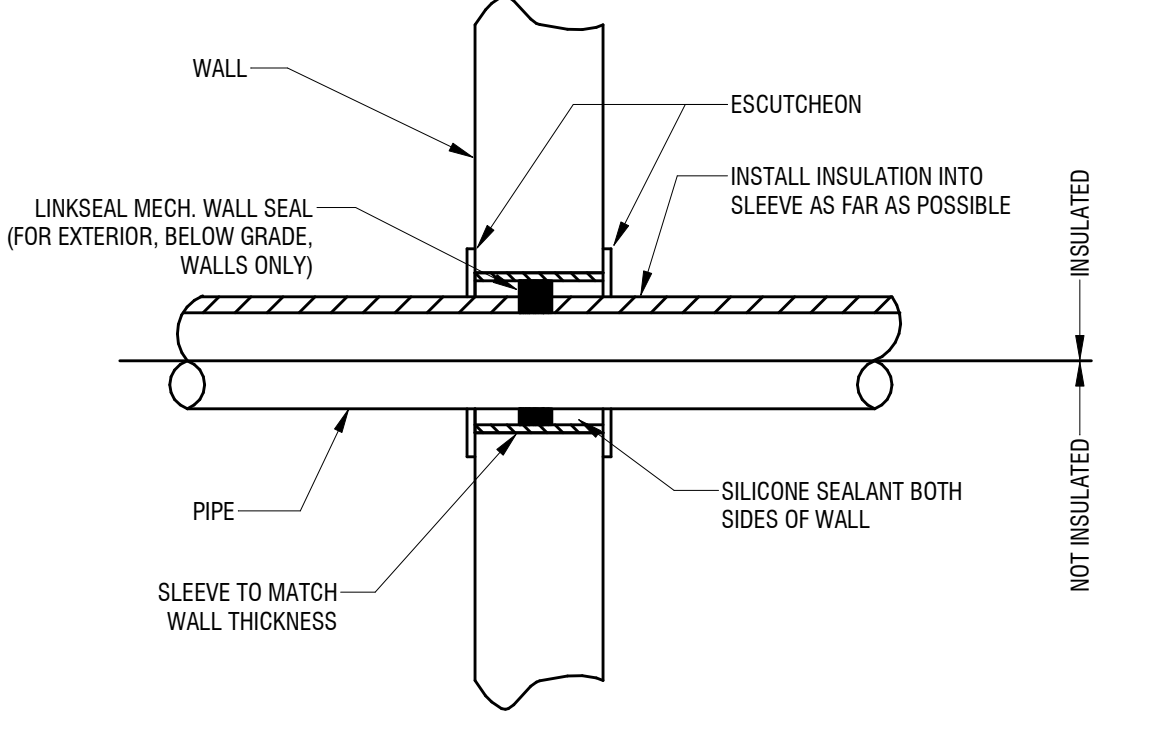
ELECTRIC WATER HEATER SCHEDULE												
TAG	LOCATION	SERVICE	STORAGE	TANK LINING	GPH AT 100FT RISE	FUEL TYPE	ELECTRICAL DATA		DIMENSIONS	MANUFACTURER	MODEL	NOTES
							V/PhHz	KW				
EW-1	MAINTENANCE STORAGE	DOMESTIC HOT WATER	15 GAL	GLASS	21	ELECTRIC	208/1	5	18'0" x 21'4"	BRADFORD WHITE	LE115U3-1	PROVIDE WITH INTEGRATED MIXING DEVICE SET TO 120°F



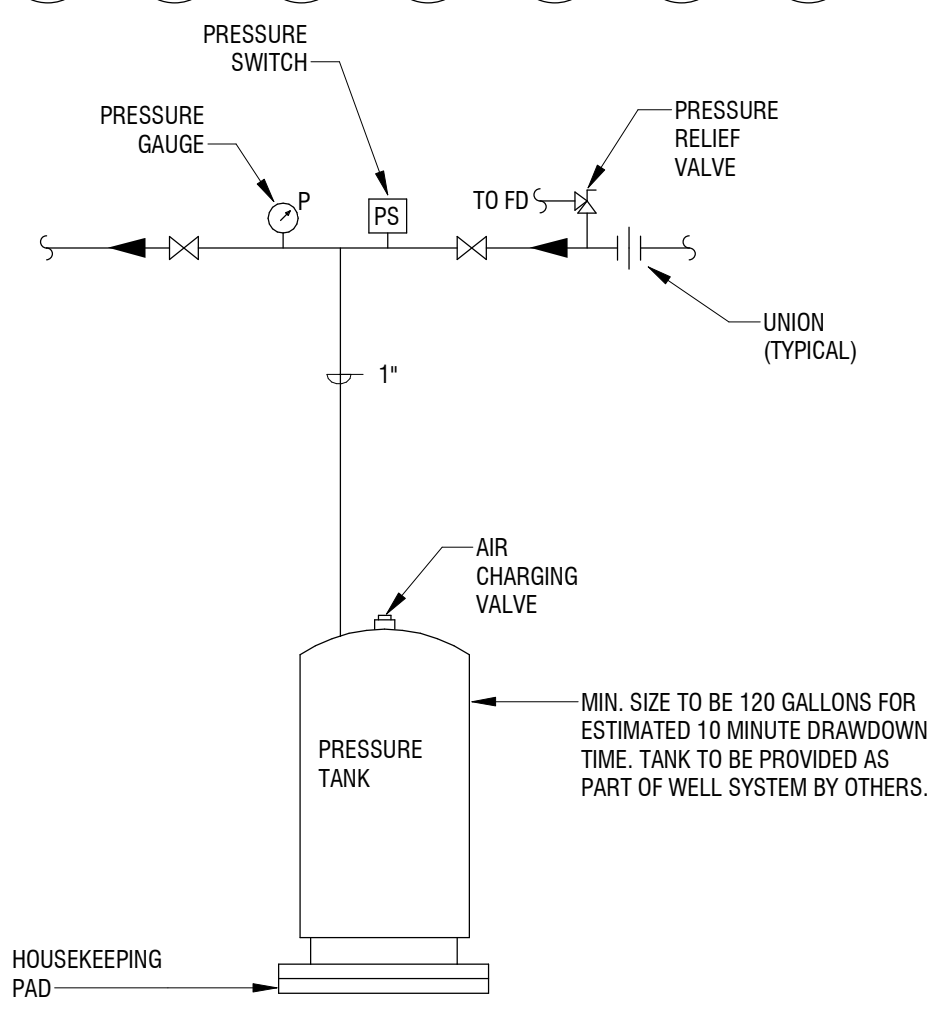
13 PLB - INTERIOR TRENCH DRAIN
P2501 NOT TO SCALE



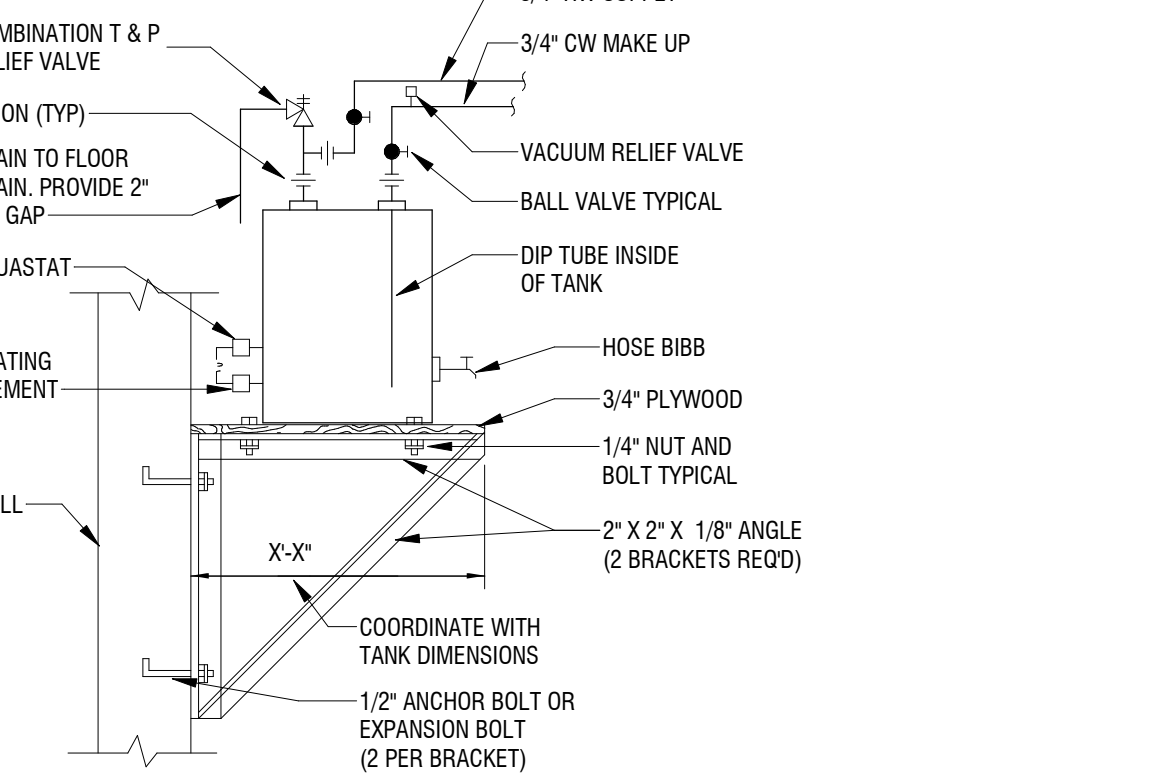
11 PIPE - PIPE THRU FLOOR/SLAB DETAIL
P2501 NOT TO SCALE



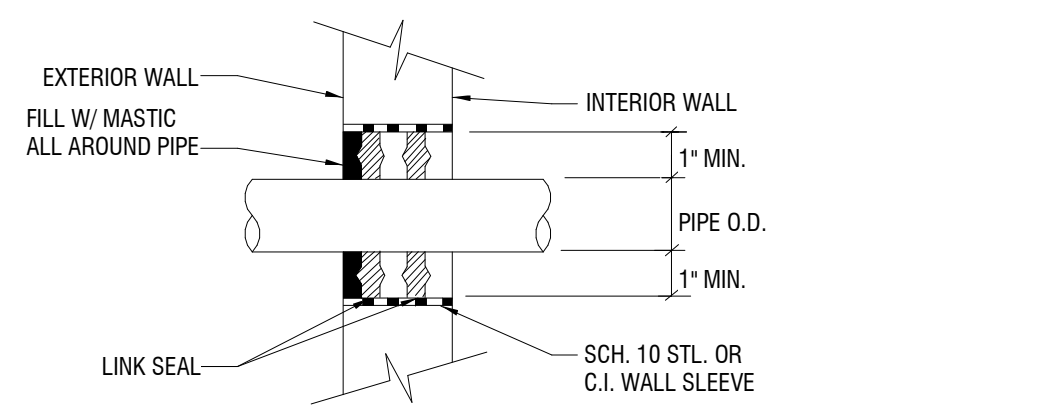
10 PIPE - PIPE THRU NON-RATED WALL DETAIL
P2501 NOT TO SCALE



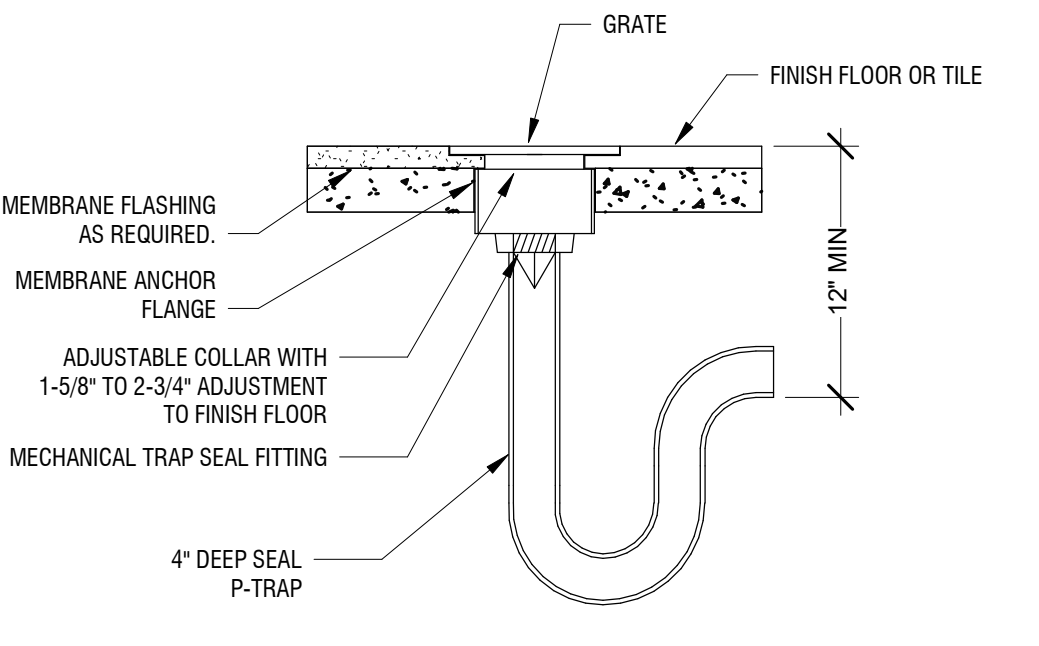
12 PRESSURE TANK INSTALL DETAIL
P2501 NOT TO SCALE



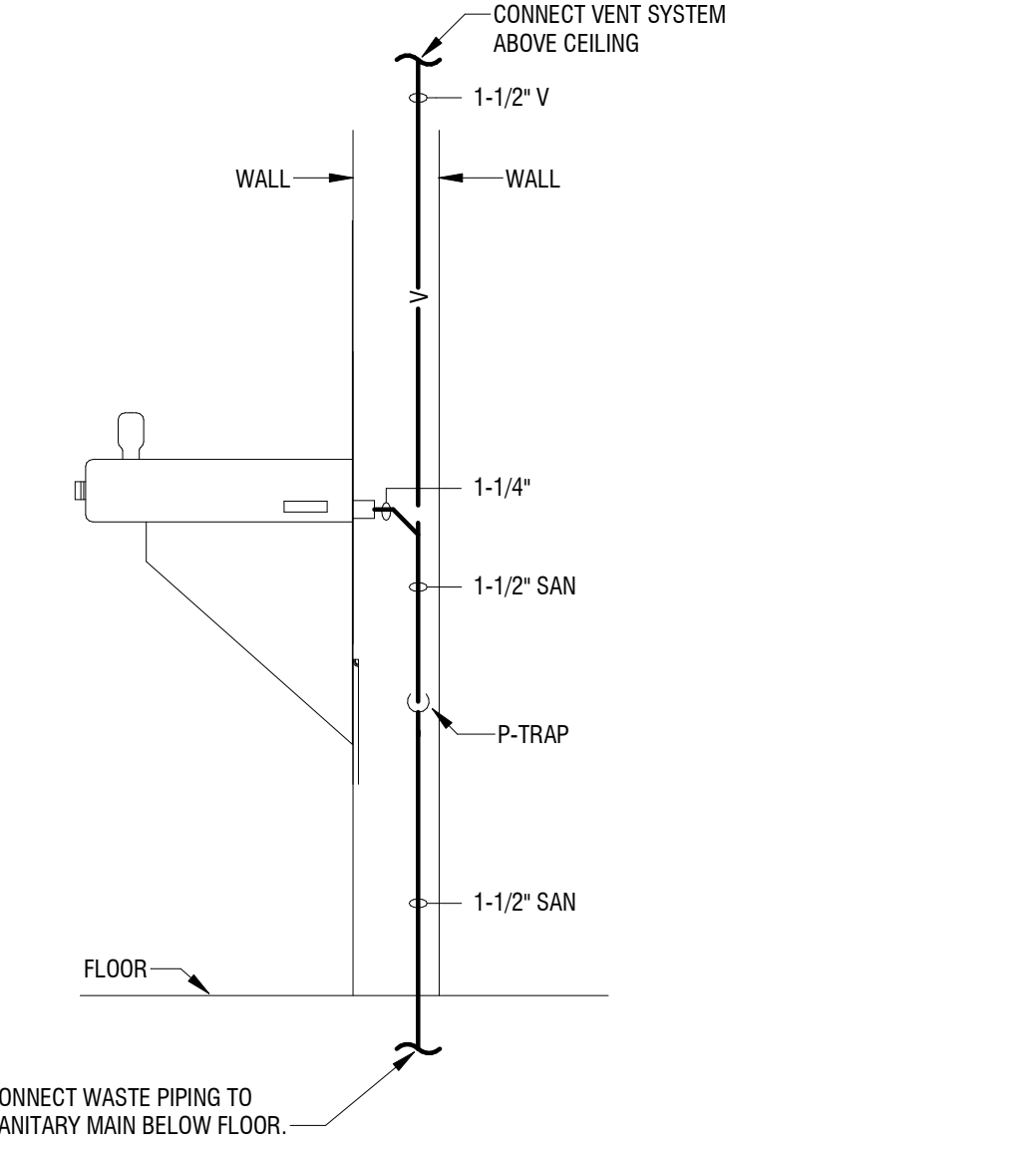
9 PLB - ELECTRIC WATER HEATER DETAIL - WALL MOUNTED
P2501 NOT TO SCALE



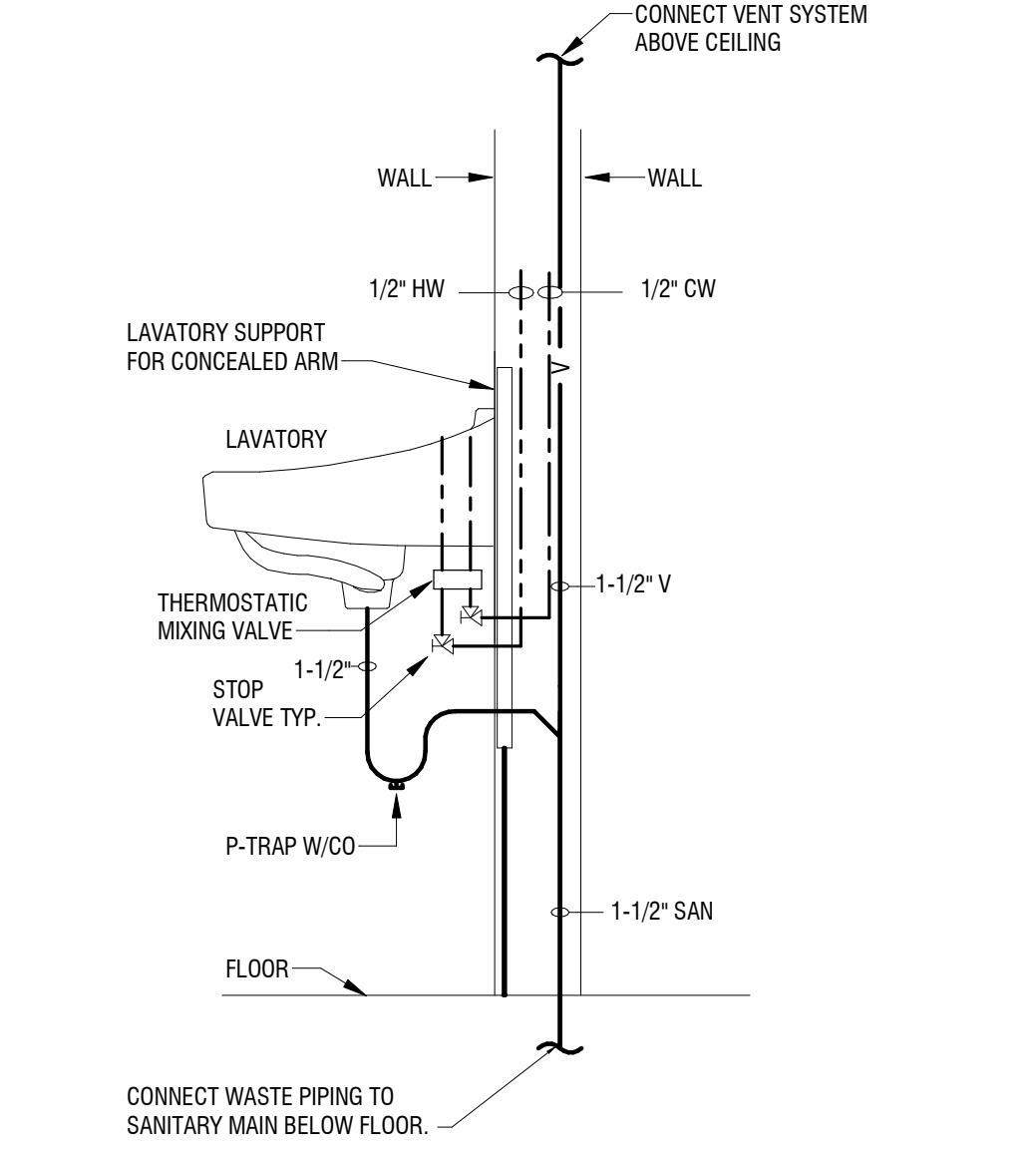
8 PLB - EXTERIOR/FOUNDATION WALL SLEEVE DETAIL
P2501 NOT TO SCALE



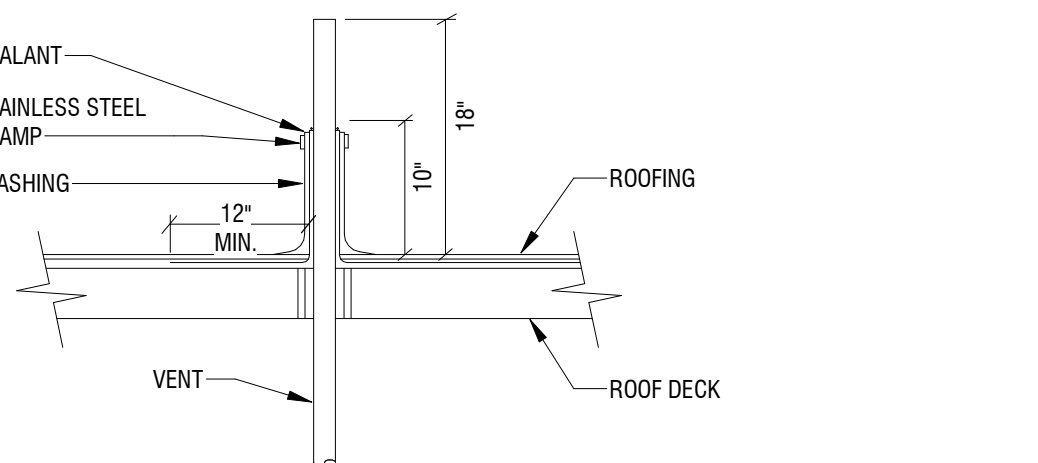
7 PLB - FD - FLOOR DRAIN DETAIL
P2501 NOT TO SCALE



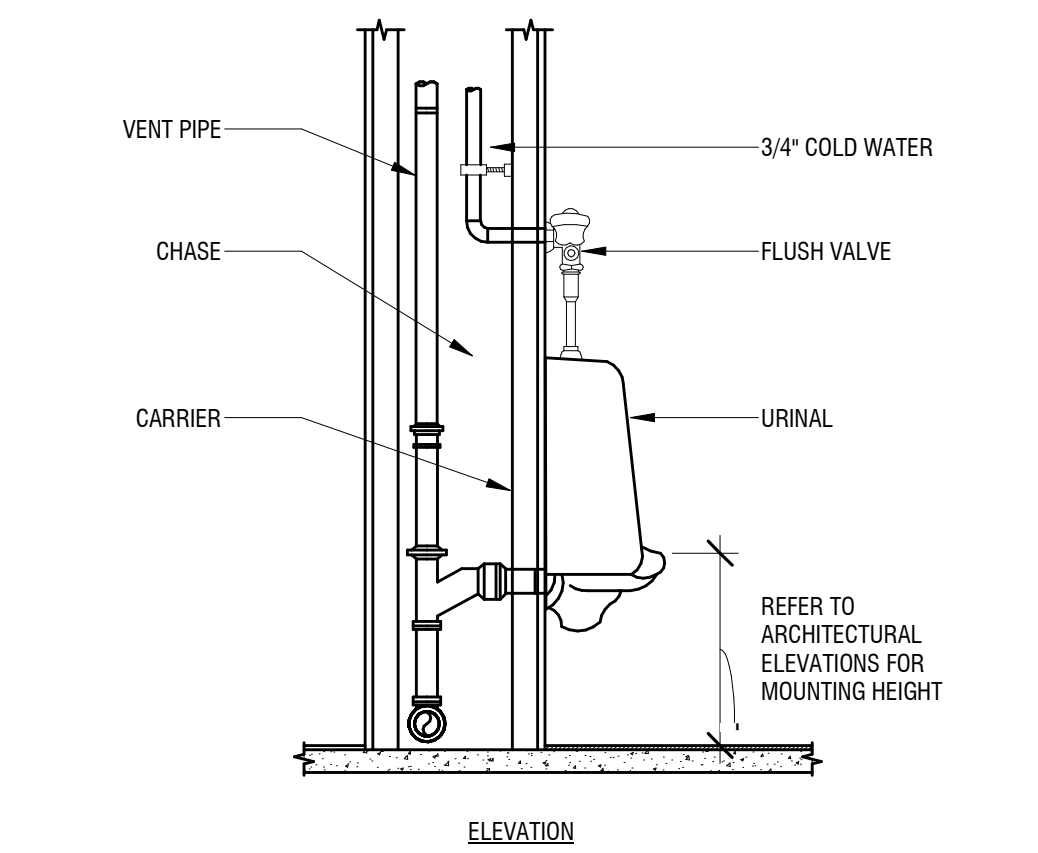
6 PLB - DRINKING FOUNTAIN DETAIL
P2501 NOT TO SCALE



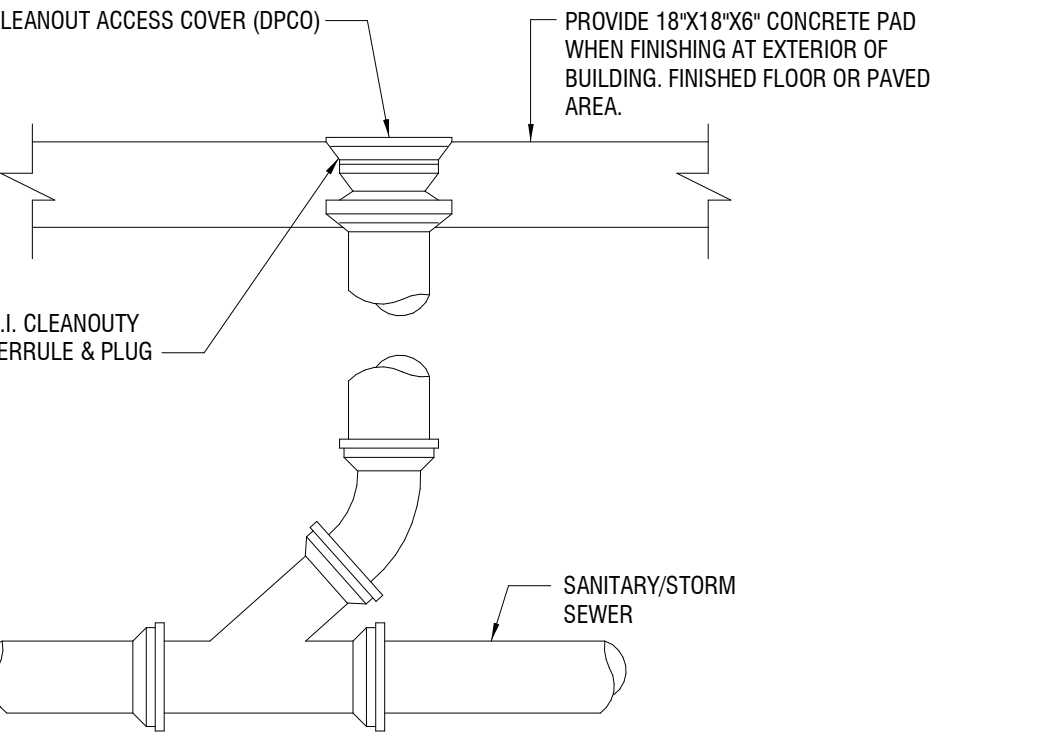
5 PLB - LAV - W/ HW & CW SUPPLY DETAIL
P2501 NOT TO SCALE



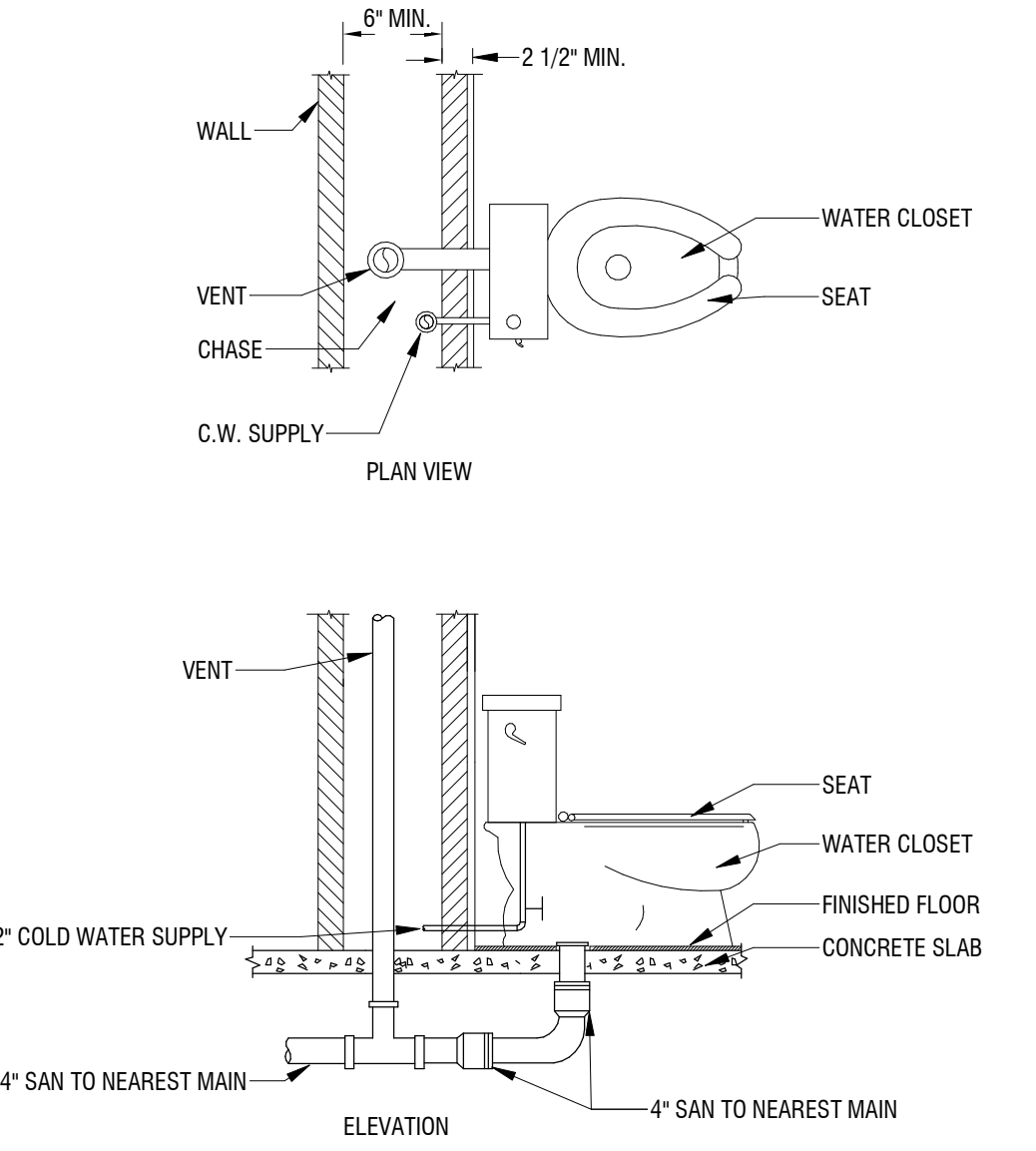
4 PLB - VENT THROUGH ROOF
P2501 NOT TO SCALE



3 PLB - URINAL - WALL HUNG URINAL DETAIL
P2501 NOT TO SCALE

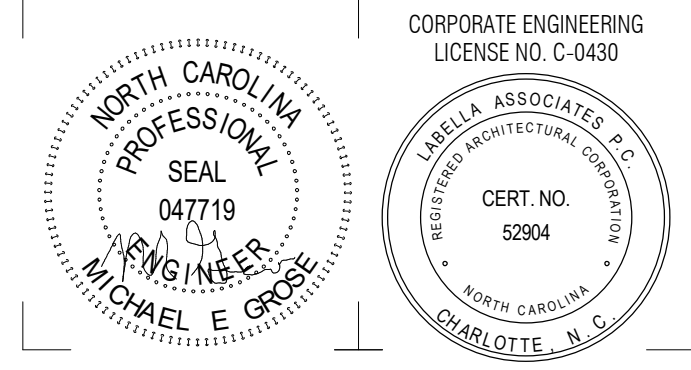


2 PLB - CO - DECKPLATE CLEANOUT
P2501 NOT TO SCALE



1 PLB - WATER CLOSET - FLR MTD- TANK DETAIL
P2501 NOT TO SCALE

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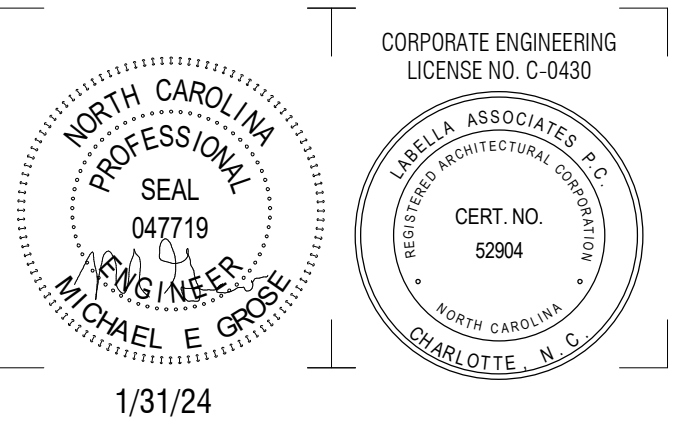
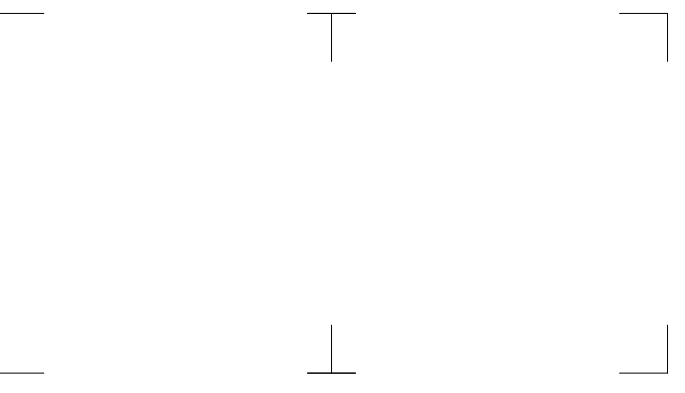
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Revisions:
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DRAWN BY: MG / MM
REVIEWED BY: MG
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DATE: 1/31/24

OFFICE & MAINTENANCE PLUMBING SCHEDULES AND DETAILS

DRAWING NUMBER:

P2501



1/31/24

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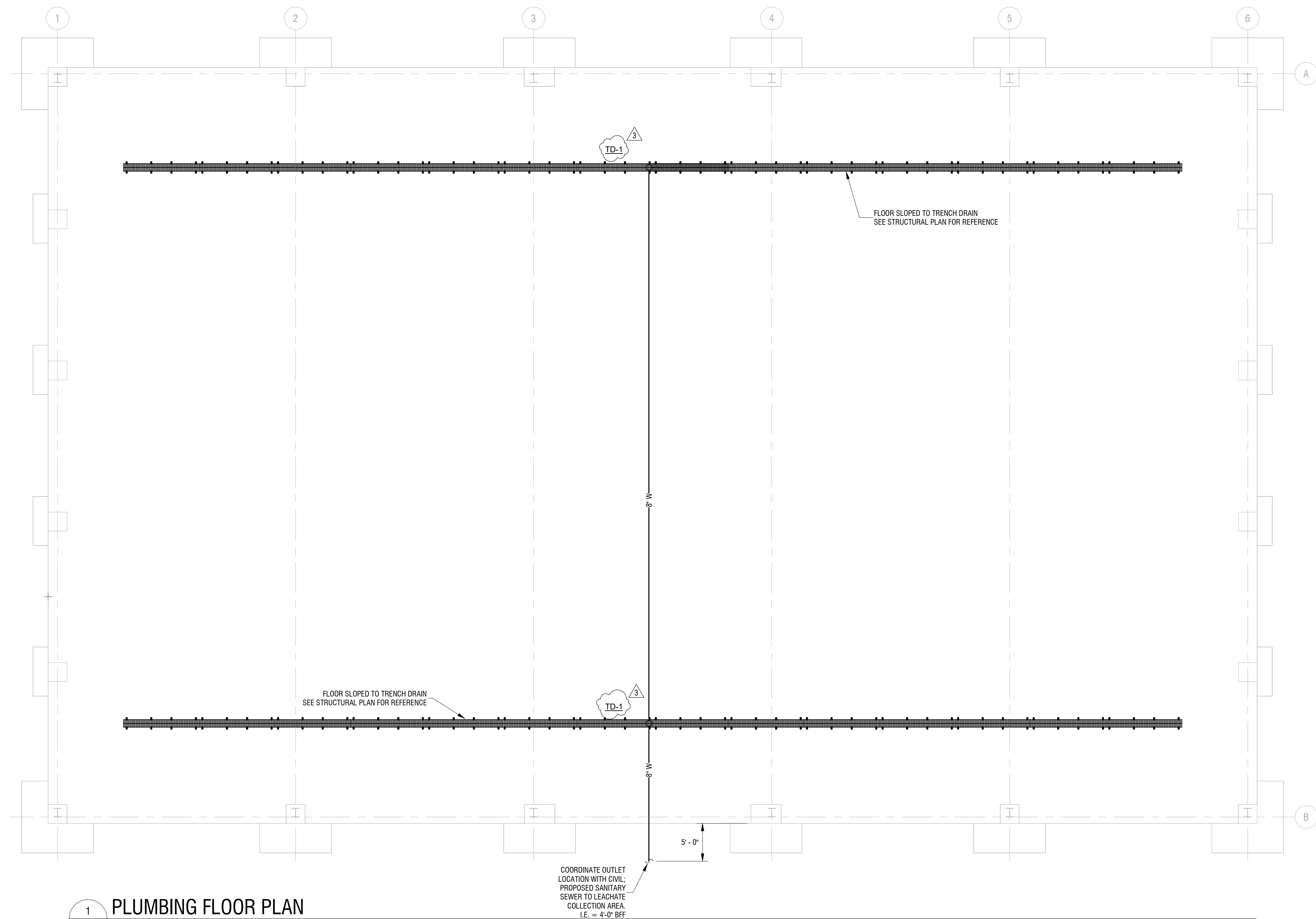
DATE: 1/31/24

DRAWING NAME:

**CANOPY STORAGE
PLUMBING PLAN**

DRAWING NUMBER:

P3201



1 PLUMBING FLOOR PLAN
P3201 1/8" = 1'-0"

